Climate Change Damage and International Law

Prevention Duties and State Responsibility

Roda Verheyen

Martinus Nijhoff Publishers

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Prevention Duties and State Responsibility

by

Roda Verheyen

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ABBREVIATIONS

a.a.	amongst others
AGBM	Ad hoc Group on the Berlin Mandate
AGCM	Atmosphere General Circulation Models
AJIL	American Journal of International Law
AOGCM	Coupled Atmosphere-Ocean General Circulation Models
AOSIS	Alliance of Small Island States
AVR	Archiv des Völkerrechts
BGHZ	Bundesgerichtshof Zivilsachen – Reports of the German High Court civil law branch
C_2F_6	Hexafluoroethane
CAN	Climate Action Network
CBA	Cost-Benefit Analysis
CBD	UN Convention on Biological Diversity (1992)
CCD	UN Convention to Combat Desertification (1994)
CDM	Clean Development Mechanism
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (USA)
cf.	confer
CF_4	Tetrafluoromethane
CFCs	Chlorofluorocarbons
CH_4	Methane
CHP	Combined heat and power
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973)
CJIL	Commonwealth Journal of International Law
CLC	Convention on Civil Liability for Oil Pollution
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CO	Carbon monoxide
CO_2	Carbon dioxide
COP	Conference of the Parties
DASR	ILC Draft Articles on Responsibility of States for internationally wrongful acts (adopted 2001)
EB	Executive Board
EEZ	Exclusive Economic Zone
EIT	countries that are undergoing the process of transition to a market econ
EJIL	European Journal of International Law

ELR	Environmental Law Reporter
ENSO	El Niño-Southern Oscillation
ETS	European Treaty Series
f.i.	for instance
FCCC	UN Framework Convention on Climate Change (1992)
GDP	Gross domestic product
GEF	Global Environmental Facility
Gg	Gigagrams (109 grams)
GWP	global warming potential
HCFCs	Hydrochlorofluorocarbons
HFCs	Hydrofluorocarbons
ICJ	International Court of Justice
ICJ Rep.	Reports of the International Court of Justice
ICLQ	International and Comparative Law Quarterly
IDR	in-depth review
ILA	International Law Association
ILC	International Law Commission
ILM	International Legal Materials
INC	Intergovernmental Negotiation Committee for the FCCC
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution and Prevention Control
ITLOS	International Tribunal for the Law of the Sea
JI	Joint Implementation
KP	Kyoto Protocol
LDC	Least Developed Country
MMTCE	Million Metric Tonnes of Carbon Equivalent
MoU	Memorandum of Understanding
N_2O	Nitrous oxide
NILR	Netherlands International Law Review
NMVOCs	Non-methane volatile organic compounds
NOx	Nitrogen oxides
NuR	Natur und Recht
NYIL	Netherlands Yearbook of International Law
OECD	Organisation for Economic Co-operation and Development
OGCM	Ocean General Circulation Model
OJ	Official Journal of the European Community
PCIJ	Permanent International Court of Justice
PFCs	Perfluorocarbons
ppm	Parts per million per volume
QUELRO	Quantitative emission limitation and reduction objectives/obligations
RCM	Regional Climate Model

RdC	Receuil des Cours
RECIEL	Review of European and International Environmental Law
RIAA	Reports of International Arbitral Awards
SAR	Second Assessment Report
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SF_6	Sulphur hexafluoride
SPA	South Pacific Forum
SRES	Special Report on Emission Scenarios
STAP	Scientific and Technical Advisory Panel
t/C	tonnes of carbon
TAR	Third Assessment Report
UN Doc.	United Nations Document (no.)
UN ECE	United Nations Economic Commission for Europe
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNGA	United Nations General Assembly
UNGA Res.	United Nations General Assembly Resolution
UNTS	United Nations Treaty Series
VCLT	Vienna Convention on the Law of Treaties (1969)
VOCs	Volatile organic compounds
WBGU	Wissenschaftlicher Beirat Globale Umweltveränderungen/German Advisory Council on Global Change
WCED	(UN) World Commission on Environment and Development
WCP	World Climate Programme
WCRP	World Climate Research Programme
WHO	World Health Organisation
WMO	World Meteorological Organisation
YBIEL	Yearbook of International Environmental Law
ZaÖRV	Zeitschrift für ausländisches öffentliches Recht und Völkerrecht
ZUR	Zeitschrift für Umweltrecht

FOREWORD AND ACKNOWLEDGEMENTS

During my time as a climate change campaigner we invented the slogan "Face up to Climate Change!" which featured on buttons, sand bags which formed a dyke at an important international climate conference (COP6 in the Hague), T-Shirts and umbrellas. I still think this slogan should be stuck on every wall. Working on this book has made me realise again just how fragile the system we call climate is – and just how quickly we are destroying a balance which we barely understand.

While this is a legal analysis – a book on international law – I cannot and do not want to hide the fact that I am biased. I firmly believe that preventing climate change damage, especially injury to those most vulnerable (including ecosystems world-wide) is a *moral* obligation. I also believe that spelling out the *legal* responsibilities of States will help us become more conscious of what we are doing to the planet. We cannot continue depleting the world's fossil fuel resources as if there is no tomorrow – in the literal sense. I hope therefore that this book not only enriches the legal debate but that the ideas enshrined in it will also provide food for thought for those with decision-making power.

This book has been a steady component of my life for the past four years. I wish to thank many – especially:

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I thank Kai, not only for existing and living with me, but specifically for his patience and support – I can only recommend being married to a non-lawyer who is always up for general and theoretical discussions of justice and common sense.

This book is dedicated to my little daughter Flora and her generation.

Roda Verheyen, April 2005

Chapter One

CLIMATE CHANGE DAMAGE IN INTERNATIONAL LAW – OVERVIEW

> *"Humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war"*[1]

I. Introduction

Climate change is a relatively well-researched issue, both scientifically (even though much remains to be researched) and legally. However, "climate change law", as it might be defined, has primarily dealt with defining and specifying obligations with regard to the reduction of greenhouse gases, and instruments to achieve such reductions on the international and national level. A good example of this has been the extensive debate on emissions trading[2] and the regulation of energy efficiency standards – both domestically and internationally. To date, legal scholars for the most part have put aside the issue of damages due to climate change, i.e. the legal implications of the impacts of climate change to countries and their populations. It is this gap in the analysis which this thesis intends to explore. Accordingly, the analysis attempts to answer one paramount question: How does international law regulate damages arising from climate change? Does it 1) provide sufficient protection to States; 2) sufficiently prevent climate change damage; and 3) does it provide a basis for action should such damage occur? This thesis begins with an analysis of the current status of international law (excluding the field of human rights)[3] with respect to damages caused by climate

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1 The changing atmosphere: Implications for global security – Conference Statement, Toronto, Canada, June 27-30, 1988, reprinted in 5 American University Journal for Int'l Law & Policy (1990) 515.

2 See the Directive of the European Parliament and of the Council 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, OJ L 275, 32.

3 While human rights law is certainly an area of international law, in contrast to public international law generally, it represents minimum standards of protection for human beings instead of regulating relations between their home States or countries of citizenship. In terms of the impacts of climate change, it is well imaginable that human rights could be affected if states fail to address the issue in

change, leaving considerations of how the issue might be dealt with politically in the future to Chapter VI.[4]

The thesis builds on the assumption that, while international law is sometimes regarded as a 'doubtful case' with regard to its legal character,[5] it in fact provides many rules guiding and limiting State behaviour, and through State obligations also that of private individuals, and thus also covers the issue of damages associated with climate change. Due to the global nature of the climate change phenomenon, international law can be regarded as the natural starting point for an analysis of climate change damages – even though the impacts of climate change might also have profound legal implications on a domestic law level.

Another assumption underlying this thesis is the conviction of the author that States (and their peoples) which emit greenhouse gases, thereby supporting and expanding economies built on fossil fuels, are responsible for protecting the climate system for future generations, as well as the lives and livelihoods of those potentially most at risk from the results of climate change, and that international law must and does respond to this (moral) duty. This thesis is consciously written from the perspective of the victims, be they poor communities in developing countries, ecosystems or whole geographical regions.

This brief Chapter is intended to provide an overview of the flow of the analysis, as well to present some facts and terms that are well placed in this overarching, rather than in the theme-specific Chapters. The structural choice of norm categorisation which serves as the methodological foundation of this work is explained below (II), followed by some remarks about the International Law Commission (III), and finally an overview of the six following Chapters (IV).

II. Categories of Rules

International rules for the protection of the environment and the prevention of damage due to environmental phenomena can be split into several categories. One way of categorising rules would be by addressee (the State, private entities, individuals). More to the point, however, is probably a categorisation by type of obligation or

---

a timely manner. However, this thesis focuses on relations between States and thus on the core field of public international law. For a human rights perspective on environmental pollution of all kinds see Boyle/Anderson, Human Rights Approaches to Environmental Protection, Oxford 1996 and for a specific perspective on the implicatuions of climate change on human rights: Goldberg/Wagner, Human Rights Litigation to Peoples of the Arctic, 2/1 Oil, Gas and Energy Law Intelligence (2004).

4 Please note that this thesis incorporates developments in law and climate policy up to and including March 2005.

5 Hart, The concept of law, 1994, 3.

quality, i.e. do the rules impose substantive obligations, procedural obligations, obligations to transpose certain rules into national legislation, or are they rules that influence behaviour directly or indirectly?

In recent decades, international environmental law, and treaty law in particular, has focussed on rules that are meant to influence State conduct to prevent environmental degradation and/or damages caused by environmental phenomena ("primary rules").[6] However, international law also provides for rules on another level, i.e. those rules that stipulate the consequences of unlawful behaviour, irrespective (theoretically) of what exactly lawful behaviour entails ("secondary rules"). For the most part they are rules applicable after the damage has been done or, rather, a breach of an existing international obligation has occurred. These rules have, historically in international law, been captured by the "State Responsibility" doctrine.

Modern international law also provides rules for holding private persons directly accountable and establishes the jurisdiction of an international court[7] – but international criminal law is not the topic of this thesis. Neither are the various ways in which private individuals or entities could act in civil law frameworks under the guidance of international private law. There is of course, strictly speaking, also a third subset of rules, which sets the framework for enforcement of the legal consequences prescribed through secondary rules. These are the procedural rules of international courts, jurisdiction requirements, etc.[8]

This thesis is based on an understanding of international law as a set of interrelated subsystems comprised of primary and secondary rules. Chapters III and IV examine primary rules, while Chapter V uses these as a starting point for applying secondary rules to specific case studies of climate change damage. This structure of primary and secondary rules is familiar in domestic legal systems, e.g. for German tort and civil lawyers the violation of a primary rule is the first condition for a claim (the "haftungsbegründender Tatbestand"), while secondary norms determine under what conditions compensation or other remedies can be obtained (the "haftungsausfüllender Tatbestand"). The structure has been successfully advocated for at the level of international law by *Roberto Ago*, the second Special Rapporteur to the International Law Commission (ILC) on the issue of State Responsibility (see Chapter V). For him, responsibility was the emergence of new legal relations (therefore secondary) between a wrongdoer on the one hand and his victim on the other.[9] *Hart* took a similar direction by

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6 See for an overview the Buck/Verheyen, Umweltvölkerrecht, in: Koch (ed.) Umweltrecht, 2002, 1; Sands, Principles of international environmental law, 1995, 5.

7 The International Criminal Court (ICC), established by the Rome Statute of the International Criminal Court, 17 July 1998, which entered into force on 1st July 2002, for all documents see <http://www.un.org/law/icc/index.html>.

8 These were called "tertiary rules" by the ILC's Special Rapporteur Riphagen, 4th report, Yearbook ILC 1983-II-1, 3, UN Doc. A/CN.4/366, paras. 3-11.

9 Ago, 2nd report, (1970), UN Doc.A/CN.4/233 paras. 12-30. See Chapter V for details.

differentiating between primary rules which are concerned with actions and secondary rules which are concerned with the primary rules.[10]

Admittedly, much writing has been dedicated to this categorisation of rules of international law,[11] and while some criticism remains, the general structure has been accepted amongst scholars and in the jurisprudence of international tribunals. It is chosen therefore as the basis for the analysis undertaken in this thesis.

III. The International Law Commission

Chapters IV and V will draw heavily on pieces of work provided by the International Law Commission (ILC). In particular, the topics of "State Responsibility" and the "International Liability for Injurious Consequences for Acts not Prohibited by International Law" have served over the decades as a motor for debate about the legal consequences of State behaviour and the duty to prevent environmental damage. To appreciate the place of the ILC as well as its products (draft treaties, etc.) in international law, a few background notes are in order, best presented here, in a non-thematic context:

As is well known, apart from the restrictive right to pass binding resolutions in the Security Council, the UN does not have any formal legislative powers and thus cannot enact binding rules of international law. Yet, the countries involved in drafting the UN Charter after the Second World War wanted to entrust the UN system at least with some recommendatory powers regarding international law. Accordingly, Article 13.1 of the UN Charter provides:

> The General Assembly shall initiate studies and make recommendations for the purpose of: a) encouraging the progressive development of international law and its codification. . . .

In 1947, the General Assembly established a preliminary Committee to implement this task,[12] and at its second session, it established the ILC and approved its Statute[13] which lays down the objective of the ILC:

> . . . to promote and progressively develop international law and its codification (Article 1.1).

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10 Hart, The concept of law, 94. Naturally, his theory is more sophisticated as it differentiates between several categories of secondary rules: rules of recognition, rules of change, rules of adjudication – which include sanctions to enforce the primary rules.

11 See e.g. Combacau/Alland, "Primary" and "Secondary" Rules in the Law of State Responsibility: Categorizing International Obligations, 16 NYIL (1985) 81; Simma, Grundfragen der Staatenverantwortlichkeit in der Arbeit der International Law Commission, 24 AVR (1986) 357, 362 f.

12 UNGA Res. 94(I), "Committee on the Progressive Development of International Law and its Codification".

13 UNGA Res. 174(II), the text of the Statute of the International Law Commission can be obtained from <http://www.un.org/law/ilc/texts/statufra.htm>.

Article 15 of the ILC Statute defines this task further as the

> preparation of draft conventions on subjects which have not yet been regulated by international law or in regard to which the law has not yet been sufficiently developed in the practice of States and
>
> the more precise formulation and systematisation of rules of international law in fields where there already has been extensive State practice, precedent and doctrine.

In 1953, the General Assembly gave the ILC the mandate to codify the Law of State Responsibility,[14] i.e. to codify the legal consequences of an internationally wrongful act by a State. This mandate was fulfilled in August 2001 with the adoption of the Draft Articles on Responsibility of States for Internationally Wrongful Acts, which form the basis of the analysis in Chapter V on State Responsibility.

In 1963, the ILC noted that the scope of its work on the Law on State Responsibility could also cover damages due to special (risky) activities that are legal under international law, i.e. instances where no direct breach of obligation occurs but nevertheless damage may arise; and in 1977 the UN General Assembly assigned the ILC with the task of developing the topic of "International liability for injurious consequences arising out of acts not prohibited by international law".[15] The Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, which constitute part of this topic and were adopted in 2001 form part of the analysis in Chapter IV.

The ILC's deliberations have been commented on by many legal scholars, and have been the impetus for many official opinions of States on elements of international law. The resulting reports, drafts and other documents therefore serve as a tool for discerning the status of law, both in terms of State practice, or *opinio iuris*, and the opinions of scholars (See Article 38 ICJ Statute, listing the sources of international law). It is for this reason the ILC material is used extensively in this thesis.

IV. Overview

This thesis is divided into roughly three parts: a scientific overview (Chapter II), the *status quo* in international law (Chapters III-V), and a discussion of how the law could be developed to respond to the gaps identified (Chapter VI).

To start with, **Chapter II** presents the problem – climate change and resulting damage or risk of damage to human beings and the environment alike. It discusses State

14 UNGA Res. 799(VIII), 7 December 1953.
15 UNGA Res. 32/151, 19 December 1977.

contributions to the phenomenon as well as the expected impacts on States and regions. It is this Chapter which establishes the differences between (i) climate change mitigation; (ii) adaptation to the impacts of climate change; and (iii) residual damage. Once explained and established, these three aspects of climate change are dealt with throughout the remainder of this thesis. As will be seen, mitigation, i.e. the reduction of greenhouse gas emissions and the enhancement of carbon sinks, is an indirect way of preventing climate change damage. To conduct adaptation measures means to directly prevent damage. Residual damage is what cannot be prevented regardless, and the victims of such damage might seek compensation. Chapter II also explores the relationship between the scientific facts and the legal framework of climate change, discussing the importance of scientific statements from bodies such as the Intergovernmental Panel on Climate Change (IPCC), the uncertainties inherent in any assessments or projections of climate change, and the relevant data on contributions to the problem, i.e. emissions of greenhouse gases.

Chapter III presents the international climate change regime's approach to damages caused by climate change. How do the UN Framework Convention on Climate Change (FCCC)[16] and the Kyoto Protocol (KP) deal with concrete damage? How do they enable or oblige countries and regions to take measures to prevent such damage? What are the precise mitigation obligations and how can they be applied to distinct damage? To what extent can financial claims for adapting to the impacts of climate change or for any residual damage be made through the climate regime?

To answer these and other questions, Chapter III begins with a thorough analysis of the negotiation history of the FCCC, with the special aim of discerning state opinion, practice, and intention regarding the issue of damages resulting from the impacts of climate change. It then moves on to an analysis of the provisions of this treaty as adopted in 1992, focussing again on rules pertinent to preventing or minimizing climate change and on clues as to how residual damage might be tackled. Because of the specificity of this focus, the analysis differs substantially from the existing publications on the FCCC.

The KP then is briefly presented and certain elements (the Clean Development Mechanism and the Adaptation Fund; compliance with Kyoto targets) are discussed in more depth.

Since the impacts of climate change and thus any resulting damages may depend less on the letter of the law, and more on the level of its implementation, special effort has been made to analyse the level of implementation of the FCCC (as well as

16 In all Chapters of this thesis, official documents and material from the climate regime will be used and cited. These documents (starting FCCC/. . .; AGBM/. . .; INC/ . . .) can be obtained from the official website: <http://www.unfccc.int>.

the KP which only recently entered into force). Because such analysis is difficult, especially with regard to practice regarding adaptation to the impacts of climate change, a separate assessment is undertaken in the last part of Chapter III, both with regard to the real measures taken by countries to adapt and the financial obligations assumed by industrialised countries to pay for such measures in developing countries.

Chapter IV examines to what extent international law rules and principles outside the international climate regime are applicable to the issue of damages arising from climate change. Based on the question posed above ("How does international law regulate climate change damage?"), this Chapter could explore all types of rules that have any bearing on climate change, i.e. including treaties on energy use, forest practices, etc. However, this being beyond the scope of this thesis, Chapter IV concentrates specifically on international law rules which relate directly to the impacts and any attendant damages of, climate change.

Chapter IV, thus begins by showing that – even though a functioning international legal regime exists for climate change – general rules of international law as well as other treaties are applicable to the issue of climate change damage. The "self-contained-regime" theory used by the ICJ is analysed, but the possibility of an exclusive application of the rules described in Chapter III is dismissed.

The Chapter then moves on to explore the significance of the customary law no-harm-rule as a primary rule aiming at the minimization and prevention of climate change damage, and discusses how this rule could be applied to climate change damage in practice. This analysis draws heavily on international jurisprudence as well as the discussions of the ILC in the framework of the codification project "International liability for injurious acts not prohibited by international law". On this basis, it attempts to define and refine the relevant legal elements of the no-harm rule as applied to climate change damage.

Subsequently, the Chapter studies some pertinent treaties such as the UN Convention on the Law of the Sea (UNCLOS) as well as various nature protection and biodiversity treaties. The objective of this analysis is not only to discern primary rules aimed at preventing and minimizing climate change damage, but also to reveal yardsticks for States in the implementation of Article 2 of the FCCC, which captures the duty to prevent "dangerous interference with the climate system". Finally, this Chapter points out how the aims and practical application those treaties might be frustrated by the impacts of climate change over the medium- and longer term.

Chapter V turns to the secondary rules of international law and explores whether state responsibility exists or will exist for climate change damage, resulting both in an obligation to undertake or finance the prevention of direct damage through adaptation and an obligation to provide compensation for any residual damage.

It has been argued that *"state responsibility alone is not likely to be an adequate remedy for global warming since, in several ways, state responsibility does not respond to the complex scientific and political issues at stake"*.[17] However, based on the primary rules identified in Chapters III and IV, an overview of the different elements of the law on State responsibility shows that it can be applied to instances damage resulting from climate change. The argument is based both on an assessment of the roots of the concept of state responsibility and the ILC's Draft Articles on State Responsibility adopted in 2001, and adheres to the general structure of state responsibility.

Legal consequences will arise if an internationally wrongful act has been committed. Such an act must constitute a breach of an international obligation and be attributable to a State. Another state can then demand cessation, i.e. the reinstatement of lawful behaviour, and/or reparation, including compensation if the wrongful act has caused an injury. Legal consequences will not arise if the culprit State can draw on exemptions from wrongfulness. These elements are discussed in the first part of Chapter V, with a special focus on how they could be applied to climate change damage. A core issue here, as well as in the second part of this Chapter is the issue of causation, i.e. the problem of demonstrating a causal link between certain (human) behaviour and a specific event (injury).

Having established the general principles and with the help of three case studies, the second part of Chapter V goes deeper into the law as well as into the science of climate change to answer whether state responsibility could provide the basis for a claim of reparation. The case studies consider the following potential claims (i) Nepal and Bhutan for damages resulting from increased glacial melting and the ensuing dangers arising from glacial outburst floods; (ii) the Cook Islands for damages due to the risks of sea level rise to coastal lands and the ensuing decreases in property prices; and (iii) China for financial support on the payment of insurance premiums to insure infrastructure at risk from extreme precipitation events and flooding.

Chapter VI summarises the key findings of the previous chapters. It draws on the gaps and problems identified in the previous Chapters with their general conclusion that the current system of primary and secondary norms in international law does not efficiently regulate damages resulting from climate change, their prevention and compensation, nor required restoration. It builds on three assumptions, or rather facts: One, it is unavoidable that some degree of climate change damage will occur; two, most of the damage will occur in countries that are already poor and have contributed little to the anthropogenic greenhouse effect to date; and three, to avoid much greater levels of damage, mitigation activities must be extended and sustained beyond the level currently negotiated (described in Chapter III) as soon as possible.

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17 Nanda, International Environmental Law and Policy, 1995, 247.

But beyond summarising, Chapter VI is an attempt to provide an outlook for countries and people facing climate change damage. Various questions are discussed and some answered: How could the international community help to hedge risks? Should a scheme for tackling climate change damage be negotiated and is it realistic that countries might opt for such a solution? Could a compensation fund for residual damage be installed as part of the international climate regime? How can countries continue to be motivated to prevent climate change damage (through adaptation and mitigation) rather than just allow it happen? Might insurance instruments provide a way to share risks internationally? And how do the different types of damage and risk affect such solutions?

Various possible approaches, elements and criteria for a legally and morally sound solution to the issue of climate change damage are discussed, providing a preliminary basis for developing international law in the future.

Having thus set the scene conceptually, Chapter II will now set the scene scientifically for the ensuing legal analysis.

Chapter Two

CLIMATE CHANGE AND DAMAGE – THE PROBLEM

> *"Decision makers must realise that there are legitimate reasons to believe in the apocalypse, and there is a chance that we may still be headed for the disaster"*[1]

I. Introduction

To form a basis for the ensuing legal discussion, this chapter provides a brief overview of climate change and its impacts on human and natural systems. This will include a presentation of the scientific basis of the climate system, the human activities and other factors influencing it, and a summary of the changes to the climate system which are defined in this thesis as climate change damage or injury. The information in this Chapter is based mainly on the Third Assessment reports of the IPCC, the Intergovernmental Panel on Climate Change (see below III). While setting out clearly the graveness of the problem, the analysis also reveals that uncertainty will always remain an embedded problem when discussing climate change damage – be it in factual or legal terms. In the course of this description, types of changes and injuries are defined so that they may be applied to legal definitions in the following Chapters. For the reader's benefit, important terms that will be used and referred to in the following chapter are set in **bold**.

The remainder of the Chapter will discuss the contributions of States to the problem of climate change in the form of greenhouse gas emissions. Several methods of determining "responsibility" are presented (see below IV) which will play an important role in Chapter V when determining state responsibility for climate change damage.

In summary, this Chapter provides ample evidence that climate change is no longer an abstract problem but one that will heavily affect human and natural systems as well as inter-state relations. This is the essential basis on which the following Chapters and this entire thesis build.

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1 Balling, The Heated Debate – Greenhouse Predictions Versus Climate Reality, 134.

II. Climate, Weather and the Greenhouse Effect

1. The climate and climate change

The global climate ties together the atmosphere, oceans, land surface as well as animal and plant ecosystems.[2] In the most aggregate of terms, "climate" may be defined as "the organized summary over time of the planetary land, atmosphere and water system".[3] It is mainly driven by the energy provided by the sun (radiation). The solar energy that does not reflect off clouds and snow is absorbed by the atmosphere and the Earth's surface. As the surface warms, it sends infrared radiation, or heat, back towards space.

To fully understand climate change and the implications of the anthropogenic greenhouse effect, it is important to distinguish between "climate" and "weather". The weather is the fluctuating state of the atmosphere around us, characterised by temperature, wind, precipitation, clouds, etc. Climate refers to the average weather in terms of the mean and its variability over a certain time-span in a certain area.[4] Thus, a multitude of extreme weather events or patterns can indicate a change in the climate system. This system is dynamic and has changed substantially in the history of the Earth.[5] These changes are captured by the phrase climate variability. **Climate variability** refers to variations in the mean state and other statistics of the climate on all temporal and spatial scales. It can be due to natural internal processes (such as solar activity), anthropogenic influences or "forcing".[6] Changes caused by forcing of the climate system could result, for example from aerosol derived from volcanic eruptions, but climate variability can also occur without any external forcing like the "El Niño"[7] phenomenon.

For the purpose of this thesis, it is essential to distinguish between natural climate variability and changes due to human behaviour, as regulated by the UN Framework

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2 See report to the Nation on Our Changing Planet: The Climate System, taken from the web site of the US National Oceanic and Atmospheric Administration, April 2002, <http://www.ogp.noaa.gov>.

3 Coughlan, Climate Trends and Variability, in: Jäger/Ferguson, Climate Change: Science, Impacts and Policy: The Proceedings of the second World Climate Conference, 1991, 71.

4 IPCC TAR WG I, 87, see note 59.

5 For example, in the Cretaceous period about 100 million years ago, mean temperatures were about 10°C warmer than they are today, and because water was not locked up in major ice sheets near the poles, sea levels swelled. These warm conditions resulted in part from extra carbon dioxide (CO_2) that accumulated in the atmosphere because of widespread volcanic activity. Then, about 100 million years ago the Earth's climate began to cool, culminating over the past two million years in a series of repeated ice ages, where average surface temperature was approximately 5ºC below that of today.

6 IPCC TAR WG I, 789, see note 59.

7 El Niño-Southern Oscillation (ENSO). "El Niño" is a highly irregular climate pattern that results when the Pacific Ocean teams up with the global atmosphere to cause widespread changes in weather.

Convention on Climate Change (FCCC).[8] Article 1.2 FCCC defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods". The Intergovernmental Panel on Climate Change (IPCC) on the other hand defines it as a variation in "either the mean state of the climate or in its variability, persisting for an extended period, typically decades or longer",[9] i.e. the IPPC uses the terms climate variability and climate change almost interchangeably. In this thesis, the term **"climate change"** will be used to connote the human influence in climatic changes, while "climate variability" or "natural climate change" is used to indicate that natural forces are responsible for any observed or predicted changes. Sometimes, "climate change" will be characterised as "anthropogenic" to re-inforce the difference between natural and human-induced forcing more clearly. This use of terms is essential as legal obligations and responsibility can only attach to human behaviour. But, as this short introduction highlights, to detect a human influence, it is necessary to identify the anthropogenic "signal" against the background "noise" of natural climate variability.[10]

2. The Greenhouse Effect – causes and agents

As stated before, the climate is mainly driven by the energy provided by the sun in the form of solar radiation. About one third of this energy is absorbed by the atmosphere, oceans, land and biosphere, the rest is reflected back into space. The natural greenhouse effect is caused by atmospheric greenhouse gases such as water vapour,[11] carbon dioxide (CO_2), nitrous oxide (N_2O) methane (CH_4), ozone (O_3) and chlorofluorocarbons (CFCs)[12] which effectively act as a blanket that traps radiation (heat) and prevents most of the thermal radiation from entering outerspace – like in a greenhouse. Without these gases and their heat trapping abilities, the Earth would be about 34°C colder than it currently is – it would be a "frozen wasteland".[13] The natural greenhouse effect increases the mean temperature on Earth to a life sustaining 14°C.

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8 See Chapter III for references.

9 IPCC TAR WG I, 788, see note 59.

10 Jepma/Munasinghe, Climate change policy: facts, issues, and analyses, 1998, 12.

11 Contrary to popular belief, water vapour is the most important greenhouse gas (largest greenhouse effect) and not CO_2. However, its concentration in the troposphere is determined by the climate system itself and not affected by human sources. It is important to note that water vapour will increase with global warming and thus enhance the greenhouse effect further.

12 These greenhouse gases form only a small fraction of the atmosphere, which consists primarily (99%) of oxygen and nitrogen. Neither of these gases can trap radiation.

13 See note 2.

Increases in the concentration of greenhouse gases in the atmosphere lead to less radiation entering outerspace, which gradually increases the temperature of the lower atmosphere and the Earth's surface ("global warming"). In scientific terms, the net radiative balance at the top of the atmosphere is changed which leads to **radiative forcing**[14] of the atmosphere. Increased greenhouse gas concentrations result in positive radiative forcing while additional cooling of the Earth, for example through an increase in aerosols, would be described as negative radiative forcing. Any radiative forcing will alter the surface and ocean temperatures and affect weather patterns and the entire hydrological cycle. As can be seen in table II.1, concentrations of greenhouse gases have increased dramatically since pre-industrial times.

Table II.1 Summary of key greenhouse gases[15]

Parameter	**CO2**	**CH4**	**N20**	**CFC-11**	**CFC-12**	**SF6**
Late glacial	195	0,35	0.244	0	0	0
Pre-industrial (1750-1800)	280	0,84	0,285	0	0	0
1990 levels	353	1,72	0.310	280 pptv	484 pptv	
1998 levels	365	1,75	0,314	268 pptv	538 pptv	4,2 pptv
Relative radiative forcing*	1	27	210	12400	15800	22.220
Atmospheric lifetime (years)	5-200	12	114	45	130	50.000
Rate of concentration change	0.4%/yr	0.6%/yr	0.25%/yr	0% /yr[1]	0%/yr[1]	0,24 ppt/yr

All data in ppm = parts per million per volume.[16] *ppbv = parts per billion by volume (billion =10^9). pptv = parts per trillion by volume (trillion = 10^{12})*

** direct warming effect relative to one unit of CO_2; 1: These substances are controlled by the Montreal Protocol and are being phased out.*

For example, atmospheric concentrations of the most important greenhouse gas CO_2 have increased by more than 30% from pre-industrial times (~1750). The main anthro-

14 The IPCC defines radiative forcing as "a measure of the influence a factor has in altering the balance of incoming and outgoing energy in the Earth-Atmosphere system and is an index of the importance of the factor as a potential climate change mechanism. It is expressed in Watts per square metre (Wm^2)", IPCC TAR, WG-I, 5, see note 59.

15 IPCC First Assessment Report, 20 (note 52), IPCC Second Assessment Report, 15 (note 56), IPCC TAR WG I, Table 1, 38 (note 59).

16 Parts per million volume. Over 99% of the volume of the "dry" atmosphere is made up of the permanent constituents Nitrogen (N), Oxygen (O_2) and Argon (Ar), but they are of little importance for the Earth's climate.

pogenic sources are fossil fuel combustion[17] and land conversion, e.g. deforestation. For the ensuing legal analysis, it important to note that it is impossible to trace a particular CO_2 unit until it reaches the atmosphere because carbon (C) is exchanged constantly between atmosphere, oceans and terrestrial biosphere in the **global carbon cycle.** The carbon might be taken up by the ocean or biosphere and never reach the atmosphere, depending on levels of saturation. Yet, because CO_2 has a lifetime of 5-200 years, past emissions continue to influence the radiative balance for centuries to come. Methane (CH_4) has a much shorter atmospheric life time than CO_2 (12-17 years) but a greater warming effect and its concentrations in the atmosphere have doubled since pre-industrial times. Sources of methane are fossil fuel production and combustion, waste disposal, and agriculture. Nitrous oxide (N_2O) concentrations have risen by 15%, the main sources being agriculture and industry. Halocarbons (the so *c*alled "F" gases)[18] are also significant greenhouse gases, mainly because of their long atmospheric lifetimes. They are emitted in industrial processes such as the production of adiptic and nitric acid, nitrogen fertilizer and aluminium.[19]

In this thesis greenhouse gas emissions will be discussed generally, but often the focus will be on CO_2 or carbon, as the main greenhouse gas or greenhouse gas component.

Ozone (O_3) is also an important greenhouse gas present both in the troposphere (air mass from the ground up to 10-16 km) and the stratosphere (the area above the troposphere, up to 50 km above ground). Even though the depletion of the ozone layer and the enhanced greenhouse effect are different phenomena, there are important links between the two. The concentration of both stratospheric and tropospheric ozone is changing due to human activities. Tropospheric ozone has a warming effect, while decreases in stratospheric ozone (in particular the "ozone-hole" over Antarctica) have a slight cooling effect.[20] Recent research shows that global warming could indirectly support the chemical reactions that destroy the ozone layer.[21] Greenhouse gases, while heating up the lower atmosphere might substantially cool the stratosphere, which enhances the ozone depleting effects of chemicals such as CFCs.[22]

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17 85% of human energy consumption originates from fossil fuels, Hoffert, Climate Sensitivity, Climate Feedbacks and Policy Implications, 1998, 35.

18 Hydrofluorcarbons HFCs, perfluorcarbons PFCs and sulphur hexafluoride SF_6.

19 See FCCC/AGBM/1996/2, p. 10. All FCCC/ documents can be obtained at the website <http://unfccc.int>.

20 According to the IPCC TAR, the depletion of the stratospheric ozone layer has caused a negative radiative forcing of – 15 Wm^2. The magnitude of negative forcing will be reduced as the ozone layer recovers (hopefully) over the 21st century, TAR WG I, 4 (note 59).

21 WMO Antarctic Ozone Bulletin #5/2000, Issued on 5 October 2000 (Dr Michael H. Proffitt).

22 The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer controls chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) – synthetic compounds which deplete the ozone layer and are also greenhouse gases. Hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) are used as

Non-human related phenomena also have an influence on the greenhouse effect. For example, by reflecting solar radiation away from Earth, some clouds cool the planet, while others trap heat near the surface. Overall, recent research has shown that clouds have a powerful cooling effect on the Earth. Moreover, aerosols (particles resulting from sulphur dioxide emissions emitted mainly by power stations, and by the smoke from deforestation, the burning of crop wastes but also by volcano activities) also play an important role in the development of radiative forcing. Aerosol particles block sunlight directly thus scattering it back into space but also encourage the formation of clouds.[23] Predictions of the impacts of aerosols on future climate are highly uncertain but are now mostly included in climate change scenarios. Moreover, atmospheric concentrations of greenhouse gases can be influenced significantly by so-called **natural feedback** effects. These are reactions of the natural environment to a warmer world and the associated implications for the greenhouse effect. For example, in terrestrial ecosystems, higher temperatures could increase respiration at a faster rate than photosynthesis and thus increase carbon dioxide emissions. Also, warmer oceans could lead to a diminished uptake of carbon. The feedback is positive if it amplifies a warming or cooling trend, it is negative if it diminishes the same warming or cooling trend.[24]

At the beginning of the 21st century, there is little doubt that human activities alter the climate system and that emissions of greenhouse gases amplify the natural greenhouse effect. The Earth is today 0.6°C warmer than it was 1900, and indeed, 2002, 2001 and 1998 were the top three warmest years on record since recorded measurement began in 1860.[25] The IPCC's 2001 Third Assessment Report clearly attests to a warming trend due to increased greenhouse gas concentrations and an enhanced greenhouse effect, and attributes part of the last 50 years of observed warming to human activities. Recent studies also point out that natural forces such as volcanic activity or solar variability cannot offset these anthropogenic activities and that natural factors cannot explain the anomalous warming.[26] Moreover, scientists agree that the dominant cause of climate change over the 21st century will be changes in

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replacements for CFCs and HCFCs in some applications, as they do not deplete the ozone layer. However, as they are greenhouse gases, HFCs and PFCs are covered by the FCCC and are also included in the six greenhouse gases subject to emission targets under the Kyoto Protocol. See Chapter III for detail and Decision 17/CP.5 in FCCC/CP/1999/6/Add.1 (available at <http://unfccc.int>).

23 See UNFCCC, Climate Change Information Sheet 3, and IPCC TAR WG-I, 5 (note 59). While sulphate, biomass burning aerosols and fossil fuel organic carbon have negative forcing effects, fossil fuel black carbon ("Ruß") is now known to contribute to global warming (positive forcing effect). See further O'Andrae, The dark side of aerosols, 409 Nature (2000) 671.

24 Hoffert, Climate Sensitivity, Climate Feedbacks and Policy Implications in: Confronting Climate Change, 34. For an overview of possible feedbacks see also Mendelsohn/Rosenberg, Framework for Integrated Assessments of Global Warming Impacts, 28 Climatic Change (1994) 15 at 22.

25 US National Oceanographic and Atmospheric Administration, The State of the Climate, 2003, see <http://www.gcrio.org>.

26 See most recently Mann et al., EOS (American Geophysical Union), issue 8 July 2003, <http://www.agu.org/pubs/eos>.

atmospheric trace-gas concentrations – and thus human, not natural factors.[27] The next section will explain how scientists arrive at such findings and gives some overview of the expected impacts of climate change.

III. Modern Climate Science

Climate science is a mixture of many disciplines, such as geography, physics, oceanography, etc. The pivotal organisation in climate science today is, as already mentioned, the IPCC. To understand how climate change is treated today by scientists and to adequately value the observations and predictions made by the IPCC for the ensuing legal discussion, it is necessary to understand what this institution is and how it works (1). What follows (2) is a description of the main findings and prevailing problems (uncertainties), as well as projected impacts of and damage due to climate change (3).

1. History of Climate Research and the Origins of the IPCC

The human influence on the climate system, potential impacts and **mitigation** strategies (i.e. strategies to reduce greenhouse gas emissions and enhance the storing capacity of terrestrial carbon sinks to halt increasing atmospheric greenhouse gas concentrations) have only recently become the focus of international research.[28] Even though the greenhouse effect and the possibility of man-made interference with the climate system was first suggested in 1827 by *Jean Baptiste Fourier* and subsequently by the Swedish scientist *Svante Arrhenius*,[29] it was only in the 1950s that global interest in the subject was revived. For the first time, monitoring data from Antarctica and Hawaii allowed for in-depth research in atmospheric greenhouse gas concentrations, and in the subsequent decades, the scientific community gathered enough knowledge to trigger an international discussion about global warming at the policy level.[30]

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27 Bertrand et al., Are natural climate forcings able to counteract the projected anthropogenic global warming? 55 Climatic Change (2002) 413 at 423.

28 Naturally, some scientific research on the effect of human activities on the climate was undertaken earlier on. See e.g. Bach, Man's impact on climate: Proceedings of an international conference, June 14-16, 1979.

29 See Arrhenius, On the influence of carbonic acid in the air upon the temperature of the ground, Philosophical Magazine, 41 (1896) 237 ff.; Aggrawala, Context and Early Origins of the Intergovernmental Panel on Climate Change, 53 Climatic Change 1998, 421 and Aggrawala, Early science-policy interactions in climate change: lessons from the Advisory Group on Greenhouse Gases, 9 Global Environmental Change (1999) 157.

30 See Manabe/Wetherald, Thermal equilibrium of the atmosphere with given distribution of relative humidity, 24 Journal of Atmospheric Sciences, (1967) 241, who estimated the overall effect of anthropogenic CO_2 on radiative forcing and climatic conditions.

Global warming was a topic of discussion at the first UN Conference on Human Development in Stockholm 1972 and the first World Climate Conference was convened in 1979 where the World Climate Programme (WCP) was launched. The WCP provided the basis for extensive research and scientific cooperation through workshops and conferences and is one of the predecessors of the IPCC.

Another landmark meeting for climate science was convened in 1985 in Villach, Austria by the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP). For the first time in history, an emerging scientific consensus on the question of man-made climate change was expressed. Climate change, the scientists concluded in Villach, must be considered "a plausible and serious possibility" and that, if current trends continued, "a rise in global mean temperature greater than any in man's history" could occur in the first half of the 21st century. They called on policy makers to "begin active collaboration to explore the effectiveness of alternative policies and adjustments" and suggested that these policies might be backed by a global convention.[31] On this basis, the second World Climate Conference in Toronto in 1988 (attended by policy makers and scientists) called on governments to reduce their emissions of CO_2 by 20% by 2005 compared to 1988 levels.[32]

Against this background, intergovernmental organisations and research institutions in the WCP and World Climate Research Programme (WCRP),[33] WMO and UNEP and key governments decided during the 1980s that further institutionalisation of climate research cooperation was needed to increase its efficiency.[34] Furthermore, the Brundtlandt Report of 1987 identified human-induced climate change as one of the major environmental threats of the future, calling on Governments to intensify cooperation to tackle the problem.[35] Thus, the Intergovernmental Panel on Climate Change (IPCC) was created to review and pool existing science on climate change. The first Plenary session was held in November 1988.

The IPCC operates in three working groups (WG): WGI assesses available scientific information and climate change projections; WGII assesses environmental and socio-economic impacts of climate change and vulnerability; and WGIII deals with cross-

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31 WMO, Report of the international conference on the assessment of the role of carbon dioxide and other greenhouse gases in climate variations and other associated impacts, 1986.

32 The changing atmosphere: Implications for global security – Conference Statement, Toronto, Canada, June 27-30 1988, reprinted in 5 American University Journal for Int'l Law & Policy (1990) 515.

33 This was established in 1980, under the joint sponsorship of International Council for Science (ICSU) and the WMO. See for a brief history and mission statement <http://www.wmo.ch>.

34 See in detail Aggrawala, note 29.

35 World Commission on Environment and Development, Our Common Future, Oxford 1987, Chapter 8, para. 19 ff. (28). The Commission had been established in 1983 by the UN General Assembly and its 1987 report formed the basis of the concept of "sustainable development". It was decisive for the accomplishments of the Earth Summit in 1992 (UN Conference on Environment and Development).

cutting issues such as climate change mitigation options.[36] The IPCC assesses existing science only and does not usually perform its own research. Therefore, scientists in public research institutions, universities, and private institutions play a major role in the development of climate science. One exception to this model are the **emission scenarios** developed and released by the IPCC. These scenarios are reflections of a likely future and are used for driving global circulation models to develop climate change scenarios for predictions of a future (warmer) world.

The IPCC is open to all UNEP and WMO Member countries (Principles Governing IPCC Work, Principle 7).[37] Important decisions are to be taken by the Panel Plenary (Principle 4), using "all best endeavours to reach consensus" (Principle 10). A double-layered review process ensures that all views (including those of governments) are taken into account before a chapter is submitted to the Plenary. The new Rules of Procedure, adopted in 1999[38] are important for the transparency of the system and the application of findings in practice. To some extent, the institutional structure of the IPCC was itself a major success for those worried about climate change.[39] The findings of the IPCC are of crucial significance to policy makers, the UN climate regime (see Chapter III), and, ultimately, to the individuals and legal entities faced with the realities of climate change. Governments endorse the reports, for example as decisions of the Conference of the Parties of the FCCC.

The legal significance of IPCC findings merits some thought since it could well be argued that IPCC findings cannot be refuted in a court of law:

The IPCC is an impartial scientific body, despite the fact that it was set up by (political) UN institutions.[40] Its impartiality has been the subject of many discussions, especially since the discussions in the Plenary sessions that lead to the adoption of text such as the important "Summary for Policy Makers" often resemble negotiation

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36 The working groups were set up in 1988, but rearranged in 1992. The former WGII and WGIII (response strategies) were merged into the WGII described and the current WGIII was created, see Skodvin, note 39, 138.

37 See note 40.

38 Appendix A to the Principles Governing IPCC Work, Procedures for the Preparation, Review, Acceptance, Adoption, Approval and Publication of IPCC Reports, adopted at the Fifteenth Session of the IPCC (San Jose, 15-18 April 1999). The June 1993 (9th Session) guidelines were replaced (note 40).

39 See Skodvin, Structure and Agent in the Scientific Diplomacy of Climate Change, 1999, 146 for implications regarding the IPCC's structure.

40 The IPCC's role is to "assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation. IPCC reports should be neutral with respect to policy, although they may need to deal objectively with scientific, technical and socio-economic factors relevant to the application of particular policies." Principles Governing IPCC Work, Approved at the Fourteenth Session (Vienna, 1-3 October 1998) on 1 October 1998, Principle 2. Available at <http://www.ipcc.ch>.

sessions led by diplomats.[41] Nevertheless, the IPCC is open to all scientists and governments. It reviews all peer reviewed literature/science, including scientific studies which doubt the existence of climate change or its impacts. As mentioned above, the IPCC does not produce its own science. It makes decisions by consensus. IPCC findings are endorsed by governments, and its conclusions represent the scientific underpinning of the FCCC and Kyoto Protocol. The double review procedure enables all relevant stakeholders to participate in the process, even if no primary science was produced by them. All governments may discuss and criticise aspects of the assessment reports – but eventually, a single text is approved. Taken together, these facts suggest that in the IPCC, a judge would have an official system of reference for the field of climate change science. In fact, this system of reference closely resembles an impartial court hearing of arguments with a subsequent "finding of truth", which in the case of the IPCC is the scientific truth about climate change. Thus, while these facts show at the very least that IPCC findings would be of very high evidentiary value in a court of law, the argument could be taken a step further by asserting that no court of law could possibly deviate from IPCC findings, since any expertise put before the court would never be as inclusive as that inherent in the IPCC.

Thus, even if a small minority of so-called "climate sceptics"[42] can still voice its often doubtful scientific opinions in the media, it would be difficult indeed in a court of law to rebut conclusions made by the IPCC with single pieces of science originating one of these sceptics.

2. Scientific findings and problems

The following section is an attempt to summarise the substantive knowledge about climate change and variability (Chapter I:III.2.a) and to outline possible climate change scenarios which will serve as the basis for potential damage estimates below. As a

41 Author's personal observation, see also note 39 with further references. The question as to whether the IPCC is actually impartial (i.e. equivalent to a court of law for scientific questions) is not strictly decisive in the legal context, as individual witnesses would be called on in legal cases in any case. Therefore, this discussion is not expanded here, even though it undoubtedly merits thought.

42 See in general on the so-called climate sceptics Ott/Oberthür, The Kyoto Protocol, 1999, 10 ff.; Gelbspan, The heat is on, 1997, 36 ff. and Balling, who presents both sides of the argument but heavily criticises the "apocalyptic popular vision" of the man-made greenhouse effect in: The Heated Debate – Greenhouse Predictions Versus Climate Reality, 1992, 149 ff. For an overview of the arguments of a prominent climate sceptic see Lindzen, Global Warming: The Origin and Nature of the Alleged Scientific Consensus, in: Regulation – The Cato Review of Business and Government, Vol. 15, No. 2 (1992), Singer, The Scientific Case Against the Global Climate Treaty, 1997; Michaels et al., The Way of Warming, Regulation Vol. 23, No. 3 (2000) and "The Climatesceptics Annual Report 2002", <http://personal.inet.fi/koti/hameranta/climate-msa2-03.htm>.

necessary starting point for this summary, scientific methods, climate models and the issue of uncertainty will be discussed in section (a).

a) *Uncertainty, Methods and Models*

As this analysis is set in a legal framework, one issue should be kept in mind from the outset: uncertainty. Uncertainty is a feature of climate science on several levels. One, as emissions monitoring involves estimates and aggregate observations, there is uncertainty or the possibility of inaccuracy on the level of determining anthropogenic contributions to the problem. Two, uncertainties prevail on the level of observations. By how much have sea levels risen in the 21st century? This question is only answerable if sufficient comparison data is available, for example tide gauge data. This is often not the case over longer periods of time. Uncertainties in observational data also make it difficult to trace particular damage and attribute it to climate change.

Two categories of uncertainty with even more importance are the uncertainty about the functioning of the climate system on the global level and the uncertainty about the specific regional and local impacts of climate change.[43]

In the first category, immense scientific progress has been made since the IPCC'S First Assessment Report was released in 1990. As outlined in the most recent IPCC report, the Third Assessment report (TAR), uncertainty about the global climate system is continually being reduced and with improved knowledge of the climate system scientists are able produce more accurate climate models and predictions – to the point where uncertainties could be deemed negligible in the legal sense (see below). Still, the accuracy of models will always depend on the quality of the data input and the accuracy of the assumptions made. Thus, uncertainties will never be eliminated completely.

By comparison, work on regional and local impacts has only just begun. And while it might be possible, with the right datasets and models, to predict and attribute regional impacts (snow-melt, regional temperature increase, etc.) to climate change, it may never be possible to relate specific weather events such as droughts and floods to climate change as such. This is due to the non-linearity of the climate system and the fact that even today, we cannot, with any degree of certainty, predict such extreme events for the future. This non-linearity coupled with the endemic uncertainty is diametrically opposed to the black-and-white approach often taken by the law:

Climate research today is mainly based on complex **models** which are reflections of the Earth's systems. Essentially, the goal of models is to create a representation of the physics governing the mass, momentum and energy flows and exchanges in the atmospheric system. Being run over long periods of time, they are able to predict the

43 See Penalver, Acts of God or Toxic Torts? Applying the Tort Principles to the Problem of Climate Change, 38 Natural Resources Journal (1998) 563 at 567.

climatic future (make projections) based on specific input (e.g. a certain emission scenario). Most models start at pre-industrial times (for example 1750 or 1890) and are therefore also a viable means of checking recorded observations against model runs and to detect which natural or anthropogenic forcings play a role in detected changes in climate.

Box II.1: Climate Models[44]

Atmosphere general circulation models (AGCMs), consist of a three-dimensional representation of the atmosphere coupled to the land surface and cryosphere. An AGCM is similar to a model used for numerical weather prediction (weather forecasting), but because it has to produce projections for decades or centuries rather than days it uses a coarser level of detail. The AGCM has to be provided with data for sea surface temperatures and sea-ice coverage. Hence an AGCM by itself cannot be used for climate prediction, because it cannot indicate how conditions over the ocean will change. AGCMs are useful for studying atmospheric processes, the variability of climate and its response to changes in sea-surface temperature.

Ocean general circulation models (OGCMs). An OGCM is the ocean counterpart of an AGCM; it is a three-dimensional representation of the ocean and sea-ice. OGCMs are useful by themselves for studying ocean circulation, interior processes and variability, but they depend on being supplied with data about surface air temperature and other atmospheric properties.

Carbon cycle models. The terrestrial carbon cycle is modelled within the land surface scheme of the AGCM, and the marine carbon cycle within the OGCM. The carbon cycle model is needed in order to capture several important climate feedbacks on carbon dioxide concentration, for instance fertilisation of plant growth by carbon dioxide and uptake or outgassing of carbon dioxide by the oceans.

Coupled atmosphere-ocean general circulation models (AOGCMs). These are the most complex models in use, consisting of an AGCM coupled to an OGCM. Some recent models include the biosphere, carbon cycle and atmospheric chemistry as well. AOGCMs can be used for the prediction and rate of change of future climate. They are also used to study the variability and physical processes of the coupled climate system. Global climate models typically have a resolution of a few hundred kilometres.

Regional climate models (RCMs). Local climate change is influenced greatly by local features such as mountains, which are not well represented in global models because of their coarse resolution. Models of higher resolution cannot practically be used for global simulation of long periods of time. To overcome this, regional climate models, with a higher resolution (typically 50 km) are constructed for limited areas and run for shorter periods (20 years or so).

44 Taken from an overview given by the Hadley Center, <http://www.met-office.gov.uk>.

A model's ability to predict the climatic future and the ensuing results depend heavily on the input provided, and today most heavily on the **emission scenario** chosen. Scenarios are images of the future, or alternative futures. They are neither predictions nor forecasts. Rather, each scenario is one alternative image of how the future might unfold. As such they enhance our understanding of how systems behave, evolve and interact. They are tools for scientific assessments and assist in climate change analysis, including climate modelling and the assessment of impacts, adaptation and mitigation.[45] Scenarios cover a wide range of the main driving forces of future emissions, from demographic to technological and economic developments. Scenarios also encompass different factors that might influence greenhouse gas sources and sinks, such as future structures of energy systems and land-use changes.

Models are complex but crude representations of reality and are far from perfect.[46] This is not only so with respect to their forecasting ability, but also with respect to their control function in respect of observed climate and forcings. Therefore, some attempts have been made to distinguish between natural climate variability and human induced climate change with the help of statistics rather than models. Statistical methods are familiar to courts and the law through medical and toxic torts trials and are well accepted. Where global circulation models fail, e.g. their inability to take into account the regional structure of climate variables, statistical research is meant to control and supplement the model results.

To this effect, a recent German statistical analysis study, taking into account observed climatic data and natural influences since 1899, has been able to attribute the influence of the (observed) enhanced greenhouse effect on surface temperatures with a very high statistical likelihood (since 1973 >99%).[47] This study also evaluated the contributions of the various causes for climatic changes, such as solar activity (4%) and volcanoes (6%) and concluded that the human influence on the enhanced greenhouse effect and thus on temperatures can be quantified as >60%.[48] Similarly, experts in "detection and attribution" of the human signal in climate change have stated that enhanced models, improved proxy data and statistical analyses today allow for rigorous attribution statements.[49] The recent past has seen enormous progress in the field of regional "detection and attribution". For example, scientists are now 99% certain

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45 Nakicenovic, Emission Scenarios, 2000, Technical Summary, para. 2.

46 See for a summary of models Balling, note 42, at 44 ff. Some have called the climate models "crystal balls" that provide an imperfect glimpse into the future.

47 See Grieser/Staeger/Schönwiese, Statistische Analysen zur Früherkennung globaler und regionaler Klimaänderungen aufgrund des anthropogenen Treibhauseffekts, UBA Forschungsbericht 297 41 132, Februar 2000.

48 Note 47, Tabelle 9.1, at 130.

49 International Ad-Hoc Detection and Attribution Group, Status Report: Detection and Atrribution of Anthropogenic Climate Signal, 25 Sept. 2002 (submitted to the Bulletin of the American Meterological Society) which states that scientists have become much more confident in their detection and attribution statements than only a few years ago.

that human-induced climate change more than doubled the risk of the 2003 European heatwave,[50] and various studies have been able to show human influence on regional temperature increases.[51]

The fact that such statistical evidence for a human contribution to 20th century warming exists and that regional attribution studies increasingly link human activities leading to climate change to regional changes strengthens the possibilities of applying legal theories of causation (and thus, liability of responsibility) to climate change damage – as will be done in Chapter V.

Having discussed the basis of climate science, a brief account is given of the findings and projections of the three IPCC Reports (1990, 1995 and 2001). The chronological display is chosen because the determination of when what was known with what degree of certainty is of importance in Chapters IV and V.

b) *IPCC First Assessment Report*

The IPCC's first assessment report was released in 1990. It concluded *inter alia* that[52]

- there is a natural greenhouse effect, which is being enhanced by man due to emissions of greenhouse gases;
- atmospheric concentrations of greenhouse gases are rising and mean temperatures increased by 0.3-0.6 °C during the 19th century, while sea levels have risen by 10-20 cm;
- even if all emissions of greenhouse gases were to be halted immediately, the greenhouse effect would remain enhanced for over a century as nature can eliminate it only very slowly;
- to stabilise concentrations of greenhouse gases at 1990 levels, emissions of CO_2 and other long-lived greenhouse gases must be reduced by more than 60% immediately.[53] Without any substantial reduction,[54] global mean temperatures could rise

50 Stott/Stone/Allen, Human contribution to the European Heatwave of 2003, (2004) Nature Vol. 432, S. 610 ff.

51 See Karoly/Braganza/Stott/et al., Detection of a Human Influence on North American Climate, (2003) SCIENCE Vol. 302, S. 1200.

52 Based on Houghton et al., Scientific Assessment of Climate change (WG I), 1990 and Tegart et al., Climate change: The IPCC impacts assessment, (WG II), 1990 (IPCC, First Assessment Report, 1990) and Bolin, The IPCC, in: Jäger/Ferguson, Climate Change: Science, Impacts and Policy: The Proceedings of the second World Climate Conference, 19 and Houghton, Scientific Assessment of climate change: summary of the IPCC Working Group I Report, in Jäger/Ferguson, ibid., 26.

53 The IPCC identified the following reduction requirements: CO_2: >60%, CH_4: 15-20%, N_2O: 70-80%, CFC-11: 70-75%, HCFC: 40-50%. These reductions would, based on emission scenarios used, stabilise concentrations of the gases in the atmosphere at 1990 levels.

54 This is based on the "business-as-usual scenario", assuming no major changes in energy production and consumption.

by 0.3°C per decade, leading to an increase of 1°C above present mean temperatures by 2025 and 3°C by 2100; and
– sea levels could rise on average by 6 cm per decade during the 21st century – leading to a sea level rise of 20 cm by 2030 and 65 cm by 2100.

These findings served as a warning signal to the international community. On the basis of their influence, 160 states signed up to the FCCC in Rio in 1992 (see Chapter III).[55]

b) *IPCC Second Assessment Report*

The Second Assessment Report (SAR) was published in 1995[56] and, based on many scientific studies published between 1990 and 1995, was able to conclude on observations, projections and likely impacts of climate change with much more certainty. Most importantly, the IPCC agreed to this statement: "the balance of evidence suggests a discernible human influence on the global climate". This was unprecedented, essentially concluding that it was more likely than not than human activities are altering the global climate. The other main conclusions were:

– global average temperature has increased by 0.3-0.6°C since the late 19th century;
– sea levels have risen by 10-25 cm in the same time period and much of that rise may be attributed to the increase in global temperature;
– global mean temperatures could rise by 2°C (1-3.5°C) by the end of the 21st century and this "will" lead to changes in sea levels, which could rise by 15-95 cm by 2100;
– to stabilize greenhouse gas concentration in the atmosphere, global CO_2 emissions must decline by 60% by 2050 (compared to 1990 levels);
– developing countries in the South will suffer most from the impacts of climate change;
– impacts of climate change could include coastal erosion, water scarcity, heat stress, increased frequency and severity of extreme events, change of forest ecosystems, melting of up to half of existing mountain glacier mass in the 21st century alone, increased desertification of semi-arid land areas, major negative crop yield impacts, etc.
– "no regrets" options to reduce greenhouse gas emissions are available in most countries ("no regrets" measures are measures that will be cost-neutral); and
– the potential risks and impacts of climate change justify action beyond "no regrets".

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55 The report's projections and conclusions were based on four basic climate change scenarios ranging from business-as-usual (Scenario A) to "best-case" (Scenario D) which presumed a reduction of global CO_2 emissions by 50% over 1985 levels until 2050. In 1992, the IPCC conducted a review of the 1st assessment report and developed six new emissions scenarios (IS92 a-f) which served as a basis for the SAR.

56 See Houghton, et al., Climate Change 1995 (WG I), Watson et al., Climate Change 1995 (WG II), Bruce et al. Climate Change 1995, (WG III).

Most of the studies looking at possible impacts were confined to "doubling CO_2" (~560 ppm concentrations) scenarios and disregarded any dynamic responses to increased greenhouse gas concentrations.

Since 1995, much research activity has focussed on the question of attribution and a better understanding of natural climate variability, the global carbon cycle as well as attempts to further refine impact predictions. Importantly, in 1998 the IPCC published a special report on the regional impacts of climate change, which further concretised the likely impacts of climate change in the various regions of the world.[57] Having realised that emission scenarios must be adapted to the state of the art science to provide a better basis for model runs and projections, the IPCC developed a new and more comprehensive set of emission scenarios in 2000, upon which predictions of the Third Assessment Report (TAR) (2001) are now based. The "Special Report on Emission Scenarios" (SRES) develops four alternative scenario "families" (A1, A2, B1 and B2) comprising 40 SRES scenarios subdivided into seven scenario groups. There is no single most likely, "central", or "best-guess" scenario, either with respect to SRES scenarios or to the underlying scenario literature. However, the scenarios cover such a broad range of likely developments that the ranges of impacts of climate change resulting from model runs with those scenarios are a good indication of the likely (warmer) future world.[58]

c) *IPCC Third Assessment Report*

The 2,776-page Third Assessment Report (TAR),[59] with its 2,500 authors and reviewers, was published in 2001. Its significance for a legal analysis of climate change damage is two-fold: (1) since the Second Assessment Report in 1995, there is new evidence, improved understanding and reduced uncertainty, supporting updated conclusions; and (2) for the first time, percentage confidence ranges have been assigned to almost all the key findings and projections (see Box II.2). This is important to a legal analysis

57 Watson et al., The regional impacts of climate change: an assessment of vulnerability, Special report of IPCC Working Group II., 1998.

58 No additional climate initiatives are included in the SRES scenarios (such as implementation of the Kyoto Protocol) but various changes have been assumed to occur that would require other interventions, such as those leading to reductions in sulphur emissions and significant penetration of new energy technologies. The driving forces behind scenario development are population growth, economic development and structural and technological change (which include predictions about the future energy mix, energy efficiency developments, etc.). See note 45.

59 Houghton et al., Climate Change 2001: The Scientific Basis, (WG I), Mc Carthy et al., Climate Change 2001: Impacts, Adaptation and Vulnerability, (WG II), Metz et al., Climate Change 2001: Mitigation (WG III). These reports will henceforth be cited as TAR WG (x), page no. See for a summary Pittock, What we know and what we don't know about climate change – reflections on the IPCC TAR, 53 Climatic Change (2002) 393.

because it indicates where evidence levels are high or low, i.e. in which cases changes and adverse effects can a) be proven to exist or to occur over time; and b) be caused by climate change. Unfortunately, the various Working Groups used different measures to indicate their confidence. These do not, however, vary much in substance, as can be seen in Box II.2:

Box II.2: IPCC confidence levels

TAR Working Group I[60]	TAR Working Group II[61]
– *virtually certain* (greater than 99% chance that a result is true);	*Very High* (95% confidence or higher)
– *very likely* (90-99% chance);	*High* (67-95%)
– *likely* (66-90% chance);	
– *medium likelihood* (33-66% chance);	*Medium* (33-67%)
– *unlikely* (10-33% chance);	*Low* (5-33%)
– *very unlikely* (1-10% chance);	*Very Low* (5% or less)
– *exceptionally unlikely* (less than 1% chance).	

Both the observations and predictions are more refined and detailed than those of the First and Second Report. Probably the most important statement for a legal analysis of climate change damage and human activities is this one: ". . . most of the [surface temperature] warming observed over the last 50 years is attributable to human activities".[62]

With regard to other observations on the climate of the 20th century the IPCC is:

– 90-99% confident that the global mean surface temperature increased by 0.6°C (–0.2°C), with most of the warming occurring in the periods 1910-1945 and 1976-2000, with land areas warming more than the oceans and with most of the warming observed over the last 50 years being attributable to human activities;
– 90-99% confident that global average sea level rose between 10 and 20 cm in the 20th century, and that 20th century-observed warming has contributed significantly to the observed sea level rise;

60 TAR WG I, 28.
61 TAR WG II, 24.
62 TAR WG I, 10. This finding as well as the authority of the IPCC has been confirmed recently by the World Climate Change Conference, Moscow, Russia, 29 Sept.-3 Oct. 2003: "The Intergovernmental Panel on Climate Change (IPCC) has provided the basis for much of our present understanding of knowledge in this field in its Third Assessment Report (TAR) in 2001. An overwhelming majority of the scientific community has accepted its general conclusions that climate change is occurring, is primarily a result of human emissions of greenhouse gases and aerosols, and that this represents a threat to people and ecosystems", see summary statement, 3rd October 2003.

- 90-99% confident that continental precipitation increased by 5-10% in the Northern Hemisphere, although decreased in some areas such as north and west Africa, and 66-90% confident that heavy precipitation events increased at mid- and high northern latitudes;
- 90-99% confident that the extent of snow cover has decreased by about 10% since the late 1960s, with a widespread retreat of mountain glaciers in non-polar regions;
- 67-95% confident that recent regional changes in temperature have had discernible impacts on many physical and biological systems such as: thawing of permafrost, later freezing and earlier break-up of ice on rivers and lakes, shifts in plant and animal ranges, declines in some plant and animal populations, and earlier emergence of insects;[63] and
- 67-95% confident that coasts are already experiencing relative sea-level rise, from a combination of subsidence and already-identified global sea-level rise.

For the 21st century, some of the IPCC's predictions (based on the SRES scenarios) are:

- From 1990 to 2100, globally-averaged surface temperature is projected to increase by 1.4 to 5.8°C – much more than the observed changes during the 20th century and (90-99% confident) without precedent during the last 10,000 years;
- Over the same period, global mean sea level is projected to rise by 9-88 cm, due primarily to thermal expansion and loss of mass from glaciers and ice caps.;
- Many small glaciers may disappear and the Greenland ice sheet will lose mass (67-95% confident);
- 95% confident that numerous Earth systems that sustain human societies will be impacted by changes in climate. Small island states are likely to be among the countries most seriously impacted.[64]

Extreme events could have even more catastrophic impacts on vulnerable communities and countries than the gradual changes such as temperature change and sea level rise. IPCC observations and projections on extreme weather and climate events are displayed in Table II.2:

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63 Since the release of the TAR, scientists have set out to estimate the implications of climate change for species around the world, with dramatic results. For example, Thomas, C./Cameron, A./et al. predict, based on a mid-range climate-warming scenario for 2050, that 15-37% of species in a region covering 20% of the Earth will be 'committed to extinction' (in: Extinction risk from climate change, NATURE, Vol. 427 (2004), 145).

64 See also Adger/Barnett, Climate Dangers and Atoll Countries, Tyndall Centre Working Paper No. 9, October 2001.

Table II.2 Estimates of confidence in observed and projected changes in extreme weather and climate events. (Source: IPCC, TAR WG I, 15 complemented by WG II results)

Confidence in observed changes (latter half of 20th century)	Changes in Phenomenon	Confidence in projected change (during 21st century)
Likely	Higher maximum temperatures and more hot days over nearly all land areas	Very likely, and 67-95% confident that this will result in increased incidence of death, serious illness in older age groups, increased risk of damage to crops, increased heat stress in livestock and wildlife, reduced energy supply reliability and a shift in tourist destinations
Very likely	Higher minimum temperatures, fewer cold days and frost days over nearly all land areas	Very likely, and 67-95% confident that this will extend the range and activity of some pest and disease vectors and increase the risk of damage to a number of other crops
Very likely	Reduced diurnal temperature range over most land areas	Very likely
Likely, over many areas	Increase of heat index over land areas	Very likely over most areas
Likely, over many Northern Hemisphere mid- to high latitude land areas	More intense precipitation events (for other areas, insufficient data or conflicting analyses)	Very likely, over most areas; and 67-95% confident that in some areas this will result in increased damage from floods, landslides, avalanches and mudslides, increased soil erosion and increased pressure on insurance systems and disaster relief
Likely in a few areas	Increased summer continental drying and associated risk of drought	Likely, over most mid-latitude continental interiors. (Lack of consistent projections in other areas)
Not observed in the few analyses available	Increase in tropical cyclone peak wind intensities	Likely, over some areas
Insufficient data for assessment	Increase in tropical cyclone mean and peak precipitation intensities	Likely, over some areas, and 67-95% confident that these changes will result in some areas in increased risk to human life and of infectious disease epidemics, increased

Table II.2 (*cont.*)

Confidence in observed changes (latter half of 20th century)	Changes in Phenomenon	Confidence in projected change (during 21st century)
		coastal erosion and damage to coastal buildings and infrastructure and increased damage to coral reefs and mangroves
Insufficient data for assessment	Summer continental drying and associated risk of drought over most mid-latitude ontinental areas	Likely over some areas; and 67-95% confident that this will result in decreases in crop yields, water resource quantity and quality, and increases in damage to building foundations and forest fire risk.

It should be noted that the left hand column does not display statistically tested observations, but indicates judgmental estimates of confidence of leading scientists in the field. As noted above, however, the increase in risk of these extreme events could be linked to human activities via "detection and attribution" studies.[65]

With respect to activities to halt or slow climate change, the TAR also contains important statements. For example, it predicts atmospheric levels of carbon dioxide (CO_2) in 2100 to be at 540-970 ppm. Stabilising concentrations at 650 ppm would require global emissions to drop below 1990 levels within a few decades, and stabilisation at 450 ppm would require global anthropogenic CO_2 emissions to drop below 1990 levels within a few decades and continue to decrease steadily thereafter. It also states that emissions of CO_2 due to the burning of fossil fuels will be the dominant influence on trends in atmospheric CO_2 concentrations during the 21st century and that the net effect of land and ocean climate feedbacks[66] (through reduced carbon uptake) will further increase atmospheric CO_2 concentrations.[67] This illustrates the urgency of employing measures to reduce emissions.

Yet, even after stabilisation is achieved, global temperature rise and sea level rise are projected to continue for hundreds of years due to the long timescales the deep

65 See as an example note 50.

66 The increased greenhouse effect and ensuing warming will result in an acceleration of respiration and decomposition, releasing more carbon into the atmosphere, for example from soils. The magnitude of this feedback is enormous: just the first meter of soil contains more carbon than all the world's forests (1400 Gt/C are tied up as organic detritus etc.).

67 The range of concentrations as indicated by the SRES scenarios plus uncertainties of up to 30% result in estimates of 490-1260 ppm by 2100, i.e. 75% to 350% above pre-industrial levels (280 ppm). Most studies concerning impacts of climate change assume a mere doubling of CO_2 concentrations.

oceans need to adjust to climate change: if heat is transported quickly into the lower layers of the oceans, climate change is slowed down, but sea levels rise more rapidly due to the increased expansion of water under great pressure.[68] As the ocean warms, the density of the water decreases and thus even at constant mass the volume of the ocean increases, leading to sea level rise. The storage capacity of the ocean means that there is a considerable delay before all the consequences of surface warming will be felt in the human environment.

It should be remembered that the TAR is a consensual document and the IPCC a consensual body. There are additional scientific views, some developed since publication of the TAR, that may go further in their prediction of future catastrophic and irreversible effects; but for this thesis, the important issue is that even on the basis of mainstream scientific opinion, a court of law would be unable to ignore climate change as a phenomenon along with its associated impacts. With the preparation of the underway (to be released 2007), it is likely that the new conclusions of the IPCC will become even more legally "utilizable".

3. Climate Change – Impacts and Damage

As already highlighted in the sections above, the IPCC predicts a range of impacts that could severely affect people and ecosystems worldwide. These studies are based mostly on average warming of 2°-4°C, which is what is expected for atmospheric concentrations of greenhouse gases at approximately 560 ppm.[69]

While the term **climate change impacts** is not defined in any legal instrument, Article 1.1 FCCC defines adverse effects of climate change as "changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience, or productivity of natural or managed ecosystems or on the operation of socio-economic systems or on human health and welfare".

It would be beyond the scope of this thesis to repeat the elaborate assessments of the likely impacts of climate change on a regional scale as undertaken by the IPCC Report on Regional Impacts in 1998 and the Report of WG II of the TAR. Yet, some additional discussion of physical impacts is warranted since the legal analysis in this thesis is shaped by them. This discussion is set out below in section (a). Then, on the basis of the information provided in section (a), terms important to the ensuing legal analysis, such as climate change damage, adaptation, and vulnerability are defined in section (b).

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68 TAR WG I, 643 f.
69 TAR WG II, 91.

a) *Physical Impacts*

As the IPCC points out, human health, ecological systems and socio-economic sectors such as hydrology, food and fibre production, and human settlements are sensitive to changes in climate. This sensitivity is not merely triggered by susceptibility to the magnitude and rate of climate change but also by changes in climate variability. Climate change is expected to change the hydrological cycle significantly; reduce biodiversity; increase the likelihood of desertification, coastal erosion and flooding; and change ocean circulation patterns, which will severely impact marine ecosystems and carbon storage capacity. WG II of the TAR predicts, for example:

- A general reduction of potential crop yields in most tropical and subtropical regions for almost any projected increases in temperature;
- A general reduction, with some variation, in potential crop yields in most regions in mid-latitudes for increases in annual-average temperature of more than a few °C;
- Decreased water availability for populations in many water-scarce regions, particularly in the subtropics;
- An increase in the number of people exposed to vector-borne (e.g. malaria) and water-borne (e.g. cholera) diseases and an increase in heat stress mortality;
- A widespread increase in the risk of flooding for many human settlements, especially those in small islands and low-lying deltas (e.g. tens of millions of inhabitants in settlements studied in Bangladesh) from both increased heavy precipitation events and sea level rise;
- For small island states, scientists are 67-95% confident that the projected sea level rise for the 21st century would cause increased coastal erosion, loss of land and property, dislocation of people, increased risk from storm surges, reduced resilience to coastal ecosystems, and saltwater intrusion into freshwater resources along with the high resource costs required to respond to and adapt to these changes; limited arable land and soil salinization makes agriculture in these areas highly vulnerable to climate change; coral reefs would be negatively affected by bleaching and reduced calcification due to increased CO_2 levels; and tourism would face severe disruption from climate change and sea-level rise.

Some of the expected beneficial impacts of climate change include increased potential crop yields in some regions, a potential increase in global timber supply from appropriately managed forests, increased water availability for populations in some water-scarce regions (e.g., in parts of Southeast Asia), reduced winter mortality in mid- and high latitudes due to less frost days and reduced energy demand for space heating due to higher winter temperatures.

Moreover, as mentioned above, the IPCC also concluded that recent regional climate changes, particularly temperature increases, have already had an impact on physical and biological systems. Examples of observed changes include the shrinkage of

glaciers, the thawing of permafrost,[70] later freezing and earlier break-up of ice on rivers and lakes, the lengthening of mid- to high latitude growing seasons, poleward and altitudinal shifts of plant and animal ranges, declines of some plant and animal populations, and earlier flowering of trees, emergence of insects, and egg-laying birds.

In aggregate terms, the impacts of climate change can have potentially disastrous effects on individual and regional economies. Economists have begun to estimate the monetised effects of climate change,[71] and while these estimates are riddled with uncertainties,[72] they provide another justification for assessing the legal implications of climate change damage.

For example, where temperatures rise globally by 2.5°C, the climate change impact is expected to cost India 4.9% and Africa 3.9% of their respective GDP. Other studies estimate that Europe (OECD) might benefit by approximately 3.7% of aggregate GDP due to increased agricultural yields.[73] Overall, the estimates could understate the true cost of climate change because they tend to ignore extreme weather events; underestimate the compounding effect of multiple stresses; and ignore the costs of transition and learning.

The unifying theme of all these studies, however different their results (see for two sample studies of this kind *Mendelsohn et al.*[74] and *Tol*)[75] is that developing countries will be hardest hit from the standpoint of their (already low) GDP. (This is a notable outcome since most of the studies examining observed changes in natural systems or assessing the likely economic impacts of climate change are actually undertaken for industrialised countries, in particular the US and Europe.) This conclusion

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70 25% of the land mass of the Northern Hemisphere is underlain by permafrost, the main permafrost areas being in Canada, China, Russia and Alaska. Very small changes in surface temperatures can produce significant changes in permafrost regions and ecosystems (TAR WG I, 127).

71 See the first attempt by Fankhauser, Valuing climate change: the economics of the greenhouse, 1995. See also Hohmeyer/Gaertner, The costs of climate change: a rough estimate of orders of magnitude, Report to the Commission of the European Communities, Directorate General XII, 1992.

72 And have doubtful moral implications, since they necessarily monetise values within existing (Western) value systems regardless of the specific implications these injuries might have on specific countries. This moral aspect is not germane to economic estimates of climate change damage. Often times regulatory decisions are based on cost-benefit analyses that place a monetary "value" on human lives, which may depend on factors such as the country he/she lives in and the level of eductation he/she has attained.

73 See a summary table of these studies in Tol/Verheyen, State responsibility and compensation for climate change damage: A legal and economic assessment, 32 Energy Policy (2004) 1109.

74 Mendelsohn et al., Country-specific Market Impacts of Climate Change, 45 Climatic Change (2000) 553; Mendelsohn et al., Framework for Integrated Assessments of Global Warming Impacts, 28 Climatic Change (1994) 15.

75 Tol, New Estimates of the Damage Costs of Climate Change, Part I: Benchmark Estimates, 21 (1), Environmental and Resource Economics (2002), 47 and Tol, New Estimates of the Damage Costs of Climate Change, Part II: Dynamic Estimates, 21 (1) Environmental and Resource Economics (2002) 135.

is shared by the IPCC when examining regional impacts and vulnerability.[76] The prediction that the impacts of climate change will affect developing countries more severely results both from the heightened effect of climate change on hyper-sensitive tropical regions and the vulnerability of developing country economies to changes in the natural world. Developing economies rely more heavily on climate-sensitive activities (in particular agriculture), and many already operate close to environmental and climatic tolerance levels (e.g., with respect to coastal and water resources).

b) *Impacts, Adaptation and Damage – Terminology*

Despite the general susceptibility of human and natural systems to climatic changes, it is necessary to understand that the actual impacts of climate change on human and natural systems or actual damage in a legal sense will mainly depend on the vulnerabilities of specific locales or regions and their ability to adapt to change.[77]

Vulnerability is defined as the extent to which a natural or social system is susceptible to sustaining damage from climate change. In other words, vulnerability is the function of the **sensitivity** of a system to changes in climate (the degree to which a system will respond to a change in climate), its **adaptive capacity** (the degree to which adjustments in practices, processes or structures can moderate or offset the potential for damage or take advantage of opportunities created by a given change in climate) and the degree of **exposure** of the system to climate hazards.[78] This formula is well known from traditional risk analysis, and is used, for example, by insurance companies to calculate their premiums based on the actual risk and values at stake. In such a context, vulnerability could also be defined as the degree of loss (from 0 to 100%) resulting from a potentially damaging phenomenon.[79]

Nature and human beings have always been vulnerable to weather and climate and have also always adapted to changes in climate variability, for example during El Nino phases.[80] Yet, climate change poses a new challenge to these coping strategies, both because of the expected pace of change and the commitment required by climatic changes despite mitigation efforts.

Adaptation or increasing adaptive capacity is therefore one response to climate change which differs from mitigation. Thus it is an important concept in the discussion of legally relevant climate change damage and risks. **Adaptation** in natural or human systems is a response to actual or expected climate stimuli or their effects,

76 TAR WG II, 8.

77 See Verheyen, Adaptation to the Impacts of Anthropogenic Climate Change – The International Legal Framework, 11 RECIEL (2002) 15 ff.

78 TAR WG II, 89 and TAR WG-II Box SPM.1, 6.

79 Downing et al., Introduction in: Downing/Olsthoorn/Tol: Climate, Change and Risk, 1999, 5.

80 See Worldbank et. al., Poverty and Climate Change, 2003, 14 ff.

which moderates harm or exploits beneficial opportunities. In this thesis adaptation refers to all those responses which may be used to reduce vulnerability, including measures that increase the adaptive capacity of communities or systems.

Adaptation is a very broad concept and can be used in a variety of ways. Adaptation to the (expected) negative impacts of climate change generally takes place in two ways: anticipatory (before impacts take place) and reactive (as a response to initial impacts). In natural systems adaptation is reactive by definition. In human systems adaptation can be both anticipatory and reactive and can be implemented by public and private actors.[81] In the negotiations leading to agreement of the FCCC, adaptation was also described as "all purposeful and deliberate activity taken in response to or in anticipation of the adverse impacts of rapid climate change" – specifically human responses as opposed to spontaneous adjustments made by natural systems.[82] Confusingly, the FCCC sometimes also refers to the mitigation of the adverse effects of climate change.

Measures to enhance adaptive capacity and adaptation measures, can take many different forms and take place both on a 'macro' and 'micro' level. To enable a system to prevent damage from climate change more effectively, improved housing and infrastructure, education, dissemination of information, and generally the eradication of poverty could prove very successful ('macro' level). On a 'micro' level adaptation measures might include increasing the height of sea walls, building irrigation systems to protect agriculture from salt water intrusion, or installing air-conditioning systems to avoid heat-related illness or death.[83]

While adaptation can significantly reduce vulnerability to climate change impacts, no level of adaptation will allow for a complete avoidance of impact from climate change. In other words, there is always potential for **residual damage**. Residual damage occurs when adaptation measures are not possible or are not carried out because of economic or technical constraints. It should be noted that at least under international law, States are not obliged to undertake all adaptation measures imaginable, but can themselves determine what is "adequate" (see Chapter III). Residual damage could thus occur to a greater extent in one country over another depending upon a determination of what constitutes adequateness.

With respect to any legal obligation to avoid residual damage there are therefore two possible responses: mitigation, i.e. tackling the problem at the source, which, with respect to any possible impacts could be called **indirect damage prevention;** and adaptation, which is directed much more at the prevention of a specific impact and could therefore be defined as **direct damage prevention**. These terms will be used

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81 See Klein, Adaptation to climate variability and change: What is optimal and appropriate? in: Giupponi/Schechter, Climate Change and the Mediterranean: Socio-Economics of Impacts, Vulnerability and Adaptation, 2002 and TAR WG II, 88 f.

82 INC – Synthesis Report of Adaptation, Note by the Secretariat, A/AC.237/68, 6 (11 August 1994).

83 See Verheyen, note 77.

throughout this thesis, since legal obligations apply both to mitigation and adaptation and both responses are relevant for preventing climate change damage.

Climate change damage is a broad term which encompasses both residual damage and the risk of such damage, which might lead to legal obligations to reduce that risk. It can therefore be used synonymously with the term **climate change impacts** or **injury**.[84] Whether a particular type of damage is covered by legal obligations and thus possibly recoverable as **damages** is a different matter and will be discussed in the ensuing Chapters.

IV. Human Emissions and their Contribution to Climate Change

Lastly, before turning to the legal analysis of climate change damage, some remarks about the human influence on climate change is warranted. The fact that human activities influence the atmospheric concentrations of the greenhouse gases which cause climate change has been established. This section provides an overview of the distribution of this influence based on the parameters of time and (country) source. The timing and source of greenhouse gas emissions as well as the behaviour of the emissions themselves is fundamental to the legal analysis, especially for the discussion of State Responsibility (Chapter V), but also for the discussion of primary norms aimed at preventing climate change damage (Chapter III and IV). To understand the nature of the human contribution to climate change, it must be placed in the context of time (the time factor) and the level of commitment to some degree of climate change which has already been made.

1. The Time-Factor

In assessing changes to the global climate, the IPCC uses the beginning industrialisation (1750) as a starting point since this is when people began using fossil fuels as an energy source on a large (industrial) scale. Many climate models begin with 1890. It is important to note, however, that releasing a Gigatonne of CO_2 in 1750 or even 1890 would not have the same effect on the global climate as releasing the same amount in the year 2000. Since the global carbon cycle has less capacity to soak up and store carbon today than it had 100 to 150 years ago, today's emissions of CO_2

84 **Risk** is the expected loss due to cessation of life, personal injury, property damage or disrupted economic activity resulting from a particular hazard for a given area and reference period. Based on mathematical calculations, risk is the product of hazard and vulnerability. Downing et al., Introduction in: Downing/Olsthoorn/Tol: Climate, Change and Risk, 5 f.

outweigh the earlier contributions in terms of their impact on radiative forcing and thus, climate change in the long term. Moreover, the fact that scientist assume lifetimes for specific greenhouse gases does not mean that these gases will not have an impact on the radiative balance of the atmosphere after their assumed lifetime (for CO_2 100-200 years, for CH_4 30-40 years) has expired. Rather, it must be assumed that of the CO_2 released today about 20-30% will still be in the atmosphere in 1,000 years. Accordingly, some attempts have been made to calculate the carbon stock resulting from certain levels of emissions over time, i.e. to calculate the rate of decay of CO_2.[85]

2. The Commitment to Climate Change

The issue of time also points to another important parameter when analysing the legal framework for tackling climate change damage: the level of commitment already made.

Due to the long lifetimes of greenhouse gases, humankind is already committed to a degree of climate change, probably in the range of 1°C warming[86] (along with any resulting damage) and has committed future generations to climate change as well. For example, several centuries after CO_2 emissions occur, about _ of the increase in CO_2 concentrations caused by these emissions will still be present in the atmosphere.[87] This is a heavy legacy to leave to future generations. In fact, due to past anthropogenic emissions of greenhouse gases, the commitment to change within the climate system is such that many climate change impacts are currently inevitable absent any actions taken to reduce vulnerability to these impacts.[88]

Moreover, even efforts to reduce emissions seem inadequate at the moment. For example, the Kyoto Protocol (discussed in Chapter III) with its target of 5% reduction of greenhouse gas emissions by industrialised countries relative to 1990 by 2012 is only likely to reduce warming in 2050 by $^1/_{20}$ of a degree Celsius. The following table II.3 shows that global temperature developments are relatively insensitive to emissions reductions in the short term. This is due to the described inertia in the climate system and the long life of most greenhouse gases. Most of the warming that is anticipated and taken up in the climate models is a result of emissions that have already occurred. Thus, emission reductions made today will only weaken the impacts of climate change over the very long term.

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85 See WRI Climate Indicators Tool, <http://www.wir.org>, last visited 12 June 2003.

86 See WBGU, Climate Protection Strategies for the 21st Century. Kyoto and Beyond, 2003.

87 TAR WG I SPM, p. 10.

88 Parry et al. Buenos Aires and Kyoto targets do little to reduce climate change impacts, 8/4 Global Environmental Change, (1998) 285.

Table II.3 – from Parry et al. 286, using IPCC 1997 models

Emission Scenario	Global Warming in °C expected by 2050 (relative to 1961-1990 temperature average)	Global Warming in °C expected by 2100 (relative to 1961-1990 temperature average)
unmitigated – business as usual	1.39	2.54
Kyoto	1.33	2.39
20% reduction industrialised countries	1.22	2.19
30% reduction industrialised countries	1.19	2.08
Kyoto Protocol + developing countries 1% GHG reduction/yr after 2020	1.24	1.79

This issue presents even more clearly what a major challenge climate change presents to all countries. It also clarifies that discussing climate change damage in a legal framework is necessary given the probability of residual damage and apparent inability to effectively prevent all such damage.

Historically, gross anthropogenic CO_2 emissions have increased at an average rate of about 1.7% per year since 1900. Should this historical trend continue, global emissions will double during the next three to four decades and increase more than six-fold by 2100.[89] Based on current trends, the total climatic impact of such rising greenhouse gas levels will be equal to that caused by a doubling of pre-industrial CO_2 concentrations by 2030, and a trebling or more by 2100. Given the fact that most climate change impact studies reviewed by the IPCC operate on the basis of CO_2 doubling only, it is clear that the chances of avoiding climate change damage are minuscule. Even freezing global CO_2 emissions at their current levels would only postpone CO_2.doubling to 2100; and emissions would eventually have to fall to about 30% of their current levels sometime in the future for concentrations of CO_2 to stabilize at double the level they are at today.[90]

89 IPCC Special Report on Emission Scenarios, note 45, Technical Summary, para. 5.

90 See UNFCCC, Climate Change Information Sheet 1, available at the website.

3. Emissions vs. Contributions to Climate Change

Naturally, the sources of greenhouse gas emissions are practically uncountable. Every car and every gas cooker emits CO_2. Every rice paddy emits methane. However, because this thesis is concerned with international law only, i.e. the relationship between countries, it is relatively easy to calculate the contributions countries have made to climate change on the basis of their net emissions (even given the uncertainties relating to emissions estimates). Countries have an obligation to report on these emissions through the FCCC for the baseyear 1990 and beyond.[91] Before this date, various data sets exist that can be used to calculate historical contributions.[92]

Table II.4[93] lists the most important historical emitters of carbon and also contains estimates of emissions per capita, an important measure apart from absolute emissions. It contains data on emissions from fossil fuels and land use change from 1990-1999.

As opposed to assessing absolute emissions, it is much more difficult to calculate a country's actual contribution to observed or future warming, or for that matter any other indicator of climate change. To attribute climate change directly to human behaviour in this way, climate models are needed to simulate the impact emissions have on certain climatic conditions.

Ongoing methodological work is being conducted to establish the relationship between a State's greenhouse gas emissions (the cause of climate change), and the quantitative effect on climate change (e.g., the actual rise in temperature). This work, being undertaken with support from Parties to the FCCC was first triggered by a proposal from Brazil in July 1997 during the negotiations leading to the agreement of the Kyoto Protocol.[94] This proposal – while aimed primarily at designing a compliance fund in the context of the Kyoto Protocol (see Chapter III) – essentially assigns relative responsibilities to individual Parties according to their contributions to climate change, as measured by the induced change in temperature.[95] It is apparent that this relative method (a final methodology should be available by the end of 2005) could be of great importance for assigning state responsibility for any climate change damage.

Based on the results of the first model, OECD Member States (in 1990) have contributed from 39% to 47% to temperature change in 2000 on the basis of their

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91 For most recent FCCC datasets see FCCC/SB/2002/INF.2 and FCCC/WEB/2002/10.

92 See only <http://www.cdiac.org> for a compilation of fossil fuel related data, and for other sources of data WRI, Climate Convention Indicators: Indicator Framework Paper, 2003, 32 ff.

93 Taken from <http://www.wri.org>, last visited Sept. 2002.

94 FCCC/AGBM/1997/MISC.1/Add.3 at 8.

95 See further <http://www.rivm.nl/FAIR> and <http://www.cru.uea.ac.uk/unfccc_assessment>. This work is being undertaken by the so-called MATCH group <http://www.match.org>.

Table II.4: Emissions of greenhouse gases by countries

Top 20 Historical Emitters of Carbon from Fossil Fuels
Millions of Tons of Carbon, Estimates

Country/Region	- - - 1900-1999 - - - Total Emissions	Percent of Total	- - - 1999 - - - Total Emissions	Emissions per Capita (tons)
1. United States	77,320	30.3%	1,520	5.6
2. *European Union*	*56,280*	*22.1%*	*915*	*2.4*
3. Russia	22,721	8.9%	400	2.7
4. Germany	18,644	7.3%	230	2.8
5. China	17,786	7.0%	669	0.5
6. United Kingdom	14,336	5.6%	152	2.6
7. Japan	9,360	3.7%	307	2.4
8. France	7,241	2.8%	109	1.8
9. Ukraine	5,981	2.3%	104	2.1
10. Canada	5,831	2.3%	151	4.9
11. Poland	5,198	2.0%	85	2.2
12. India	5.098	2.0%	243	0.2
13. Italy	4,189	1.6%	121	2.1
14. South Africa	3,153	1.2%	99	2.2
15. Australia	2,736	1.1%	94	5.0
16. Czech Republic	2,565	1.0%	29	2.8
17. Mexico	2,529	1.0%	101	1.0
18. Belgium	2,426	1.0%	38	3.7
19. Netherlands	2,331	0.9%	64	4.1
20. Spain	2,288	0.9%	82	2.1
Top 20	211,736	83.1%	4,597	1.3
Rest of the World	43,109	16.9%	1,544	0.6
World Total/Avg.	254,845		6,141	1.0

Source: World Resource Institute estimates. Underlying data: see *Data Sources*
Notes: European Union is shown together, and separately where appropriate

emissions of CO_2, CH_4 and N_2O between 1890 and 2000, Asian States from 22 to 29%, Africa, Latin America and the Middle East, combined, from 14 to 21%, and Eastern Europe and the former Soviet Union from 13 to 17%.[96] A finer level of resolution by region or country should be possible with further work on the model and additional data input. This type of attribution modelling could also be applied to other indicators "along the cause-effect chain from emissions to climate change",[97] such as sea level rise or radiative forcing. It is possible in such models to choose a

96 "Brazilian Proposal" Work Reports: FCCC/SBSTA/2002/INF.14, see also FCCC/SBSTA/2001/INF.2.
97 FCCC/SBSTA/2002/INF.14, 7.

start date for the attribution, so that emissions prior to that date are not attributed to any particular source. Likewise, an attribution end date can be chosen.

The ability to define the attribution period allows for a specific portion of emissions and that portion's attendant effects to be attributed to a particular country for a specific time period (e.g. the period in which that country's behaviour was "unlawful", see Chapter V). The model would also make it possible to determine one country's contribution to future climate change. By artificially stopping emissions in a particular year and calculating the length of time those emissions would remain in the atmosphere, the model results would paint a more realistic picture of a country's actual contribution to climate change over the long term.

This brief overview has shown that it is possible to assign "responsibility" to individual states for climate change, either by way of comparing absolute emission contributions or even by attributing specific changes of temperature (or other indicators) to these emissions. Therefore, while climate change is a global problem, it is theoretically possible to attribute impacts to discrete emitters on the basis of the behaviour of the emissions themselves. The ability to establish this causal relationship is essential to assigning legal responsibility for climate change.

V. Conclusions

This Chapter has shown how the climate change phenomenon will influence life on Earth for centuries to come. Based on existing accepted science, there is no doubt that we are already altering various climatic factors such as temperature and rainfall patterns, thus affecting biological systems, committing species to extinction, and threatening human lives and livelihoods in the process. The next three Chapters will provide some insight into the current capabilities of international law to handle climate change damage – either through prevention or by way of compensation. Chapter VI will return to the framework outlined in this Chapter and offer possible long-term solutions to the issue of climate change damage preferably within the existing international legal framework.

Chapter Three

CLIMATE CHANGE DAMAGE IN THE INTERNATIONAL CLIMATE REGIME

> *". . . acknowledging that change in the Earth's climate and its adverse effects are a common concern of humankind . . ."*[1]

I. Introduction

The body of international law is comprised of treaty law and customary international law. Quite independent of developments in the customary law on state responsibility, practical problems of highly hazardous activities and products threatening transboundary damage, as well as threats to the global commons by overuse has prompted States to adopt a multitude of bilateral and multilateral treaties. These deal mainly with the prevention of damage but also with the issue of post-damage regulation, i.e. restoration, compensation etc. Since the adoption of the United Nations Framework Convention on Climate Change (FCCC)[2] in 1992, the problem of climate change has been dealt with through the climate regime,[3] i.e. the provisions of the FCCC and the Kyoto Protocol (KP)[4] of 1997, as well as the wealth of Party decisions and implementation activities occurring within the framework of those agreements.

This Chapter presents both the FCCC and the Kyoto Protocol with a special focus on how these tackle the issue of climate change damage, i.e. both direct and indirect damage prevention (mitigation and adaptation) and the issue of compensation of any residual damage. To some extent this perspective necessitates a general analysis of the treaties and their implementation practice, but an attempt is made to

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1 Preamble to the United Nations Framework Convention on Climate Change, FCCC, para. 1.

2 United Nations Framework Convention on Climate Change, (1992) 31 ILM 849. All documents related to the FCCC or Kyoto Protocol (document symbols FCCC/. . .) can be found on the official website: <http://unfccc.int>.

3 An international regime is the entirety of rules and practices associated with the management and implementation of one or several, interrelated, international treaties through special institutions that are used to further develop the treaty rules. For further discussion on the term "regime", see Chapter IV.

4 Kyoto Protocol to the United Nations Framework Convention on Climate Change, (1998) 37 ILM 22.

take the perspective of those States that are or potentially will be injured by the impacts of climate change as described in Chapter II. It is this perspective that makes this analysis different from existing treatises on the subject,[5] most of which look in the aggregate at the general prevention duties and efficacy of the regime with respect to the global system. The perspective taken in this analysis will allow the rules being presented to be applied in the context of state responsibility (Chapter V) and will allow recommendations to be made with respect to how the issue could be tackled going forward, both inside and outside the climate regime (Chapter VI).

II. The UN Framework Convention on Climate Change

This section begins with a thorough analysis of the negotiation history of the FCCC, focusing especially on climate change damage, funding and "liability" (i.e. discussions on who would bear the cost of residual damage). This show how Parties[6] to the FCCC perceived the issue at the time, which is crucial for determining foreseeability of injury resulting from climate change in the context of state responsibility (Chapter V). It will also put the treaty rules into perspective, allowing them to be interpreted and providing a basis for recommending future developments (Chapter VI). The legal content of the FCCC is then set out, with attention being paid primarily to damage and damage prevention provisions. Special emphasis is put on the definition and interpretation of the prevention duties (Articles 2 and 4), as well as those provisions explicitly referring to the "adverse impacts of climate change", i.e. climate change damage; to "adaptation", i.e. direct damage prevention; and to markers set with respect to residual damage. The financial commitments of the FCCC are unique and of particular importance to the topic of this thesis since they determine which Parties will bear the costs of adaptation measures, i.e. direct damage prevention in developing countries. The relationship between the potentially injured countries, donor countries and the financial mechanism of the FCCC (the Global Environmental Facility) is explored in some depth because it determines the method of funding adaptation measures. Certain other Party obligations, such as reporting duties, are considered here because they give rise to evidence of whether Party commitments are being met, which is a key component of the analysis of state responsibility set out in Chapter V.

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5 See for a recent comprehensive analysis Yamin/Depledge; The International Climate Change Regime, A Guide to Rules, Institutions and Procedures, Cambridge University Press, 2004.

6 'Parties' includes all State parties to the FCCC, developed and developing countries. This Chapter will refer to 'industrialised' or 'developed' countries to connote (broadly) today's OECD members, and to 'developing' countries to describe the rest of the international community. After the introduction of the specific distinction used in the FCCC, 'industrialised' or 'Annex I' countries will be used to describe OECD States and the rest will be referred to as 'non-Annex I' or 'developing' countries.

1. Negotiation History

The FCCC is one of the so-called Rio agreements, developed and adopted in conjunction with the UN Conference on Environment and Development (UNCED) in 1992.[7] It was adopted on 9 May 1992 by the Intergovernmental Negotiation Committee (INC), signed at UNCED by 155 States and has since been ratified by 189 States.[8] The FCCC entered into force after the 50th ratification on 21 March 1994.[9] The INC was appointed by the UN General Assembly (UNGA) in December 1990[10] implementing the Assembly's earlier call for preparations of negotiations for a framework convention on climate change under the auspices of the UN.[11]

a) *UN General Assembly and other bodies*

The UNGA had already supported UNEP in 1987 in making the research of climate change a key priority,[12] and in 1988 Malta proposed a declaration that would make

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7 The other main Rio documents are: the Convention on Biological Diversity, the Convention to Combat Desertification, the Rio Declaration on Environment and Development, the Forest Principles and Agenda 21, the last three being non-binding instruments of mainly declaratory character. See for an overview Hohmann, Ergebnisse des Erdgipfels von Rio, NVwZ 1993, 311 and Sand, UNCED and the Development of International Environmental Law, 3 YIEL (1992) 3.

8 As of 6th December 2004, see <http://www.unfccc.de/resource/convkp.html>.

9 For a detailed overview of the FCCC, its negotiation history and provisions see Bodansky, The UN Framework Convention on Climate Change: A Commentary, 18 Yale J.Int'l Law (1993) 451. See also Verheyen, Der Beitrag des Völkerrechts zum Klimaschutz, in: Koch/Caspar, Klimaschutz im Recht, Baden-Baden 1997, 29; Bail, Klimaschutz und rechtspolitischer Ausblick, in: EUDUR 1998, Bd.I, § 56; Luterbacher/Sprinz (eds.), International Relations and Global Climate Change, 1997; Dolzer, Die internationale Konvention zum Schutz des Klimas und das allgemeine Völkerrecht, in: Festschrift für Bernhard, 1995, 957; Schröder, Klimaschutz als Problem des internationalen Rechts, in: Breuer/Kloepfer/Marburger/Schröder, Jahrbuch des Technik- und Umweltrechts 1993, 191; Oberthür/Ott, The Kyoto Protocol – International Climate Policy for the 21st century, 1999, 33 ff.; Grubb et al., The Kyoto Protocol, 1999, 36 ff.; Sands, The United Nations Framework Convention on Climate Change, 1 RECIEL (1992) 270; Boisson de Chazournes, The United Nations Framwork Convention on Climate Change: On the Road Towards Sustainable Development, in: Wolfrum (ed.), Enforcing Environmental Standards, 1996, 287; Ehrmann, Ergebnisse des Berliner Klimagipfels, UPR 1995, 435; Andresen/Aggrawala, Leaders, Pushers and Laggards in the Making of the Climate Regime, 12 Global Environmental Change (2002) 41. For a political science analysis see Oberthür, Politik im Treibhaus, Die Entstehung des internationalen Klimaschutzregimes, 1997.

10 UNGA Res. 45/212, 21 December 1990, UN Doc. A/45/851, para. 1, scheduling the first INC meeting and establishing an ad-hoc secretariat.

11 See for the general call for negotiations already UNGA Res. 44/207; 22 December 1989, UN Doc. A/44/862, para. 10. This resolution also states: "The United Nations system . . . is the appropriate forum for concerted political action on global environmental problems", (para. 5). This was designed to forestall negotiations of a convention within the framework of the IPCC, whose WG III had already started evaluating different legal options. See IPCC; Report of the 2nd session of the IPCC WG III/Response Strategies, Geneva 2-6 October 1989. See for an (early) legal perspective Nanda, Global Warming and International Environmental Law – A Preliminary Inquiry, 30 Harv.Int.L.J, (1989) 375.

12 UNGA Res. 42/184, 11 December 1987, UN Doc. A/42/902.

the climate system the "common heritage of mankind". Even though the UNGA did agree to Malta's request, it did recognize that "climate change is a common concern of man-kind"[13] (a concept that is now included in the FCCC) and urged "Governments . . . to treat climate change as a priority issue" and to make "every effort to prevent detrimental effects on the climate and activities which affect the ecological balance".[14] This was in line with the 1987 World Commission on Environment and Development (WCED) report (mandated in 1983 by the UNGA itself) that had called for "discussions leading to a convention" to halt global warming.[15] UNGA also provided a general contextual and moral framework for the convention-to-be. In 1989, several island states, organised as the South Pacific Forum (SPF), prompted the consideration of sea level rise and climate change and the potential damage they would cause to their economies and population. The UNGA recommended that "the vulnerability of affected countries and their marine ecosystems to sea level rise be considered during discussions of a draft framework convention on climate and within the framework of the UN Conference on Environment and Development . . .".[16] The specific provisions on adaptation and vulnerability (e.g. in Articles 4.3 and 4.4 FCCC, see below) respond to this request. These activities and statements are evidence of an early consensus among state representatives that climate change was a threat to countries and the global environment.

In 1989, the UNGA provided further guidance to the drafting experts by attributing the main responsibility for climate change mitigation to developed countries, since "the largest part of the current emission of pollutants into the environment" originates in those countries.[17] This approach is reflected in the FCCC (see below). Topical to this thesis is the fact that, in the same resolution of 1989, UNGA reaffirmed in the context of climate change the general "responsibility of States to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or areas beyond national jurisdiction and the need to play their due role in preserving and protecting the global and regional environment in accordance with their capacities and specific responsibilities"[18] and finally called, as mentioned above, for a framework convention on climate to be developed as a matter of urgency. The international community had already assumed then that damage resulting from climate change might not be avoidable.[19]

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13 UNGA Res. 43/53, 6 December 1988, UN Doc. A/43/905, para. 1. See generally on this concept Biermann, Common Concern of Mankind – The Emergence of a New Concept in International Environmental Law, 34 AVR (1996), 426 and Brunée, Common Interest – Echoes from an Empty Shell? ZaÖRV 1989, 791.

14 UNGA Res. 43/53, note 13, paras. 6 and 9.

15 World Commission on Environment and Development: Our Common Future, 1987, Chapter 8 at 28.

16 UNGA Res. 44/206, 22 December 1989, UN Doc. A/44/862, para. 4.

17 UNGA Res. 44/207, 22 December 1989, UN Doc. A/44/862, Preamble para. 8.

18 UNGA Res. 44/207, ibid., para. 4.

19 See UNEP Governing Council Decision 15/36, in: UN Doc. A/44/25, Annex I and UNGA Res. 44/207, note 17, para. 13.

Accordingly, at a meeting in Ottawa later that year, legal and political experts requested, in the suggested "Elements for a Global Convention", that Parties "develop appropriate principles of liability, compensation or other relief under relevant protocols" and that "States should consider the possibility of establishing a World Atmosphere Trust Fund."[20] The beneficiaries of the Trust Fund were to be developing countries, and resources from this fund were intended to be used both for reducing emissions and for damage prevention and compensation in those countries most affected by the impacts of climate change. It was to be funded through voluntary contributions as well as "user fees" for activities causing climate change and fines for violations of the convention itself.

The IPCC topic group on Legal Measures, whose report served as a basis for early drafts of the FCCC, on the other hand, avoided dealing with the topic of liability and responsibility, but clearly identified the need to provide Parties with incentives and/or duties to adapt to climate change.[21] For example, it was suggested that Parties should *"adopt appropriate measures to protect against the adverse effects of climate change, to limit, reduce and adapt to, as far as possible . . .".* [22]

b) *The INC*

The INC met in five sessions until the FCCC was adopted by governments. Table III.1 provides a summary of meetings. It continued to meet after May 1992 (INC 6-11) to discuss issues of implementation until the entering into force of the FCCC.[23]

Table III.1: Overview of INC Meetings

INC 14-14th	February 1991 – Chantilly, Virginia
INC 219-28th	June 1991 – Geneva
INC 3 9-20th	September 1991 – Nairobi
INC 4 9-20th	December 1991 – Geneva
INC 518-28th	February and 30th April–9th May 1992 – New York

20 Protection of the Atmosphere: Statement of the meeting of legal and policy experts, Ottawa, 22 February 1989, reprinted in: 5 American University Journal for Int'l Law & Policy (1990) 535. This meeting was held by invitation of the Canadian Government to follow up the political objective set at the 1988 Toronto Conference (see Chapter II) that a global convention on climate change be developed by 1992.

21 See Draft Framework Convention on Climate Change, draft by the UK based on the report of the IPCC Topic Group, in: Set of informal papers provided by delegations, related to the preparation of a framework convention on climate change, UN Doc. A/AC.237/Misc.1/Add.1, 53 ff.

22 See Compilation of possible elements for a framework convention on climate change, Note by the secretariat, UN Doc. A/AC.237/Misc.2, 21.

23 See for a summary of proceedings Oberthür/Ott, The Kyoto Protocol, 43 ff.

(1) *General*

At the first INC meeting (INC 1), the UNEP representative made reference to the need for negotiators to address issues of damage prevention in the form of adaptation as well as liability and compensation, and in this context several nations referred to the polluter pays principle as an appropriate legal framework.[24] Generally, however, the INC discussions reflected very much the opinion of most delegations, that compensation and liability were not to be discussed but that the focus of the convention should be the prevention of climate change or mitigation (i.e. the reduction of emissions or the enhancement of sinks) generally, but also adaptation in the widest sense.[25] Both areas of work were to be covered by Working Group I of the INC ("Commitments"). The reluctance to deal with questions of possible residual damage and liability for them led the Alliance of Small Island States to suggest inclusion of the following phrase in the convention: "This convention . . . is without prejudice to the existing rights under international law, including rules governing international liability for damage to people, property and the environment".[26] At least, the need for financial assistance for developing country adaptation measures and adverse impacts as such, e.g. sea level rise, increased cyclone activity, and coral bleaching, was noted throughout the INC process.[27]

Industrialised country delegations and developing country delegations were very much divided on questions of adaptation, residual climate change damage and who was to cover the respective costs. In its first country submission, Germany called for a protocol to be developed under the future convention on "the adjustment to climate changes and the prevention and containment of climate-related damage".[28] While none of the industrialised countries echoed this approach, the developing country delegations brought forward a range of proposals to deal with damage and damage prevention both structurally and financially.

For example, regarding ecosystems ("ecological damage") some Parties recognised that climate change would pose a significant threat to vulnerable ecosystems and pro-

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24 See Report of the INC, 1st session 4-14 February 1991, UN Doc. A/AC.237/6, 6 f.

25 INC 1 texts referred to "measures to counter the effects of climate change and its possible adverse effects, particularly on small island developing countries, low-lying coastal, arid, and semi-arid areas, tropical regions liable to seasonal flooding and areas prone to drought and desertification". See Guidelines for the Negotiations, as decided by the first INC meeting, in: Report of the first INC session, UN Doc. A/AC.237/6, at 23.

26 See submission of Vanuatu on behalf of the Alliance of Small Island States (AOSIS), Elements for a Framework Convention on Climate Change, in: Set of informal papers provided by delegations, related to the preparation of a framework convention on climate change, UN Doc. A/AC.237/Misc.1/Add.3, at 22.

27 See Report of the 1st INC session, UN Doc. A/AC.237/6, 14, Report of the 2nd INC session, UN Doc. A/AC.237/9, 17; Report of the third INC session, UN Doc. A/AC.237/12, 11 ff.

28 Non-Paper by Germany, in: Set of informal papers provided by delegations, related to the preparation of a framework convention on climate change, UN Doc. A/AC.237/Misc.1/Add.1, at 21.

posed a "green plan" for the protection and recovery of fragile ecosystems.[29] This approach, which would have provided Parties with a focused tool to tackle potential damage to the natural environment, was not discussed in depth and – given that the IPCC has concluded that ecosystems are already affected by climate change today – unfortunately was dropped from the INC text.

(2) *The Climate Fund*

Most notably, the idea of a "Climate Fund" as contained in UNGA Resolution 44/207[30] was developed further by negotiators. The Fund was meant to "meet . . . on a grant basis . . . the costs for developing countries to adapt to and mitigate the adverse effects of climate change" and was to be financed by contributions from industrialised countries in the form of "new and additional financial resources".[31]

In the view of some Parties, the Fund was to cover both mitigation and adaptation measures, *inter alia*, to cope "with negative impacts due to sea level rise resulting from climate change caused by man-made activities".[32] Other Parties envisaged that the fund would cover only the incremental costs incurred by developing countries to meet specific convention obligations, and should only "assist" developing country Parties in meeting adaptation costs.[33] Opinions also differed on the administration of such a fund. While developing countries wanted it to be independent of existing financial institutions such as the World Bank's Global Environmental Facility (GEF), industrialised nations wished to use the existing expertise and wanted to avoid creating a new institution.

Developing countries stressed that the Climate Fund should "cover the full incremental costs" and that it should be truly additional, i.e. not involving any reallocation of existing multilateral or bilateral financing flows. Despite the fact that the fund was meant to provide funds for both direct and indirect damage prevention (mitigation and adaptation) and was not intended to compensate countries or individuals for damage incurred by them as a result of climate change, the Group of 77 and China[34] stressed that "these funds from the developed countries to developing countries will

29 Report of the 4th INC session, UN Doc. A/AC.237/15, 46 and Report of the 5th INC session, Part I, UN Doc. A/AC.237/18 (Part I), 39 (para. 4.3.3).

30 See above note 17.

31 Arts 2 and 5 of the Draft Framework Convention of Climate Change, submitted by India, in: Set of informal papers provided by delegations, related to the preparation of a framework convention on climate change, UN Doc. A/AC.237/Misc.1/Add.3, at 7.

32 See submission by the Netherlands, in: Compilation of possible elements for a framework convention on climate change, Note by the secretariat, UN Doc. A/AC.237/Misc.2, 46.

33 See e.g. the submission by Norway, in: Set of informal papers, UN Doc. A/AC.237/Misc.1/Add.2, 21.

34 The Group of 77 serves as a negotiation platform for developing countries not only in the climate context. Within the FCCC context it comprises all non-Annex I countries except for Tuvalu, including big emitters such as China, India and Brazil.

be to a great extent of a compensatory nature".[35] This emphasises the fact that developing nations perceived the issue of climate change damage and damage prevention actually as an issue of liability for historical emissions.

In the course of the negotiations it became clear that neither the level funding nor the purpose of contributions made to the Climate Fund was clear. This prompted some delegations to make specific proposals to close this gap. For example, Vanuatu (on behalf of AOSIS) suggested a fund (substantive financial obligations for industrialised countries) to "compensate developing countries (i) in situations where selecting the least climate sensitive development option involves incurring additional expense; and (ii) where insurance is not available for damage resulting from climate change.[36]

This proposal was supplemented at INC 4 with a proposal for how to deal with climate change induced damage directly, rather than by way of adaptation: a global insurance scheme.[37] The proposal included, as an annex to the convention, an "International Insurance Pool", complementing the Climate Fund by providing insurance against sea level rise, i.e. damage resulting from climate change.

(3) *The International Insurance Pool – AOSIS proposal*

AOSIS states were conscious of the possibility that not even the most sophisticated and radical climate change Convention would be capable of preventing sea level rise altogether. Since the 1980s, these States had studied and discussed the potential effects of sea level rise on their territories and peoples and were thus keen to establish a functioning regime to distribute the costs of climate change impacts appropriately, i.e. according to historical and present responsibilities for climate change.

The insurance pool proposal sought to establish an international scheme, funded by industrialised Parties, which would compensate small island and low-lying developing nations for loss and damage resulting from sea level rise. While it was limited to damage and loss from sea level rise, it was seen to serve as a role model for other types of impacts, such as drought, floods and desertification.

Mandatory contributions to the pool were to be administered by an administrating authority (Authority), which would also be responsible for handling claims made

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35 Set of informal papers, Submission by Ghana on behalf of the States members of the Group of 77, UN Doc. A/AC.237/Misc.1/Add.15 (submitted at INC 4), 5.

36 Vanuatu on behalf of the Alliance of Small Island States (AOSIS), Elements for a Framework Convention on climate change, in: Set of informal papers provided by delegations, related to the preparation of a framework convention on climate change, UN Doc. A/AC.237/Misc.1/Add.3 at 30.

37 The proposal by Vanuatu on behalf on AOSIS is contained in A/AC.237/WG.II/CRP.8 and reprinted in Report of the 4th INC session, UN Doc. A/AC.237/15, 126 ff. See also Linneroth-Bayer, J./Mace, M.J./Verheyen, R., Insurance-Related Actions and Risk Assessment in the Context of the UN FCCC, Background Paper, May 2003, <http://www.unfccc.int>.

against the resources of the pool.[38] The proposal contemplated that before an insurance situation arose, areas in developing countries potentially affected by sea level rise would be valued, with insured values and coverage negotiated between each country and the Authority. All assets and interests would then be registered with the Authority to determine the scope of application of the insurance scheme. Both economic and human losses as well as ecological damage were to be covered. The proposal also allowed countries to include in their calculations of assets the "option value", i.e. the potential value of an asset in the framework of future development. This was important since the actual damage from sea level rise was not to be calculated *ex post* (as in the framework of national tort law or the international law of state responsibility, Chapter V) but *ex ante* and developing countries naturally wished to protect their development options and the increasing value of their assets.

Contributions to the fund were to be calculated using a formula similar to that agreed by the Parties to the 1963 Brussels Convention on Third Party Liability in the Field of Nuclear Energy (see Chapter VI). Contributions would be calculated based on (i) the ratio between the GNP of each industrialised country contributor and the total GNP of the group of contributors, and (ii) the ratio of individual country CO_2 emissions to the total CO_2 emissions of the group of contributing countries. Historic contributions of countries to CO_2 emissions would be disregarded; the base year for determining emissions would be the year before contributions were to commence under the scheme.

Ten years after the entry into force of the convention (i.e. in 2004, had the insurance scheme been adopted together with the FCCC), if the rate of global sea level rise had reached an agreed figure, industrialised nations would contribute an agreed percentage of their total GNP to the fund. The ten-year time period was chosen because at the time the proposal was made (1991), the IPCC had predicted that within this period more detailed information would be available for assessing the impacts of climate change.

No right to claim against the pool would arise until the rate of global mean sea level rise and the absolute level of global mean sea level rise had reached previously-agreed figures, and the relative mean sea level rise for an insured area in a vulnerable country had reached an agreed level above base level. (The regional trigger levels were subject to negotiation between individual countries and the Authority.) Monies would then be paid out of the pool to meet claims. Commercially-insured property and assets would be excluded from the scheme.

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38 The composition and role of the proposed Authority is comparable to the Kyoto Protocol's Executive Board to the Clean Development Mechanism. See Guidance to the Executive Board of the clean development mechanism, FCCC/CP/2002/L.5/Add.1. and <http://cdm.unfccc.int>.

From the possible responses to sea level rise (categorised by the IPCC as (i) retreat, (ii) accommodation, and (iii) protection), only retreat and accommodation (continued use of the land at risk, without protecting the land but providing protection for the people, i.e. emergency shelters etc.) would fall within the scope of the insurance scheme. Protection would be a matter of adaptation and therefore one for the Climate Fund. However, in assessing claims the Authority was to determine whether and to what extent the loss or damage could have been avoided by "measures which might reasonably have been taken at an earlier stage."[39] For this assessment, availability of funds and availability of commercial insurance would have been key criteria.

In sum, the insurance mechanism proposed by AOSIS was not aimed at establishing private sector insurance, or liability, but was to be a compensation fund to address direct damage from sea level rise. The proposal would have established quite a flexible and cooperative regime. The levels of contributions (% of GNP), the triggering figure for rate of sea level rise (x cm/year absolute and relative) and the values covered would have been subject to negotiation between Parties and the Authority. It was also foreseen that claims would not actually arise for several decades; but the single contribution made ten years after entry into force of the Convention would (if wisely managed) increase to an appropriate sum for the future.

(4) *The last texts and steps towards the FCCC*

The consolidated draft text of the convention as issued and discussed at INC 4 in December 1991 reflected many of the opinions and proposals mentioned above. It still included the Climate Fund idea and even some paragraphs on compensation and liability in the "Principles" section which read:

> "The developed countries responsible for causing damage to environment through inducing climate change should bear the primary responsibility for rectifying that damage and the costs of prevention measures and should compensate for environmental damage suffered by other countries or individuals in other countries".

Or, alternatively:

> "Those countries directly responsible for causing damage to the environment through inducing climate change should bear the responsibility for rectifying that damage. By openly demonstrating their direct responsibility or negligence, those countries shall compensate for environmental damage suffered by other countries or individuals in other countries".[40]

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39 UN Doc. A/AC.237/WG.II/CRP.8, para 6.

40 See Report of the 4th INC session, UN Doc. A/AC.237/15, 28.

Those paragraphs, making direct reference to State responsibility and liability were heavily disputed but reappear in the draft version at INC 5.[41] One of the last INC consolidated text versions still included a paragraph noting that the convention would be "without prejudice to the application of the rules of international law governing the liability of states".[42] In the final text, the idea of a principle on liability/responsibility was dropped altogether due to the heavy resistance of industrialised country delegations. Nevertheless, these pieces of text show that the issue of residual damage was far from settled and very much on the mind of negotiators.

The INC 4 and INC 5 draft versions of the convention[43] also included text on the financial mechanism and Climate Fund to be established, which required developed country Parties to meet the "full incremental costs" necessary for all developing country Parties to "adapt to and mitigate the adverse effects of climate change".[44] In this context, the term "mitigation" did not refer to the mitigation of climate change by reducing greenhouse gas emissions, but described the potential alleviation of residual damage, e.g. restoration measures after an extreme weather event. Thus, this proposal would have included both the cost of adaptation measures and some form of compensation or restoration after residual damage had occurred. What remains from this proposal in the FCCC will be discussed below, but it should be noted here that Articles 4.3 and 4.4. FCCC do not refer to the compensatory part of the original obligation. This is the result of successful negotiations by a unified group of industrialised countries. Those drafts also already establish the structure of country commitments versus the functioning of the financial mechanism, which are dealt with separately (now Articles 4.3, 4.4 and 11 FCCC). The insurance scheme was also included in the draft texts both at INC 4 and INC 5,[45] but was dropped from the final text altogether due to the strong resistance of industrialised countries.

c) *Conclusion*

As this overview has shown, countries negotiating the FCCC were aware that climate change would potentially damage economies and ecosystems, especially in vulnerable countries such as small island states. Even though the issue of residual damage resulting from climate change and questions of liability or responsibility are not addressed in

41 See Report of the 5th INC session, Part I, UN Doc. A/AC.237/18 (Part I), 29. INC 5 took place in two sessions, in February and May 1992.

42 Consolidated Text, Submitted by the Bureau of Working Group I, UN Doc. A/AC.237/Misc.9, 7.

43 Consolidated Text, Submitted by the Bureau of Working Group I, UN Doc. A/AC.237/Misc.9, 15 f. (based on WG I submission at INC 3).

44 See Report of the 4th INC session, UN Doc. A/AC.237/15, 42; 76 ff., and Report of the 5th INC session, Part I, UN Doc. A/AC.237/18 (Part I), 37 (para. 4.2.2), 59 ff. (Article 12).

45 Report of the 4th INC session, UN Doc. A/AC.237/15, 80 (with Annex V) and Report of the 5th INC session, Part I, UN Doc. A/AC.237/18 (Part I), 62 (Article 13 with Annex IV).

the FCCC as adopted in New York in May 1992, these discussions show the level of awareness of the problem. This is also reflected in the assent of industrialised countries to support developing countries in their efforts to adapt to the impacts of climate change.

The level of awareness of climate change damage and possible compensation needs is also reflected in the declarations made by various countries upon signature of the FCCC: (taking up an early proposal by AOSIS) ". . . signature of the Convention shall in no way constitute a renunciation of any rights under international law concerning state responsibility for the adverse effects of climate change . . .".[46] This reservation is also of importance in the context of the applicability of other law than that of the climate regime to the issue of climate change damage (see Chapter IV).

The negotiation history does not corroborate the conclusion that Parties were unwilling to tackle the issue of residual damage – however, they chose to focus on mitigation provisions, generally, as well as provisions aimed at direct prevention of climate change (adaptation). The precise content of these duties will be explored in the next section.

2. Legal Content and Structure

The provisions of the FCCC can be divided into the following categories: i) objectives and principles; ii) obligations (substantive, reporting, monitoring, financial); iii) institutions and procedures; and iv) miscellaneous. The preamble of the FCCC, which in the Law of Treaties serves as a context for the purpose of interpreting a treaty (Article 31.2 Vienna Convention on the Law of the Treaties (VCLT)),[47] embraces several important legal concepts and notions such as common concern of mankind, sustainable development, intergenerational equity, the no-harm rule, and common but differentiated responsibility, which will be discussed below in conjunction with the substantive provisions.[48] In this section, the content and structure of the FCCC will be outlined to provide the background for a detailed analysis of the provisions dealing with damage prevention (mitigation and adaptation). With respect to mitigation, the FCCC provisions are discussed to discern what prevention duties parties have undertaken, but also with the understanding that any breach of these primary obligations might give rise to a claim of state responsibility (Chapter V). The provisions aimed at adaptation or direct damage prevention, together with the financial commitments, are an important indication of how states acknowledge and tackle the problem of cli-

46 Declarations made by the Governments of Nauru, Tuvalu, Fiji, and Papua New Guinea. See note 8.

47 The Vienna Convention on the Law of the Treaties (1969), entered into force on 27 Jan 1980, 91 Contracting Parties, 8 ILM 679 (1969). Most of its important provisions are reflections of customary international law, see Brownlie, Principles of Public International Law, 1998, 608.

48 For details see Bodansky, note 9, 497 ff. and Dolzer, note 9.

mate change damage. Yet, to differentiate between the legal analysis of rules contained in the FCCC and their implementation in reality, the practice of funding for adaptation purposes is discussed separately in Part V of this Chapter.

a) *Objective: Preventing dangerous climate change*

According to Article 2 FCCC, the "ultimate objective" of the Convention and its related legal instruments is

> "to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

It is important to note that "stabilisation" of atmospheric concentrations of greenhouse gases (meaning that greenhouse gas emissions have a nil effect because they are balanced by removal processes) is not the same as stabilisation of the climate, which could take much longer to achieve due to the long lifetimes of greenhouse gases and the inertia of the climate system (in particular the oceans). Nevertheless, stabilisation is linked to the prevention of dangerous interference with the climate system, which implies that the actual objective of the FCCC is the stabilisation of the climate itself at safe levels.

It is also worth noting that through Article 2, the Parties to the Convention generally acknowledge the link between human activities and emissions, concentrations of greenhouse gases in the atmosphere, and the resulting changes in the natural environment with its attendant impact on human lives (food production). The wording clearly suggests, however, that not all activities that contribute to man-made climate change are prohibited, as had been suggested in the early negotiation phase. India, for example, had proposed wording which corresponds closely to the no-harm rule as explored in Chapter IV: "The Parties take all necessary measures in accordance with the terms of this Convention to ensure that human activities within their jurisdiction or control do not *contribute* to climate change" (emphasis added).[49]

The legal status of Article 2 has been subject to discussion as has the notion of "dangerous interference with the climate system", which, together with the indicators in the second sentence (providing a time-element), constitutes the normative threshold of the provision. It could be argued that Article 2 constitutes only a vague aim

49 See India's proposal in: Set of informal papers provided by delegations, related to the preparation of a framework convention on climate change, UN Doc. A/AC.237/Misc.1/Add.3 at 25.

which cannot be defined and concretised without multi-stakeholder involvement and a balancing exercise by policy makers and international negotiators. On the other hand, the Article 2 wording is part of an international treaty. Therefore, it can and in fact must be assessed and interpreted in the context of international law using the tools provided in the VCLT. This means that the wording of Article 2 should be interpreted within its ordinary meaning in context and in the light of the object and purpose of the treaty itself (Article 31.1 VCLT). Adhering to these guidelines, this author's interpretation is as follows.

(1) *Duty of prevention*

The first thing of note is that Article 2 is provides a duty of prevention: What is to be prevented is dangerous climate change. The Article is (i) bound by the assumption that human beings interfere with the climate system by increasing atmospheric greenhouse gas concentrations, and (ii) assumes that human activities can prevent these gases from rising above a threshold of "dangerous interference". What is left open is the definition of the term dangerous interference, but not the necessity to (absolutely) prevent such interference. It is clear that interference is occurring, the only question is what constitutes an acceptable level. This preventive approach is also reflected in paragraph 2 of the preamble, where Parties recognize increasing greenhouse gas concentrations in the atmosphere, that these enhance the natural greenhouse effect and that *"this will result on average in an additional warming of the Earth's surface and atmosphere and may adversely affect natural ecosystems and humankind" (emphasis added).*

In other words, operationalising Article 2 is not contingent on further scientific evidence for climate change as such. Rather, Article 2 expresses the consensus that there is anthropogenic interference with the climate system and that something must be done to prevent this interference from becoming dangerous. The fact that the term "dangerous interference" is left undefined does not qualify this statement in any way. It is common for treaties and statutes to use legal terms that require further interpretation.

Schröder[50] sees it differently. In his opinion, Article 2 does not contain an obligation to act and thus is an unoperational phrase which can only be concretised by further action of the Parties. *Schröder* argues that Article 2 is "only" a reflection of the precautionary principle, which indeed, in the international law context, is not a concrete obligation of conduct but a guiding principle for law and decision makers at all levels.[51]

50 Schröder argues that the Convention is concerned with precautionary action only, thus leaving much more leeway to Parties its implementation (Schröder, note 9 at 201); see also Schröder et al., Klimavorhersage und Klimavorsorge, 2002, 257.

51 Freestone/Hey, Origins and Development of the Precautionary Principle, in: The Precautionary Principle in International Law, 1996, at 12. See further below Section Chapter I:II.2.b)(3).

Yet, looking at its ordinary meaning, Article 2 FCCC clearly states that preventive action is necessary even though the exact impacts of climate change, i.e. resulting damage might still be uncertain (see also paragraph 5 of the preamble, which refers to scientific uncertainties with regard to predictions of climate change). As such it is a classic example of an environmental quality standard – it sets a threshold for the FCCC and all future legal instruments which must not be exceeded ("dangerous climate change") and against which concrete commitments and obligations are to be measured. It reminds the author, a German environmental lawyer, of the so-called "Schutzgrundsatz" (duty of protection) stipulated in § 5.1.1 of the Federal Air Quality Protection Act[52] which allows for strict limits for air quality and emissions from industrial plants. If the operation of a particular installation results in air pollution (e.g. sulphur dioxide emissions) above a stipulated threshold within a specific locality, operation of the installation will be prohibited. Behind this regulatory approach is the belief or certainty that the sum of human activities (emissions) accumulating in a "pollution hotspot" will damage human health and the natural environment and thus must be halted. The law itself does not define thresholds, but only refers to the duty to prevent dangerous environmental impacts ("schädliche Umwelteinwirkungen").[53] This terminology is as vague as that of "dangerous interference with the climate system".

The comparison ends there since climate change is not confronted with the problem of hotspots. As soon as greenhouse gas emissions are released, they accumulate in the atmosphere and are potentially dangerous for all mankind and ecosystems. Moreover, as is clear from the overall context of the FCCC and climate science, the objective in Article 2 operates over a very long timeframe. Target dates for stabilisation of greenhouse gas concentrations of 550 ppm and 750 ppm are for example 2150 and 2250, respectively.[54] Unlike the German "Schutzgrundsatz", Article 2 FCCC does not operate on an installation-by-installation basis but rather provides the fram work for the targets to be set and activities to be taken by Parties to the climate regime. Moreover, due to the inertia in the system, and the complex interactions of greenhouse gases with the terrestrial biosphere and the oceans, emissions of greenhouse might not result directly in an increase of atmospheric concentrations. From the negotiating history it is clear that Parties were only willing to agree to a general duty of prevention. Still, the notion of designing a "budget" or setting a threshold beyond

52 Bundesimmissionsschutzgesetz (BImSchG), which enables the emission and air quality related regulation of certain industrial sites and plants. This provision is applicable also to long-range or transboundary air pollution, see BVerwGE 69, 37 ff. German law places precaution on top of prevention – even where damage cannot be foreseen directly plant owners must adopt technical standards that will serve to prevent risk (best available techniques). This system is different from the notion of the precautionary principle in international law.

53 See further Koch, Immissionsschutzrecht, in: Koch (ed.) Umweltrecht, 2002, 135 at 156 ff.

54 See e.g. Arnell et al., The consequences of CO_2 stabilisation for the impacts of climate change, 53 Climatic Change (2002) 413.

which emissions must not occur is a useful analogy, even if it might not operate simply on the basis of Article 2 FCCC.

Article 2 cannot, therefore, in the literal sense be viewed merely as a non-binding policy statement. It provides the objective of the climate regime and therefore also its purpose in the sense of the VCLT. Thus, all Parties are obliged to "refrain from acts which would defeat" Article 2 (Article 18 VCLT). *Bodansky* has questioned this contention,[55] but fails to give any convincing arguments to the contrary. As *Dolzer* points out, Article 2 is a compromise but it would be wrong to assume that the provision is devoid of any legal meaning.[56] As such, Article 2 may also to be used as an interpretative tool for all other FCCC provisions.[57] Because Article 2 provides the "ultimate objective" of the FCCC, it clearly also serves a different purpose from Article 3.3 FCCC, which provides for use of the precautionary principle. Article 2, is, therefore, the source of a binding, long-term commitment for all Parties to the FCCC to prevent climate change.

(2) *Dangerous interference*

The determination of what is deemed "dangerous" is not a purely scientific exercise but also one that involves judgement.[58] This immediately raises the question of who decides what constitutes this threshold. According to Article 7 FCCC the Conference of the Parties (COP) is the supreme body of "this Convention". The COP is to exercise all functions necessary for the achievement of the objective (Article 7.2(m)); this, therefore, must include any decisions concerning the interpretation of Article 2.[59] In

55 Bodansky, note 9 at 500.

56 Dolzer, note 9 at 960.

57 See Verheyen, note 9, at 40.

58 See Moss, reporting on an IPCC workshop in 1994 designed to provide the scientific underpinnings for Article 2 FCCC, in: Avoiding dangerous interference in the climate system, 5 Global Environmental Change, (1995) 3 at 4 f. See also. European Climate Forum/PIK, What is dangerous climate change? Initial Results of a Symposium on Key Vulnerable Regions Climate Change and Article 2 of the UNFCCC, Buenos Aires, 14 December 2004, 4.

59 The legal quality of decisions of the COP is debated. Generally, as the COP is not an international organisation, its decisions have no binding force beyond the treaty regime. Such decisions are often referred to a "secondary law", which is confusing in the context of this thesis as the same term is used to describe the rules on legal consequences for the breach of primary international obligations, i.e. the system of state responsibility. COP decisions express the subsequent will of all Parties and could therefore also be said to constitute binding international declarations by States. Only if a treaty regime permits majority decision making can the relevant COP have legislative powers that are different from the sum of the will of the Parties. This is true for example for the Conference of the Parties to the Montreal Protocol which can take binding decisions with a 2/3 majority and establish binding rules for Parties that never consented to them (See Beyerlin, Umweltvölkerrecht, 2001, 48 and 80; Sands, Principles of International Environmental Law, 1995, 261 ff. The FCCC excludes that amendments become binding on Parties without their consent. Amendments can be decided upon by the COP with a ¾ majority of "Parties present and voting" (Article 15.2), but such amendments will not

this, however, the COP will be guided in a decisive manner by scientific findings. This is reflected both in the FCCC preamble and the creation of the Subsidiary Body for Scientific and Technical Advice (SBSTA, Article 9 FCCC), which is to provide regular updates on the state of scientific knowledge relating to climate change and its effects. Within this framework, the IPCC has assumed an important role, and has initiated specific discussions on Article 2.[60] In addition to state of the art knowledge on climate change, the COP will need to be consider other existing international law obligations enshrined either in customary law or treaties, e.g. obligations regarding nature and wildlife protection. This aspect is further developed in Chapter IV.

It must be remembered, though, that this threshold notion is embodied in a treaty and is therefore open to interpretation. The set of parameters that should be considered in arriving at this interpretation is discussed below. In arriving at these parameters, due account was given to scientific and policy statements of relevant bodies. As this analysis will show, the stabilisation of greenhouse gas concentrations in the atmosphere at the threshold of 450ppm is capable of preventing dangerous interference by keeping temperature rise below 2°C. Establishing a stabilisation threshold, however, does not solve the problem of determining what action will be required to achieve it. This is not stipulated in Article 2.

Reference Points

Determining a threshold such as "dangerous interference" is, as is well known from national environmental law debates, mainly a question of reference points – dangerous to what or whom. Defining what constitutes dangerous interference is also inextricably linked to how one (or the society at large) perceives danger or risk.[61] Moreover, as impacts of climate change are only assessable via climate models, predictions will always be a representation of risks (with sometimes very high probability of becoming real, as concluded by the likelihood statements in the TAR) rather that of some certain damage in the future.

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enter into force for any Party unless it has ratified them (Article 15.4 and 15.5). However, many decisions of the COP, while not called amendments, might actually constitute a treaty change or at least they may change the literal meaning of certain provisions of the treaty. As long as all Parties to the treaty consent to such decisions, the legally binding force intra-regime cannot be questioned. This is important to be kept in mind when analysing the existing framework for adaptation to the impacts of climate change. It is – in principle – possible that Parties could be bound by majority decision making: Article 7.3 expressly mandates the COP to adopt rules of procedures that include majority decision making. This provision was ratified together with the rest of the treaty. Were rules of procedure adopted by Parties, they would be bound by the "secondary law" enacted by the COP in the framework of the regime. This would also apply to a decision interpreting Article 2 FCCC.

60 See preparatory work on the Fourth Assessment Report on <http://www.ipcc.ch>

61 See Dessai et al., Defining and experiencing dangerous climate change, Tyndall Working Paper 28, January 2003.

Article 2 presents a global and long-term objective. What is to be protected is the global climate system for the benefit of all mankind and future generations, which makes it imperative that all available scientific and political knowledge is considered. What constitutes dangerous must be determined over the course not of 50, but 100 or 200 years' time. This long-term context is created by both the concept of common concern and the explicit mention of future generations in Article 3.1 FCCC. The Parties have therefore taken it upon themselves to preserve the climate system, and while this might involve some balancing of interests of current and future generations, those interests are equal for the purposes of the FCCC. That future generations have rights equal to those of the current generation has not been explicitly accepted by the ICJ,[62] but the notion is fully endorsed by some of its judges[63] as well as scholars. Still, perceptions of what is dangerous in a specific case will vary across regions and countries.

A Regional Focus?

When drafting the FCCC, Parties did not have country-specific damage in mind. Article 2 was not designed to protect a particular ecosystem or coastal zone in a specific country. These will in fact be vulnerable to warming to different extents. Thus, there is no regional or local bias implicit in the FCCC for defining the Article 2 threshold. The Parties did however recognise that some regions and countries are more vulnerable than others (Preamble paragraph 19 and Article 4.8 FCCC) – for example low lying island and other small island countries, countries with areas prone to drought or flood or low-lying coastal areas. This is an indication that any definition of dangerous interference must be oriented not towards the most resilient countries and regions, but instead towards the most vulnerable. This is also the approach taken by many scientists today.[64] On a country-specific level it could indeed be argued that climate change has already reached dangerous levels, when for example, valleys in Nepal and Bhutan are under threat from glacial outburst floods, caused by increased glacial melting in the Himalayas (see Chapter V).

The second sentence of Article 2 stipulates that a threshold decision must take into account the natural adaptation capacities of ecosystems. It is important to note

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62 In its recent advisory opinion the ICJ did not explicitly accept that future generations have rights, but did recognise that they play a role in interpreting and applying international environmental law. See Legality of the use of nuclear weapons 1996 ICJ Rep. 15, paras. 29 and 35 (*Nuclear Weapons*). See Brown-Weiss: Opening the Door to the Environment and Future Generations, in Sands: Nuclear Weapons and the ICJ, 1999, 338 at 349 ff. and for in-depth discussion of the issue Brown-Weiss, In Fairness to Future Generations, 1989.

63 Dissenting opinion of Judge Weeramantry in the Nucear Weapons Case (1996 ICJ Rep. 226) 1996 ICJ Rep. 429 ff., pointing to the UN Charter and many treaties for evidence and endorsing the principle of intragenerational equity as a principle of international law (at 502 ff.).

64 See European Climate Forum, note 58.

that in 1990 the IPCC had predicted already that many ecosystems would not be able to adapt at all much less "naturally", as prescribed in the second sentence of Article 2. In fact, regional temperature changes are already affecting biological systems, most likely leading to biodiversity loss.[65]

This second sentence, it should be noted, is indicative ("should be achieved") and the list of criteria non-exhaustive. Still, it is a valuable indication and scientific estimates of what could happen to the natural environment with a certain degree of warming are an important starting point for defining the Article 2 threshold. Accordingly, biologists have suggested looking at specific ecosystems to determine the "acceptable" level of change. Thus the most vulnerable ecosystems (biodiversity hotspots already affected by climate change) are being used as a reference point for Article 2.[66] For example, it has been argued by coral reef experts that a long-term target of 1°C above 1990 temperatures would prevent severe damage to coral reef systems[67] and that with 1-2°C warming there is a severe risk that vulnerable ecosystems already living near their ecological tolerance ranges would vanish forever.[68]

This approach implies that global mean temperature is not the yardstick for "dangerous" but the resulting regional or local temperature and weather (and socio-economic) changes.[69] Such an approach would respond to the need to prevent specific climate change damage, rather than looking at mankind and the global climate system as a whole. This is more in line with the damage prevention objective expressed in the preamble of the FCCC (the no harm rule, see Chapter IV) and the interest of countries such as small islands that were quite certain that they would suffer substantial loss if emissions were not curbed significantly and soon.[70]

Moreover, many Parties to the FCCC are also parties to nature conservation treaties and are thus obliged to comply with their duties of protection under those treaties. Nature conservation treaties generally have zero tolerance for the kind of species or ecosystem

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65 See Parmesan/Yohe, A globally coherent fingerprint of climate change impacts across natural systems, 421 Nature (2003) 37; Root et al., Fingerprints of global warming on wild animals and plants, 421 Nature (2003) 57; and Thomas, C./Cameron, A./Green, E./ et al., Extinction risk from climate change, 427 Nature (2004), 145.

66 Hannah et al., Defining the "Acceptable" – Avoiding Biodiversity Losses in a Greenhouse World, submitted to Science Magazine, 2003.

67 O'Neill/Oppenheimer, Dangerous Climate Impacts and the Kyoto Protocol, 296 Science (2002) 1971 at 1972, citing a study by Hoegh-Guldberg.

68 TAR WG II, 84 and, summarising risks to biological systems, ECF, note 58, 4 ff.

69 This suggested approach is similar to the Tolerable Window Approach (TWA), which is a decision making framework for climate policy. TWA asks decision makers to specify perceived limits to potential climate impacts (so-called impact guardrails) as well as requirements for an acceptable socio-economic development. In the second step, the whole set of emissions reduction strategies that simultaneously obey these constraints are identified through a model-based analysis. See Füssel et al., Climate Impact Response Functions as Impact Tools in the Tolerable Windows Approach, 56 Climatic Change (2003) 91, at 93.

70 This concern was endorsed by the UN General Assembly, see note 16 and accompanying text.

extinction projected for some warming scenarios.[71] For example, the Great Barrier Reef in Australia or the Sunderbans in Bangladesh are protected under the 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage,[72] wetlands are protected under the 1971 Ramsar Convention,[73] and the Antarctic environment under the various Antarctic Treaties.[74] If all of the obligations of the relevant conservation treaties were complied with, scientific assessments of acceptable temperature change would have to determine what degree of warming the respective ecosystems could tolerate.[75] Some of these treaty duties will be explored in-depth in Chapter IV. Generally, however, it is a straightforward argument that a definition of "dangerous" which defeats the objectives of such treaties will not be legally feasible in the context of the FCCC because it would infringe upon other international law obligations.

Similarly, impacts on human development (e.g. food production, as listed in Article 2) can be assessed on a regional basis, even if uncertainties remain. Several models have estimated impacts on crop production; however, it is difficult to predict what regional impacts are to be expected with world markets reacting to supply and demand possibly alleviating regional food crises.[76]

Specific impacts

Scientists have also used certain impacts to define "dangerous", such as the disintegration of the West Antarctic Ice Sheet,[77] or the breakdown of thermohaline circulation.[78] These impacts are deemed to be especially dangerous because of their feedback effects on the global climate system. Importantly, it is envisaged that if such changes occur, adaptation will not be an option, but irreversible harm will be done both to ecosystems and human infrastructure and life. It could well be argued, therefore, that such impacts are dangerous *per se*.

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71 See TAR WG II, 83.

72 11 ILM (1972) 1358, in force since 17th December 1975. The list of protected sites published in accordance with this Convention contains 144 natural and 23 mixed sites in the 125 States Parties. The Great Barrier Reef was inscribed in 1981, the Sunderbans in 1997. See further Chapter IV.

73 Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitats, in force 21 December 1975, 22 ILM (1982) 698. See further Chapter IV.

74 See Protocol to the Antarctic Treaty on Environmental Protection, Madrid, 4 October 1991, in force since January 1998, 30 ILM (1991) 1461. See further Chapter IV.

75 This is reflected in the report by the European Climate Forum, note 58.

76 See for discussion of those difficulties Tol/Verheyen, State responsibility and compensation for climate change damage: A legal and economic assessment, 32 Energy Policy (2004) 1109 and Füssel et al., note 69, who create "climate impact response functions" (CIRFs) in order to avoid the downsides of purely economic indicators to assess climate impacts and to better assess non-market impacts.

77 Vaughan/Spouge, Risk estimation of the collapse of the West Antarctic Ice Sheet, 52 Climatic Change (2002) 65.

78 Rahmstorf, The thermohaline ocean circulation: a system with dangerous thresholds?, 46 Climatic Change (2000) 247; and Rahmstorf, Thermohaline circulation: The current climate, 421 Nature (2003) 699.

Global Yardstick – concentration levels and temperature rise

Due to the difficulties in modelling regional impacts, most scientists and environmentalists believe that, for practical purposes, the global average temperature increase should be the yardstick against which to operationalise Article 2. Estimates of future changes and expected damage can then be drawn from the temperature increases. The other side of the coin of predicted temperature increase is of course the allowable level of atmospheric greenhouse gas concentration over some period in the coming century or century and a half. This is the "budget" approach normally enshrined in environmental quality standards. In the case of Article 2 FCCC the question would be: What level of emissions is allowable before we have used the atmospheric budget?

The IPCC currently operates with different scenarios, predicting CO_2 concentrations of 490-1260 ppm by 2100 and suggesting reduction scenarios targeting 450, 650 or 1000 ppm by 2100. It has not taken a decision as to which ppm scenario would fit the definition of Article 2 FCCC. Most impact studies (see Chapter I) have modelled climate change impacts and damage on the basis of a doubling of atmospheric concentrations of carbon dioxide only, i.e. ~560 ppm, resulting in temperature increases, when other gases are taken into account, significantly higher than 3°C. By way of illustration, for warming scenarios above 2.5°C most current studies agree that world food prices would increase due to declining yields,[79] aggravating the undernourishment problem in many developing countries. Many of these studies already take into account adaptation efforts.

If these studies identify substantial impacts and (residual) damage despite adaptation efforts, it should be clear that the threshold of "preventing dangerous interference" should actually lie well below this figure, because these estimates imply that many ecosystems will not be able to adapt "naturally" to the predicted changes.

Balancing current economics and the interests of future generations, *Schröder et al.* have suggested a flexible "temporary value" target of 550 ppm, subject to corrections in the light of climate science.[80] Recent comparative studies have indeed found that an emission trajectory leading to stabilisation at 550 ppm by 2150 would definitely slow down the rate of change and "prevent some very significant adverse effects in the long term", while not necessarily having any substantial short-term effect on the damage occurring through coastal erosion or water shortages.[81] Opposed to this, the stabilisation target of 750 ppm would only delay damage, but is not likely to actually prevent adverse impacts.[82] Such a scenario is likely to be unacceptable on the basis of Article 2

79 TAR WG II, 84.

80 Schröder et al., Klimavorhersage und Klimavorsorge, at 15 (Summary in "Climate Predictions and Climate Precautions" at 21).

81 Arnell et al., note 54, at 444.

82 Parry et al., Millions at risk: defining critical climate change threats and targets, 11 Global Environmental Change (2001) 181 at 183.

FCCC, which stipulates that dangerous change must be prevented, not just delayed.

Climate Action Network (CAN) has therefore suggested that even a temperature increase of 2°C above pre-industrial times could constitute dangerous interference, but that anything beyond this threshold should certainly qualify as "dangerous". This temperature target alongside a 450 ppm concentration target has also been adopted by the German Advisory Council, WBGU[83] as well as by the European Union.[84] Even with temperature increases peaking at 2°C there is no guarantee that sea level rise over the next several centuries can be limited to half a metre, i.e. excluding inundation of islands and coastlands especially in developing countries,[85] which are among those listed as particularly vulnerable in the FCCC. This can only be achieved with CO_2 concentrations peaking below 450 ppm, as is illustrated in the IPCC "low" concentration scenario, as even concentration levels of 450 ppm are very likely to produce a long-term temperature rise of 2.5°C (IPCC best estimate).[86] According to the IPCC's new estimates, a stabilisation scenario at 450 ppm is achievable, but would require global anthropogenic emissions to drop well below 1990 levels within a few decades and continue to decrease steadily thereafter.[87] A 450 ppm-threshold was also suggested by *O'Neill/Oppenheimer* who also illustrated that this goal can be achieved only if there is no delay in reducing anthropogenic greenhouse gas emissions in industrialised countries.[88] Very similar suggestions were also made by *Metz et al.* who stress that this target might be the only adequate one in light of the uncertainties regarding climate feedback and a need for further knowledge about impacts.[89]

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83 See WBGU, World in Transition – Towards Sustainable Energy Systems, 2003, Summary for Policymakers, 1 ff.

84 See recent EU Council conclusions 20th December 2004, (2632. meeting), Climate Change para. 2: "REAFFIRMS that, with a view to meeting the ultimate objective of the Convention to prevent dangerous anthropogenic interference with the climate system, overall global annual mean surface temperature increase should not exceed 2°C above pre-industrial levels . . ."; and the statement of the Netherlands on behalf of the EU at the 10th Conference of the Parties, Earth Negotiation Bulletin, ENB Summary of COP10, 3 (www.iisd.org).

85 Climate Action Network, Preventing Dangerous Climate Change, 2002 and ECF, note 58.

86 This target would only be reachable if global CO_2 emissions begin to drop quite rapidly well before the peak concentration is reached, and will need to be close to zero by 2100, due to the slow rate of uptake of CO_2 by the ocean. Absolute reductions of about 80% by Annex I countries by mid-century relative to 1990 would be needed, followed by further reductions towards zero by 2100. This position was also taken by the French Foreign Minister Raffarin when he addressed the Assembly of the IPCC in Paris in February 2003, also calling for a 50% emissions reduction in industrialised countries by 2050. In 1990 the IPCC had already predicted that cuts of 60-80% of global CO_2 emissions were needed to ensure that dangerous climate change was prevented.

87 TAR WG I, 75.

88 Note 67.

89 Metz et al., Towards an equitable global climate change regime: compatibility with Article 2 of the Climate Change Convention and the link with sustainable development, 2 Climate Policy (2002) 211.

(3) *Tradeoffs?*

As was shown in the preceding section, scientific advice seems to focus on concentration thresholds of 450-550 ppm or a 2°C temperature rise threshold to prevent dangerous climate change. At the same time, all scientific estimates of what would constitute a "dangerous" threshold conclude that some degree of change is inevitable and thus adaptation is necessary.[90] It will also be necessary to enable sustainable economic development – a provision of the second sentence of Article 2. As pointed out above, the relationship between *prevention of* climate change and *adaptation to* a changing climate is important in the context of this thesis. Adaptation can be regarded as direct damage prevention while mitigation is prevention of global climate change regardless of the specific impacts. In the context of Article 2 (and any primary obligation to prevent damage) it is necessary to discuss whether, where certain damage can be avoided by adaptation, the mitigation threshold is lowered.

From the very beginning of the FCCC negotiations, Parties have maintained that a balanced mix of adaptation and abatement or mitigation policies should be pursued, but the precise relationship between those courses of conduct has not been clarified. Commenting on the text of the FCCC, *Sands* has argued that Article 2 shows the priority of the Convention to be the prevention of dangerous climate change,[91] an assessment which is shared by environmentalists and other scholars.[92] This analysis implies that adaptation options would not be capable of lowering the mitigation threshold. *Bodansky* contends that the text is neutral on this issue. In his view, Article 2 only seeks to prevent dangerous interferences and in cases where adaptation is possible climate change could be viewed as benign.[93]

The FCCC contains substantive obligations regarding adaptation, which will be discussed further below. This implies that damage prevention in the form of adaptive measures was always viewed by Parties as an option in approaching climate change. Article 2 does not prohibit any anthropogenic climate change, but only dangerous change. If certain changes can be remedied through adaptation, they are at least not dangerous in a material sense, i.e. dangerous to human beings, food production, or ecosystems; but while it is relatively easy to submit that changes such as the melting of the Antarctic ice sheet cannot be avoided by any measure of adaptation, it will be difficult to predict where other changes can be offset by suitable adaptation measures. In particular, for ecosystems already protected by international law,

90 TAR WG II SPM, at 6: "Adaptation is a necessary strategy at all scales to complement climate change mitigation efforts".

91 Sands, note 9, at 272.

92 See for example Ott, Völkerrechtliche Aspekte der Klimarahmenkonvention, in Brauch (ed.) Klimapolitik, 1996, at 64.

93 Bodansky, note 9, at 500.

adaptation might not be possible. Therefore, in the opinion of this author, the "dangerous" threshold is relatively unaffected by adaptation options, at least for some regions and sectors.

Moreover, and this is certainly a crucial reminder, Article 2 FCCC does not include any possibility for cost-effectiveness tradeoffs. Article 3.3 FCCC mentions cost-effectiveness in the context of the precautionary principle, obliging Parties to implement their commitments as cost effectively as possible (see below). Article 2, however, does not allow Parties to deviate from the goal of preventing dangerous climate change on the basis of expected costs.

(4) *Conclusion*

It is possible to interpret and operationalise the prevention duty contained in Article 2 FCCC on the basis of existing science and legal standards of protection enacted outside the FCCC. Looking at current scientific evidence and taking into account interests protected in other international treaties, it would appear that greenhouse gas concentrations in excess of 450 ppm, which would to lead to temperature increases in excess of 2°C as compared to pre-industrial times, qualify as dangerous. Given the fact that rising temperatures are already affecting biological systems, a specific country or biodiversity hotspot approach might even lead to declaring current levels of greenhouse gas concentrations dangerous. Stabilisation scenarios that show no prevention but only delay of certain adverse impacts (e.g. 750 ppm and above) must be deemed unacceptable given the duty of prevention provided in Article 2.

Article 2 FCCC therefore obliges Parties to take action to secure the stabilisation of atmospheric concentrations of greenhouse gases at around 450 ppm or to ensure that global average temperatures do not exceed 2°C above pre-industrial levels. This is a relatively concrete target which leaves only a limited number of implementation options. What this limitation means to commitments declared by the Parties will be explored below in the discussion of Article 4.2.

Interpreting Article 2 as the provision of a general obligation of States to protect the global climate has importance beyond the climate regime. Given that nearly every sovereign State is Party to the FCCC, that no non-Party State has objected to Article 2, that States have continued to declare the importance of protecting the global climate since ratification of the FCCC,[94] and the overarching notion that climate change

94 See only the Johannesburg Plan of Implementation concluded at the so-called Rio + 10 summit in September 2002, which reads in its relevant part (at 17): "36. The United Nations Framework Convention on Climate Change is the key instrument for addressing climate change, a global concern, and we reaffirm our commitment to achieving its ultimate objective of stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference

is a common concern of mankind (FCCC preamble, paragraph 1), the objective in Article 2 could be deemed to constitute customary international law of an *erga omnes* character.[95] This is significant for the application of international law outside the FCCC regime (see Chapter IV), as well as for enforcement options under the law of state responsibility, as discussed in Chapter V.

b) *Principles*

In a rather novel way, Article 3 FCCC provides principles to "guide" the Parties in achieving the FCCC's objectives. None of the other Rio Conventions, or the role model Conventions (the 1985 Ozone Convention and the 1979 Geneva Long Range Air Pollution Convention) contain a similar provision – they provide some guidance through their preambles.[96] The principles of the FCCC are important interpretative tools for primary duties to prevent climate change damage even outside the climate regime due to the universal membership of the FCCC, and they could also be of importance in the framework of state responsibility claims, e.g. via the principle of common but differentiated responsibility. First of all, however, a brief discussion of the significance of principles is warranted as this term is not universally applied in all legal traditions. In particular, it is necessary to determine their legal character, since this is what it in turn determines their legal force and practical applicability.

(1) *The Legal Character of Principles in International Law*

Calling the notions provided in Article 3 'principles' (actual title) was the subject of heavy debate in the INC. Some nations (in particular the USA) were concerned with the legal significance of principles in international law. They maintained that principles only served an interpretative function and that they were better included in the treaty's preamble (Article 31.2 VCLT stipulates that a treaty's preamble should be used to interpret the meaning of treaty provisions). Other Parties considered the prin-

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with the climate system, within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner, in accordance with our common but differentiated responsibilities and respective capabilities." Available at: <http://www.un.org>.

95 This is suggested by Durner, Common Goods, 2001, 268 and by Scheyli, Der Schutz des Klimas als Prüfstein völkerrechtlicher Konstitutionalisierung, 40 AVR (2002) 273 at 297, who argues that the common concern concept is evidence of elements of international environmental law constituting elements of public international law with constitutional character – overarching norms for the benefit of all mankind.

96 However, other instruments, such as the 1991 Protocol on Environmental Protection to the Antarctic Treaty (Article 3: "Environmental Principles") and the 1997 UN Convention on the Non-navigational Use of International Watercourses (Part II: "General Principles") do contain "principles" provisions.

ciples to have legal value over and above that of preambular material, and therefore, should have a distinct place in the text of the convention.[97]

The term "principles" is indeed imbued with different shades of meanings by international legal scholars and tribunals. Article 38.1 of the ICJ Statute explicitly lists "general principles of law as recognised by civilised nations" as a source of international law, and allows international law to draw from municipal law where no customary or treaty law is available.

The distinction between norms and principles is a theoretical one, independent of whether they are of municipal or international character. *Brownlie* states that principles are "primarily abstractions from mass rules and have been so long and generally accepted as to be no longer directly connected with state practice" and cites as examples of such international law principles the equality of states, reciprocity and good faith.[98] These are abstract notions not comparable to obligations. *Sands* refers to two types of principles, the general ones, deducted from municipal practice, such as good faith and equity, and such principles as have been formed explicitly in the area of international environmental law. In his view, such principles embody legal standards, but are more general than commitments and do not specify particular action, unlike rules.[99] This view is coherent with that of the Mixed Claims Commission's in the *Geneti* case, where a principle is defined as expressing "a general truth, which guides our action, serves as a theoretical basis for the various acts in our life and the application of which to reality produces a given consequence".[100] Similarly, *Cheng* notes that rules (norms) are the practical application of principles.[101] And for *Dworkin* both rules and principles are standards "that point to a particular decision about legal obligation in particular circumstances, but they differ in the character of the direction they give".[102] If the requirements of a rule are fulfilled, the consequences must be accepted,[103] but legal principles "do not set out legal consequences that follow auto-

97 See Bodansky, note 9, 501 ff. and Report of the 2nd INC session, UN Doc. A/AC.237/9, 13 and 17 f., Kellersmann, Die gemeinsame, aber differenzierte Verantwortlichkeit von Industriestaaten und Entwicklungsländern für den Schutz der globalen Umwelt, 2000, 54 ff.

98 Brownlie, Principles of Public International Law, 18.f. Similarly Vitzhum, in: Vitzhum, Völkerrecht, 76 ff. stresses that such principles ("allgemeine Rechtsgrundsätze") can only be deducted from municipal law by way of comparative law analysis. The ICJ relied on the principle of good faith and *pacta sunt servanda* for example in the *Nuclear Tests* cases, ICJ Rep. 1974, 267 f.

99 Sands, Principles of international environmental law, 183 ff. at 185. Verdross/Simma also argue that principles of international law materialise through international relations, such as in resolutions of international organisations, in: Völkerrecht, 1984, para. 606, 639.

100 Cited after Sands, International Law in the Field of Sustainable Development, BYIL (1994) 303 at 336.

101 Cheng, General Principles of Law as Applied by International Tribunals, 1953, at 376.

102 Dworkin, Taking Rights Seriously, 1970, at 22. See also the essays in 81 Yale Law Review (1972): Hart, Bentham on Legal Powers, 799; Raz, Legal Principles and the Limits of Law, 823; Dworkin, Social Rules and Legal Theory, 855.

103 Dworkin, Taking Rights Seriously, 24.

matically when the conditions provided are met".[104] Rather, a principle "states a reason that argues in one direction, but does not necessitate a particular decision".[105]

Thus, while some differences in theory exist, the legal significance of principles as general legal rules, which might not contain a direct obligation upon states to act, but must be taken into account by them when behaving towards other states is not disputed.[106] This conclusion also applies to Article 3 FCCC, even if a footnote to Article 1 FCCC explains that "titles of Articles [such as the title "Principles"] are included solely to assist the reader". As *Kellersmann* has pointed out, since Article 3 is placed in the operative part of the FCCC, there can be no doubt about the binding force of those notions or "principles" in the context of climate change law.[107] This is particularly true since the *chapeau* of Article 3 employs the word "shall". In their actions to achieve the objective of the FCCC and to implement its provisions, Parties shall be guided by, *inter alia*, the five principles listed, which broadly reflect the elements and notions called for by the General Assembly before the negotiations started. Only three are discussed here, as they are of singular importance to the issue of climate change damage.

(2) *Common but Differentiated Responsibility*

Article 3.1 calls for the protection of the climate for the "benefit of present and future generations . . . on the basis of equity" (intra- and intergenerational equity) and establishes the notion of "common but differentiated responsibility", which results in the obligation of developed country Parties to "take the lead in combating climate change and the adverse effects thereof". This leadership role for industrialised countries is reiterated both in the preamble to the FCCC (paragraphs 3 and 18) and in Article 4.2 (b). Paragraph 3 of the preamble explicitly notes that "the largest share of historical and current global emissions of greenhouse gases has originated in developed countries, that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs". The element of differentiated responsibilities has become a basic principle of climate change law, which to date only obliges industrialised countries to take specific mitigation action (Article 4.2 FCCC and Article 3 with Annex B of the Kyoto Protocol). Notably, Article 3.1 not only refers to the capacity of industrialised countries to mitigate climate change, but also "the adverse effects thereof", i.e. it establishes the leadership role with respect to climate change damage as well. The detailed provisions on the financial obligations of industrialised

104 Ibid., 25.
105 Ibid., 26.
106 See also Buck/Verheyen, Umweltvölkerrecht, in Koch (Ed.), Umweltrecht, 2002, 16.
107 Kellersmann, note 97, at 145.

countries to assist in financing adaptation to climate change are a reflection of this element of the principle.

The notion of common but differentiated responsibility has developed from the principle of equity (or justice) in international law. During and before UNCED it was recognised that the formal equality of States does not always mean that all States have the same duties, in particular when some have better means to effectively protect the global environment. Therefore, Principle 7 of the Rio Declaration states: "In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities". It is a new measure to distribute responsibility according to economic ability and status of development.[108]

The fact that some states have less ability to cope with environmental problems on the one hand and are less able to take preventive action was already captured in Principle 23 of the 1972 Stockholm Declaration.[109] Yet, the content and implications of the principle are still difficult to ascertain. Prior to the conclusion of the FCCC, international law had mainly differentiated between countries by using contextual norms, i.e. by requiring a certain conduct "as far as possible" or "according to their abilities".[110] The Montreal Protocol and UNCLOS (Article 207 IV) began to set out differentiated substantial obligations for industrialised countries and developing countries. In addition, many agreements adopted the idea of support for implementation, i.e. financial support for developing countries to comply with international agreements. These two elements (asymmetry of obligations and financial support for developing countries) are the prominent features of the principle of common but differentiated responsibility.

In accordance with this understanding, the FCCC sets out a variety of obligations, both substantive and procedural, that differentiate between developed and developing countries and reflect those two features of the principle. There are two categories of obligations or commitments: general ones, relating to information exchange, cooperation in scientific research, greenhouse gas inventories, national strategies and reporting (Articles 4.1, 5, 6, and 12.1); and specific commitments, that oblige developed countries to provide financial assistance (Articles 4.3 and 4.4) and to aim at reducing CO_2 emissions (Articles 4.2).

The Convention has two annexes, which serve as differentiation tools throughout the FCCC as well as the Kyoto Protocol. Annex I includes all OECD nations[111] and

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108 Kellersmann, note 97, 38 and 323f. and Stone, Common but differentiated responsibilities in international law, 98 AJIL (2004) 276, 279 ff.

109 Principle 23 reads in its relevant part: "it will be essential in all cases to consider . . . the extent of applicability of standards which are valid for the most advanced countries but which may be inappropriate and of unwarranted social cost for developing countries".

110 Kellersmann, note 97, at 61 ff.

111 The OECD, the Organisation for Economic Cooperation and Development has a membership of 30 countries. Apart from the countries of Western Europe and North America, Japan, Australia, New

some former Soviet and Socialist countries.[112] Annex II is only comprised of OECD countries. In addition, the Convention recognises "least developed states"[113] (Article 4.9 FCCC) and countries with economies in transition (which are represented in Annex I but receive a somewhat more flexible treatment, see Article 4.6 FCCC).

The principle as applied in the FCCC does not divide countries according to the potential impacts of climate change ("vulnerability to climate change") as the Alliance of Small Island States (AOSIS) had requested during the INC negotiations; but the climate damage dimension is reflected in Article 3.2, which explicitly refers to the special needs of developing countries that are particularly vulnerable to the adverse effects of climate change, and is also taken up by Articles 4.8 and4.9 as well as Article 4.4. Non-Annex I countries are on the whole more vulnerable to the impacts of climate change. As Chapter II has shown, most damaging effects of climate change are expected in the developing world, while OECD countries as well as those countries with economies in transition are much less vulnerable due to their geographical position and superior technical and financial capacities to adapt, but also due to a lesser reliance on natural resources as a source of income. A differentiation approach based on the degree of impacts of vulnerability might have better reflected the realties of climate change.

Nevertheless, the Annexes do differentiate between countries on the basis of per capita greenhouse gas emissions, listing those countries with historically high atmospheric emissions (in accordance with paragraph 3 of the FCCC's preamble). Between 1991 and 1997, Annex I countries were responsible for 71% of the world's total CO_2 emissions from fuel combustion and about 78.8% of CO_2 emissions from fossil fuel combustion between 1900 and 1990 originated in Annex I countries.[114]

Zealand and Turkey, other countries from other regions have joined more recently – Mexico, the Czech Republic, Hungary, Poland, Korea and the Slovak Republic. See further <http:www.oecd.org>.

112 In this category Annex I includes Belarus, Bulgaria, Croatia, Estonia, Latvia, Lithuania, Romania, The Russian Federation, Slovenia and the Ukraine. At the 5th Conference of the Parties, Kasachstan applied to be added to Annex I. The COP has not yet decided about this request (see Article 4.2.f) and g) FCCC).

113 According to Todarot, (Economic Development, 1995), least developed countries are those with a per capita income of under US $500 in 1990. The UN developed the term in 1971 to emphasise the status of the poorest countries. Today, least developed countries are defined as countries that suffer from long term poverty and a particularly low level of human resource development, which is measured in the "Augmented Physical Quality of Life" index (life expectancy, per capita nutrition supply, rate of school entry and literacy rate, economic diversification, industry/GDP, industry/jobs ratio, electricity consumption per capita and export orientation). Only countries with a maximum population of 75 million are included in the category. Before 1991 42 countries were classified as LDC, as of 1993 the list comprised 46 countries (see Wagner/Kaiser, Ökonomie der Entwicklungsländer, 1995). See for more information on country classification the World Development Report (Worldbank, 2000/2001). At the moment, 47 countries fall into this category.

114 IEA, CO_2 emissions from fuel combustion 1971-1997. The FCCC secretariat database does not contain data for all Parties. However, the IEA data is broadly comparable to that reported to the FCCC secretariat by the Parties.

Annex I countries are not, however, necessarily economically better off that non-Annex I States. GDP, as well as overall welfare of the population, is higher in Singapore or Quatar (non-Annex I) than, for example, in Romania or Belarus (Annex I). Thus, while both the financial and technically superior capacity of industrialised countries to respond to climate change coupled with their established historical responsibility for emissions prior to 1992 led to the inclusion of the principle of common but differentiated responsibility in the FCCC,[115] the element of economic superiority is not completely reflected in the Annexes.

The differentiation between countries on the basis of pollution levels and contributions to the climate change problem was mainly supported by the developing nations, which originally wanted to include the polluter pays principle in Article 3.[116] *Rajmani* therefore argues that the principle in Article 3.1 clearly attributes responsibility for the preservation of the global commons with respect to historical pollution and not just present contributions to climate change, i.e. that the principle leads a country's historic contributions to climate change to be transformed into a "measure of its responsibility".[117] But such a "measure" cannot by itself impose actual responsibility on states for any climate change damage resulting from historical emissions, as will be seen in Chapter V. The principle does not impose any additional duties on industrialised states, but can only serve as an interpretative tool for obligations and differentiations therein as well as justification for differentiation in future negotiations.[118] It is not a new primary norm, nor is it a reflection of the polluter pays principle ("Verursacherprinzip"),[119] which for some might be understood to constitute a primary norm leading to a direct claim for damages against the author of the damaging activity. The polluter pays principle is reflected in Principle 16 of the Rio Declaration,[120] but it is not accepted as a measure of responsibility for damage between countries in international law (see Chapter IV). *Kellersmann* and *Bodansky* have shown

115 Bodansky, note 9, at 503.

116 It should be noted that neither the preamble nor Art 3.1. reflect the request to clearly mark the "main responsibility" of industrialised countries for climate change as proposed by India and supported by many G77 nations during the INC negotiations. India had proposed preambular language that differs from the FCCC in that it refers to current emissions: "Noting the fact that the largest part of the current emissions of pollutants into the environment originates in developed countries, and recognising therefore that these countries have the main responsibility for combating such pollution". See India's submission in: Set of informal papers related to the preparation of a framework convention on climate change, UN Doc. A/AC.237/Misc.1/Add.3, 3.

117 See Rajmani., The Principle of Common but Differentiated Responsibility and the Balance of Commitments under the Climate Regime, 9 RECIEL (2000) 91, at 120-122.

118 Sands, Principles of International Environmental Law, 217 ff., Kellersmann, note 97, at 50.

119 See for a discussion Ott, note 92, at 65 and Bail, in EUDUR § 56, Nr. 12.

120 Principle 16 reads: "National authorities should endeavour to promote the internalisation of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the costs of pollution, with due regard to the public interests and without distorting international trade and investment".

that the origin of the principle in Article 3.1 FCCC is not the polluter pays principle, but in fact the result of the opposition of industrialised countries opposition to the inclusion of this principle in the FCCC.[121] The principle of common and differentiated responsibilities reflects a recognition of the differing economic capabilities of developing and industrialised countries in contributing to environmental protection. *Kellersmann* also points out though that the principle clearly mandates that the differing extent to which countries are a source of environmental problems should be reflected in the obligation of that state to remedy the problem.[122] When examining the differentiated responsibilities outlined in the FCCC and its Annexes, this reasoning does not appear to have been fully adopted by the Parties.

While the principle does not provide any new obligations or rights with regard to climate change damage, it can be used as a guiding principle for future regulation of such damage. For example, the three-fold distinction (Annex I, non-Annex I, particularly vulnerable) could be important, if and when further treaties are developed to regulate climate change damage (see Chapter VI), or when further guidelines are adopted for adaptation to the impacts of climate change within the obligations of industrialised countries as set out in Articles 4.3 and 4.4. (section Chapter I:II.2.c)(5). The principle can also play a role in allocating responsibility under the law of state responsibility (Chapter V).

With respect to climate change mitigation obligations, it should be noted that the principle does not preclude substantial mitigation obligations on the part of developing countries. Article 3 calls for industrialised countries to "take the lead", but Parties are only to be guided by this principle in the achievement of the Article 2 objective. As presented above, to achieve this aim, emissions reductions and reversals of trends are unequivocally required globally, not just from industrialised countries.

However, it is arguable that the famous Resolution 98 of the US Senate of 12 June 1997, which prohibits US ratification of the Kyoto Protocol unless developing countries take on commitments in the same compliance period, runs counter to Article 3.1.[123] The leadership of industrialised countries in mitigating climate change is enshrined in the Kyoto Protocol's targets which only apply to them – at least in the first commitment period (see further below). To ask for immediate commitments on the part of developing countries negates the agreed leadership principle embodied in Article 3.1 FCCC.

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121 Bodansky, note 9, at 479 ff., Kellersmann, note 97, at 41 ff. See also Beyerlin, Umweltvölkerrecht, 61.

122 Kellersmann, note 97, at 42.

123 The so-called Byrd-Hagel Resolution called for "meaningful participation of developing countries" and stated that the US Senate would not accept emission reduction obligations for the USA unless "the protocol or other agreement also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period" (105th Congress. 1st session, Senate Resolution 98). See further Oberthür/Ott, The Kyoto Protocol, 68 ff.

(3) *Precautionary Principle*

Article 3.3 FCCC provides the precautionary principle: *"Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects"*. Lack of scientific certainty cannot be used as an excuse to postpone such measures where there are threats of "serious or irreversible" damage. It is important to note that the precautionary principle not only applies to the prevention of climate change but also to the "mitigation of its adverse effects", i.e. to adaptation measures.

Having stated that Article 2 FCCC embodies the duty of prevention, it is interesting to see how the precautionary principle operates within the context of the FCCC. In the author's view, it complements Article 2 in that it calls on Parties to take measures even in the absence of agreed and binding targets. Moreover, it provides important guidance in the definition of the "dangerous" threshold as discussed above – it could, for example, lead parties to take as the basis for their assessment of likely physical impacts in the future an emissions scenario which is not overly optimistic with regard to emission developments.

Apart from such guidance, the principle's legal content and binding force is debated. On the national and European level the precautionary principle is implemented as a legally binding rule, for example in § 5(1) No. 2 German Federal Emissions Control Act or Article 2(11) of Annex IV of the EC's IPPC Directive.[124] For the addressees of this legislation, the principle constitutes a direct obligation to take precautionary measures, e.g. to use only the best available techniques in the production process. On the international level, the precautionary principle has appeared in numerous international policy declarations[125] and binding agreements[126] and represents a binding prin-

124 Directive 96/61 of 24 September 1996 concerning integrated pollution prevention and control, OJ 1996 L 257/26.

125 Article VII, XV(ii), XVI(1) of the 1987 Ministerial Declaration of the Second North Sea Conference; Principle 15 of the 1992 Rio Declaration; Paragraph 17.21 of Agenda 21; United Nations General Assembly resolutions 44/225 of 22 December 1989 and 46/215 of 20 December 1991; Ministerial Declaration on the Protection of the Black Sea (1993); Article 7.5 FAO Code of Conduct for Responsible Fisheries (1995); Sintra Statement of the Ministerial Meeting of the OSPAR Commission on 22-23 July 1998.

126 Article III (1)(b) 1952 North Pacific Fisheries Convention; Article V Convention on the Conservation of Antarctic Marine Living Resources, 1980; International Whaling Commission, 1982; Preamble Vienna Convention, 1985; Article 4(3) & (4) Antarctic Mineral Resources Convention, 1988; Article 4 Bamako Convention, 1991; Article 2(5)(a) ECE Transboundary Watercourses Convention, 1992; Article 2(2)(a) OSPAR Convention, 1992; Article 3(2) Baltic Sea Convention (Helsinki), 1992; Article 4(1)(f) Climate Change Convention, 1992; Article 174(2) of the Treaty Establishing the European Community (consolidated version) 1992; Convention on the Conservation and Management of the Pollock Resources in the Central Bering Sea, 1994; Article 6 UN Fish Stocks Agreement, 1995, Article 3(1) Protocol to the 1972 London Convention, 1996; Preamble EC Council Directive 96/61 of 24 September 1996 concerning integrated pollution prevention and control (note 124).

ciple (in the sense defined above).[127] Its representation in Principle 15 of the Rio declaration[128] is now viewed to be part of general customary international law.[129]

But unlike under German or European law, the precautionary principle does not represent a concrete obligation of conduct. It is a guiding principle for law and decision makers at all levels, but, as *Freestone/Hey* argue, it does not dictate specific regulatory measures.[130] It does, however, lower the threshold upon which States and governments are obliged to protect or prevent certain environmental damage in the face of uncertainty. It could therefore be argued that Article 2 provides the duty of prevention adopted on the basis of a precautionary approach.

Furthermore, application of the precautionary principle reverses the burden of proof that a certain activity does not or will not cause damage onto the State willing to enter into an environmentally sensitive activity.[131] As *Judge Wolfrum* expressed in his dissenting opinion in the *Mox* case *"there is no general agreement as to the consequences which flow from the implementation of this principle other than the burden of proof concerning the possible impact of a given activity is reversed. A State interested in undertaking or continuing a particular*

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127 See Marr/Schwemer, The Precautionary Principle in German Environmental Law – Role Model for European and International Environmental Law?, 3 Yearbook of European Environmental Law (2004), 124; Beyerlin, Umweltvölkerrecht, at 60 who contends that it is on its way to becoming a rule of public international law.

128 Principle 15 reads: "In order to protect the environment, the precautionary approach shall be widely applied by states according to their capabilities. Where there is threat of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation".

129 Marr/Schwemer, note 127; Marr, The Precautionary Principle in the Law of the Sea, 2003; Sands, Principles of international environmental law, at 213; Trouwborst, A., Evolution and Status of the Precautionary Principle, 2002, at 286. The European Commission has supported this view, see Communication on the Precautionary Principle, COM (2000) 1, 11. But see the ICJ decision in the *Gabcikóvo-Nagymaros* case, ICJ Rep 1997, 7, in which the court failed to acknowledge the principle as a norm of customary international law, while citing it as part of developing international law on the environment. See for a comment Sands, Treaty, Custom and the cross-fertilization of international law, 1 Yale HR and Dev L J (1998) 85 at 101. The legal status of the precautionary principle was discussed at length recently in the WTO Appellate Body decision on beef hormones, see EC Measures concerning Meat and Meat Products (Hormones), 16 Jan 1998, WT/DS26/AB/R, at 50 (to be viewed through <http://docsonline.wto.org>), which denied its legal status beyond environmental law. See on the precautionary principle as a constitutional element of customary international law Scheyli, note 95 at 293. See however, Judge Wolfrum's separate opinion in the *Mox* Case (ITLOS case No. 10, Mox Plant Case, (Ireland v. United Kingdom), 3 December 2001, available at <http://www.itlos.org>) who argues that it is "still a matter of discussion whether the precautionary principle or the precautionary approach in international environmental law has become part of international customary law" (at 4.). *Brunnée,* however, argues that the US is still hesitant to accept the principle as binding international law, see: The US and International Environmental Law: Living with an Elephant, 15 EJIL (2004) 617.

130 Freestone/Hey, note 51, at 12.

131 See Marr, The Southern Bluefin Tuna Case, 11 EJIL (2000), 815 at 821 and Freestone/Hey, The Precautionary Principle – The Challenge of Implementation, in Freestone/Hey, note 130, 249 at 261.

activity has to prove that it will result in no harm, rather than the other side having to prove that it will result in harm."[132] (emphasis added). This application is also relevant for issues of burden of proof in the context of state responsibility (Chapter V).

For this thesis, the effect of Article 3.3 on the relationship between adaptation (direct damage prevention) and mitigation (indirect damage prevention) is relevant. As mentioned before, when concluding the FCCC, the Parties were well aware that some damage would occur, regardless of their activities to mitigate climate change, i.e. reduce emissions or enhance carbon sinks; but does Article 3.3 prescribe mitigation or adaptation as the primary course of action by Parties?

A literal analysis does not directly answer this question. As mentioned before, the first sentence of Article 3.3 refers to both forms of damage prevention. Yet, it proceeds to stipulates explicitly that measures to "deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost". The phrase "deal with climate change" could refer to both adaptation and mitigation and might stipulate that cost-effectiveness should decide between the two courses of action. Still, cost-effectiveness does not provide a tool for deciding whether adaptation or mitigation should be chosen as a preferred measure. The cost-effectiveness provision implies only that some or no extent of residual damage be included in the assessment of a measure's overall cost. There is to be no weighing of adaptation versus mitigation. Instead, this provision builds on the definition of the "dangerous" threshold of Article 2 (where, as described above, cost-effectiveness is not relevant). Similarly, the phrase "ensure global benefits at the lowest possible costs" simply alludes to the fact that mitigation of climate change can be done in a more cost-effective way if done globally and cooperatively, rather than suggesting a selection of one method over the other based the likely costs of the two approaches. This interpretation is re-enforced by the last sentence of Article 3.3 which refers to the concept of joint implementation.

A method that would allow for such the weighing of adaptation versus mitigation is the cost-benefit analysis,[133] which is clearly not what Article 3.3 is referring to, since the adoption of this concept was considered during the INC negotiations, and rejected.

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132 *Mox* case, note 129, at 5.

133 A cost-benefit analysis (CBA) is an economic concept and entails an appraisal of an investment including all social and financial costs and benefits accruing to the project. Dictionary of Economics, Penguin, 1998. In the context of climate change, the benefits of mitigation could thus be assessed against the benefits of adaptation in a particular situation. CBA was first applied to climate change by *Nordhaus* and has since been subject to in-depth research (Nordhaus, An Optimal Transition Path for Controlling Greenhouse Gases, 258 Science (1992) 1315 and Nordhaus, Managing the Global Commons: Economics of the Greenhouse Effect, 1994). It has been argued that CBA cannot actually be applied to climate change due to the uncertainties involved when assessing likely climate change damage. See Tol, Is the Uncertainty about Climate Change too Large for Expected Cost-Benefit Analysis?, 56 Climatic Change (2003) 265, and – critical – Howarth, Catastrophic outcomes in the economics of climate change – An editorial comment, 56 Climatic Change (2003) 257.

In fact, even if a cost-benefit approach were applied to adaptation and mitigation measures, models predict today that adaptation costs rise disproportionately with higher concentrations of greenhouse gases in the atmosphere, which would make a comparison extremely difficult and possibly render it meaningless.

Article 3.3 therefore does not alter the interpretation of Article 2 as providing a duty to prevent climate change on the basis of mitigation. Adaptation is always the second-best option, because there is never a guarantee that the changes (which could have been prevented by taking early and effective mitigative action) can or will be counterbalanced through adaptation.

Article 3.3 still has significant implications for the adaptation policies of governments. In accordance with Article 3.3, Parties that foresee damage will be required to take adaptive action in order to prevent further damage (e.g. by reducing vulnerability to coastal erosion and storms in certain coastal areas). This is true both for current and future damage. A State faced with such damage would not be able to rely on the uncertainties inherent in climate models predictions as an excuse for not protecting certain human or biological systems. The national legal system permitting, an individual should be able to rely on the precautionary principle to demand protective action today rather than waiting for residual damage to occur. This outcome will be of importance when considering the adaptation needs of countries and their obligations under Article 4.1 (b).

(4) *Sustainable Development*

The concept of sustainable development is provided in Article 3.4 FCCC. All Rio instruments embrace this concept, which was significantly developed by the WCED in 1987.[134] Since then, many States have adopted it as an overriding policy principle and it appears in most international statements on the environment and/or development. Its legal significance is still heavily debated along with the significance of principles in international law in general.[135] Elements of its legal content are, for example, the call for intra- and inter-generational equity and the integration of environmental concerns into all other policies.[136] Consistent with the Rio Declaration (Principles 4,

134 See the WCED Report "Our Common Future", 1987.

135 See inclusively on the origins and context of the concept, Sands note 100, Paradell-Truis, Principles of International Environmental Law: An overview, 9 RECIEL (2000) 98 and the volume by Boyle/Freestone: International Law and Sustainable Development – Past Achievements and Future Challenges; Schröder, Sustainable Development – Ausgleich zwischen Umwelt und Entwicklung als Gestaltungsausfgabe der Staaten, AVR 1996, 251; Adams, Is There a Legal Future for Sustainable Development in Global Warming?, 16 Georgetown Int'l Law Rev. (2003), 77.

136 See Ginther, Überlegungen zu der Herausforderung der Rechtsdogmatik durch das Ordnungsprinzip Nachhaltige Entwicklung, in: Hafter et al. (ed.), Liber Amicorum Professor Seidl-Hohenveldern – in honour of his 80th Birthday, 1998, 233.

3, 5, 12), Article 3.4. FCCC declares the right of Parties to, as well as the duty to promote sustainable development. It also recognises that "economic development is essential for adopting measures to address climate change".

During the negotiations in the INC, developing countries attempted to introduce the "right to development" as a human right.[137] This was contested by developed nations, which strove to stress the "duty" to promote sustainable development. The text of the FCCC is vague here, catering to both demands. While it is not the aim of this thesis to discuss the legal content of the concept of sustainable development in depth, it should be noted that, while the concept may not give rise to an international right to sustainable development,[138] it does set a standard for both mitigation and adaptation to climate change. If one agrees with the opinion that sustainable development combines certain environmental and equity principles (essentially an aggregation of other principles of international law),[139] then sustainable development can act as a tool for all legal standards and decisions regarding damage control or remedy for climate change damage. This means that all Parties would be required to consider the overall societal and environmental effect of measures addressing climate change. On this basis, it could be argued, for example, that while it may reduce carbon emissions in the production of energy, the construction of a nuclear power plant is not acceptable because of the risks it poses to current and future generations. Similarly, certain measures which directly prevent climate change damage might be considered unacceptable, e.g. erecting sea walls could have detrimental effects on wildlife and biodiversity and the relocation of human settlements could have profound social effects. This argument will be explored further in Chapter IV.[140]

(5) *Conclusions*

The preceding analysis has shown that the principles contained in Article 3 FCCC represent binding principles of international law to be applied in the context of climate change, including the issue of climate change damage.

The principle of common but differentiated responsibility, while not providing any new obligations or rights with regard to climate change damage, can be used as a guiding principle for any future regulation of such damage. Furthermore, the principle must be taken into account when allocating responsibility for injury due to climate change under the law of state responsibility.

The precautionary principle complements the prevention duty contained in Article

137 See UN Declaration on the right to development, UNGA Res. 41/128, UN Doc. A/41/53. The status as a human right is contested and many industrialised countries, including the USA, voted against Res. 41/128.

138 This is the general view of scholars, see Bodansky, note 9 at 604 and Ott, note 92 at 65.

139 Paradell-Truis, note 135.

140 See further Verheyen, The Legal Framework of Adaptation and Adaptive Capacity, in: Huq/Klein/Smith: Climate Change, Adaptive Capacity and Development, 2003, 163.

2 FCCC and lowers the threshold under which States and governments are obliged to protect or prevent certain environmental damage in the face of uncertainty. It is also arguable that it reverses the burden of proof in the sense that a State claiming that climate change damage has occurred on its territory could rely on the precautionary principle to require the proof from the offending State that the activity was not harmful. An analysis of the principle in the context of the negotiating history further reveals that adaptation, a form of direct damage prevention, as opposed to the mitigation, is always the second-best option, because there is no guarantee that the damage caused by climate change can be counterbalanced through adaptation.

Lastly, the concept of sustainable development requires all Parties to consider the overall societal and environmental effects of measures addressing climate change and to balance the risks and interests of current and future generations. For example, it would be contrary to the legal content of this principle to delay mitigative action for the economic benefit of current generations, while accepting massive negative change for future societies. It therefore supports the interpretation of Article 2 FCCC described above.

c) *Obligations*

Article 4 is the core provision which sets out all of the main substantive commitments, flanked by Articles 5 and 6 (Research and Observation; Education, Training and Public Awareness) which are mostly declaratory, and Article 12 (Reporting).

(1) *Reduction target*

(a) *General*

Article 4.2 FCCC provides a concrete obligation regarding the reduction of greenhouse gas emissions and the enhancement of sinks, which complement the objective set out in Article 2. During the negotiations, the EU and some developing nations (in particular AOSIS countries) strongly supported the inclusion of binding "targets and timetables"[141] which are used effectively in many other international environmental agreements such as the Montreal Protocol and the Sulphur Dioxide/Nitrogen Oxide Protocols to the Geneva Long Range Air Pollution Convention. The USA, Japan, oil producing nations and other developing States opposed binding reduction commitments for greenhouse gases.[142]

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141 The targets suggested by countries ranged from a 20% cut in CO_2 emissions by 2005 to stabilisation of all greenhouse gases on 1990/1989 levels by 2000, see the summary in Compilation of possible elements for a framework convention on climate change, Note by the secretariat, UN Doc. A/AC.237/Misc.2, 27 ff.

142 See for a detailed analysis of country positions Oberthür/Ott, Stand und Perspektiven der internationalen Klimapolitik, 4 Internationale Politik und Gesellschaft (1995) 403 and Bodansky, note 9, 514 ff.

The wording of Article 4.2 FCCC, which emerged as a result of the negotiations on targets and timetables is rather cryptic.[143] Annex I Parties "shall adopt national policies and take corresponding measures" to reduce greenhouse gas emissions and to protect and enhance greenhouse gas sinks. It obliges Annex I Parties to "communicate detailed information . . . with the aim of returning individually or jointly to their 1990 levels . . . of carbon dioxide and other greenhouse gases" (4.2(b)), "by the end of the century" (4.2(a)), i.e. the year 2000. Taking such measures would "demonstrate that developed country Parties are taking the lead in modifying longer-term trends in anthropogenic emissions consistent with the objective of the Convention" and Parties recognise that the return of emissions to earlier levels would "contribute to such modification" of trends. (4.2(a)).

While the reporting requirements refer to both emissions and uptakes by sinks, the year 2000 target refers to gross emissions only and excludes the enhancement of sinks. As will be seen below, the Kyoto targets allow for a net approach, i.e. the account for both emissions and uptake of carbon by terrestrial sinks.

The legal status of Articles 4.2(a) and (b) and especially the question, whether or not the provision constitutes a binding emission reduction target (an "obligation of result"[144] to return emissions to 1990 levels by the year 2000) was the subject of much

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143 Article 4.2. reads: "The developed country Parties and other Parties included in Annex I commit themselves specifically as provided for in the following: a) Each of these Parties shall adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs. These policies and measures will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions consistent with the objective of the Convention, recognizing that the return by the end of the present decade to earlier levels of anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol would contribute to such modification, and taking into account the differences in these Parties' starting points and approaches, economic structures and resource bases, the need to maintain strong and sustainable economic growth, available technologies and other individual circumstances, as well as the need for equitable and appropriate contributions by each of these Parties to the global effort regarding that objective. These Parties may implement such policies and measures jointly with other Parties and may assist other Parties in contributing to the achievement of the objective of the Convention and, in particular, that of this subparagraph; b) In order to promote progress to this end, each of these Parties shall communicate, within six months of the entry into force of the Convention for it and periodically thereafter, and in accordance with Article 12, detailed information on its policies and measures referred to in subparagraph (a) above, as well as on its resulting projected anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol for the period referred to in subparagraph (a), with the aim of returning individually or jointly to their 1990 levels these anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol. This information will be reviewed by the Conference of the Parties, at its first session and periodically thereafter, in accordance with Article 7 . . ."

144 Norms can be differentiated between obligations of result (aiming at a concrete result) and obligations of conduct (aiming at a particular conduct rather than a firm result). This differentiation has been used in particular to determine whether a state has violated an international obligation and must face legal consequences under the law of state responsibility. It was introduced by the International Law

dispute. The wording of Article 4.2, however, does not contain an obligation of result.[145] That Article 4.2 is not sufficient to reach the objective of Article 2 was agreed at an early stage. At the first Conference of the Parties in Berlin (COP 1, 1995) Parties declared that the provisions in Article 4.2(a) and (b) were inadequate to reach the objective of the FCCC.[146] The 1997 Kyoto Protocol and its binding reduction or limitation targets goes further than the FCCC in the usage of binding targets, but the FCCC remains in force. Article 4.2 could thus still contain a concrete damage prevention obligation, i.e. a primary rule that, when broken, could be applied in the context of state responsibility (see Chapter V), and could in fact still be complemented by decisions of the COP. Now that the timeframe indicated in Article 4.2 FCCC (the year 2000) has lapsed, most Annex I States have missed the target, and science has advanced to a state where the objective in Article 2 can begin to be concretised, it is worth revisiting this debate.

(b) *The obligation today*

While overall Annex I emissions (benefiting from the economic collapse of many economies in transition in Central and Eastern Europe, including Russia and the Ukraine) have declined by 6,3% in the period from 1990-2002, Annex II countries have increased their emissions by 8.4%.[147] By means of illustration, emissions[148] have increased by over 10% between 1990 and 2002 in Australia, Canada, the USA, Japan, Ireland, Spain, Portugal and Greece. Austria, Finland, Italy and Norway have increased their emissions by 5-10%. In these countries, per capita greenhouse gas emissions have not declined either. In 2000, the average Australian emitted 5.14 t/C, the average Canadian 4.67 t/C, the average US citizen 5.99 t/C and the average Japanese 2.61 t/C, representing an increase in per capita emissions in most of those countries since 1990, and well above the world average of 1.21 t/C.[149]

Since Article 4.2 does not constitute an obligation of result, the fact that many Annex I States have not met the year 2000 target does not in itself constitute a breach

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Commission in 1977, but later withdrawn (See further Chapter V and Dupuy, Reviewing the Difficulties of Codification, 10 (1999) EJIL 371; Crawford, Revising the Draft Articles on State Responsibility, 10 (1999) EJIL 435 at 440 ff.; Okowa, State Responsibility for transboundary air pollution in international law, 2000, 171 ff.).

145 See for discussion only: Bodansky, note 9 at 521, Ott, note 92 at 68 ff.; Sands, note 9 at 274, Bodansky, The Emerging Climate Regime, 20 Annual Review Energy Environment (1995) 425 at 436 ff.; Verheyen, note 9 at 44 ff.

146 This decision (Decision 1/CP.1, FCCC/CP/1995/Add.1) is entitled "The Berlin Mandate" and marks the beginning of the negotiations leading to the adoption of the Kyoto Protocol.

147 Data provided by the FCCC secretariat, see FCCC/CP/2004/5 on the basis of national communications.

148 Greenhouse gases excluding Land Use Change and Forestry, id., Table 3.

149 See FCCC/SB/2002/INF.2, Table 3, at 6 and FCCC/WEB/2002/10.

of obligation. However, looking at the entirety of Article 4.2 in conjunction with Article 2 allows a finding of an "obligation of conduct" on Annex I states to modify long-term trends of greenhouse gas emissions. Such an interpretation is mandated and restricted by the methods prescribed in the VCLT.

Article 31 VCLT stipulates that a treaty rule should be interpreted in "good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose". Any interpretation should also take into account Article 18 VCLT which stipulates that a Party is obliged, after signing a treaty "to refrain from acts which would defeat the object and purpose" of that treaty. This means that, upon signing the FCCC, prior to its entry into force, every Annex I signatory was obliged to *omit* actions running counter to the objective of the FCCC. After its entry into force, the obligation to omit remains but is supplemented by an obligation to act positively (*commit*) to achieve the objective of the FCCC, i.e. to work toward the stabilisation of greenhouse gas concentrations in the atmosphere at "safe" levels.

It is indisputable that at the time of the conclusion of the FCCC every country participant was aware of the fact that its primary contribution to achieving the objective of Article 2 would be the reduction of its own greenhouse gas emissions. The 1990 IPCC report had clearly spelt out that business-as-usual emission scenarios would result in greenhouse gas concentrations in the atmosphere inconsistent with the objective of Article 2 and would lead to severe changes resulting in damage worldwide in the medium- and long term.

All Parties are committed to the common objective of stabilising greenhouse gas concentrations in the atmosphere at a level which prevents dangerous anthropogenic interference with the climate system (Article 2), and Annex I states are further committed to taking the lead in combating climate change and its the effects (Article 3.1 and Article 4.2, chapeau *"The developed country Parties – . . . commit themselves specifically . . ."*). It was apparent even then that achieving the Article 2 objective was possible only if greenhouse gas emissions were restricted and reduced severely, immediately. Article 4.2(a) explicitly states that modifying long-term trends of greenhouse gas emissions is consistent with the objective of the Convention. In other words, at the outset Annex I countries accepted within their "specific commitment" that without long-term reversal of the prevalent growth trend, the objective of the FCCC was unachievable.

These three facts, i.e. that 1) all Parties are bound by Article 2's duty to prevent, which they shall not "defeat" (Article 18 VCLT); 2) Annex I Parties are specifically committed under Article 4.2; and 3) Annex I Parties specifically accept, again under Article 4.2, that a modification of trends is consistent with the objective of Article 2, provide enough evidence to conclude that the FCCC places an "obligation of conduct" on Annex I Parties to modify (reverse) the long term trend of increasing greenhouse gas emissions in order to stabilise atmospheric concentrations. It is not directly relevant to the binding nature of this obligation that no clear time or volume targets are provided.

This kind of general obligation of conduct is not novel to international law and even if the content of the obligation cannot be established precisely in positive terms, it is possible to determine when the obligation is breached (i.e. defined negatively). This could be done, for example, by referring to the inadequacy of a Party's climate action plans. Nothing in the negotiating history excludes such a finding. By formulating Article 4.2(a) and (b) in this vague manner, it was not the intention of the Parties to exclude an obligation to mitigate climate change, but rather their wish was to ensure that that they would not be legally bound by specific volume or time targets. The fact that developed Parties are required to take the lead in reaching the objective of Article 2 has neither been disputed in the context of the FCCC, nor in the specific context of the Kyoto Protocol's targets.

Naturally, this primary obligation (of conduct) must be considered in conjunction with the Kyoto Protocol's binding reduction targets (obligations of result) and the dynamic regime established by it. These synergies will be discussed below. Nevertheless, it is important to keep in mind that this duty to reverse long term emissions trends is enforceable independently of the Kyoto Protocol. Whether or not it has been breached will be analysed in Chapter IV.

(c) *Reduction obligation of developing countries?*

As has been noted, Article 4.2 only applies to Annex I countries. However, one could argue that by narrowing the obligation to developed countries, the Article 2 objective is contravened. As *Metz et al.* and others have demonstrated (modelled), a concentration target of 450 ppm or even 550 ppm cannot be reached if developing countries' emissions are allowed to grow unrestrained.[150] The question therefore arises as to whether Article 4.1, in conjunction with Article 2 imposes any effective mitigation duties on developing countries. This is of particular interest as climate change damage will affect primarily those countries whose emissions are unconstrained. It could be argued that it is in the interest of developing countries, especially in the tropics, to effectively reduce global (as opposed to Annex I) emissions. As will be remembered, the decision to exclude developing countries from mitigation obligations was made on the basis of the principle of common but differentiated responsibility and on the basis that per capital emissions of developing countries are much lower than those of the developed world (FCCC preamble, para. 3).

Several ways of reaching developing country participation in mitigation efforts (distribution of commitments) have been discussed, all of which represent an attempt to impose duties on developing countries in line with the principle of common but

150 See Metz et al., note 89.

differentiated responsibility.[151] Three policy principles for distribution are often cited: "Responsibility"[152] (mitigation efforts are distributed based on historic and current contributions to the problem – this approach is based on a cause-and-effect-relationship), "Capability" (mitigation efforts are distributed based on technical capability, income, natural resource base etc., i.e. a country's relative ability to solve the problem – this could lead to the adoption of relative carbon intensity targets to fit every economy), and "Need" (mitigation efforts which take into account development needs such as eradication of poverty, i.e. the equal rights of humans everywhere – this could lead to a distribution based on per capita emission rights and to a slow "convergence" of per capita emissions of all countries).

Taking Article 2 as a yardstick, *Metz et al.* have calculated that using the Capability approach, i.e. adopting commitments based on carbon intensity reductions – targets relative to economic growth, instead of requiring absolute reduction targets for developing countries after 2012, will render the 450 ppm (and possibly also the 550 ppm) threshold out of reach. This, would contravene the objective of the treaty. The Need approach, i.e. letting global per capita emission levels converge after a drastic reduction of Annex I per capita emissions, would lead to a "just" distribution and could indeed achieve stabilisation between 450-550 ppm; however, the emissions allowances for developing countries would still be below the level of unmitigated emissions projected for developing countries throughout the middle of this century. This means that developing countries would most likely not have much excess emissions allowance to sell to Annex I countries.[153]

This analysis does not change the fact that Article 4.2 and therefore the obligation to reverse emissions trends is not applicable to non-Annex I countries. The fact that Article 2 objective will not be achievable without commitments by developing country parties is, however, a strong indication that they, as much as the industrialised countries, must comply fully with their duty of co-operation under the FCCC and develop further instruments (Articles 4.2(d), 7.2(e) and 17 FCCC). Developing countries cannot rely on the principle of common but differentiated responsibility to shield them from any effective mitigation commitments. On the other hand, developing country Parties will be able to use this principle, as expressed in Article 4.7 FCCC, to make their co-operation contingent upon the fulfilment of the financial and technology transfer obligations of the industrialised country Parties.

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151 See Ringius et al., Burden sharing and fairness principles in international climate policy, 2 International Environmental Agreements (2002) 1. The debate about distribution of commitments has been summarised often as the "Equity problem", see also Müller, Equity in Climate Change: The Great Divide, 2003, 27 ff. and Müller, Varieties of distributive justice in climate change, 48 Climatic Change (2001) 273.

152 This term is not used to connote the law on state responsibility, but as a general ethical notion.

153 This would only be the case in application of the IPCC's "optimistic" Scenario B1, which assumes voluntary policy changes in many areas, a rapid decline in fertility levels and most growth in the service sector.

(2) *Programmes for mitigation and adaptation*

Article 4.1(b) FCCC provides that all Parties must "formulate and implement national or regional programmes containing measures to mitigate climate change . . . and measures to facilitate adequate adaptation to climate change". This formulation, while mainly interpreted as a reporting duty, contains a separate obligation to implement programmes. As the wording suggests, (". . . programmes containing measures . . .") programmes are implemented by carrying out specific, real-life measures to facilitate adequate adaptation. The FCCC thus contains a substantive obligation for Parties to address mitigation and adaptation in a strategic way through programmes and, importantly, also obliges them to implement these measures. Thus, a clear duty to take measures which facilitate indirect and direct damage-prevention is imposed on all Parties.[154] Parties must report and take responsibility for the fulfilment or non-fulfilment of these obligations in their national communications as provided in Article 12.1 of the FCCC.

With respect to mitigation measures, the obligation is difficult to enforce or substantiate without specific reduction targets or other substantive criteria. The omission of a yardstick against which to measure these mitigation duties is deliberate and is in line with the principle of common but differentiated responsibility. Besides, for many developing countries, the duty to mitigate is of secondary concern because their contribution to net greenhouse gas emissions is so small.

With respect to adaptation, industrialised countries have stepped up efforts to define their own adaptation needs in their national communications and are increasing their research efforts. This explains the current bias of scientific studies toward regional impacts in the Northern Hemisphere. Still, Article 4.1(b) obliges developing countries to engage in damage prevention, even thought it is supported financially by industrialised countries (see below, Articles 4.3 and 4.4). The following section will assess in some more detail what this obligation in Article 4.1(b) entails.

Article 4.1(b) imposes an obligation of conduct. Parties must undertake anticipatory, planned adaptation measures and cannot rely on the autonomous adaptation of natural or human systems. The equivalent of this is the duty to enhance adaptive capacity by reducing vulnerability to the impacts and risks of climate change. To assess their needs, Parties have been encouraged to use, *inter alia*, the IPCC Technical Guidelines for Assessing Climate Change Impacts and Adaptations[155] and quite apart

154 See also Kellersmann, note 97, at 149.

155 Decision 9/CP.2 (Annex I Parties), Annex, para. 41 and Decision 10/CP.2, (non-Annex I) FCCC/CP/1996/15/Add.1., Carter et al., IPCC Technical Guidelines for Assessing Climate Change Impacts and Adaptations, 1994 – these guidelines are no longer the state of the Article Recently, the FCCC released a "Compendium on methods and tools to evaluate impacts of, vulnerability and adaptation to climate change" (January 2004) which lists all current methodologies.

from the actual status of implementation (see below) there is no doubt that both Annex I and non-Annex I Parties consider themselves bound by the duty established under Article 4.1(b), as evidenced by their national communications, which, apart from a descriptive section often also include climate change action plans listing both possible mitigation and adaptation measures.[156]

Two critical issues arise in this context: 1) what is meant by the term "measures to facilitate"; and 2) what constitutes "adequate adaptation".

Measures to Facilitate

Defining the term facilitate is necessary to assess what type of conduct is required of Parties by Article 4.1(b). Within the climate regime, the term 'facilitation' appears to mean something other than the full catalogue of measures that could be envisaged to reduce vulnerability to the impacts of climate change and make a human or natural systems "climate-safe". Literally, the word 'facilitate' means 'to help, aid or assist',[157] and is often used in conjunction with planning or 'enabling activities' for categorizing funding provided by the GEF. In this framework, enabling activities are capacity or institution-building measures aimed at either assessing vulnerability to climate change or planning for adaptation. These activities are distinguished from projects to actively reduce vulnerability or "concrete adaptation projects" (see below Chapter IV).

However, based on the text of the FCCC, there is no reason to conclude that the national programmes mentioned in Article 4.1(b) must be confined to a particular set of measures. Rather, in a literal interpretation, they can include the full range of measures that would enable 'adequate adaptation'. As discussed in Chapter II, reducing vulnerability and thereby adapting to the impacts of climate change can take many different shapes. Adaptation is not merely the sum of particular measures. It is a process.[158] Therefore, methods discussed by the scientific community to enhance adaptive capacity in developing countries, such as interventions in the health, education or housing sectors,[159] should qualify as measures facilitating adaptation just as much as "hard" adaptation measures such as the building of dikes or the planting of trees in coastal areas to soften the impacts of tidal waves.

This interpretation is supported by the fact that a related provision, Article 4.1(e) calls explicitly only for preparation for adaptation to the impacts of climate change. To this end Parties shall *"cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate . . . plans for coastal zone management, water resources and agriculture, and*

156 See for all national communications <http://unfccc.int>.

157 Oxford Concise Dictionary, (Clarendon Press, 1999).

158 This is recognized in all the COP decisions regarding adaptation, in particular, by the three-stage approach established at COP1, see: FCCC/CP/1995/7/Add.1.

159 For example, by increasing awareness about the possible impacts of climate change among local communities or designing and enforcing building codes to ensure storm-proof housing.

for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods". Apart from drawing particular attention to Africa, this provision does not contain any particular obligation to actually reduce vulnerability and undertake adaptation measures – in stark contrast to the positive requirement under Article 4.1(b).

Adequate Adaptation

"Adequate" (synonyms: sufficient, satisfactory, tolerable) is a relative term by definition – as is the term "dangerous interference" in Article 2 FCCC – and is not defined in the FCCC. It re-appears in Article 4.3 FCCC in reference to the adequacy of the flow of funds.

While, as shown above, Article 4.1(b) allows for a whole range of measures to reduce vulnerability, it does not oblige Parties to carry out any particular kind or type of measure. The provision does not specify the time period in which the duty arises, nor does it set a deadline for either the formulation of the adaptation programmes or their implementation. However, it can be assumed that measures that infringe upon other international or national rules could be deemed inadequate. Therefore, adaptation measures that would destroy a wetland protected under the Ramsar Convention (see Chapter IV) or would displace people contrary to human rights provisions would be inadmissible. Please note that the enforcement of existing standards will depend on local and national laws since direct damage prevention measures are conducted at the level of national sovereignty.

Adaptation measures giving rise to additional greenhouse gas emissions by Annex I Parties could also be deemed inadequate in the context of the FCCC since they would contravene Articles 2 and 4.2 FCCC. As regards Non-Annex I countries, with no direct mitigation obligations, it could be argued that projects increasing the overall emissions of a FCCC Party would be inadequate in the light of the Convention as a whole, and thus, they would have to be justified.

Logically, determining what constitutes adequate adaptation must begin with a vulnerability assessment of the pertinent region or community. The criteria used in this determination could include the degree of economic efficiency, environmental sustainability, technical feasibility, administrative/legal admissibility, and social acceptability of the measures.[160] At various occasions during the international climate change negotiations, industrialised states (donor countries) suggested that adaptation measures would only be deemed adequate if they were cost-effective. For instance, when the system at risk is more valuable than the overall cost of the considered measures. However, determining cost-effectiveness in this sense is riddled with uncertainties,

160 See Klein/Tol, Adaptation to Climate Change: Options and Technologies, Technical Paper FCCC/TP/1997/3, at 29. See also the UNDP Adaptation Policy Framework (<http://www.undp.org>) which seeks to assist in making such choices.

knowledge gaps, and elements of judgment.[161] An "economic toolbox" alone would not provide the answer to problems of judgment when it comes to enhancing adaptive capacity and adaptation measures themselves. Instead, the choice of adaptation options will depend largely on the special circumstances of a country or region. And while Annex II states have accepted some responsibility with respect to adaptation through their financial commitments (reflecting the principle of common but differentiated responsibilities), they are not in a position to define the exact scope of Article 4.1(b) since the FCCC gives countries formulating and implementing adaptation programmes discretion to judge what is adequate. There is no provision in the FCCC to prohibit a country from making a choice that proves not to be cost-effective, e.g. when prioritising the protection of a particular ecosystem over the preservation of infrastructure. As pointed out above, such (non-economic) decisions could be mandated by international or national law. Authors who have argued against the sole use of economic tools such as cost-benefit analysis to determine adaptation options[162] find support in international law.

The FCCC does not oblige Parties to take every possible measure to prevent climate change damage. The term 'adequate' leaves a margin of discretion to the Party to choose between preventing residual damage and accepting it. This is important with respect to potential compensation claims discussed in Chapter V. Because Parties have a margin of discretion in the implementation of the Article 4.1(b) obligation, a breach will be almost impossible to determine, which provides a possible defence against a state responsibility claim.

(3) *Articles 4.8 and 4.9*

Article 4.8 FCCC provides that, in implementing the FCCC, Parties shall *"give full consideration to what actions are necessary under the FCCC, including actions related to funding, insurance and the transfer of technology, to meet the specific needs and concerns of developing country Parties arising from the adverse effects of climate change and/or the impact of the implementation of response measures . . ."*.[163] Article 4.8 lists nine groups and types of countries that must be taken specifically into account, while Article 4.9 calls for specific attention to

161 See Klein, Adaptation to climate variability and change: what is optimal and appropriate? In: Guipponi et al., Climate Change and the Mediterranean: Socio-Economics of Impacts, Vulnerability and Adaptation, 2002.

162 Ibid.; See also: Klein, Adaptation to Climate Change in German Official Development Assistance – An Inventory of Activities and Opportunities, with a Special Focus on Africa, 2001; and Callaway et al., Adaptation Costs: A Framework and Methods, in Francis et al. (eds.), Mitigation and Adaptation costs assessment, concepts, methods and appropriate use, 1998.

163 See generally Barnett/Dessai, Articles 4.8 and 4.9 of the UNFCCC: adverse effects and the impacts of response measures, 72 Climate Policy (2002) 1.

the needs of least developed countries.[164] Out of the nine items on the Article 4.8 list, eight refer to the particular vulnerability of countries to the impacts of climate change. Thus, although climate change damage was not a criterion for the creation of the Annexes to the FCCC, the special vulnerability of countries to climate change damage constitutes an important distinction in this part of the FCCC.

Articles 4.8 is politically contentious because it includes a provision for OPEC countries and other interested parties to discuss economic hardships arising from a decrease in fossil fuel demand. This is what is termed "impacts of response measures" and is explicitly spelled out in the list to Article 4.8: Parties must consider the effect of the implementation of the Convention on "countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products". Discussions about "compensation" from Annex II to OPEC countries were one of the main impediments during the INC negotiations and continued in the negotiation of the Kyoto Protocol (see Article 3.14 Kyoto Protocol). They are of marginal importance, however, to this thesis, as it is concerned with the impacts of climate change in a physical, not purely economic sense, even if the impacts of climate change might themselves lead to economic damage.

The phrase "concerns of developing countries arising from the adverse effects of climate change" is very broad. Article 1.1 FCCC defines adverse effects as any changes which have "significant deleterious effects" on human and natural systems, human health or welfare. "Concerns" can include both the financial and technological needs for adaptation to prevent loss of property, territory and life and the financial and technological needs for addressing climate change induced damage that cannot be prevented through adaptation measures. "Concerns" therefore can refer both to direct damage prevention (adaptation) along with the associated the costs and residual climate change damage with its associated costs.

That Article 4.8 includes residual damage is evidenced by its historical evolution. It is the only provision which takes up the discussions held in the INC about insurance schemes. These schemes were designed to tackle residual damage only.[165] While

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164 Article 4.9 reads: The Parties shall take full account of the specific needs and special situations of the least developed countries in their actions with regard to funding and transfer of technology".

165 Decision 5/CP.7 (FCCC/CP/2001/13/Add.1) took up this mandate and asked the Secretariat to hold workshops on how to progress on the issue of insurance. Two workshops on this issue were held in May 2003, one on insurance and risk assessment in the context of climate change and extreme weather events, the other on insurance-related actions to address the needs of developing country Parties arising from the adverse effects of climate change and from the impact of the implementation of response measures. See Linneroth-Bayer/Mace/Verheyen, Insurance-Related Actions and Risk Assessment in the Context of the UN FCCC, Background Paper, May 2003 and FCCC/SBI/2003/11, Report on the UNFCCC workshops on insurance.

it does not prescribe a specific course of action, obliging Parties only to consider such actions when implementing Article 4 obligations, it provides an important basis for the further development of the climate regime. This will be discussed in more detail in Chapter VI.

With regard to adaptation activities, these provisions complement Articles 4.1(b) and 4.1(e) and provide a basis for assessing the content of the obligations in Articles 4.3 and 4.4. As will be seen below, Article 4.8 together with Article 4.1(b) has provided detailed guidance to the financial mechanism on adaptation needs and funding priorities.

(4) *Reporting*

Articles 4.1, 4.2 and 12.1 FCCC together establish the reporting and monitoring system of the climate regime. All Parties must (i) produce national greenhouse gas inventories, using methodologies agreed by the COP; and (ii) formulate and implement national or regional programmes "containing measures to mitigate climate change . . . and measures to facilitate adequate adaptation to climate change" (Article 4.1). Annex I countries must also report on policies and measures taken to mitigate climate change and must give an estimate about their effects on emissions and sinks as well as on their respective overall emission paths (4.2(a) and (b)). The information required in (ii) above, is then reported in "National Communications" in accordance with Article 12.1 FCCC,[166] that required in (i) is included in country-specific greenhouse gas inventories.

For the purposes of this thesis, the inventories[167] are important because they provide the data for determining an individual country's contribution to greenhouse gases emitted into since 1990. The inventories do not, however, determine historic emission shares. Inventories must be submitted annually by Annex I Parties.[168] The inventories are also the basis for determining compliance with any quantitative reduction commitments (as provided in Article 3 of the Kyoto Protocol, see section III below).[169]

National communications are a starting point for assessing State practice and declarations made by governments with respect to their obligations under the climate

166 Article 12.1 (for all Parties) and Article 12.2 (for Annex I only), Article 4.2(a) and (b), 7.2(a), (d) and (e), 9.2 (b) and 10.2 FCCC contain more detailed provisions about the content of National Communications.

167 These are very large lists with country specific data about emissions based mainly on input data, not actual measurement of emissions and removals by sinks based on estimates, not measurements. This method results in some uncertainties with respect to country contributions, as discussed in Chapter II.

168 Decision 3/CP.1, FCCC/CP/1995/7/Add.1. It was decided at COP2 that Annex I Parties must submit national inventory data on emissions by source and removals by sinks on an annual basis, by 15 April of each year, see Decision 9/CP.2, FCCC/CP/1996/15/Add.1. At COP8, a new reporting format for Annex I-inventories was adopted: Part I: FCCC reporting guidelines on annual inventories, see Dec. 18/CP.8, FCCC/CP/2002/7/Add.2.

169 Greenhouse gas inventories are to be produced according to the revised 1996 'Guidelines for National Greenhouse Gas Inventories' devised by the IPCC, available at the UNFCCC website.

regime. They reveal to what extent a Party has implemented the obligations of the FCCC. Because of the reporting obligation on adaptation programmes and measures they are also a basis for estimates about expected climate change damage in countries and potential direct damage prevention measures.

Reflecting the principle of common but differentiated responsibilities, there is a substantial difference between obligations of Annex I[170] and non-Annex I[171] countries regarding national communications. According to Article 12.5 FCCC, each non-Annex I Party shall make its initial communication within three years of entry into force of the FCCC for that Party, or of the availability of financial resources in accordance with Article 4.3. Parties that are least developed may make their initial communications at their discretion. Annex I countries were obliged to submit their first national communication within six months of the entry into force of the FCCC, i.e. by September 1994. Intervals for subsequent submissions are determined by the COP. The COP also provides guidance for the elaboration of inventories and other information on the implementation of the FCCC (Articles 7.2 (d) and (e)).[172]

(5) *Financial commitments and the Financial mechanism*

There are two categories of financial obligations in the FCCC which oblige Annex II countries to provide funds to developing country parties. The first category is aimed at assisting developing countries with the implementation of their duties under the convention (Article 4.3) and the second category is aimed specifically at adaptation (Article 4.4).

The first sentence of Article 4.3 obliges Annex II Parties to "provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations under Article 12 paragraph 1". Annex II Parties thus must meet the full cost of all reporting requirements, in those of particular national communications of non-Annex I Parties.

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170 Guidelines are found in INC document A/AC.237/55, Annex I to Decision 9/2 of the Committee. The guidelines for Annex I countries were revised by Decision 9/CP.2, FCCC/CP/1996/15/Add.1. COP5 adopted four sets of guidelines on reporting and review. Part I, adopted by decision 3/CP.5, covers FCCC reporting guidelines on annual inventories which are to be used by Parties in reporting inventories due by 15 April each year, starting in 2000. Part II, adopted by decision 4/CP.5, covers FCCC reporting guidelines on national communications (FCCC/CP/1999/6/Add.1 and FCCC/CP/1999/7).

171 See Decision 12/CP.4 "Initial national communications from Parties not included in Annex I to the Convention", FCCC/CP/1998/16/Add.1 and decisions 10/CP.2 and 11/CP.2. COP8 adopted new guidelines for non-Annex I National Communications, see Dec. 17/CP.8, FCCC/CP/2002/7/Add.2.

172 At the first COP, the Parties established the so-called in depth review procedure to fulfil Article 7.2 (e) (See decision 2/CP/1, FCCC/CP/1995/7/Add.1 and Oberthür/Ott, The Kyoto Protocol, 208). The review teams are comprised of experts and draw on evaluation guidelines contained in document A/AC.237/63/Add.1. They are to report on each in-depth review of a national communication, must be written in non-confrontational language, and submitted to the subsidiary bodies. The fourth communication is due by 1 January 2006, Dec. 4/CP.8, FCCC/CP/2002/7/Add.1.

The second sentence of Article 4.3 provides the basis for claiming funds for both indirect and direct damage prevention measures in developing countries. "They [Annex II Parties] shall also provide such financial resources . . . needed by the developing country Parties to meet the agreed full incremental costs of implementing measures that are covered by paragraph 1". These activities must be financed from "new and additional financial resources", i.e. distinct from official development aid and specifically provided to implement the FCCC. Measures covered include, *inter alia*, the programme and adaptation measures in Article 4.1(b), co-operation in the preparation for adaptation in Article 4.1(e), and measures to implement Articles 4.8 and 4.9.

Article 4.4 stipulates that Annex II Parties "shall also assist developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects".

This seems to provide an unlimited basis for funding for adaptation – which was why the provision was opposed by the USA and others in the last phases of negotiations.[173] Indeed, some have interpreted Article 4.4 as the most costly provision of the FCCC and *Sands* has commented that Article 4.4 "amounts to an implicit acceptance of responsibility for causing climate change".[174]

Even though the FCCC does not require a specific level of financial resources,[175] it should be noted from the outset that the financial obligations enshrined in Articles 4.3 and 4.4 are mandatory and therefore differ substantially from official development assistance (ODA).[176] Although UN bodies as well as heads of state regularly reiterate that developed States should strive to contribute 0.7% of their respective GDPs (the official UN target), and many international instruments emphasize the need for financial cooperation to achieve sustainable development,[177] there are no binding international rules on this issue. Funds provided by industrialised countries for any activities have been voluntary. In contrast, the climate regime provides developing countries with a legal basis to claim funds from Annex II parties for the purposes defined in the FCCC, and in particular for dealing with climate change damage.[178]

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173 For the bracketed text of the 1992 INC consolidated text, see: Report of the work of the INC, Geneva, 20 December 1991, A/AC.237/15, at 41, section IV, para. 2.2(a).

174 Sands, n. 9 above, at 275.

175 Developing Parties did not propose a specific amount during the negotiations, only Norway referred to a specific amount (1.1% of GNP). See Bodansky, note 9 at 525.

176 For a history of financial obligations in multilateral environmental agreements see Jordan/Werksman, Additional Funds, Incremental Costs and the Global Environment, (1994) 3 RECIEL 81 and Beck, Die Differenzierung der Rechtspflichten in den Beziehungen zwischen Industrie- und Entwicklungsländern, 1994, 178 ff.

177 See Johannesburg Plan of Implementation, note 94, throughout.

178 During the negotiations of the FCCC, developing countries emphasized that the implementation of any obligations by them, including the duty to implement adaptation measures, would depend on new financial commitments by the developed countries. This principle is now reflected in FCCC, Article 4.7.

A role model for the FCCC's financial commitments was the Montreal Protocol. The Protocol's Multilateral Fund, established in 1990 (London amendment, Article 10 Montreal Protocol) meets "all agreed incremental costs" (Article 10.1) incurred by the 130 developing country Parties (Parties operating under Article 5 of the Montreal Protocol) to implement the measures to control and phase-out ozone depleting substances and finance country studies, technical assistance, information, training etc.[179]

Articles 4.3 and 4.4 are one of the most prominent reflections of the principle of common but differentiated responsibilities, with Article 4.7 explicitly making compliance with the FCCC by developing countries contingent on new financial commitments by industrialised countries.[180] The financial obligations are closely linked to Article 11, which establishes the financial mechanism of the FCCC. For example, funding for adaptation and mitigation activities pursuant to the second sentence of Article 4.3 must be "agreed" between the non-Annex I Party applying for funds and the financial mechanism. Therefore, before interpreting the obligations in detail and exploring terms such as "incremental costs", "agreed costs" and "particularly vulnerable parties" and "assist", it is useful to introduce the financial mechanism, and its operations, since they have a strong bearing on how the obligations are understood in practice.

(a) *The financial mechanism – The GEF*

Pursuant to Article 21.3 FCCC and several decisions of the COP, FCCC funding is provided via the Convention's financial mechanism, the Global Environment Facility (GEF). The co-operation between the two bodies (issues such as agreement on project costs, replenishment, etc.) is governed by the "Memorandum of Understanding" (MOU) adopted by COP 2.[181] The GEF was established as a joint project of UNEP, UNDP and the World Bank in 1991[182] to address the financial needs to fight biodiversity loss, climate change, degradation of international waters and ozone depletion – the four focal areas.[183]

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179 See <http:www.unmfs.org> and further Oberthür, Linkages between the Montreal and Kyoto Protocols, 1 International Environmental Agreements: Politics, Law and Economics (2001) 357 ff.

180 Article 4.7, found in the section on obligations, reads: "The extent to which developing country Parties will effectively implement their commitments under the Convention will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology and will take fully into account that economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties".

181 Dec. 12/CP.2, FCCC/CP/1996/15/Add.1, 55 ff. The COP designated the GEF as an operating entity of the financial mechanism on an ongoing basis, subject to review every four years at COP 4 (3/CP.4, FCCC/CP/1998/16/Add.1).

182 Resolution of the Worldbank No. 91-5, 30 ILM (1991) 1735. See further Dernbach, The GEF: Financing Treaty Obligations of Developing Nations, 23 Environmental Law Reporter (1993) 10124.

183 For more detail, see: GEF Report on the Development of a Climate Change Strategy, FCCC/CP/1995/4;

Developing countries had initially argued against assigning the GEF as the financial mechanism and proposed an independent "climate fund" to be administered by the COP.[184] Their main argument was the attachment of the GEF to the World Bank, and the corresponding voting system (weighted voting according to financial contributions).[185] Therefore, avoiding any definite decision, Article 11 FCCC "defines a financial mechanism" for the provision of financial resources "on a grant or concessional basis" for the implementation of the FCCC. Article 11 stipulates that the mechanism will function under the "guidance" of and be accountable to the COP. This guidance is limited in scope to "policies, programme priorities and eligibility criteria" and does not extend to specific funding decision.

With its restructuring in 1994 the GEF has become an independent entity, with a structural opening towards developing country members. The voting system is more equitable ("double-weighted-majority", Article IV.25b. GEF Instrument 1994),[186] even though donor countries still hold a de-facto veto right in the GEF Council. Many developing countries remain critical of the efficiency and transparency of the work of the GEF, but the general call for establishing a new institution seems to have stopped.[187] This is also partially due to the almost universal membership. To date, 168 countries participate in GEF activities. Industrialized countries pledge contributions to the GEF at regular intervals, thereby "replenishing" the GEF trust fund. In 1994, 34 nations pledged US$2 billion and in 1998, 36 nations pledged US$2.75 billion for operations in all four focus areas. The third replenishment of the GEF was concluded in August 2002, and the fund has now reached its initial goal of US$3 billion.[188]

Report of the Global Environment Facility to COP2, FCCC/CP/1996/8; GEF Report to COP4, FCCC/CP/1998/12; GEF Report to COP5, FCCC/CP/1999/3; GEF Report to COP6, FCCC/CP/2000/3 and FCCC/CP/2000/3/Add.1; GEF Report to COP7, FCCC/CP/2001/8; GEF Report to COP 8, FCCC/CP/2002/4; GEF Report to COP9, FCCC/CP/2003/3 and GEF Report to COP10, FCCC/CP/2004/6.

184 See A/AC.237/WG.II/CRP.9. and above section Chapter I:II.1.b) (2).

185 Spero/Hart, The Politics of International Economic Relations, 1997, 10 ff. and Shihata, The World Bank in a changing world, 1991, 56 ff.

186 Instrument for the Establishment of the Restructured GEF, 1994, <http://gefweb.org> and 32 ILM (1994), 1273. Further: Mertens, Towards Accountability in the Restructured Global Environmental Facility, 3:2 RECIEL (1994), 105; Ehrmann, Die Globale Umweltfazilität (GEF), 57 ZaÖRV (1997), 565 and Kellersmann, note 97, 182 ff. The GEF Council consists of 32 members; 16 constituencies representing developing countries, 14 OECD and 2 economies in transition. In absence of consensus, an affirmative vote in the Council must gain both 60% majority of the total number of participating countries and a 60% majority of total contributions. This latter element constitutes the de-facto veto of major donor countries.

187 See FCCC/SBI/2002/14, Review of the Financial Mechanism, Note by the Secretariat. This document summarised the views of Parties submitted in the framework of the review of the GEF as the financial mechanism of the FCCC.

188 Donors contributed an overall sum of US$ 2.966 billion at the GEF Assembly meeting, see the Beijing Declaration of the second GEF Assembly, 18 Oct. 2002 <http://gefweb.org>. In addition, at the Johannesburg Summit, some EU countries pledged to add a further US$80 Million, thus reaching the initial goal of US$3 billion.

The GEF is not an independent international organisation, and therefore may not have the legal capacity to enter into binding agreements.[189] This is important due to the role the GEF plays in affording financial support for projects aimed at reducing vulnerability and adaptation. The term "international organisation" is not defined in international law. Commonly required criteria for the existence of an international organisation are the permanent association of States established on the basis of international law and a distinction between the organisation and its members, i.e. in particular majority decision making, and legal powers.[190] Both the UN General Assembly and the World Bank (independent organisations) regard the GEF as an organ of the UN and the World Bank but not as an independent organization. The GEF's core, the trust fund, is established and governed by the World Bank (I.8 GEF Instrument). The GEF Instrument is not an international treaty establishing an international organization. The GEF Instrument is "accepted" by states (Article I.1 GEF Instrument), and not subject to ratification. Neither does the Instrument confer legal personality on the GEF, as is done in Articles 104 and 105 of the UN Charter and Article VII of the World Bank Statute.

However, as *Werksman* notes, the restructured GEF strongly resembles an independent organization and thus whether the GEF has the legal capacity to enter into agreements is at least open to question.[191] The GEF has an independent Assembly, Council and (functionally independent) Secretariat, and the World Bank, UNDP and UNEP are accountable to the GEF when acting as implementing agencies for GEF funds (I.22 GEF Instrument). Moreover, the Council has the explicit mandate to "consider and approve cooperative agreements . . . in conformity with the Convention's provisions" (V.27 GEF Instrument). If a dispute should ever arise (for example over the legal quality of the MoU), it is unclear which position will prevail: the form of the GEF Instrument, which does not create a new institution or the substance of the de-facto powers of the entity created.[192]

The GEF has an operational strategy, upon which all its decisions are based.[193] It stipulates, *inter alia*, that the projects financed or co-financed by the GEF shall result in "global benefits". According to the strategy, such benefits are obtained whenever

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189 For discussion Kellersmann, note 97, at 190, Werksman, Consolidating Governance of the Global Commons: Insights from the Global Environmental Facility, 6 YBIL (1995) 27, 54 ff.; Ehrmann, note 186, 590 ff.

190 Brownlie, Principles of Public International Law, 677 ff.

191 Note 189, at 57.

192 The ICJ theory (*Reparation for Injuries*, Advisory Opinion, 1949 ICJ Rep. 174; *Certain Expenses of the UN*, Advisory Opinion, 1962 ICJ Rep. 151; *Effect of Awards of Compensation made by the UN Administrative Tribunal*, Advisory Opinion, 1954 ICJ Rep. 47) argues that an organisation's legal personality can be deduced from the "implied powers" afforded to it in its founding instrument or statute. See Brownlie, Principles of Public International Law, 687 ff.

193 Global Environment Facility, Operational Strategy, February 1996, <http://gefweb.org>.

a global environmental objective is met, i.e. for the climate change focal area, when net emissions are reduced. In the context of adaptation funding, this basic principle is problematic because adaptation often benefits only the region or country in which measures are undertaken (see further below). In the climate change focal area, the strategy focuses GEF activities on the area of enabling activities (mostly funding for developing the national communication of developing countries), mitigation, and adaptation, according to the staged-approach adopted by the COP, which is discussed below in Section IV. Since 1991, the GEF has allocated approximately US$1.8 billion out of a cumulative fund total of US$5 billion climate change activities. An additional US$9.5 billion was invested in climate change activities through co-financing of GEF projects.[194]

To date, the GEF's climate change projects have focused (in volume of US$) on mitigation, organized into four areas: 1) removing barriers to energy efficiency and energy conservation; 2) promoting the adoption of renewable energy by removing barriers and reducing implementation costs; 3) reducing the long-term costs of low greenhouse gas emitting energy technologies; and 4) supporting the development of sustainable transport. Donor countries are eager to continue to commit most of the GEF trust fund in the climate area to mitigation activities. Mitigation activities can pave the way for future binding commitments of developing countries and – even without such commitments – are necessary to enable developing countries to take a development path that enables the international community to protect the climate system in accordance with Article 2 FCCC.

Apart from administering the financial mechanism of the FCCC, the GEF is now also entrusted with the administration of the new Kyoto Protocol Adaptation Fund (Adaptation Fund), the Special Climate Change Fund (SCC Fund), and the Least Developed Country Fund (LDC Fund), each of which were established by the Parties at the second session of COP6 (COP6*bis*) held in Bonn in July 2001.[195] These new funds are explicitly intended to provide additional funding to meet the commitments under (inter alia) Articles 4.3 and 4.4 of the FCCC (see Section IV below).

(b) *Articles 4.3 and 4.4 – Interpretation and Linkages with the GEF*

While the financial obligations enable developing countries to demand funding for both mitigation and adaptation activities, the analysis of Articles 4.3 and 4.4 will focus on the costs of direct damage prevention, i.e. adaptation.

194 Report of the GEF to COP10, FCCC/CP/2004/6, 1.

195 Dec. 5/CP.6, FCCC/CP/2001/5, confirmed at COP7, see Dec. 7/CP.7 and 10/CP.7 in FCCC/CP/2001/13/Add.1.

Various issues arise when trying to determine the legal content of the second sentence of Article 4.3 and Article 4.4 and therefore also the scope of the financial commitments. Even a decade after the adoption of the FCCC, the interpretation and application of terms such as 'incremental costs' and 'resources . . . needed' in Article 4.3 remain ambiguous. Furthermore, the FCCC remains vague about which countries are "particularly vulnerable" (Article 4.4) and what might entail assistance adaptation (Article 4.4). This author's interpretation takes into account the additional problems that arise when funding is provided through the GEF, in particular the issue of what constitutes a "global environmental benefit".

(i) *Incremental costs*

The incremental cost concept applies only to Article 4.3 and is not specified in the FCCC.[196] The concept is linked to the fact that the FCCC applies only to anthropogenic climate change. If a measure supports other aims or would be implemented anyway with funding from other sources, the costs are – in a strict sense – not incremental. The costs of an activity must therefore be compared to that of the activity it replaces or makes redundant. Thus, if a country can demonstrate that a planned project also supports the aims of the FCCC, and is therefore different than another, comparable development, incremental costs could be assessed against this baseline. This concept was discussed in-depth in the INC after the adoption of the FCCC,[197] and various COP declarations have generically called for a "pragmatic and flexible application" of the concept – not least because of the difficulties of establishing suitable and realistic baselines,[198] but has only recently featured substantively on the agenda of the climate regime.

Differentiation (i.e. finding a baseline and comparing a proposed project with what might have happened without the existence of the FCCC) is difficult for both mitigation and adaptation. However, it is especially difficult to apply with respect to impacts of climate change and projects aimed at reducing vulnerability. How can the impact from climate change be determined and what is meant climate variability?

As mentioned in Chapter II, it is methodologically difficult to define a baseline against which to measure the "incremental" costs since climate variability is complex. For example, sea defences will be maintained and upgraded in coastal states over time regardless of climate change to guard against changes in sea level and tidal waves. In this case, the FCCC funding mechanism and Annex II contributions are only meant to fund the centimetres added due to the expected sea level rise from

196 See generally Werksman, Incremental Costs under the Climate Change Convention: The Legal Context, FIELD Working Paper, 1993; Bodansky, note 9, at 526 and Jordan/Werksman, note 176.

197 See A/AC.237/50/Add.1.

198 See FCCC/CP/1995/7/Add.1, 38, FCCC/CP/1996/15/Add.1, 53 and FCCC/CP/1998/16/Add.1, 7.

anthropogenic climate change. While it might be possible theoretically to determine the share of climate change in sea level rise over time through complex climate models, the share is in fact very difficult to estimate and impossible to state with precision.

As also outlined in Chapter II, adaptation is a process involving a number of steps and different activities, ranging from awareness building and planning over the actual "hard" adaptation measures such as sea wall construction to monitoring of the system over long periods of time. Within such a socio-economic process, it is very difficult and perhaps impossible to differentiate strictly between costs incurred to combat anthropogenic climate change and costs that would have been incurred in any case to deal with natural climate variability. This problem was apparent from the outset of the funding practice under the FCCC.

The term "incremental costs" in fact establishes a type of causation test for activities relating to adaptation under Article 4.3. This has led commentators to conclude that "parties seeking aid for adaptation costs may have difficulty proving causation"[199] due to the difficult in distinguishing between climate variability and human induced climate change. In this context, *Gupta* states that it "is unlikely that scientific developments will be able to demonstrate a link between a specific impact to anthropogenic emissions. This may prove to be a major technical solution to those countries who wish to avoid providing resources for adaptation matters".[200] Whether or not such causal links can be established is the subject of in-depth-discussion in Chapter V. An initial conclusion, however, is that the incremental costs concept renders the implementation of the financial obligation for adaptation activities more difficult than for mitigation activities. This must not, however, apply to Article 4.4.

A further aspect is added to these difficulties because the application of the incremental cost concept has been left to the GEF. As noted above, the GEF is committed to funding "agreed incremental costs of measures to achieve global environmental benefits" only.[201] Yet, as the GEF notes, its funds are neither meant to support general development measures, nor disaster reduction or preparedness leading to local benefits, even though both might in fact contribute to reducing vulnerability to climate change damage.[202] The term "global environmental benefits" appears in Article 3.3 FCCC in the context of the precautionary principle, but is not a component of either Articles 4.3 or 4.4.

Therefore, while the FCCC contains an incremental cost concept based on its

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199 Bodansky, note 9 at 528 – in relation to Article 4.4.

200 Gupta, The climate change Convention and Developing Countries: From Conflict to Consensus? 1997, at 146.

201 Instrument for the Establishment of the Restructured GEF, 1994, <http://gefweb.org> and 32 ILM (1994) 1273.

202 See GEF/C.7/Inf.5, Incremental Costs, February 29, 1996, http://gefweb.org. See for discussion Kellersmann, note 97, 168 ff.

application to anthropogenic climate change only, the GEF's application adds the "global environmental benefit" criterion. This criterion does not pose problems for mitigation activities as they will always yield benefits for the global climate system. It is, however, impossible to apply to adaptation, i.e. direct damage prevention. Most measures that could be envisaged to reduce a community's or country's vulnerability to climate change impacts would in fact yield local or regional benefits only. As adaptation experts of the GEF's Scientific and Technical Advisory Panel (STAP) highlighted, *"unlike mitigation activities which aim at reducing atmospheric greenhouse gas concentrations, the global benefits related to adaptation activities are likely to be intangible or more difficult to measure. As a consequence, particular attention should be paid for lowering the baseline for adaptation activities. Related to this is the need to establish national/regional adaptation baseline, in the absence of an internationally agreed one".*[203] Accordingly, the new strategic priority on adaptation suggested by the GEF *"will fund the incremental cost of those adaptation activities that generate global environmental benefits as well as the incremental cost of selected adaptation activities that are identified as high priorities by national communications."*[204] This means that some recognition has been given to the fact that adaptation activities seldom yield global benefits. Essentially, however, the GEF Adaptation Approach (see further Section IV) avoids tackling the issue by assuming many measures that are aimed at adaptation under the so-called enabling activities that are funded pursuant to the first sentence of Article 4.3, i.e. on a full cost basis.[205]

In sum, the global environmental benefit requirement cannot be applied to adaptation activities. There is no justification in the FCCC for its usage. The GEF's operational strategy on the other hand does not represent international law and cannot override the financial obligations as set out in the FCCC. The GEF must therefore, as stated in the context of the strategic priority on adaptation, revise or qualify this requirement to be able to fulfil its duties as the financial mechanism of the FCCC.

When implementing the second sentence of Article 4.3, the incremental costs yardstick for adaptation activities should be "costs induced by climate change", but due to methodological difficulties, further guidelines for estimates are needed. So far, COP decisions on funding for adaptation measures do not refer to the incremental cost concept explicitly, but such guidance is needed to ensure the full implementation of the financial obligations in the area of adaptation funding. Because Annex II States continue to rely on it, while developing States have declared it inapplicable for adaptation

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203 Report of the STAP Expert Group Workshop on Adaptation and Vulnerability, GEF/C.19/Inf.12, at 5.

204 GEF/C.23/Inf.8/Rev.1, "GEF Assistance to address adaptation", para. 21.

205 A proposed GEF Approach to Adaptation to Climate Change, GEF/C.21/Inf.10. This has now led to a new strategic priority in the climate change focal area (Piloting an operational approach to adaptation), see Dec. 4/CP.9 requesting the GEF to operationalize the new strategic priority as soon as possible, and GEF/C.23/Inf.8/Rev.1 "GEF Assistance to address adaptation", paras. 20 ff.

purposes, negotiating difficulties clearly lie ahead.[206] Moreover, given the fact that Article 4.4 does not refer to incremental costs at all, COP guidance to the GEF must enable the GEF to provide funding to non-Annex I countries on a basis other than the one provided by this concept.

(ii) *Resources needed vs Agreed costs*

The text of Article 4.3 implies that financial entitlements for adaptation purposes are to be determined by real needs in developing countries ("resources needed"). What is needed can either be determined on an objective or subjective basis. It seems that in this context, the incremental cost concept stipulates that needs are to be defined on an objective basis, i.e. against a probable development baseline. Yet, the term "needed" mirrors the discretionary term "adequate adaptation" in Article 4.1(b), and therefore is to be defined by the developing countries seeking funding from the GEF. Developing countries are currently in the process of defining their needs through vulnerability assessments and the like (see below, section IV). Yet, this discretionary judgment by developing countries and the right to claim adaptation expenses is qualified by the requirement to *agree* on costs with the GEF (Article 4.3, first and second sentences).

According to paragraph 5 of the MoU[207] concluded between the COP and the GEF Council,[208] "funding decisions for specific projects should be agreed between the developing country Party concerned and the GEF in conformity with policy guidance from the COP". The COP can revise but not reverse any such decision taken by the GEF; it can only consider if the decision is in accordance with its policies and guidance documents and if appropriate ask the GEF Council to reconsider the project. Therefore, as *Bodansky* has stated, "If the financial mechanism rejects it [a project], developed countries need not provide any funding".[209]

The MoU's legal quality is questionable, as the GEF lacks legal capacity to conclude binding agreements. Yet, it should be noted that the COP has the capacity to both enter into agreements and declare its will with regard to the implementation of

206 See submissions by Burkina Faso and Bangladesh, FCCC/SBI/2003/MISC.4 as well as the summary of COP10 proceedings, ENB Summary, available at <http://www.iisd.org>, 15.

207 Para. 5 MoU: "If any Party considers that a decision of the Council regarding a specific project in a proposed work programme does not comply with the policies, programme priorities and eligibility criteria established by the COP in the context of the Convention, the COP should analyse the observations presented to it by the Party and take decisions on the basis of compliance with such policies, programme priorities and eligibility criteria. In the event that the COP considers that this specific project decision does not comply with the policies, programme priorities and eligibility criteria established by the COP, it may ask the Council of the GEF for further clarification on the specific project decision and in due time may ask for a reconsideration of that decision".

208 Note 181.

209 Bodansky, note 9 at 527.

the FCCC, even though it is not an international organisation.[210] Due to the lack of Rules of Procedure, it (still) operates on the basis of consensus,[211] and therefore its decisions are (for the moment) a direct reflection of the will of the Parties to the FCCC. Where decisions confer rights onto other institutions, or define or develop further the provisions of the FCCC, these decisions represent "co-operative law-making"[212] within the regime, and have a normative status for all Parties to the regime. With the conclusion of the MoU the COP has decided to confer certain discretionary powers onto the GEF – such a decision cannot be regarded legally void even in the absence of legal capacity in the GEF. Given the level of uncertainty with regard to the obligations of developing country parties, in particular as regards Article 4.1(b), each project application will involve several discretionary decisions.

Therefore, the needs of developing countries for reducing vulnerability and adaptation are made subject to agreement by an entity which is neither the COP nor another party nor even a legal entity from the perspective of international law. This considerably weakens the legal quality of the commitment in the second sentence of Article 4.3, even if it is questionable whether the GEF would ever, in practice, refuse to fund a project which is in line with the guidance and criteria adopted by the COP. Legally, Article 4.3 does not provide developing countries with a direct claim for funds from the GEF. Whether the GEF trust fund actually holds sufficient funds to agree funding and thus "meet the needs" of developing countries for the implementation of their obligations under the FCCC is a different, practical issue, and therefore will be discussed below (Section IV).

(iii) *Particularly Vulnerable Parties*

The Convention does not define the term "particularly vulnerable", which is used in Article 4.4. The Preamble of the FCCC states that "low lying or small island countries, countries with low-lying coastal, arid and semi-arid areas or areas liable to floods drought and desertification, and Developing Countries with fragile mountainous ecosystems are particularly vulnerable to the adverse effects of climate change". However, the Preamble does not refer explicitly to developing countries and the text of the Preamble can only be used as an interpretative aid.[213] In this context, the list of countries with

210 Ott, Umweltregime im Völkerrecht, 1998, 280 ff., who argues that, while the formal criteria commonly required for an international organisation are fulfilled in many environmental regimes, the will of the Parties is directed explicitly against creating an independent international organisation.

211 On this issue see Oberthür/Ott, The Kyoto Protocol, 40 f., 45 f.

212 Ott, Umweltregime im Völkerrecht, 275.

213 Convention on the Law of Treaties, (Vienna) 23 May 1969, 8 I.L.M. (1969), 679, Article 31. See also: Yamin, The Clean Development Mechanism and Adaptation, Paper for the FCCC Secretariat Capacity Building Workshop for Project Based Mechanisms, 17-18 September 1998, FIELD Working Paper No. 19.

"specific needs and concerns" contained in Article 4.8 of the FCCC could be helpful. This list is broad and includes several categories of countries that are not incorporated in the preambular text, such as countries with forested areas and areas liable to forest decay; countries prone to natural disasters; countries with areas of high urban atmospheric pollution; and countries with fragile ecosystems.

However, this list does not solve the problem of interpreting the phrase "particularly vulnerable", as Article 4.8 does not refer to the term. Moreover, applying the list to Article 4.4 would lead to virtually all developing countries being able to claim adaptation costs via Article 4.4. This would blur the difference between Articles 4.3 and 4.4 of the FCCC.

Yamin has suggested that a list of vulnerable countries should be negotiated. Citing various international declarations, she argues that the international community has accepted that Small Island Developing States are particularly vulnerable.[214] This could be questioned as the FCCC itself emphasizes the needs of Africa as a region in Article 4.1(e). However, as Article 4.1(e) is covered by the funding provision in Article 4.3, the comparison does not lead to a better understanding of which countries are "particularly vulnerable" under the auspices of Article 4.4.

Against this background, Parties have agreed that it is necessary to identify particularly vulnerable Parties in order to implement Article 4.4.[215] However, while the vulnerability of countries can be assessed scientifically, it is likely that most developing countries would qualify as "particularly vulnerable" when their financial inabilities to protect themselves, bear the financial risk of catastrophic weather events and mitigate the adverse effects of climate change are considered generally. Therefore, it has been suggested that a prioritization of eligible countries take place on the basis of vulnerability indices,[216] and that the IPCC should be entrusted with developing these indices, by building on its work of methodologies for vulnerability assessments. At the same time, the use of indices has been heavily criticized because the choice of criteria for prioritising cannot be objective and thus, indices are of very limited value in decision-making. Leaving aside the question of whether a just set of prioritised indices could be achieved at all, it is interesting to note that a prioritisation has not been demanded by the group of developing countries (G77 and China) – possibly to avoid conflicts about funding eligibility within the group.

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214 See Yamin, ibid.

215 Report of COP 1, FCCC/CP/1995/7/Add.1, para. 1(d).

216 See: UNGA Resolution 49/122 endorsing the outcomes of the Global Conference on the Sustainable Development of Small Island Developing States, (Bridgetown, Barbados) 26 April to 6 May 1994, (hereinafter The Barbados Programme of Action); and UNGA Resolution 50/11. For information on the follow-up programme, see: <http://www.sidsnet.org>. For the SOPAC project developing a global environmental vulnerability index, see: <http://www.sopac.org>.

(iv) *"Assist in Meeting the Costs"*

To add to the seemingly unsolvable problem of what constitutes "particular vulnerability", Article 4.4 remains ambiguous about the extent of funding to be provided. The use of the phrase "to assist . . . in meeting costs of adaptation" in Article 4.4, as opposed to the phrase in Article 4.3 that "the agreed . . . costs" must be covered, implies that not all costs of adaptation would need to be borne by Annex II Parties. "Assist" could indeed be any support provided, even on a very small scale relative to the overall costs of an activity. On the other hand, Article 4.4 does not refer to the incremental cost concept, which means that the baseline issue (distinguishing between climate change and climate variability) should not arise in application of this provision. As Article 4.4 has not been discussed extensively in the climate change negotiations, no clear views have been offered on this issue by Parties.

Aside from the precise meaning of "assist", the starting point for any interpretation of Article 4.4 must be the adaptation needs of countries rather than the willingness of Annex II Parties to pay for adaptation measures. This principle flows both from Article 4.1(b) and from the open formulation used in Article 4.4. If Annex II Parties must "assist" in meeting the costs of adaptation, clearly, the extent of assistance needed should be measured against the real needs of developing countries. Moreover, Annex II Parties are not only to provide the additional costs needed to implement a project/measure (incremental costs).

Therefore, scientific methods for assessing these needs play a major role in the implementation of both Article 4.3 (second sentence) and Article 4.4. Such an assessment process was started at COP1 in 1995 with its first decision on guidance for the financial mechanism, which provides that the GEF should – until further notice – finance vulnerability assessments to determine adaptation needs. This is discussed below in connection with adaptation funding in practice. Such an assessment process is also at the heart of the National Adaptation Programmes of Action (NAPAs) which are described below. The finances due under Article 4.4 are not tied to the GEF, as is funding through Article 4.3.

(v) *Conclusion*

While Article 4.3 imposes a binding financial obligation on Annex II countries to support developing countries in their efforts to directly prevent climate change damage (fulfilling their obligations under Article 4.1 FCCC), implementation is rendered difficult through the linkages with the GEF. Even if the GEF were to abandon the global environmental benefit criterion – the difficulty in defining what is incremental, as well as the requirement to agree on costs with the GEF severely weakens the right of developing countries to request support for direct damage prevention measures in practice. While Article 4.4 is not directly linked to the GEF, it is likely that it, too, will be implemented through the GEF, which makes it prone to the same difficulties

as Article 4.3. While it is a very open obligation and potentially gives rise to unlimited claims, it could in fact be interpreted in various ways with regard to the amount of support to be provided by Annex II Parties. Moreover, while both provisions are binding, their implementation relies on the amount of funding available overall, whether from the GEF or from an external source.

(c) *Contributions and level of new resources*

Article 7.2(h) FCCC provides that the Conference of the Parties shall seek to mobilize financial resources in accordance with, *inter alia*, Articles 4.3 and 4.4 Also, Annex II Parties must report in detail about the fulfilment of Articles 4.3 and 4.4 in their national communications.[217] However, there is no legal benchmark against which to measure performance. Moreover, Article 4.3 provides that, in its implementation, account shall be taken of "the need for adequacy and predictability in the flow of funds and the importance of appropriate burden sharing among the developed country Parties". Both the level of contributions and the burden sharing between Annex II countries are unresolved issues.

Article 11 does not stipulate explicitly how contributions are to be made. Article 11.3(d) FCCC only calls on Parties to determine "in a predictable and identifiable manner the amount of funding necessary and available for the implementation of this convention and the conditions under which that amount shall be periodically reviewed".[218] To this end, COP3 agreed on an Annex to the MoU between the COP and the GEF "on the determination of funding necessary and available for the implementation of the Convention".[219] This Annex is a reproduction of what had already been agreed in the GEF Council in April 1996. As stated before, the MoU is not legally binding. Still, the Annex represents subsequent practice of the Parties to the FCCC and is therefore relevant for the interpretation of Article 11 (Article 31.3 VCLT).

According to the Annex, the COP will make an assessment of amounts necessary to "assist developing countries . . . in fulfilling their commitments" over the next replenishment cycle. Expressly, the COP is to take account of the funds necessary to meet the requirements of Article 4.3 (first sentence) and Article 12.1 FCCC, as well as funds needed for the implementation of Article 4.1. No explicit mention is made of Article 4.4 or of adaptation needs. A draft annex proposed by the G77and China in 1996 had in fact made explicit mention of "financial resources requested by developing countries to meet the costs of adaptation to the adverse effects of climate change".[220]

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217 See FCCC/CP/1999/7, 91 ff.

218 In contrast, Parties to the Montreal Protocol decide annually on budgets and contributions by Parties (Article 10.7 Montreal Protocol).

219 Dec. 12/CP.3, FCCC/CP/1997/7/Add.1. The text of the annex to the MoU is contained in: FCCC/SBI/1996/14, Annex I. See for comments by Governments in: FCCC/SBI/1996/MISC.1.

220 FCCC/SBI/1996/L.4/Rev.1. See also Ehrmann, note 186, at 609.

Such emphasis was not desired by the GEF Council, and was also not consistent with the staged approach to adaptation, as adopted by COP1, according to which finance for adaptation was (initially) to be restricted to preparation and assessment activities (Section IV). With respect to future financial needs, the GEF shall "indicate the amount of new and additional funding to be contributed to the trust fund in the next replenishment cycle . . . including [for] the implementation of the Convention". The Annex enables the COP to consider the adequacy of the resources available.

Overall, the Annex does not provide a major guideline for Parties to concretise levels of funding and contributions. In particular, no attempt is made to have the COP predetermine the funding needs for the implementation of the FCCC. Industrialised states contribute to the GEF trust fund without relating these contributions directly to any needs identified by the developing country Parties to the FCCC. Moreover, it is the GEF that decides what proportion of funds will be used towards the climate change portfolio – not the COP. This re-emphasises the conclusion reached above: Articles 4.3 and 4.4 are severely weakened when implemented through the GEF. They are fulfilled in some aggregate form only, through the (voluntary) contributions to the GEF trust fund.

This is not in line with the letters of the FCCC. Moreover, this could impede overall compliance with the FCCC. As *Kellersmann* has argued, developing country obligations (Articles 4.1 and 12) and the financial commitments of Annex II Parties (Articles 4.3 and 4.4) are reciprocal in character.[221] This reciprocity does not impede the binding force of the obligations in Article 4.1(b) as described above. In fact, with respect to adaptation programmes and measures it is unlikely that a country would not comply with its obligations. Yet, the reciprocal relationship forces Annex II countries to comply with their financial commitments – in particular with regard to financing adaptation if they have an interest in the implementation of Article 4.1.

Realising the deficiency of funding arrangements, developing country Parties made an effort to establish a process for the joint determination of aggregate funding requirements by the COP and the GEF Council. The pertinent COP8 decision calling for an "assessment of funding necessary to assist developing countries in fulfilling their commitments under the Convention"[222] was initially seen as a major threat by Annex I countries who wished to retain the independence of the GEF. After the release of a report by the FCCC secretariat and the GEF on the issue,[223] this initiative has now essentially died. The pertinent COP10 decision[224] emphasises that various sources for climate change funding exist and only declares the above mentioned report as "input" for the GEF fourth replenishment negotiations. Article 11.3(d) FCCC thus remains unfulfilled.

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221 Kellersmann, note 97 at 196.

222 Decision 5/CP.8, Review of the financial mechanism, FCCC/CP/2002/7/Add.1.

223 FCCC/SBI/2004/18.

224 CP.10, Assessment of funding to developing countries in fulfilling their commitments under the Convention.

Furthermore, the FCCC provides no guidance on the issue of burden sharing, i.e. the question of which Annex II Party is to commit what volume of financial resources to the GEF for the implementation of the FCCC. In the absence of explicit guidance from the COP, the GEF replenishments follow the rules of contribution of the International Development Association (IDA) (II.10. and Annex C GEF Instrument).[225] By way of example, Parties to the Montreal Protocol chose the UN scale of assessments as a basis for burden sharing between the industrialised countries (Article 10.6 Montreal Protocol), which means that contributions are assessed on the basis of GNP, conversion rates and expected debt burden.[226] Burden sharing in the IDA is similar to the UN scale of assessments. Thus, contributions to the GEF are not provided in relation to historic or current greenhouse gas emissions. The implementation of the financial obligations is not tied to the contribution to the problem.

The Bonn Agreement recognised that in relation to funding provided to developing (non-Annex I) countries "appropriate modalities for burden sharing among Annex II Parties need to be developed".[227] At the first INC meeting, reference was made to the polluter pays principle as an appropriate legal framework,[228] and extensive mention was made of the principle throughout the COP6 negotiations, both by the European Union representatives and other Parties and the President of COP6, *Jan Pronk* in discussing the issue of funding, both for mitigation and adaptation.

The so-called "Pronk Paper" of March 2001[229] – issued after the failure of COP6 – mentions "equity among Annex II Parties" as an objective with regard to funding. The revision of this paper of April 2001[230] contains the phrase that "contribution targets should be based on Annex I Parties' relative share of CO_2 emissions in 1990". This clearly is a "polluter-pays approach", even though it is only related to CO_2. However, in the run up to the COP6*bis* meeting in June 2001, any reference to the principle was omitted and only the general language on the need for "burden sharing" was adopted.[231]

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225 IDA is a lender on highly concessional terms, an organisation within the World Bank group. See <http:www.worldbank/org/ida>.

226 These shares of contributions are then adopted by the UN General Assembly. A new scale of assessment was adopted in December 2000, lowering the ceiling of the amount to be paid by any single country from 25 to 22 per cent of the budget. See UN Doc. A/55/521 and Add.1-3 and Resolution A/RES/55/5 B-F "Scale of assessments for the apportionment of the expenses of the United Nations". Germany now pays 9.8%, Japan 19% and the US 22% of the overall UN budget.

227 Dec. 7/CP7 and 10/CP.7, FCCC/CP/2001/13/Add.1 – already agreed at COP6bis, Dec. 5/CP.6, FCCC/CP/2001/L.7. This language is identical to the compromise proposal by the President, 21 July 2001, Annex para. 3 (d) (on file with author).

228 See Report of the INC, 1st session 4-14 February 1991, UN Doc. A/AC.237/6, 6 f.

229 Elements for a Presidency Paper, 8 March 2001, on file with author.

230 New Proposals by the President of COP6, 9 April 2001, on file with author.

231 See FCCC/CP/2001/2/Rev.1, 7 and FCCC/CP/2001/2/Add.1, 46 (Consolidated negotiation text by the President, 18th June 2001); FCCC/CP/2000/5/Add.2, Report of COP6, Note by the President,

3. Various Conclusions

The FCCC provides an elaborate set of rules intended to prevent climate change damage both by reducing greenhouse gas emissions at their source, thereby contributing to the objective to prevent dangerous interference with the global climate system (Article 2), and by providing a framework for adapting to the impacts of climate change.

While Article 2 FCCC provides a general duty to prevent, it can also be interpreted as protecting the interests of countries vulnerable to the impacts of climate change. Moreover, Articles 2 and 4.2 together oblige Annex I Parties to the Convention to modify (reverse) their long term emission trends. Art 4.2 represents an obligation of conduct to contribute to meeting the objective of the FCCC.

On the other hand, Article 4.1 obliges all Parties to plan and undertake suitable adaptation measures to directly prevent climate change damage. The FCCC, however, does not regulate residual climate change damage, issues of compensation, or liability. These questions were deliberately avoided during the negotiations. The only provision available to tackle such issues is Article 4.8, which, *inter alia*, provides a mandate to consider insurance as a means for taking into account the concerns of developing countries with respect to the adverse impacts of climate change.

Throughout the FCCC, the principle of common but differentiated responsibility structures commitments and rights. Accordingly, the FCCC provides developing countries, the main victims of potential climate change damage, with a legal basis to claim support for damage prevention measures (both mitigation and adaptation). However, the financial commitments of Annex II Parties provided in Articles 4.3 and 4.4 are riddled with unclear terms, in particular with regard to adaptation, which makes it difficult for claimant countries to enforce them. The fact that contributions to the GEF are not based on adaptation needs supports the conclusion that Annex II Parties cannot rely solely on the GEF to fulfil their financial obligations – especially in the case of Article 4.4, which does not make the financial support of adaptation measures subject to GEF consent. Both the issue of global benefits and incremental costs, as well as the level of contributions and burden sharing must be addressed by the Parties to ensure compliance with the letter of the FCCC.

Overall, the prevention duties in Articles 2 and 4, as well as the adaptation duties and financial obligations, seem inadequate in the face of the likely damage that will occur due to climate change as described in Chapter II. The Kyoto Protocol, which the next section will turn to, is one instrument to remedy this deficiency in preventing or reducing climate change damage.

23.11.2000. The modus operandi of contributions was also not included in the list of "crunch issues" as discussed by Ministers from 20th to 23rd July 2001 in Bonn, FCCC/CP/2001/CRP.8, 20th July 2001, Note by the Co-Chairs of the Negotiation Groups.

III. The Kyoto Protocol

The Kyoto Protocol complements the FCCC and is an important tool to effectively prevent climate change damage through mitigation measures aimed at achieving the objective of the FCCC. The respective obligations are briefly set into context below, but only so far as they are of interest to preventing damage. Features such as the flexible mechanisms are only discussed against this background, in particular the provision made for special funding for adaptation purposes in Article 12 Kyoto Protocol. As a preparation for the chapters to follow, the legal character of these obligations is analysed in the context of the compliance system. This is of particular importance when trying to apply other norms of international law to the climate change phenomenon.

1. Negotiating History

The Kyoto Protocol was designed to strengthen the mitigation duties contained in Articles 4.2(a) and (b) FCCC, which – only three years after the adoption of the FCCC – were deemed "inadequate" (according to Article 4.2(d) FCCC) by COP1 in the "Berlin Mandate".[232] This COP decision enabled Parties to start a process of negotiations for "a protocol or another legal instrument", and established the "Ad hoc Group on the Berlin Mandate" (AGBM) which was concluded in 1997 at COP3 with the adoption of the Kyoto Protocol.[233]

The Berlin Mandate establishes Article 3.1 FCCC, the principle of common but differentiated responsibilities and respective capabilities, as guidance for the negotiation process and reiterates paragraph 3 of the preamble, referring to the high historical and current emissions of greenhouse gases by industrialised countries. It also reiterates the concerns of developing countries captured in Articles 4.8 and 4.9 FCCC, which refer to funding and insurance to counter the adverse effects of climate change. Both Articles 4.2(e) and (f) FCCC, also concerned with adaptation, were to be taken into account by the Parties in drafting a new protocol.

During the negotiations, there was much discussion about reduction targets for industrialised countries and some about adaptation mechanisms and funding, but none about mechanisms to tackle residual climate change damage. The only discussions in the AGBM regarding compensation related to the impacts of implementation of the

232 Decision 1/CP.1, FCCC/CP/1995/7/Add.1, The Berlin Mandate.

233 For a detailed analysis of the Protocol see: Oberthür/Ott, The Kyoto Protocol; Grubb et al., The Kyoto Protocol; Depledge, Tracing the Origins of the Kyoto Protocol: An Article-by-Article Textual History, FCCC/TP/2000/2; Yamin/Depledge, The International Climate Change Regime, A Guide to Rules, Institutions and Procedures, 2004. See also Bail, Das Klimaschutzregime nach Kyoto, EuZW 1998, 457.

Protocol on countries highly dependent on fossil fuel exports (impacts of response measures, Article 4.8 FCCC). OPEC countries suggested that a mechanism be established "to compensate social and economic losses arising from the implementation of the present instrument . . .".[234] With regard to the prevention of climate change damage, other developing countries suggested the establishment of new funds to implement the relevant adaptation and funding provisions of the FCCC. As described above, this suggestion culminated in the establishments of three new funds at COP6*bis*.

After the adoption of the Kyoto Protocol, the Parties felt that they were unable to ratify the treaty without establishing rules for the operation of the flexible mechanisms, the compliance system, accounting for sinks, etc. and without addressing issues of funding, capacity building and technology transfer. Thus, at COP4, rather than proceeding to ratification, the Parties adopted the Buenos Aires Plan of Action,[235] a decision which set COP6 as the final decision making forum. After a failed COP6 in November 2000, COP6*bis* adopted the "Bonn Agreement"[236] on 23 July 2001. This document contains the most urgent political decisions for the operation of the Protocol, which were affirmed at COP7 together with agreement on outstanding issues. These agreements together are now called the "Marrakesh Accords".[237]

With 129 State Parties, the Protocol entered into force on 16 February 2005 after the Russian ratification and despite the withdrawal of the USA in March 2001.[238] While this withdrawal could not prevent the entry into force of the Protocol (Article 25 requires ratification by 55 Parties representing 55% of total CO_2 emissions of Annex I countries in 1990 – the USA alone accounting for 36.1% of those emissions), it has had major implications for the effectiveness of the Protocol. In fact, it has been argued that the US withdrawal will lead to no real emissions reductions in the remaining Annex I regions.[239]

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234 FCCC/AGBM/1997/INF.1, 27 and 66.

235 Decision 7/CP.4, Annex, FCCC/CP/1998/16/Add.1.

236 See Decision 5/CP.6 contained in FCCC/CP/2001/5, 36 ff.

237 Contained in FCCC/CP/2001/13/Add.1-4. See for a summary of issues and decisions: Wirth, The sixth session (part two) and seventh session of the Conference of the Parties to the Framework Convention on climate change 96 AJIL (2002), 648; Sach/Reese, Das Kyoto Protokoll nach Bonn und Marrakesch, ZUR 2002, 65.

238 President Bush first pronounced in a letter to Republican Senators Hagel, Helms, Craig and Roberts on 13 March 2001: "I oppose the Kyoto Protocol because it exempts 80 per cent of the world, including major population centers such as China and India". (<http://www.whitehouse.gov/news/releases/2001/03/>). The USA has since participated in FCCC negotiations, but rejected any re-engagement in the Protocol.

239 See Löschel/Zhang, The Economic and Environmental Implications of the US Repudiation of the Kyoto Protocol and the Subsequent Deals in Bonn and Marrakech, 2002, 2.

2. Overview

The Kyoto Protocol (KP) contains at its core greenhouse gas stabilisation and reduction commitments for industrialised (Annex I) countries (Article 3.1 and Annex B), meant to add up to a 5% reduction in aggregate greenhouse gas emissions compared to 1990 levels in the period 2008-2012 (the "first commitment period").[240] These obligations are termed QUELRO: quantitative emission limitation and reduction objectives (or obligations).

Each Annex I Party has an "Assigned Amount" or greenhouse gas budget which is calculated according to the 1990 emissions of the six greenhouse gases and groups of greenhouse gases listed in Annex A minus the percentage target listed in Annex B (Article 3.7). The USA, for example, took on a target of 7% reduction, Japan of 6% and the EU of 8%.[241] These targets can be reached either by reducing emissions or enhancing sinks at home or by using the so-called flexible mechanisms: International Emissions Trading (Article 17), Joint Implementation (Article 6) and the Clean Development Mechanism (Article 12).[242] These flexible mechanisms were introduced to ensure the cost efficiency of greenhouse gas mitigation, as estimates show that implementation of the Protocol with "full flexibility" will only cost about 25% globally compared to implementation of the targets on a purely national basis.[243] They establish an international market with a new "currency" – greenhouse gas reduction units. The reduction commitments are not the result of the application of any legal formula (for example the polluter pays principle), or an attempt to apply Article 2 FCCC in terms of calculating allowable emissions on the basis of likely damage, but are the result of political bargaining. Also, the targets themselves do not provide the whole picture. For example, the US (had it not withdrawn from the Protocol) would have had to reduce

240 This target refers to 6 greenhouse gases or groups of greenhouse gases contained in Annex A to the Protocol. The Protocol itself reduces the 5% reduction goal to ~4.7% because economies in transition are allowed to adapt their base years (Bulgaria, Hungary, Poland, and Romania), see Art 3.6.

241 The EU target of 8% was modified for all 15 Member States in the Burden-Sharing Agreement (Council Conclusions on Climate Change, European Council of Ministers, 2106th Council Meeting, Doc. 9702/98 of 16/17 June 1998): Austria: -13%; Belgium: -7,5%; Denmark: -21%; Finland: 0; France: 0; Germany: -21%; Greece: +25%; Ireland: +13%; Italy: -6,5%; Luxemburg: -28%; Netherlands: -6%; Portugal: 15%; Spain: 15%; Sweden: +4%; United Kingdom: -12,5%.

242 For an overview Oberthür/Ott, The Kyoto Protocol, 151 ff. and, including the Marrakesh accords, Verheyen, Klimaschutz als Beispiel kooperativer Umweltpolitik, NuR 2002, 445; Wilkins, What's new in the CDM?, 11 RECIEL (2002) 144; Wirth, note 237, 651 ff.; Harders/Graichen, Die Ausgestaltung des internationalen Treibhausgas-Emissionshandel nach dem Kyoto-Protokoll und seine nationalen Umsetzungsvoraussetzungen, ZUR 2002, 73. On the CDM generally: Pohlmann, Das Kyoto Protokoll: Erwerb von Emissionsrechten durch Projekte in Entwicklungsländern, 2004 and on the flexible mechanisms in practice Freestone/Streck Legal Aspects of Implementing the Kyoto Protocol Mechanisms Making Kyoto Work, 2005.

243 Grubb et al., The Kyoto Protocol, at 163.

emissions by 24.3% relative of its actual projected emissions to meet its 7% reduction target, while most of the EU States register much smaller gaps between their targets and projected emissions: the UK must reduce between 6.6% and 7.3%, Germany 2.4%, Spain 4.3%, and France only 0.39% relative to the EU burden sharing targets.[244] The Ukraine and Russia, in contrast, were emitting far below their 1990 levels in 1997 and were thus under their Kyoto targets. Applied to all Annex I countries, the Kyoto Protocol in fact represents an actual stabilisation of emissions at 1996 levels by 2012 and, depending particularly on the use of carbon sinks for accounting purposes, allows some growth in emissions in these countries. In addition, COP6*bis* and COP7 allowed countries to count a high amount of sinks credits towards their targets (Articles 3.3 and 3.4 Kyoto Protocol), which leads to a reduction target for the Annex I countries as a whole of 1.9%, in comparison to the original reduction target of 5.2%.[245]

In relation to global emissions, the Kyoto Protocol represents only a first small step – it has been estimated that the targets only modify the global business-as-usual emission trend by a small percentage, still allowing global emissions to grow substantially until 2010.[246] Therefore, scientists have argued that the even if the 5.2% target of the Kyoto Protocol were fulfilled, it would have little or no effect on climate change impacts in the medium to long-term.[247] This is inadequate in terms of reaching the objective of Article 2 FCCC. Adequate action would necessitate significant reductions relative to business-as-usual emission trajectories now. It is also inadequate in terms of preventing climate change damage to any serious extent. In fact, some governments have declared that "in light of the best available scientific information and assessment on climate change and its impacts, [they] consider the emissions reduction obligation in Article 3 of the Kyoto Protocol to be inadequate to prevent dangerous anthropogenic interference with the climate system".[248]

But the Kyoto Protocol is designed to evolve into a more environmentally effective instrument with the negotiation of subsequent commitment periods (Article 3.9). According to this provision, Annex I Parties are required to begin negotiating a second commitment period in 2005. With the withdrawal of the USA and the general economic

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244 Actual emission figures for 1998 taken from FCCC/SBI/2000/11, Table B.1 and projected emissions taken from Second compilation and synthesis of second national communications, FCCC/CP/1998/11/Add.2, Table C.6. The projected emissions represent "with measures" scenarios as submitted by countries. With measures scenarios are projection scenarios for emissions, taking into consideration proposed or potential measures for mitigating emissions. For an explanation of calculations and the data, see <http://www.grida.no/db/maps/collection/climate6/about.htm>.

245 Löschel/Zhang, note 239, 6.

246 World Resource Institute, How much will the Kyoto Protocol reduce emissions?, graph based on data by the US Department of Energy, International Energy Outlook 1998 and 1999, available at <http://www.wri.org>.

247 See the discussion under section Chapter I:II.2.a.

248 Declaration by the Governments of the Cook Islands, Niue, Kiribati. See Kyoto Protocol, status of ratification, last visited 13 July 2003.

slowdown since the conclusion of the Protocol, it is unclear whether Parties will be able to agree on more adequate reduction targets to reach the objective of the FCCC.[249] With EU leaders in favour of stringent reduction targets, for example Germany suggested cuts in greenhouse gas emissions of 40% by 2020,[250] and the UK proposing a political target of 60% reduction of CO_2 emissions by 2050,[251] it is at least possible that the EU as a whole will adopt similar targets and thus lead the way into the new commitment period negotiations. Moreover, the discussion on how developing countries might participate in the mitigation efforts is pressing and might lead to higher environmental effectiveness.

The remainder of this analysis will focus on the special mechanisms adopted for the purposes of adaptation: the Clean Development Mechanism (CDM) and its adaptation fund (the arrangements made by COP6*bis* connected with this fund but also adaptation funding in general will be reviewed in Section IV) and on the character of the Kyoto Protocol's reduction targets as a primary norm. This also entails some discussion of the special compliance system. The latter plays an important role in assessing the relationship of the Kyoto Protocol's obligations with other norms of international law.

3. The Clean Development Mechanism (CDM) and the Adaptation Fund

a) *History*

The CDM emerged from the interest of industrialised countries in involving developing countries in actions to mitigate climate change and from a proposal on how to ensure industrialised country compliance submitted by Brazil in July 1997 shortly before the Kyoto Conference.[252]

The background to the interest of industrialised countries is easily traceable: economic studies on different costs of reducing or preventing greenhouse gas emissions around the globe had indicated that the FCCC could be implemented in a more cost-effective manner if developing countries were involved. In this regard, Articles 3.3, 4.2(a) and (d) FCCC had already allowed countries to implement measures

249 See for a discussion of the "Post 2012 debate" Ott, It takes two to tango – Climate Policy at COP10 in Buenos Aires and beyond, 3 JEEPL 2005 (forthcoming).

250 This target is enshrined in the coalition treaty (Koalitionsvereinbarung 16. Oktober 2002): a 40% reduction of greenhouse gas emissions relative to 1990, see also the governmental declaration (Regierungserklärung) of 29 October 2002, all available via <http://www.germanwatch.org>.

251 Environment Daily 1391, 24/02/03: "UK urges EU toward 60% CO2 emissions cut".

252 See generally on the history of the CDM: Werksman, The Clean Development Mechanism: Unwrapping the Kyoto Surprise, 7:2 RECIEL (1998) 128, and Ott/Oberthür, note 233, 165 ff.; Pohlmann, note 242, 41 ff.

"jointly". However, developing countries (especially) had fundamental concerns about joint implementation as a concept, since it would enable Northern countries to "use up" cheap emissions reduction potential in the South while not changing production and consumption patterns in the North. As a compromise, COP1 adopted a decision on the Pilot Phase for Activities Implemented Jointly (AIJ),[253] stating that "activities implemented jointly between Annex I Parties and non-Annex I Parties will not be seen as fulfilment of current commitments of Annex I Parties under Article 4.2(b) of the Convention; but they could contribute to the achievement of the objective of the Convention". Thus, Annex I Parties started investing in mitigation projects in developing countries, because of the relatively low abatement costs and in anticipation of being allowed to use such reductions towards future commitments. AIJ programmes include both energy production and efficiency projects, and carbon sink development, i.e. forestry projects.[254] During the AGBM negotiations, AIJ host countries wanted to ensure that AIJ-type projects would continue, as it meant both technology and financial transfers to their countries.

The proposal put forward by Brazil at AGBM 8 is more difficult to understand and to link to the CDM as reflected in Article 12 KP. The Proposal was already described in Chapter II as it makes a methodological effort to attribute temperature increases to emissions of countries. Essentially, Brazil proposed a "clean development fund" as a compliance fund rather than a project based mechanism. It was not connected to the concept of joint implementation. Rather, it was supposed to receive contributions from (industrialised country) Parties found to be in non-compliance with their reduction targets. According to Brazil, there was a need for a legal framework in which "the departure by a Party from its commitment results in an obligation to compensate such departure by other means". In essence, Parties in non-compliance with their commitments would have to pay "3.33 US$ for each emissions unit above the effective emissions ceiling". These effective emission ceilings (i.e. reduction targets) were designed according to a calculation formula establishing a relationship between the anthropogenic emissions (the cause of climate change), and the quantitative resulting change of climate (the effect of human action) in the form of changes in temperature. The Brazilian proposal thus assigned relative responsibilities to individual Parties according to their contributions to climate change, as measured by the induced change in temperature, using the responsibility principle introduced in Article 2 FCCC (Section II.2.a) as a mechanism for distributing mitigation action.[255]

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253 Decision 5/CP.1, FCCC/CP/1995/7/Add.1. extended by Decision 13/CP.5, FCCC/CP/1999/8. See for an overview Ott/Oberthür, note 233 at 151 ff., Ott et al. Evaluation of (non-sink) AIJ-Projects in Developing Countries, GTZ Deutsche Gesellschaft für Technische Zusammenarbeit, January 2000.

254 See list of AIJ projects, status 18.July 2001, <http://www.unfccc.int/programm/aij/aijproj.htm>. About ¼ of AIJ projects were undertaken in non-Annex I countries. (FCCC/SB/1999/INF.2/Add.1, p. 8.)

255 <http://www.rivm.nl/FAIR>.

The resources in the fund were to be made available for mitigation and adaptation projects in non-Annex I countries, preferentially to those non-Annex I Parties that already contributed substantially to climate change, i.e. Brazil itself, as well as countries like China, India and South Africa. Specifically with regard to adaptation, the proposal stipulated that "the financial resources of the non-Annex I clean development fund allotted to climate change adaptation projects shall not exceed 10% of the total amount of this fund in any year."[256] Thus, the fund was not designed to deal with climate change damage, but was a combination of a compliance fund and the desire to support mitigation activities in developing countries. Still, this proposal is the nearest the AGBM negotiations ever got to a compensation scheme for climate change damage.

b) *Legal Content*

Article 12 KP establishes the CDM and thereby allows Annex I Parties to engage in project based activities in developing countries. Such projects, if certified by "operational entities" will generate "certified emission reductions" (CERs) which Annex I Parties can use to fulfil their emission reduction obligations under Article 3 of the Protocol.[257] CERs will be added to Annex I Party budgets, thus allowing them to take less action at home to meet their obligations. The purpose of the CDM is three-fold (Articles 12.2 and 12.5): (i) to assist non-Annex I Parties to achieve sustainable development; (ii) to contribute to "the ultimate objective of the Convention"; and (iii) to assist Annex I Parties to achieve their reduction commitments under Article 3 of the Protocol.

Both emissions reduction and – to a certain extent – sink activities are eligible as CDM projects (e.g. a rural electrification project using solar panels or the reforestation of land). Projects must be approved by all Parties involved, but the operation of the CDM as a mechanism is supervised by the Executive Board (EB), operating under the authority of the Conference of the Parties serving as a Meeting of the Parties to the Protocol (COP/MOP).[258] The EB is, *inter alia*, to accredit operational entities (most likely companies who have experience in verification activities), that will validate proposed CDM projects on the basis of project design documents. The EB then formally registers a project, and participants are obliged to monitor it. A different operational entity will verify the monitored emission reductions and eventually certify those emission reductions as legitimate CERs. On this basis, the EB will issue the CERs and distribute them to project participants.

256 FCCC/AGBM/1997/MISC.1/Add.3 at 8.

257 See the institutional arrangements made at COP6*bis* and confirmed at COP7 in FCCC/CP/2001/13/Add.2.

258 See for information on the CDM <http://unfccc.int/cdm/index.html>, the official website of the FCCC Secretariat for the CDM, and the new guidance issued by COP8 to the Executive Board, FCCC/CP/2002/L.5.

c) *Share of Proceeds – Adaptation Fund*

Article 12.8 KP provides that "a share of proceeds" from project activities shall be used to meet administrative costs and to "assist developing country parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation".

The "share of proceeds" provision is what remains from the original Brazilian proposal. It does not, however, link funding to the non-compliance of Parties. Moreover, monies are earmarked for adaptation and administrative costs and are for "particularly vulnerable" countries only; in this respect mirroring Article 4.4 FCCC. Mitigation projects are not to be funded through this special fund.

After the adoption of the Protocol, questions arose such as: what percentage of the proceeds would be used towards adaptation, what and how much exactly would be levied, should this levy be applied to all flexible mechanisms, which were the target countries, and what institutional arrangement would be required to disburse the available funding.[259]

In particular AOSIS insisted that these issues be listed as contentious items in the Buenos Aires Plan of Action. At COP6*bis*, Parties settled these questions only partially. The Bonn Agreement provides that "2% of the certified emissions reductions issued" shall be the share of proceeds "to assist developing country Parties that are particularly vulnerable".[260] CDM project activities in least developed country Parties shall be exempt from the share of proceeds to assist with the costs of adaptation. COP6*bis* established a "Kyoto Protocol Adaptation Fund", which will receive the share of proceeds as well as voluntary contributions by Parties, be administered by the GEF and become operable after the Protocol enters into force.

Parties also agreed that the level of the share of proceeds to cover administrative expenses, such as costs for the operation of the executive board, shall be determined by the Conference of the Parties upon the recommendation of the executive board, and that until such determination, the executive board shall charge a fee to recover any project related expenses.[261] The overall levy on CDM transactions, therefore, will be higher than 2%.

Article 12.10 provides that CERs generated as of 2000, i.e. before the entry into force of the Protocol, can be used towards meeting Kyoto targets. This "prompt start" is a special feature of the CDM and means that a share of proceeds could start to be paid into the adaptation fund soon. However, the role of the CDM in practice is highly uncertain – especially after the withdrawal of the USA has resulted in a ready supply of "hot air" from Russia and the Ukraine. Moreover, the monetary value of

259 See for all options FCCC/SB/2000/4 and for an analysis Lefevere, Defining and Distributing the "share of proceeds", FIELD Paper, 2000.

260 FCCC/CP/20001/L.7.

261 FCCC/CP/2001/CRP.11 at 18.

a CER is not predetermined but will depend on supply and demand ratios, i.e. markets. It is unclear whether the adaptation fund will receive CERs as such and be free to sell them whenever funding is being sought or whether it will receive the monetary value of the CERs after they are issued. While the Bonn Agreement does not explicitly stipulate a review of the 2% share of proceeds figure,[262] the COP/MOP is free under Article 13 KP to recommend changes at any time. In fact, the Bonn Agreement itself will have to be adopted by the 1st COP/MOP to satisfy the requirements of Article 12.8.

Article 12.8 does not clarify who would be eligible for funding – the same problems arise here as described in relation to Article 4.4 FCCC. In sum, developing countries qualifying as particularly vulnerable will not be able to estimate with any certainty how much monies will be available for them through the share of proceeds and the adaptation fund.

4. Quality of and compliance with QUELROs

The legal quality of the reduction commitments of the Kyoto Protocol is of importance for the following chapters. Are they conclusive in that no other international law can apply to the prevention of climate change damage, and what happens if they are breached? As will be discussed further in the next chapter, it is possible that the Kyoto Protocol prescribes the exclusive use of legal consequences foreseen by the Protocol itself and therefore offers a justification not to apply the law of state responsibility to any breach of treaty. This would mean that states do not face any legal consequences (such as claims for compensation) even if they violate their quantitative obligations. This section therefore examines the legal consequences of a breach of the Kyoto commitments, and the results of this discussion will be drawn on in the beginning of Chapter IV. Moreover, the following discussion shows how Parties perceived the problem of residual damage in the context of the Kyoto Protocol – i.e. they did not tackle this issue but were concerned only about compliance with the QUELROs themselves.

During the negotiations of the Kyoto Protocol, there was some discussion about the application of the law of state responsibility and liability in the context of the special compliance system. This discussion was particularly linked to the establishment of international emissions trading and the fact that Parties that oversell (i.e. sell emissions units to other States in excess of their assigned amount) could severely damage other Parties as well as the overall structure of the Protocol. At COP6*bis* Parties

262 This had been suggested by China, Switzerland and others because of the large uncertainties surrounding both the operation of the CDM and the financial needs for adaptation. See for country proposals FCCC/SB/2000/4 and Lefevere, note 259, at 5.

agreed to tackle the issue of overselling through a "commitment period reserve", a mechanism which ensures that only a part of a State's Kyoto budget (Assigned Amount) can be sold. On the contrary, there was only very limited discussion about compensation of actual climate change damage in the context of negotiations on the consequences of non-compliance. A proposal for a special fund to "repair the environmental damage" caused by any excess emissions remained in the compliance draft texts until the last stage of negotiations at COP6*bis*. This fund might indeed have constituted some form of "automatic compensation" for climate change damage, aimed particularly at the restoration and protection of ecosystems. However, as Parties were reluctant to agree to any financial penalties for breach, reference to this fund was removed from the text at the very last stage of negotiations.[263]

The Kyoto Protocol's complex and thoroughly regulated compliance system has been heralded as unprecedented in international law.[264] It is scheduled to be adopted by the Parties to the Kyoto Protocol at the first COP/MOP (the COP "only" reached a preliminary political consensus at COP6*bis*). The Kyoto Protocol's compliance system forms a stark contrast to the FCCC. While Article 13 FCCC does envisage a "multilateral consultative process" to ensure compliance with all the obligations of the FCCC, no special compliance procedure has ever been adopted by the COP. COP1 entrusted an ad hoc group on Article 13 ("AG 13") with the development of a proposal,[265] but the proposal eventually adopted by COP4[266] did not evolve further because negotiations were focused on completion of the Protocol's compliance system.

Should a Party breach its commitments under the Kyoto Protocol, Parties to the Kyoto Protocol would invoke this special compliance and enforcement mechanism, rather than invoking the law on state responsibility (see Chapter V). It is therefore worth exploring what legal consequences the system will foresee once it is operational, and what significance these might have on climate change damage.

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263 This option for consequences of non-compliance was still included in the negotiation text of 21 July 2001, two days before the final agreement was reached. See "Core elements for the implementation of the Buenos Aires Plan of Action", Draft Decision, Annex, p. 14: "V. The Conference of the Parties agrees . . . 2. that the consequences of non-compliance to be applied by the enforcement branch . . . shall be . . . e) to make payments to repair damage to the environment." This paper by the COP President (Jan Pronk) was changed with regard to compliance in the negotiations following the morning of 21 July 2001. The new compliance text was agreed on 23 July 2001 by negotiators and no longer contained element (e).

264 ENB Final COP-7, 12 Earth Negotiations Bulletin 189, (2001), available at <http://www.iisd.ca>, at 15 (noting that the Kyoto Protocol contains "the most innovative and elaborate non-compliance procedure for any existing multilateral environmental agreement."). See also Wirth, note 237, 654 ff.; Wang/Wiser, The Implementation and Compliance Regimes under the Climate Change Convention and the Kyoto Protocol, 11:2 RECIEL (2002) 181 and Oberthür/Marr, Das System der Erfüllungskontrolle des Kyoto Protokolls, ZUR 2002, 81.

265 See Bodansky, note 9 at 547 ff. and Oberthür/Ott, The Kyoto Protocol, 231 f.

266 FCCC/AG13/1998/2 and Dec. 10/CP.4; FCCC/CP/1998/16/Add.1.

Institutionally, compliance with the Kyoto provisions will be supervised by the Compliance Committee, which has a "Facilitative Branch" and an "Enforcement Branch".[267] The Facilitative Branch is modelled after the Montreal Protocol's non-compliance procedure and will provide advice and assistance to Parties in complying with their obligations. The Enforcement Branch, on the contrary, is adjudicatory in character. It has the power to prescribe legal consequences where a Party fails to comply with the methodological and reporting requirements (Articles 5.1, 5.2, 7.1 and 7.4 KP), fails to meet the eligibility requirements for the use of the flexible mechanisms or fails to meet its QUELROs under Article 3 KP.[268] The agreement sets out specific legal consequences where a Party is in non-compliance with any of these obligations.[269] In particular, a Party that does not meet its QUELRO will be subject to, *inter alia*, a "penalty" rate for excess emissions, i.e. will have to reduce 1.3 times as much in the next commitment period to make good for the non-compliance: 1.3 times its excess emissions will be deducted from the respective Party's Assigned Amount. This has been described as "borrowing" from the next commitment period[270] and is problematic especially as compliance with the QUELROs will not be assessable until long after the respective commitment period has ended. For example, compliance with the targets for 2008-2012 will not be determined before 2015, and only then will Parties know whether anything and if so how much will be deducted from their assigned amount.

To provide stronger leverage for the Compliance Committee, Parties that have exceeded their Assigned Amount are also obliged to submit for Enforcement Branch review a "compliance action plan" setting out how they intend to "restore the tonnes" they failed to reduce in the previous commitment period. However, the physical consequences of the delay in emission reductions are not addressed (i.e. there is no explicit provision for compensation for damage or payments to enable adaptation measures). A Party in non-compliance with its QUELROs also will have its eligibility to participate in the emissions market suspended.

The first conclusion to draw here is that the compliance system of the Kyoto Protocol is only concerned with the integrity of the treaty itself and does not foresee any remedies for States claiming that the unlawful behaviour of other States has caused damage to the climate system and to their territory. This is why many States have – upon ratification of the Protocol – made the following declaration "signature and subsequent ratification of the Kyoto Protocol shall in no way constitute a renunciation of any rights under international law concerning State responsibility for the

267 The rules and procedures on compliance adopted at COP7 are contained in: Dec. 24/CP.7, FCCC/CP/2001/13/Add.3, 64 ff.

268 Dec. 24/CP.7 (note 267) para. V.4.

269 Dec. 24/CP.7 (note 267) para. XV. (Consequences applied by the Enforcement Branch.)

270 See Wang/Wiser, note 264 at 196, for more detail.

adverse effects of the climate change and that no provision in the Protocol can be interpreted as derogating from principles of general international law".[271]

Moreover, the legal nature of the consequences described is complex and different to any consequences applied under the law of state responsibility. They are only binding within the treaty regime. The issue of binding consequences was one of the most contentious questions during the negotiations. The second sentence of Article 18 KP stipulates that "any procedures . . . entailing binding consequences shall be adopted by means of an amendment to this Protocol". This means that any binding consequences would be subject to the approval and ratification of the Parties.

During the negotiations, the EU advocated the adoption of a compliance agreement, which would be mandatory for all Parties to the Protocol, even prior to the Protocol's entry into force. The "Umbrella Group" countries (mostly USA, Canada, Japan, and Russia) on the other hand succeeded in including language in the Bonn Agreements, which anticipated a non-binding decision concerning compliance. The Marrakesh Accords defer the question of the legal form of the compliance regime (legally binding agreement or non-binding COP/MOP decision) until the first COP/MOP.

Naturally, this debate (or Article 18 KP) does not change the legal character of the QUELROs. They are legally binding and enforceable. The contentious issue is rather whether the decisions of the Compliance Committee are legally binding, i.e. whether a State will be legally obliged to apply the 1.3 penalty rate to its next assigned amount, whether it will be seen in breach of treaty if it does not submit a compliance action plan, etc. This is particularly important as the Committee is independent of the COP/MOP – its decisions cannot be revised by a political decision in the COP/MOP plenary. Decision 24/CP.7 further highlights that the decisions of the Compliance Committee are not the last resort. It expressly stipulates that "the procedures and mechanisms relating to compliance shall operate without prejudice to Articles 16 and 19 of the Protocol" (paragraph XVI). These provisions make the compliance and dispute settlement provisions (Articles 13 and 14) of the FCCC applicable. Article 14 FCCC is the dispute settlement clause, which is not replaced but supplemented by mechanisms established in accordance with Article 13. It is a standard clause used in many international agreements. If a dispute arises, Parties should first attempt to settle it through negotiations. Upon signature, Parties can submit to the jurisdiction of the International Court of Justice (ICJ) or to arbitration (Article 14.2). If the Parties to a dispute have not submitted to binding adjudication, and negotiations have failed to resolve the dispute, either Party may request a conciliation commission (Article 14.5). This commission only has the power to give recommendatory awards, but still represents a form of binding dispute settlement mechanism.

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271 Declaration by the Governments of the Cook Islands, Niue, Kiribati. See Kyoto Protocol, status of ratification, last visited 13 July 2003.

In sum, therefore, while the Compliance System of the Kyoto Protocol is a landmark agreement, it neither excludes the settlement of disputes outside the Compliance Committee nor the legal consequences for a breach of treaty that are not foreseen by the Compliance System of the Protocol. This is important, especially since the System is concerned solely with the enforcement of QUELROs and not with remedying climate change damage.

5. Conclusions

The Kyoto Protocol does not broaden the scope of instruments related to the prevention of climate change damage. While it foresees binding mitigation targets and thereby facilitates the implementation of the objective set out in Article 2 FCCC, it does not do so on the basis of the a specific parameter for damage prevention (i.e. the 450 ppm target). Rather, the QUELROs mirror the political willingness of Annex I countries to contribute to preserving the global climate system. This approach is not in line with the clear prevention duty set out in Article 2 FCCC, and it can only be hoped that further reductions (commitment periods) will be agreed on a more rational basis aimed at preventing injury to natural and human systems.

With respect to adaptation, the share of proceeds from the CDM are not designed to meet the real needs of developing countries for reducing vulnerability to the impacts of climate change. The share of proceeds are determined by the market value of the CERs and the overall price of carbon (or the costs of mitigation measures) which will determine how much the CDM as a mechanism will be used by Annex I countries. Article 12.5 KP complements the financial obligations of Articles 4.3 and 4.4 FCCC but does not alter the need for Annex II countries to fulfil those obligations independently of the operation of the CDM.

Lastly, the compliance system of the Kyoto Protocol is not concerned with remedying the damage caused by (excess) emissions, but aims only at the enforcement of the QUELROs themselves. It is not all-encompassing in that it only prescribes legal consequences to bring Parties back into compliance with the Protocol. It does not offer a possibility for States to claim compensation for any injury suffered due to climate change, nor does it install a fund which might help prevent such damage.

IV. Adaptation Activities and Funding under the FCCC and Kyoto Protocol – the Practice for Developing Countries

In the sections above, the provisions in the FCCC and Kyoto Protocol relating to the prevention of climate change damage were described. This section sets out in some more detail the *practice* of the climate regime with respect to adaptation in develop-

ing countries. This analysis is warranted because it will assist in the determination of the extent to which specific substantive and financial obligations are being fulfilled. It will also assist in identifying gaps. This assessment takes into account the specific decisions of the COP, as well as the funding reality of the GEF. As mentioned before, the GEF's operational planning and funding decisions in the area of implementation of the climate regime's provisions are guided by decisions of the Parties to the FCCC (Article 11.1 FCCC), and there is thus a close link between those two entities.

Naturally, Annex I countries are also vulnerable to the impacts of climate change, and they have the substantive obligation under Article 4.1(b) to prepare and undertake adaptation measures to prevent residual damage (even in the light of uncertainty, Article 3.3 FCCC). However, as shown above, this obligation has various highly discretionary elements. It is for the States themselves to determine what they deem necessary. An appraisal of the extent to which industrialised States comply with this obligation is therefore difficult. Generally, there has been an increasing focus in Annex I Parties on adaptation. Some have begun planning for adaptation and are already envisaging the implementation of certain measures (e.g. the UK).[272] While Germany's first national communication clearly stated that "measures for combating the anthropogenic greenhouse effect" have priority and that "no measures for adaptation are yet planned",[273] there is a clear trend toward more structured planning both in Germany and other Annex I countries. Usually efforts in the field of adaptation are evidenced by increased research activity and planning in the areas of coastal impacts, agriculture, human settlements, etc. as displayed in the national communications submitted by Annex I countries.[274]

The focus on developing countries here is justified by the international legal dimension associated with adaptation activities in these countries. This stems from the reciprocal relationship between the financial obligations of industrialised country Parties (Articles 4.3 and FCCC and Article 12 KP) and the substantive obligations of developing country Parties (Article 4.1(b) and (e)). Moreover, as pointed out in Chapter II, industrialised countries are much less vulnerable to the impacts of climate change due to their better financial and technological response capacities.

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272 The UK climate change programme – Section 3: Adapting to the impacts of climate change in the UK, Department for Environment, Transport and the Regions, London November 2000.

273 Climate Protection in Germany, First Report of the Government of the Federal Republic of Germany to the UN FCCC, September 1994, 99.

274 See for example the US's third national communication, Chapter VI, which provides an overview of potential negative and positive impacts and possible response options. Chapter IV of the German third national communication operates on the assumption that impacts in Germany will be modest – ranging from higher temperatures and smaller amounts of rainfall, especially during the warmer half of the year, and expected milder, wetter winters with a trend toward drier, warmer summers in western and northern Europe. Chapter VI of New Zealand's third national communication provides evidence of the increased vulnerability of coastal settlements. Annex I national communications also list ongoing research and concrete measures.

1. Implementation of adaptation obligations in developing countries

Article 4.1(b) of the FCCC has been implemented with different degrees of effectiveness in developing countries.[275] To support Parties in the implementation of this obligation, the FCCC Secretariat has conducted several technical workshops and commissioned papers on climate change impacts and adaptation, both in the framework of technology transfer and implementation of Article 4.3 and 4.4 FCCC. The general verdict is that Article 4.1(b) is not being implemented appropriately.[276] An assessment in 1996 found "non-fulfilment" of the requirements of the 1994 IPCC Technical Guidelines for Assessing Climate Change Impacts and Adaptation which give detailed guidance for the implementation of Article 4.1(b).[277] Yet, with the new political focus on adaptation since COP8,[278] this is rapidly changing.

Planning of adaptation measures in non-Annex I countries is still scarce due to the lack of financial and skilled human resources as well as reliable predictions about possible impacts.[279] Possible adaptation measures in non-Annex I countries are identified at a general level and increased research and data gathering is the primary concern of those Parties, while there is only a limited attempt to quantify the costs and assess the effectiveness of concrete adaptation measures.[280] Nevertheless, non-Annex I Parties are beginning to identify their needs for adaptation in areas such as agriculture (to secure the food base), water and coastal management.

The lack of concrete implementation of Article 4.1(b) is partially due to the circumstances under which activities might be funded by the GEF, but also because implementation is so inextricably linked with general economic and social development. Because of the real lack of country data as a basis for decision-making, adaptation planning in most developing countries is still in the assessment phase. As such, many countries currently are only compiling information for adaptation decision-making as part of the development of their national communications (pursuant to Article 12.1 of the FCCC), or are just entering the planning phase.

By the end of 2004, 122 out of 146 non-Annex I Parties (including large emitters such as China, India and Brazil) had submitted national communications in which

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275 On this entire issue see Verheyen, The Legal Framework of Adaptation and Adaptive Capacity, in: Huq/Klein/Smith: Climate Change, Adaptive Capacity and Development, 2003.

276 See Compilation and Synthesis of National Communications, FCCC/CP/1996/12.

277 See Compilation and Synthesis of National Communications, FCCC/CP/1996/12, para. 53.

278 See the Delhi Declaration, FCCC/CP/2002/7/Add.1.

279 See for a general assessment of the difficulties in implementing, *inter alia*, Article 4.1(b): First compilation and synthesis of initial communications from Parties not included in Annex I to the Convention, Note by the Secretariat, FCCC/SBI/1999/11, 7.

280 FCCC/SBI/1999/11, 26, 28. See for a suggested methodology FCCC secretariat, Compendium on methods and tools to evaluate impacts of, vulnerability and adaptation to climate change, January 2004.

they also provided information about the impacts of climate change and adaptation.[281] Until recently, reporting about these aspects was based, *inter alia*, on a 1994 set of IPCC guidelines, but also on other tools.[282] The utility of these guidelines was questionable, in particular in relation to their ability to link national adaptation assessments with the legal obligations of countries (including the financial duties of Annex II countries under Articles 4.3 and 4.4 of the FCCC). The application of the guidelines produced basic country assessments of impacts, but did not provide a methodology or legal tools for decision making. Because demand for adaptation funding will grow, there is a clear need for guidelines that enable decision makers to prioritise activities or projects. A step in this direction are the National Adaptation Programmes of Action (NAPA, see below) as well as the "Adaptation Policy Framework" designed by the UN Development Programme which intends to provide assessment as well as decision making tools for developing countries.[283] The linkages between these tools and national communications must still be developed thoroughly, especially since the most recent COP decisions expressly insist that "action relating to adaptation follows an assessment and evaluation process, based on national communications . . .".[284]

The lack of implementation of Article 4.1(b) as well as the unavailability of funds for adaptation purposes, in particular for least developed countries (LDCs also lag behind most Parties in developing their national communications), compelled Parties at COP7 to adopt the concept of NAPAs.[285] NAPAs are designed to communicate the urgent adaptation needs of LDCs, and they are the only specific document within the framework of the climate regime to address adaptation exclusively. The gist of the NAPA is a list of priority activities necessary for adapting to current and projected climate change impacts in the respective country. Activities are to be prioritised in the NAPAs if delays in implementing such projects or other activities (including projects, integration

281 FCCC/SBI/2003/INF.1. The methodological approaches used by Parties were generally consistent with the analytical framework provided in the IPCC Technical Guidelines which Parties are encouraged, while not obliged, to use (See Dec. 10/CP.2, FCCC/CP/1996/15/Add.1.) New guidelines for Non-Annex I National Communications were agreed at COP8, Dec. 17/CP.8, FCCC/CP/2002/7/Add.2.

282 IPCC Technical Guidelines, note 155. See for further details FCCC Secretariat, Compendium of Decision Tools to Evaluate Strategies for Adaptation to Climate Change, 1999 and FCCC Secretariat, Compendium on methods and tools to evaluate impacts of, vulnerability and adaptation to climate change, January 2004.

283 See note 160. See on adaptation assessment methodologies also Burton et al., From impact assessment to adaptation priorities: the shaping of adaptation policy, 2 Climate Policy (2002) 145.

284 Dec. 1/CP.10, Buenos Aires programme of work on adaptation and response measures, para. 4.

285 Decision 27/CP.7 and 28/CP.7, contained in FCCC/CP/2001/13/Add.4. At COP8 it was decided that the NAPA guidelines do not need any revision at this stage (FCCC/SBI/2002/L.8), however, annotated guidelines were produced by the Least Developed Country Group, see document FCCC/SBI/2002/INF.14. NAPAs have been approved by the GEF for 43 out of 48 LDCs. NAPAs for Bangladesh, Cambodia, Ethiopia, Malawi, Mozambique, Samoa, Sudan, Tuvalu and Yemen will be amongst the first to be completed. See FCCC/CP/2004/6 (Report of the GEF), 9.

into other activities, capacity building and policy reform) "could increase vulnerability, or lead to increased costs at a later stage".[286] As a first step, the guidelines call for a participatory assessment of vulnerability to *current climate variability* and extreme weather events as well as an assessment of potential increasing risks induced by climate change. It is striking that the legal differentiation between natural and anthropogenic climate change seems to have been abandoned.

The final NAPA document, endorsed by the government of the respective country, is also supposed to serve as a basis for seeking financing through the LDC fund or the GEF trust fund for actual project implementation. However, the problems identified in the preceding sections with regard to the implementation of Articles 4.3 and 4.4. through the GEF (global benefits, incremental costs, and assist) remain. The first NAPAs are expected in the first half of 2005, and naturally, the debate about how the implementation of the NAPAs will be funded has played a major role in discussion since COP7. Moreover, other developing countries have demanded additional assistance with the planning of their adaptation strategies. This will be discussed further below in the context of the LDC fund.

Overall, the NAPA discussion has advanced the role of adaptation within the climate regime immensely. This is partially due to the advances in science which have made it clear that early adaptation activities are necessary to prevent residual climate damage. Also, with the NAPA guidelines adopted at COP7,[287] Parties have recognized that the reduction of current vulnerability to climate variability can lead to better adaptive capacity in LDCs in the decades to come. Response activities (implementation of NAPAs) therefore will not be limited strictly to impacts caused by anthropogenic climate change. This is an important deviation from the principles in the funding provisions of the FCCC (incremental costs) and might result in a situation where the climate regime provides funding for measures that are beyond its initial scope (see further below). NAPAs are also a first step toward using vulnerability assessments, which focus on the system of interest as the basis for decision-making, rather than impact assessments based on climate models.

Still, developing country Parties are far from having implemented their obligations under Art 4.1(b) to set up adaptation programmes and facilitate their implementation, and the extent to which NAPAs will actually reduce vulnerability and thus prevent residual climate change damage will depend on the level of implementation and funding.

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286 FCCC/CP/2001/13/Add.4, p. 8.
287 Note 285.

2. Guidance to the GEF

This section seeks to set out the current guidance provided by the COP to the GEF regarding adaptation. This is done chronologically, so that the developments as well as remaining gaps can be best discerned.

According to the GEF Operational Strategy, the *"overall thrust of GEF-financed climate change activities is to support sustainable measures that minimize climate change damage by reducing the risk or the adverse effects of climate change".*[288] As already discussed, the GEF is primarily concerned with activities which yield global environmental benefits; and therefore, adaptation is not a natural area of engagement. As pointed out in Section II.1, in the negotiations leading to adoption of the FCCC, the issue of funding for adaptation planning and measures was not a priority. Only after the adoption of the FCCC did the INC also turn to the possible activities of the financial mechanism in the area of adaptation and to prepare guidance for the GEF on this issue. Industrialised countries wanted to ensure that any funding for adaptation projects would be based on proper planning and vulnerability assessments, since the actual needs for adaptation were unknown. Developing countries on the other hand argued for flexible programmes that would enable them to apply for real adaptation funding early.[289] Finally, on the basis of a proposal made by Germany,[290] COP1 adopted as a compromise a three-stage process for adaptation measures and planning to be funded through the GEF.

a) *The three-stage approach*

The three-stage approach as contained in Decision 11/CP.1[291] is reproduced in parts below (Box III.1):

> . . . (d) Regarding adaptation, the following policies, programme priorities and eligibility criteria should apply:
>
> "(i) Adaptation to the adverse effects of climate change, as defined by the Convention, will require short, medium and long term strategies which should be cost effective, take into account important socio-economic implications, and should be implemented on a stage-by-stage basis

288 GEF operational strategy, note 193, Chapter 3 – climate change.

289 See UN Doc. A/AC.237/68, Implementation of Article 11, Synthesis report on adaptation. See also A/AC.237/MISC.38 and Add.1 – submissions from Parties on the financial mechanism, with a focus on possible funding options for the GEF in the area of adaptation.

290 A/AC.237/MISC.38/Add.1 – Submission on the specific near-term and long-term priorities and needs of developing countries, adaptation and issues related to the financial mechanism.

291 FCCC/CP/1995/7/Add.1 (Report of COP1), 34 ff. Additional guidance was provided at COP2: in Dec. 11/CP.2, FCCC/CP/1996/15/Add.1 and at COP4: Dec. 2/CP.4, FCCC/CP/1998/16/Add.1, and at COP7: Dec. 6/CP.7, FCCC/CP/2001/13/Add.1. For comment and analysis on Dec. 11/CP.1: see Gupta, The Climate Change Convention and Developing Countries, 102.

Box III.1: The three stages of adaptation funding

in developing countries that are Parties to the Convention. In the short term, the following stage is envisaged:

- Stage I: Planning, which includes studies of possible impacts of climate change, to identify particularly vulnerable countries or regions and policy options for adaptation and appropriate capacity-building;

(ii) In the medium and long term, the following stages are envisaged for the particularly vulnerable countries or regions identified in Stage I:

- Stage II: Measures, including further capacity-building, which may be taken to prepare for adaptation, as envisaged by Article 4.1(e);

- Stage III: Measures to facilitate adequate adaptation, including insurance, and other adaptation measures as envisaged by Articles 4.1(b) and 4.4;

Since COP decisions complement the provisions of the FCCC, this three-stage approach constituted a *de facto* limitation of activities to be funded in accordance with Articles 4.3 and 4.4 in the short and medium term.

The "enabling activities" under Stage I are closely connected to reporting requirements under Article 12 FCCC. As mentioned above, pursuant to the first sentence of Article 4.3 FCCC, Annex II countries must meet the full costs for the national communications of non-Annex I countries. The development of these fit the criteria of Stage I activities. Thus, in fact, Stage I activities meet only the obligation of the first sentence and do not implement the second sentence of Article 4.3 nor do they implement Article 4.4. It is important to note that, because the GEF bears the full costs of all such activities, there has been no need for prioritisation of requests.[292]

The GEF has funded numerous enabling activities, such as vulnerability assessments in agriculture, forestry, coastal zones, water resources, health and natural ecosystems as components of non-Annex I Party national communications.[293] Since Stage I activities are envisaged to identify "particularly vulnerable countries", and help to define this term in both Article 4.4 of the FCCC and 12.8 of the Kyoto Protocol,

292 On this entire issue see Verheyen, Adaptation Funding – Legal and Institutional Issues, in: Huq/Klein/Smith: Climate Change, Adaptive Capacity and Development, 191.

293 To date, the GEF has assisted 132 countries to undertake Stage I adaptation activities in accordance with Decision 11/CP.1 as part of their first national communications. Some of these funds were used to conduct voluntary vulnerability and adaptation assessments. Stage I work is still ongoing since only 51 Parties have so far presented information in their national communications on vulnerability to and impacts of climate change and not all non-Annex I countries have submitted a national communication at all. See GEF/C.19/Inf.10; GEF Review of climate change enabling activities. Evaluation Summary Report #2-00 November 2000, see <http://www.gefweb.org> and GEF, Report of the GEF to the Eighth Session of the Conference of the Parties to the UN FCCC, contained in document FCCC/CP/2002/4.

they are a first step toward the implementation of those obligations. Stage I activities are also meant to identify "adequate" adaptation options, which could be essential to defining the term "adequate" in Article 4.1(b) of the FCCC. In its 2003 "Adaptation Approach", the GEF still envisages that the majority of adaptation activities will fit under the heading of enabling activities and therefore qualify for full cost funding.[294]

Funding for the actual implementation of Articles 4.1(b) and 4.4 through measures reducing vulnerability and advancing adaptation is not fully authorized until Stage III is reached. Decision 11/CP.1 stipulates explicitly: *"If it is decided . . . that it has become necessary to implement the measures envisaged in Stages II and III, the Parties included in Annex II to the Convention will provide funding to implement the adaptation measures envisaged in these stages in accordance with their commitments contained in Article 4.3 and 4.4 of the Convention"*. Moreover, the COP is required to decide explicitly *"on the channel or channels, under Article 11 of the Convention, to be used for the funding referred . . . to implement the adaptation measures envisaged in Stages II and III"*.

This COP1 Decision already indicates that Parties were reluctant to agree to adaptation funding via the general GEF trust fund. This general reluctance remains, and indeed, the establishment of the new funds at COP6*bis* indicated that many Parties prefer to separate adaptation funding from the general climate core area (see below).

Yet, as Articles 4.3 and 4.4 are binding financial obligations under the FCCC, it would not be in line with treaty obligations were such implementation measures (Stage III and beyond) not funded through the GEF at all. While Article 11.5 also calls on developed country Parties to provide "financial resources related to the implementation of the Convention through bilateral, regional and other multilateral channels", the implementation of the financial commitments is clearly primarily linked to the GEF.

b) *Additional Guidance*

The restriction of funding to Stage I activities was criticized by many developing countries, especially small island developing States. To address these concerns, Parties at COP4 decided that the GEF should fund "adaptation response measures (Stage II activities) in particularly vulnerable countries and regions identified in Stage I activities.[295] Despite the COP4 decision and the identification of vulnerable countries and regions in Stage I projects, no additional funds were allocated to the GEF to fund Stage II activities. This was partially due to the fact that Stage II activities were not specified beyond the COP1 decision and it was thus difficult to identify eligible projects.[296] Still, the GEF has since provided funding to several Stage II projects from the GEF's general trust fund. These have been provided on a first-come-first-serve basis, which, due

294 See above note 205 and accompanying text.
295 Dec. 2/CP.4, FCCC/CP/1998/16/Add.1.
296 See Klein, Adaptation to Climate Change in German Official Development Assistance, 20.

to the limited number of applications, did not create difficulties.[297] Also, as these activities were qualified as enabling activities in the context of the development of national communications, they are funded on the basis of the agreed full-cost principle.

The following additional guidance was provided to the GEF at COP7:[298]

- the GEF is to support Stage II adaptation projects in regions identified as particularly vulnerable in Stage I assessments;
- the GEF should establish adaptation pilot or demonstration projects in regions that have undergone Stage I and II measures to show how the assessments and plans can be translated into concrete projects that will provide real benefits and may be integrated into national policy and sustainable development planning;
- the GEF is to provide funding for capacity building in the areas of disaster preparedness and contingency planning for natural disasters such as droughts and floods in areas prone to extreme weather events; and
- the GEF should set up or strengthen existing early warning systems for extreme weather events.

Within this framework, the GEF must prioritise the needs of least developed countries and, in particular, the needs of small island developing states. This emphasis might provide a further clue to defining the term "particularly vulnerable" in Article 4.4 of the FCCC and Article 12.8 of the Kyoto Protocol, but is not a conclusive interpretation by the COP. Given the fact that some countries might lose eligibility for funding under these provisions, a conclusive interpretation would have to be labelled as such and agreed by the COP functioning as the supreme body of the climate regime. The interpretative competence of the COP is derived from Article 7.2 FCCC.

This COP7 guidance has forced the GEF to revise (or at least not apply) its operational strategy in the area of adaptation to the impacts of climate change because of the new language, which requires projects to result in "real benefits" rather than in "global benefits". Furthermore, the guidance explicitly obliges the GEF to fund Stage II projects, and regional capacity building – both being activities which "only" result in local or regional benefits. The GEF therefore will have to adjust to this change in focus in the distribution of funds. Principle 5 of the operational principles of the GEF states that the GEF will maintain sufficient flexibility to respond to "evolving guidance of the Conference of the Parties".[299]

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297 To date, six projects have been approved, most of them regional in character. One of the Stage II projects is the joint UNEP and IPCC project: "Assessment of Impacts and Adaptation to climate change in Multiple Regions and Sectors". See GEF Report 2002; FCCC/CP/2002/4; note and for background information http://www.gefweb.org.

298 Dec. 6/CP.7, FCCC/CP/2001/13/Add.1.

299 The Principles are contained in the Operational Strategy, note 193.

Responding to the new guidance, the GEF developed its "Strategic Priority – Piloting an Operational Approach to Adaptation". Within this Approach, the GEF will support *"a portfolio of projects which will be designed to maximize the opportunity for learning and capacity building and will be representative of particularly vulnerable regions, sectors, geographic areas, ecosystems and communities"*. Building on the existing concept of incrementality, the GEF will fund the incremental cost of adaptation activities that generate global environmental benefits but also, and this is the important deviation from its own policy, *"the incremental cost of selected adaptation activities that are identified as high priorities by national communications"*.[300] According to the Operational Guidelines[301] for this Approach, the lessons learned from these projects are to be "applicable in a wide context" – i.e. a major selection criterion will be whether the particular project yields transferable results. This focus on learning through adaptation projects is not strictly in line with the interests of developing countries to implement programmes and projects to reduce vulnerability to the impacts of climate change and shows that the new Adaptation Approach cannot be seen to constitute full Stage III financing. Rather, parties have asked the GEF to integrate adaptation concerns into portfolios in other focal areas such as international waters, biodiversity and land degradation. This (wise and probably effective) exercise will complicate the answer to the question whether Articles 4.3 and 4.4 FCCC are being adequately implemented.

Thus, existing COP guidance does not enable funding for Stage III adaptation measures, which would include, *inter alia*, insurance measures and measures to implement Articles 4.1(b) and 4.4 FCCC. This means that Stage III funding for measures actually reducing the vulnerability of regions and countries to the impacts of climate change will not be made available – apart from the few pilot projects under the Adaptation Approach. Indeed, in the various COP6*bis* and COP7 decisions on funding issues, Annex II Parties also maintained that Stage III funding would not be provided at all at this stage. Project funding is strictly restricted to the specific elements mentioned in the new guidance to the GEF and other decisions. These elements, however, are being stretched, for example through the new Buenos Aires Programme of Work on Adaptation and Response Measures,[302] which contains a wealth of activities in the area of research and institutional capacity building.

The sum of existing COP guidance acknowledges the linkages between current weather extremes and future adaptation needs. It allows countries to apply for funding for disaster preparedness regardless of whether such disasters are caused by anthropogenic climate change. After COP6*bis*, donor countries have maintained that the GEF, when serving as the financial mechanism of the FCCC, should focus only on

300 Proposed to the GEF Council in May 2004, GEF/C.23/Inf.8/Rev.1, para. 21.

301 Ibid., Annex C.

302 Dec. 1/CP.10, note 284. This programme is to be funded by the GEF, see Dec. 8/CP.10, Additional guidance to an operating entity of the financial mechanism, para. 3.

damage and risks due to anthropogenic climate change. Yet, as discussed earlier, the differentiation of these causes is difficult, and for practical reasons often not advisable.[303] This is where a legal claim (see Chapter VI) would differ from the practicalities of a financing entity. GEF experts have noted clearly that funding for adaptation needs is to be directed at better understanding and enhancing adaptive capacity. Reducing vulnerability to climatic hazards begins by learning from current vulnerability.

Generally, regarding the concept of incremental costs, the guidance does not solve any of the problems highlighted in Section II.2.c)(5)(b)(i) above. In fact, for pilot and demonstration projects the incremental cost approach is hardly applicable at all, even where the GEF notes that incremental funding for these projects will be provided by NGOs, bilateral donors or other sources. If the GEF is to "establish" pilot and demonstration projects to test the implementation of Stage I and II planning and to show how such projects can be "integrated into national policy planning", and enable general learning from the project experience, there is no baseline against which the incremental costs of such projects might be measured. Also, it is not clear whether other funding criteria such as economic efficiency (optimum solution) could be applied, since the benefit of those projects is not just adaptation but also the demonstration effect.

In addition to the above mentioned Programme of Work, another COP6*bis* decision on the implementation of Articles 4.8 and 4.9 of the FCCC complements the new guidance and specifies activities that should be supported by the GEF.[304] This list of activities does not introduce new areas, but further stresses the need for vulnerability assessments and disaster preparedness. It includes strengthening or establishing observation and monitoring networks (for sea level rise and weather extremes) as well as research programmes on climate variability and climate change; support for enabling activities for vulnerability and adaptation assessment; technical training for climate change impact and vulnerability and adaptation assessments; and support for capacity building for preventive measures, planning and preparedness of disasters. It also emphasizes the need for transfer of adaptation technology to implement the technology transfer obligation in Article 4.5 FCCC.

c) *Conclusions*

In sum, the existing COP guidance to the GEF fails to fully mirror the financial obligations contained in Articles 4.3 and 4.4 FCCC, even if major steps towards adaptation financing have been taken. The GEF is not entitled to respond favourably to claims made by developing countries to undertake actual adaptation measures beyond the assess-

303 See Report from the STAP Expert Group Workshop on Adaptation and Vulnerability, 7 May 2002, GEF/C.19/Inf.12. See also FCCC: Review of Adaptation Activities under the Convention, Working Paper No. 10 (2003).

304 Decision 5/CP.7, FCCC/CP/2001/13/Add.1 and note 284.

ment of a country's vulnerability, unless it is a pilot project that will enable general learning (demonstration project). It is questionable to what extent the restriction to assessment activities is justified on the basis of the FCCC text. Article 4.4, especially, cannot be expected to be implemented given the reluctance of Annex II Parties to enable the GEF trust fund to start Stage III projects. Based on the letters of the FCCC, adaptation activities certainly cannot be confined solely to the enabling activities of assessment and capacity building. The overall guidance also does not remedy the problems set out above (incremental costs, etc.) and in fact empowers the GEF to confine climate-related funding mainly to mitigation measures.

From a political standpoint, this approach likely emerged from an awareness by the Parties that adaptation to the impacts of climate change can only be successful if coupled with general planning and (economic) development. For this reason, donors are inclined to confine the funding of adaptation projects to areas of policy formulation, capacity building and institutional reforms, to ensure that in future adaptation is considered in all activities undertaken either publicly or by the private sector. Articles 4.3 and 4.4 FCCC do not stop here, however. Instead, they demand actual assistance in reducing vulnerability to the impacts of climate change, thereby preventing climate change damage. This dilemma between the push for the integration of adaptation concerns in overall policy and the preference of developing countries for access to project implementation finance (to which they are entitled on the basis of the FCCC) remains to be resolved.

3. The new funds

The Bonn Agreement[305] (endorsed by COP7) established three new funds, both for mitigation and adaptation purposes and calls on Annex II Parties, and other Annex I Parties "that are in a position to do so" to provide additional funding to meet the commitments under, *inter alia*, Articles 4.3 and 4.4.[306] Each of the funds will be administered by the GEF. During the negotiation of the Buenos Aires Plan of Action,[307] developing countries maintained that new funds would be necessary to comply with the financial obligations of the FCCC, while Annex I Parties attempted to maintain the core GEF trust fund as the only means of supporting the implementation of the FCCC by developing countries. COP6 president *Pronk* first introduced a "Convention Fund" alongside an "Adaptation Fund" into the negotiations.[308] He envisaged the

305 See Dec. 5/CP.6, FCCC/CP/2001/L.7 (see also the COP7 decisions FCCC/CP/2001/13/Add.1, 4)
306 See Huq, The Bonn-Marrakesh agreements on funding, 2 Climate Policy (2002) 243.
307 See section Chapter I:III.1 above.
308 FCCC/CP/2000/CRP.14 and (in the report of COP6-first part) FCCC/CP/2000/5/Add.2, Note by the President of the Conference of the Parties, 23 November 2000.

Convention Fund as focusing on mitigation and economic diversification (the implementation of Article 4.8 FCCC in relation to the impact of climate change protection measures, i.e. support for oil exporting countries). Annex II Parties were to transfer x% of their Assigned Amount to the fund, and these units would then be open for purchase (International Emission Trading, Article 17 Kyoto Protocol). After the breakdown of COP6 in The Hague in November 2000, developing countries managed to include a third fund in the President's papers, which were to be the basis for negotiations. The least developed countries, especially, stressed the urgent need for a special LDC fund, because when compared to the other non-Annex I Parties, LDCs had received a very small share of GEF funding since 1994. Thus, the paper of March 2001[309] already listed all three funds, which were eventually adopted by COP6*bis* in June 2001.

The special climate change fund (SCCF) is to finance activities complementary to those funded by the resources allocated to the GEF and bilateral and multilateral funding. Eligible activities include adaptation, technology transfer, energy, transport, industry, agriculture, forestry and waste management, as well as activities to assist developing countries diversify their economies.[310]

The discussion about the SCCF after COP7 was contentious, especially since the pertinent decisions include funding for so-called response measures (economic diversification).[311] After much discussion, Parties agreed that the fund should "serve as a catalyst to leverage additional resources from bilateral and other multilateral sources" and that "adaptation activities to address the adverse impacts of climate change shall have top priority for funding" and finally that technology transfer activities should also be supported.[312] The size of this fund as well as the voiced intention of the Parties to fund in a "catalytic" manner sets limits to the implementation of Articles 4.3 and 4.4. This is part of the ongoing discussion about further guidance to the fund.[313]

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309 Note 229.

310 See Dec. 7/CP.7 (para. 2), FCCC/CP/2001/13/Add.1, 43.

311 Dec. 5/CP.7 (para. 8), FCCC/CP/2001/13/Add.1, 32. Activities to be funded include: 1) *implementing adaptation activities* in the areas of water resources management, land management, agriculture, health, infrastructure development, fragile ecosystems, including mountainous ecosystems, and integrated coastal zone management, where sufficient information is available to warrant such activities; 2) *monitoring of diseases and vectors* affected by climate change and related forecasting and early warning systems, and in this context, improvement of disease control and prevention, 3) *supporting capacity building*, including institutional capacity, for preventive measures, planning, preparedness and management of *disasters relating to climate change*, including contingency planning, in particular, for droughts and floods in areas prone to extreme weather events; 4) strengthening existing or establishing new national and regional centers and information networks for *rapid response to extreme weather events*, utilizing information technology as much as possible.

312 Dec. 5/CP.9, FCCC/CP/2003/6/Add.1 on the basis of Dec. 7/CP.8, FCCC/CP/2002/7/Add.1.

313 See FCCC/SBI/2004/L.25 – discussions will continue at SBI 22 in May 2005.

The least-developed countries fund (LDC Fund)[314] is open to LDCs only and will implement a work programme for LDCs based on Decision 5/CP.7, focusing on adaptation and related capacity building activities. As a first step, it finances the already discussed National Adaptation Programmes of Action (NAPAs). The LDC fund was not very contentious as donor countries (Annex II Parties) acknowledged both the need to address LDC issues separately and the chance of monies contributing to compliance with their financial obligations, the implementation of the FCCC by LDCs, and development goals such as the eradication of poverty.

Following the COP7 guidance, the GEF will meet the full agreed costs of preparing NAPAs. COP9 decided that the GEF should also "support the implementation of national adaptation programmes of action as soon as possible after their completion".[315] This is a major step, since the implementation of NAPAs is project financing essentially equivalent to Stage III funding. Nevertheless, because no firm decision was taken about the extent to which these activities should be funded – instead the GEF is mandated to develop *"criteria for supporting activities on an agreed full-cost basis"* – negotiations continue.

The LDC fund and the implementation of the measures identified in the NAPAs would fit all the criteria of Stage III funding and it would be the first opportunity for Parties to test how "real" adaptation finance would work, circumventing the "incremental costs" issue. Still, observers already speak of a "full-cost deadlock" (at COP10) and it remains to be seen to what extent Parties will agree to the financing of adaptation measures through this fund in future.

The third fund, the "Kyoto Protocol Adaptation Fund", which corresponds to Article 12.8 Kyoto Protocol, will be governed by decisions by the Parties to the Kyoto Protocol rather than the COP. It will finance "concrete adaptation projects and programmes in developing countries that are Parties to the Protocol" as well as other activities (see immediately below).[316] It will receive monies through the Clean Development Mechanism ("share of proceeds") as well as other voluntary contributions. Because the Adaptation Fund depends on the entry into force of the Kyoto Protocol, discussion about further guidance to the GEF has focused heretofore on the SCCF.[317] The main point of conflict in the context of developing this guidance is whether the GEF will receive the mandate to fund projects that actually reduce vulnerability rather than projects that merely study and assess vulnerability.[318]

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314 See Dec. 7/CP.7 (para. 6), FCCC/CP/2001/13/Add.1, 43.
315 Dec. 6/CP.9, FCCC/CP/2003/6/Add.1.
316 Dec. 10/CP.7, FCCC/CP/2001/13/Add.1, 52.
317 See Dessai, The Special Climate Change Fund, Tyndall Briefing Note No. 5, 2002.
318 See submissions by Parties: FCCC/SBI/2003/MISC.1 und -INF.3. and -INF.12.

4. Funding available

The funding provisions of the FCCC have been complemented by political declarations from the EU, Canada, New Zealand, Switzerland and Iceland, committing to an increase in climate change funding for developing nations with a total estimated worth of US$410 million per year by 2005, which is to be revised in 2008.[319] Meanwhile, the US delegation stated that it should not be expected to make contributions "beyond its pre-existing commitments as set forth in the framework convention".[320] However, since two of the new funds are set up to implement existing FCCC obligations, the US might be expected to contribute to them. So far, donors pledged an initial US$30 million for the SCCF, which should start operating in 2005. The LDC fund has already received US$16.5 million on which it is operating.[321]

The new funds and respective guidance only highlight further that the issue of how and when actual adaptation projects and measures to reduce vulnerability will be funded to prevent climate change damage in accordance with Articles 4.3, 4.4 and 4.7 is yet to be fully solved. This issue will remain high on the agenda of the climate regime, as Annex II Parties have committed themselves to fund either the "agreed incremental costs" or assist with developing country adaptation costs. It is unclear what level of funding may be required over time to fulfil these obligations. However, it is clear that funding is essential for the realisation of direct damage prevention in poor or less developed countries. Without substantial adaptation funds (if indeed such funds will make a difference), many developing countries will be faced with significant residual damage due to climate change in the decades to come.

V. Conclusion: Obligations Regarding Climate Change Damage in FCCC and Kyoto Protocol

As this analysis has shown, the proposals and declarations made during the negotiation of the FCCC is evidence that States were well aware of the possible damage that could be inflicted on human and natural systems as a result of the anthropogenic activities changing the global climate system. The fact that the FCCC relies on both

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319 See FCCC/CP/2001/L.14 and L.15. The EU described this amount as the "fair share" of the contribution to the necessary funding of the mentioned developed countries. See "Joint EU Presidency and European Commission statement on the successful conclusion of the Bonn climate change negotiations", MEMO/01/276, 23.07.2001.

320 Head of the U.S. delegation, Under Secretary of State for Global Affairs Paula Dobriansky, 23 July 2001, viewed at <http://www.usinfo.state.gov/topical/global/climate/01072301.htm> (20 September 2001).

321 See Report of the GEF, FCCC/CP/2004/6, 8 ff.

mitigation and adaptation measures also shows the willingness of the Parties to prevent climate change damage.

Nevertheless, neither the negotiation of the FCCC nor that of the Kyoto Protocol was led by these concerns. Instead, they represent the starting point of a legal regime aimed at the preservation of the global climate system for the benefit of mankind. Climate change damage in terms of specific impacts is not at the heart of these treaties. In fact, both treaties ignore the fact that residual damage was expected based on the science available at the time of their conclusion. Article 2 FCCC, however, does provide an important yardstick for all countries, since it can be concluded that a 450-550 ppm concentration target, which translates to a 2°C temperature increase must be the objective of any further action. If Parties wish to act in accordance with this objective (which they must, Article 18 VCLT) delaying greenhouse gas emissions reduction policies is not an option. Therefore, Article 4.2 in conjunction with Article 2 FCCC imposes an important obligation of conduct on industrialised countries to modify (reverse) emissions trends in the long term.

While adaptation as a measure to prevent direct damage is regulated, and financial support offered, in practice the financial support is not directed at satisfying the needs that are arising now and those that will arise in the future. Therefore, it cannot be said that the climate regime in its current state deals fully with the issue of climate change damage.

The next two Chapters explore how international law outside the climate regime treats such damage, whether the activities leading to certain kinds of damage are possibly prohibited per se and whether, should damage arise, the victims could claim compensation for their injury. The concluding Chapter then discusses options available for complementing the international climate regime with instruments that tackle the issue of climate change damage in a more comprehensive manner.

Chapter Four

OTHER INTERNATIONAL LAW: EXISTING RULES AND APPROACHES TO PREVENT, MINIMIZE OR RESTORE CLIMATE CHANGE DAMAGE

> *"The environment is not an abstraction but represents the living space, the quality of life and the very health of human beings, including generations unborn"* [1]

I. Scope of this Chapter

This Chapter presents and analyses other international law rules and principles which operate alongside the international climate regime (described in Chapter III) to prevent, minimize or restore climate change damage. The first requirement for such an analysis is establishing the general legal relevance of other rules outside the climate regime. The question first discussed therefore is whether the existence and operation of the climate regime pushes aside or replaces all other international law (below II).

Rejecting this proposition, the next section of this Chapter turns to the "no-harm" rule in customary law as the most important customary rule applicable to climate change damage. Both its origins, related concepts and its legal content and preconditions will be discussed in depth as this rule is the generic standard of protection set by international law for the benefit of individual States and interests (below III). The standard of care will be discussed as well as its relationship to the climate change regime. In essence, the no-harm rule emerges as a primary rule containing an obligation to prevent or minimize climate change damage. It is acknowledged that there are other pertinent principles or notions of international law that could apply to instances of climate change damage. Yet, the most important of these have already been addressed in Chapter III (precautionary principle, polluter pays principle, principle of common but differentiated responsibilities) and a separate analysis would be superfluous, especially as none of these principles provides distinct guidelines for how States may prevent or restore climate change damage. Rather, these principles act together with (material) primary

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1 Legality of Nuclear Weapons (Advisory Opinion), ICJ Rep. 1996, 226, at 241, para. 29 *(Nuclear Weapons)*.

rules such as the ones identified in Chapter III as well as in the following pages. They will be discussed as appropriate, also in the context of applying the secondary rules of State responsibility in Chapter V.

From the no-harm rule, the analysis turns to other treaty law (below IV). In this section, the role of treaty provisions are discussed from two perspectives: one, whether they contain any direct prevention obligations pertaining to climate change damage (i.e. the identification of primary norms that could also be applied as a cause of action for a State responsibility claim, Chapter V) and two, to what extent they have already set standards of protection that are of relevance in the context of defining Article 2 FCCC (threshold of dangerous interference with the climate system). As it is not practical to discuss every item, principle and norm of international law that could potentially have some bearing on the issue of climate change damage, the focus is on the law of the sea and nature/biodiversity protection treaties. As will be seen, climate change can have profound impacts on the operation of these treaties, and in the case of the Law of the Sea Convention (UNCLOS) even alter legal entitlements afforded to States under this treaty (maritime zones).

II. Excurse: Exclusive application of "Climate Change law" to Climate Change Damage?

As was shown above, the protection of mankind against the threat of global climate change has become a distinct area of international law, which is already referred to as "climate change law". To some extent, this body of law also pertains to the direct prevention of climate change damage through adaptation, but it is mainly directed at the indirect prevention of such damage by mitigating anthropogenic climate change.

The existence of such specialised treaty systems in international law leads to the need to question the applicability of other rules of treaty law as well as of rules and principles of customary international law. This phenomenon is well known in domestic civil legal systems, where the adoption of a specialised statute can preclude the application of more general provisions, or, in common law systems, from using a principle formed by the courts of that country. In international law, this issue has been discussed in the framework of a "self-contained regime theory" or the principle of *lex specialis*.

The term regime was first used in the political science arena. In this context, regimes are defined as social institutions that define practices, assign roles and guide the interaction of occupants of such roles within given issue areas.[2] Over time, the term regime has also been given a legal meaning. An international environmental

2 See: Young, International Governance: Protecting the Environment in a Stateless Society, 1994, 3.

regime connotes the entirety of rules and practices associated with the management and implementation of one or several, interrelated, international treaties through special institutions that are used to further develop the treaty rules.[3] The rules and institutions established by the FCCC and the Kyoto Protocol with all the additional decisions and guidance from the Conference of the Parties to the FCCC certainly meet this definition of a regime. Taken together, these rules and institutions are designed to tackle the problem of anthropogenic climate change. In fact, the climate regime has already been said to equal domestic administrative law in terms of detail and specificity of regulation.[4]

Yet, the fact that a regime exists does not automatically exclude the application of other rules of international law. Rather, in each case, the specific structure of the regime as well as the will of the Parties to design an exclusive body of law is decisive. A brief discussion of the International Court of Justice's (ICJ) self-contained regime concept as well as opinions by scholars will confirm this rather logical Statement.

1. The self-contained regime concept

This somewhat confusing or even misleading[5] concept was invented by the ICJ and has its background in the problematic choice of legal consequences in the event of breach of treaty (i.e. in the area of secondary rules of international law). In its 1979 *Tehran Hostages* case[6] the ICJ Stated that Parties are not free to apply any kind of legal consequences if a set of rules exists in a special legal area, i.e. if the treaty system in question constitutes a self-contained regime. In essence, the concept describes nothing more than a "strong form of *lex specialis*".[7]

When applying different rules of international law, two main concepts apply: *lex posterior* and *lex specialis*. The *lex posterior* principle gives precedence to the legal rule that was adopted or created at a later stage in time. The *lex specialis* principle pertinent here provides that the more specific rule will prevail over the more general one. Neither is a positive rule of international law, but rather a maxim of interpretation, or "means to giving effect to the presumed intention of a law-giver".[8] In accordance

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3 See for a detailed analysis Gehring, Internationale Umweltregime: Umweltschutz durch Verhandlungen und Verträge, 1994, 42 ff.; Ott, Umweltregime im Völkerrecht, 1998, 37 ff., definition at 42.

4 Hey, E., The Climate Change Regime: An Enviro-Economic Problem and International Administrative Law in the Making, 1:1 International Environmental Agreements (2001) 75.

5 Dupuy, The danger of fragmentation or unification of the international legal system and the international court of justice, 31 NYUJILP (1999) 791 at 797.

6 Case concerning United States Diplomatic and Consular Staff in Teheran (US v. Iran), ICJ Rep. (1980) 3 *(Teheran hostages case)*.

7 See Report of the International Law Commission, 53rd session, UN Doc. A/56/10 (2001) at 358.

8 Akehurst, The Hierarchy of the Sources of International Law, 47 BYIL (1974/75), 273.

with the prevailing theory that international law is voluntary,[9] whenever conflicts between different sources of law arise, what counts is not the rule but the (presumed) will of the States involved or of the entirety of States. It is this latter principle which has triggered the self-contained regime discussion.

In the *Tehran Hostages* case, following the seizure of staff members of the US embassy in Tehran by militant demonstrators on 4 November 1979, the US sought judgement on whether, by not protecting the US Embassy and failing to free the hostages, the Islamic Republic of Iran had violated the Vienna Convention on Diplomatic Relations of 1961 and the Vienna Convention on Consular Relations of 1963. In response to the treatment of its staff, the US Government had frozen Iranian assets located in the United States,[10] while the Government of Iran responded by alleging that the US consular staff had in fact behaved illegally against the Government and implicitly submitted that therefore, the protection afforded by the said Conventions had been foregone.

The court ruled that, even if US staff had indeed behaved illegally, the Government of Iran would have been obliged to take recourse to the specific legal consequences set out in the Vienna Conventions. It emphasised that the Conventions contained both primary and secondary rules that, in this special case, excluded the use of other law beside them:

> ". . . diplomatic law itself provides the necessary means of defence against, and sanctions for, illicit activities by members of diplomatic or consular missions.[11] . . . The rules of diplomatic law, in short, constitute a self-contained regime, which, on the one hand, lays down the receiving State's obligations regarding the facilities, privileges and immunities to be accorded to the diplomatic missions, and, on the other, foresees their possible abuse by members of the mission and specifies the means at the disposal of the receiving State to counter any such abuse. These means are by their nature, entirely efficacious . . ."[12]

The ensuing discussion of this judgment (and the concept) focus on the use of general secondary rules rather than the exclusive application of the primary law rules. It is a *lex specialis* discussion focused on the law of State responsibility (see Chapter V for detail). In this context the former Special Rapporteur of the International Law Commission (ILC), *Willem Riphagen*, further developed the concept. He saw self-contained regimes as *"subsystem[s] of international law"*[13] and Stated that a self-contained system constituted

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9 Brownlie, Principles of Public International Law, 1998, 2.

10 See the US Governments Order to this effect: Executive Order No. 12,170, 44 Fed. Reg. 65,729 (Nov. 14, 1979).

11 *Teheran hostages case*, 1980 ICJ Rep. 3 at 38.

12 *Teheran hostages case*, 1980 ICJ Rep. 3 at 40.

13 Yearbook ILC 1982-II (Part one), 39 ff., at 42 f., U.N. Doc. A/CN.4/354 and Add.1 and 2. Riphagen used the term "subsystem" interchangeably with "regime" (see Simma, Self-Contained Regimes, (1985) 16 NYIL 111 at 115).

an ordered set of conduct rules forming a *"closed legal circuit for a particular field of factual relationship." Riphagen* also explained that different primary obligations between States fulfil different functions, so that these differences necessarily shape the content of the applicable secondary rules. In other words, the existence of different State obligations at the same time represents a "concursus of different subsystems" with different secondary rules, thereby producing a choice between the legal consequences specifically provided by the different subsystems. As a consequence, in his eyes, a subsystem such as the field of diplomatic law constitutes a self-contained regime in that situations and considerations that are part of another subsystem cannot invalidate or overrule the subsystem. However, his successor *Arangio-Ruiz* rejected this strict notion which would have excluded all recourse to general international law.[14] Similarly, the ILC's Draft Articles on State responsibility as adopted in 2001 do not presume that conflicts of rules cannot occur, rather they presume that, where they exist, they must be solved flexibly in line with the principle of *lex specialis*, i.e. focusing on the will of the Parties.[15]

Simma analysed the self-contained regime theory, also focussing on the applicability of the general law of State responsibility in the case of breach of treaty. He noted that recourse to the general law on State responsibility is precluded when "a set of primary rules is linked to the specific legal consequences of their breach",[16] but also pointed out that most legal regimes do not contain an entire set of secondary rules. According to him, a self-contained regime can only be one that contains a full set of secondary rules, otherwise customary international law can and must fill the gaps. Therefore, in his view, the EC Treaty constitutes "as far as possible" a self-contained regime since the legal consequences of treaty violations are completely superseded by special procedures and remedies, while in the case of human rights treaties (such as the European Human Rights Convention)[17] enforceability is limited and thus general international law can still be applied.[18] Indeed, the lack of effective and exclusive dispute settlement procedures for these treaties has led other authors to conclude that the field of human rights as a whole does not constitute a self-contained regime.[19]

For the field of international environmental law *Redgwell* and *Ehrmann* (among others) reject the notion that multilateral environmental treaties constitute closed systems, or that such systems should be created, and argue instead that some of the innovations developed for these special cases (such as compliance mechanisms) should be

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14 Yearbook ILC 1992-II (Part one) 6, U.N. Doc. A/CN.4/SER.A/1992/Add.1 (Part 1) IV, at 33.

15 See Crawford, The ILC's Articles on Responsibility of States for Wrongful Acts – A Retrospect, 96 AJIL (2002) 874 at 879.

16 Simma, Self-Contained Regimes, 16 NYIL (1985) 111 at 115.

17 Convention for the Protection of Human Rights and Fundamental Freedoms, 4 November 1950, E.T.S. No. 5.

18 Simma, note 16 at 128.

19 See further Vierdag, E.W., Some Remarks about Special Features of Human Rights Treaties, 25 NYIL (1994) 119.

seen as part of the general law of treaties.[20] Similarly, *Rublack* argues that in most instances, the primary obligations in these treaties are so sketchy that they would not provide a basis for arguing that they constitute closed regimes.[21]

2. Discussion

Looking closely at these opinions, it emerges that both the ICJ as well as scholars have attempted to ascertain whether a particular treaty regime was/is meant to be of exclusive application by the combined resolve of the Parties. A strong argument for exclusive application would be where States agree to include both primary and secondary rules in the specific treaty, which is why *Simma* and others focus on analysing whether a closed set of legal consequences for a breach of treaty exists in various treaty regimes. The same question must be answered when determining whether a certain rule constitutes *lex specialis* over another.

It is therefore important to ascertain the will of the Parties to the climate treaties to determine whether their provisions are to be applied exclusively to all legal relationships pertaining to climate change damage. As was shown in Chapter III, Parties were aware of and accepted the fact that the FCCC and the Kyoto Protocol would not indeed tackle the issue of climate change damage entirely. Evidence of this is provided by the structure of rules now contained in the FCCC and Kyoto Protocol.

In terms of the primary obligation to prevent damages caused by anthropogenic climate change through the reduction of greenhouse gas emissions and the protection of carbon sinks, the FCCC and Kyoto Protocol contain detailed provisions, including, in the case of the Kyoto Protocol specific targets and timetables. The regime also contains rules on the preparation and implementation of adaptation measures. To some extent, the FCCC also sets out financial obligations of developed country Parties. As was shown, though, these do not cover climate change damages per se but only oblige Annex II Parties to assist developing countries in adapting to the impacts of climate change.

Neither of these treaties contains provisions that help to define climate change damage, prohibit certain types of damages, concretise obligations with regard to adaptation, or stipulate that damages should be compensated.

The FCCC also contains and specifies some international law principles such as the precautionary principle, the principle of common but differentiated responsibility, intra- and intergenerational equity and the notion of sustainable development. It is

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20 In: Gowland-Debbas, Multilateral Treaty-Making, 107 f.; Ehrmann, M., Procedures of compliance control in international environmental treaties, 13 COJIELP (2002), 377 at 441.

21 Rublack, Der grenzüberschreitende Transfer von Umweltrisiken im Völkerrecht, at 202.

debatable whether, if such principles are applied in the context of climate change damages, their legal content should be determined exclusively in the context of the FCCC. But again, such exclusivity can only be demanded for the specific obligations set out in the treaties themselves, not for any type of international law. Thus, the *lex specialis* concept does not bar reference to other treaties or customary law sources when looking at these principles, for example, in the context of State responsibility (see Chapter V).

With regard to secondary rules, certain Parties pointed out both upon their ratification of the FCCC and the Kyoto Protocol that ratification would not preclude application of the law on State responsibility, i.e. not preclude their right to seek reparation for damage in case a wrongful act is committed by a State leading to injury on their territories. Moreover, while the FCCC and the Kyoto Protocol contain specific provisions on dispute resolution and compliance, there was never an expressed will of any of the Parties that these provisions exclude other international law.

In the case of the FCCC, these procedures are not at well developed, especially as neither the multilateral consultative process (Article 13 FCCC), i.e. the FCCC's compliance mechanism,[22] nor the conciliation mechanism foreseen in Article 14.7 FCCC has been put in place by working procedures. In addition, the COP has yet to adopt an annex on arbitration, as envisaged in Article 14.2 FCCC. No specific legal consequences are foreseen in the FCCC itself.

For the Kyoto Protocol, on the other hand, Parties have adopted a sophisticated compliance system which also foresees sanctions (described in Chapter III).[23] However, as the compliance system has not yet been adopted by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol pursuant to its Article 18 and 20, it does not constitute international law on the same level as the sanctions foreseen, for example in the Vienna Conventions on diplomatic relations of States, which were at the core of the *Tehran Hostages* case. If the system was adopted in this way, it would indeed provide for specific sanctions within the climate regime for failure to meet the specific reduction targets, i.e. some *lex specialis*. On the other hand, Parties did not agree at any point that the compliance system was to exclude the application of the law of State responsibility, especially as the legal consequences foreseen in the Compliance Agreement do not cover reparation for actual climate change damage.

In sum, nothing in the negotiation history or the structure of the existing treaties indicates that the rules of the regime are *lex specialis* vis à vis other rules of international law. This applies both to the level of primary rules and the level of legal consequences for breach (secondary rules).

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22 See Ehrmann, note 20, 417 ff., and "Report on the Ad Hoc Group on Article 13 on its Sixth Session", Annex II, at 9-12, U.N. Doc. FCCC/AG13/1998/2 (1998) [hereinafter Ad Hoc Group on Article 13].

23 See Chapter III, note 256 and accompanying text.

3. Relationship between international law rules in general

Having found that the climate regime does not in fact bar the application of other international law, some brief comments on the relationship between these rules are in order.

Firstly, one must consider the situation where both treaty rules and customary international law is applicable to a certain legal question. Two principles can be Stated here: i) customary law will operate alongside treaties even when they codify existing law,[24] and ii) treaties can often constitute *lex specialis* of general customary law rules or principles.[25] The former principle is necessary because of the limited number of Parties to treaties, as well as because some treaties allow Parties reservations with respect to some of its provisions. This principle was invoked explicitly by the ICJ in the *Nicaragua* case.[26] The latter principle is only logical since treaties evolve from and around broader principles (such as the notions of sustainable development or the precautionary principle in international environmental law)[27] and are normally more precise as to their legal content and the obligations they confer on Parties than customary law. Thus, should a rule of customary international law be considered in conflict with a treaty rule, the treaty rule would normally prevail. It should be noted that due to the vagueness of most customary international law rules, such conflicts generally do not occur. However, if a treaty does not contain rules covering what is stipulated by a general rule of customary law, the latter will fill the gap.[28]

Secondly, one must consider the case where various treaty rules apply. Often, these rules will not apply equally to all States. Yet if they do, abstract questions of application do not arise. Instead, the "relation between treaties between the same parties and with overlapping provisions is primarily a matter of interpretation, aided by presumptions".[29] The FCCC as the main treaty concerning anthropogenic climate change binds 187 States and naturally therefore will be applicable to most legal questions pertaining to climate change damage. Its provisions are to be interpreted in line with the VCLT, the pertinent discipline of international law, which for the most part

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24 See Sinclair, The Vienna Convention on the Law of the Treaties, 1984, 257.

25 See Vitzhum in Vitzhum (Ed.), Völkerrecht, 2001, 83; Verdross/Simma, Universelles Völkerrecht, 1984, 335.

26 Military and Paramilitary Activities in and against Nicaragua (Nicaragua v. USA) ICJ Rep. 1986, 14 at 105 (*Nicaragua*).

27 See Buck/Verheyen, Umweltvölkerrecht, in Koch (Ed.), Umweltrecht, 2002, 13.

28 An exemption is established in Arts. 53 (and 64) of the Vienna Convention on the Law of the Treaties (VCLT), which stipulate that treaties violating a peremptory norm of general international law are void. Such norms are, for example, the prohibition of slavery or genocide or acts of aggression against another country, but also possibly certain vicious destructive acts against the natural environment.

29 Brownlie, Principles of Public International Law, 630.

mirrors customary international law on the subject.[30] Should a conflict of rules arise, interpretation techniques must be employed in the specific context.

Against these remarks, the following sections will proceed to identify and analyse existing rules pertaining to the prevention, minimization or restoration of climate change damage in international law.

III. Customary International Law – The No-Harm-Rule

1. Context

This section will discuss the origins and content of the no-harm rule, which is part of customary international law.

Article 38 of the ICJ Statute defines customary international law as "evidence of general practice accepted as law", and the ICJ has Stated that customary law arises when a practice among nations is extensive and virtually uniform, and is accompanied by a conviction that it is obligatory under international law [*opinio juris*].[31] The analysis of State practice and the deciphering of *opinio juris* where the circumstances of each case vary greatly are riddled with difficulties.[32] This is especially true in the determination of whether *opinio juris* exists. Accordingly, the most recent theory of the International Law Association (ILA) on the formation of customary law even States that *"it is . . . probably not even necessary to prove the existence of any sort of subjective element in addition to the objective element [State practice]"*.[33] In essence, the ILA special committee on the formation of customary law is of the opinion that if it can be shown that States generally believe that a certain State practice is permitted (or required) by law, this is sufficient for it to be law. The present thesis adopts this point of view.

Due to the difficulties in ascertaining State practice, customary law rules often remain vague and open, and therefore, the boundaries between *lex lata* and *lex ferenda* are not easy to draw[34] and some uncertainty may be inherent in the concept of law,

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30 It is against this background that the ICJ saw "no need to dwell upon the applicability . . . of the Vienna Convention of 1969 . . ." in its *Gabcíkovo-Nagymaros* judgment, 1997 ICJ Rep. 3, para. 46.

31 See *North Sea Continental Shelf cases* (West Germany v Netherlands; West Germany v Denmark), 1969 ICJ Rep. 43-44. See also the *Nicaragua Case*, 1986 ICJ Rep. 14 at 97-100 and 106-109.

32 As evidence for State practice the ILC listed the following criteria: treaties, decisions of national and international courts, national legislation, opinions of national legal advisers, diplomatic correspondence, practice of international organizations (Yearbook ILC (1950) Part II, 368 ff.) See also ILA Committee on Formation of Customary General International Law, "Statement of principles applicable to the formation of general customary international law", Final Report Of The Committee, London Conference (2000), and for further reference: Brownlie, Principles of Public International Law, 5.

33 ILA London Conference, note 32, at 31.

34 This is also pointed out by Okowa, State responsibility for transboundary air pollution in international law, 2000, 63.

especially when it has to be determined by inference and deduction.[35] In the context of international environmental law, the application of customary law rules has several drawbacks, one of them being the determination of the content of rules of customary international law, another being the flaws of enforcement and implementation of such rules outside treaty regimes. For tribunals, this vagueness might lead to a problem of "*non liquet*", i.e a situation where the tribunal might find that the law is insufficient to decide the question before it. However, at the same time, the vagueness leaves ample space for interpretation. The subject of the exercise of ascertaining the law is, in this section, the no-harm rule.

No State shall cause harm to another. This rule, however general it may be, constitutes existing customary international law.[36] In 1949 the United Nations Survey of International Law concluded that *"[t]here has been general recognition of the rule that a State must not permit the use of its territory for purposes injurious to the interests of other States in a manner contrary to international law"*.[37]

The rule is based on the concept of national territorial integrity, which forms the basis of the law of war and peace and is thus one of the foundations of public international law as such. As described in Chapter II, continued emissions of greenhouse gases are causing change and will cause substantial damage to human and natural systems, particularly in developing countries. The no-harm rule is of prime importance in the context of this thesis since (as will be shown below) it provides an objective standard of protection against damage inflicted on one State by another – an obligation applicable to all States. If the no-harm rule can be applied to the issue of climate change damage, it can provide an important supplement to the climate regime's negotiated rules and, in fact, guide future negotiations. The primacy of this rule in the context of the climate change regime justifies the following in-depth discussion.

It should be noted at this stage that the no-harm rule has been discussed and interpreted primarily in the context of State responsibility or the duty to compensate damage incurred. Therefore, elements of the law of State responsibility (or legal consequences for breach of international law) are often confused with the legal content of the no-harm rule itself as a primary rule. Indeed, some elements of the rule, such as fault and causation, do mirror the general requirements for establishing State responsibility, as will be seen in Chapter V. In this section, however, an attempt shall be made to detail the legal content of the rule as it applies to damage resulting from climate change. First, its general elements and origins are explored. Then, the rule is analysed in the framework of the ILC's work on Injurious Consequences which

35 See on this general problem Kammerhofer, Uncertainty in the formal sources of international law: customary international law and some of its problems, 15 EJIL (2004) 523.

36 See Rao (Special Rapporteur to the ILC), First report on prevention of transboundary damage from hazardous activities (1998), UN Doc. A/CN.4/487, 7.

37 U.N. Doc.A/CN.4/1/Rev.1 (U.N. Pub. 1948. V.1(1)), at 34 (1949).

provides the most recent authoritative discussion of the content of the no-harm rule, especially with regard to the concept of risk. The subsequent sections then deal with the individual legal components of the no-harm rule (the transfrontier element and the standard of care), and the applicability of the rule to climate change in general.

2. The general rule and its underlying concepts

The ICJ has recently confirmed that *"the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment"*.[38] As such, the no-harm rule is a primary norm obliging States to behave themselves in a way which will not cause (significant) harm to other States, and which, if breached, will give rise to reparation or compensation for the damage caused. This is also reflected in the following stipulation in the 3rd Restatement of Foreign Relations Law,[39] which provides a persuasive interpretation of international law from the perspective of US scholars and practitioners:

"(1) A State is obligated to take such measures as may be necessary, to the extent practicable under the circumstances, to ensure that activities within its jurisdiction or control
(a) conform to generally accepted international rules and standards for the prevention, reduction, and control of injury to the environment of another State or of areas beyond the limits of national jurisdiction; and
(b) are conducted so as not to cause significant injury to the environment of another State or of areas beyond the limits of national jurisdiction."

The no-harm rule as enshrined in Principle 21 of the 1972 Stockholm declaration[40] is referred to frequently by international courts and tribunals as the basic rule of international environmental law.[41] It reads:

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38 *Nuclear Weapons*, 1996 ICJ Rep. 241, para 29. The rule is reStated and accepted in the *GabËikovo* case by both Parties, Case concerning the GabËikovo-Nagymaros Project (Hungary v. Slovakia) 1997 ICJ Rep. 7, in particular at 41. See for a general overview Beyerlin, Umweltvölkerrecht, 2001, 54 ff.

39 American Law Institute, *Third Restatement* (1987) Vol. II at 103, section 601: State obligations with respect to environment of other States and the common environment.

40 Stockholm Declaration on the United Nations Conference on the Human Environment, 11 ILM (1972), 1416.

41 It was a cause of action in the case Certain Phosphate Lands in Nauru (Nauru v Australia), Preliminary Objections, 1992 ICJ Rep. 240 (*Nauru*). See for an analysis Anghie, The Heart of my home: Colonialism, Environmental Damage and the Nauru Case, 34 Harv. Int'l L.J. (1993) 445 at 480 ff. See also *Nuclear weapons* 1996 ICJ Rep. 15. The rule was invoked (and not contested) by Australia in the *Nuclear Test* case, Nuclear Tests, (Australia v France), 1974 ICJ Rep. 253. See for an in-depth analysis of Principle 21 in the context of State practice and international jurisprudence: Okowa, State responsibility for Transboundary Air Pollution, 69 ff., 76.

> States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond national jurisdiction.[42]

Principle 21 (along with Principle 22 on liability and compensation)[43] has also been endorsed by the UN General Assembly as the basic rule on international responsibility.[44] With some variations, Principle 21 has been enshrined in many international environmental treaties, such as in paragraph 8 of the Preamble to the FCCC or in Article 3 of the UN Convention on Biological Diversity (see below IV.2.b).

The famous *Trail Smelter* Arbitration of 1941 had a clear influence on the formulation and content of the no-harm rule. While the importance of the case has been downplayed by several scholars because of its restrictive scope,[45] it has provided the basis for both prevention duties and the law on State responsibility for environmental damage. The tribunal concluded that:

> Under the principles of international law . . . no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.[46]

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42 Principle 2 of the 1992 Rio Declaration re-states this principle, adding national developmental policies to environmental policies that guide the use of natural resources (Rio Declaration on Environment and Development, United Nations Conference on Environment and Development, 31 ILM (1992) 874). For a discussion of the implication of this addition to the rule content see Perrez, The Relationship between "Permanent Sovereignty" and the obligation not to cause transboundary environmental damage, 26 Environmental Law (1996) 1187 at 1203.

43 Principle 22 of the 1972 Stockholm Declaration provides: "States shall cooperate to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such States to areas beyond their jurisdiction". Principle 13 of the 1992 Rio Declaration reads: "States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction".

44 UNGA Res. 2996 (XXVII), 27th session, UN Doc. A/8730 (1972), reprinted in Brownlie, Basic Documents in International Law, 235.

45 Canada's responsibility for the damage had already been affirmed by agreement between the two countries, so that the Tribunal only had to deal with issues of compensation. See Pisillo-Mazzeschi, Forms of International Responsibility for Environmental Harm, in: Francioni (Ed.), International Responsibility for Environmental Harm, 15 at 28.

46 *Trail Smelter* (USA v Canada), Award of 1941, III RIAA 1911 at 1965. In this dispute, a smelter located in Canada caused substantial pollution to US territory with black carbon and other aerosols. See Kuhn, The Trail Smelter Arbitration, 32 AJIL (1938) 785 and 35 AJIL (1941), 665; Read, The Trail Smelter Dispute, 1 CYIL (1963) 213.

While *Trail Smelter* focussed on pollution of US territory directly traceable to a Canadian smelter, the no-harm rule now extends to relations between all States, however distant and has also extended its scope from territories of States to common spaces and the environment as a whole.[47]

To avoid confusion it should be noted here that the notion of *"sic utero tuo ut alienum non laedas"*[48] ("So to use your own property as not to injure another's")[49] is essentially the same as the no-harm rule or, as it has also been called, the principle of good neighbourliness[50] or the rule of "harmless use of territory".[51] It is also closely related to and overlaps with what is sometimes called the "principle of preventive action" or "Preventive Principle", which constitutes (if at all) a principle of customary international law, not a rule in the sense discussed here.[52]

Intent needed?

Some authors discuss whether or not the invocation of the no-harm rule requires intent to cause damage, which is a constituent element of the doctrine of abuse of rights.[53]

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47 See Charney, Third State Remedies for Environmental Damage to the World's Common Spaces, in: Francioni (ed.), International Responsibility for Environmental Harm, 149; Durner, Common Goods, 2001, 53. For *lege ferenda* arguments see Arsanjani/Reisman, The Quest for an international liability regime for the protection of the global commons, in: Wellens, K.C. (ed.), International law: Theory and practice; Essays in honour of Eric Suy, 469;

48 See for an application in a civil case the 1974 District Court of Rotterdam judgment: Handelswekerij G.J. Bier BV & Stichting Reinwater v Mines de Potasse d'Alsace SA, Case 4320/74, Arrondissementsrechtbank Rotterdam (1979) ECC 206, reprinted in XV NYIL (1984) 471. But see also the cassation of this judgement by the High Court, The Hague, reprinted in XIX NYIL (1988) 496.

49 Definition taken from Pinto, Reflections on International Liability for Injurious Consequences Arising out of Acts not prohibited by International Law, 16 NYIL (1985) 17 at 34.

50 See the thorough analysis in Hinds, Das Prinzip "Sic utere tuo ut alienum laedas" und seine Bedeutung im internationalen Umweltrecht, 30 AVR (1992) 298, 308 ff. This is also the opinion of the International Law Commission, Report of the International Law Commission, 53rd session, General Assembly, Official Records, 56th session, Suppl. No. 10, UN Doc. A/56/10 (2001) (Hereinafter: Report ILC 53rd session), at 390. Note that Epiney argues the opposite, as, in her view, the *sic utero* rule is based on the exercise of a right, while in fact, the no-harm rule States that there is no right to cause transboundary pollution but rather a prohibition with exemptions (note 61, at 324). The sic utero principle is also understood as underpinning the recent ILC work on liability, see Rao (Special Rapporteur), 1st Report on the legal regime for allocation of loss in case of transboundary harm arising out of hazardous activities, ILC Doc. A/CN.4/531, August 2003 (55th ILC Session), 9.

51 Dupuy, International Law for Transfrontier Pollution, in: Bothe, M. (ed.): Trends in International Environmental Policy and Law, 1980, 363 ff.

52 Sands, Principles of International Environmental Law, 1995, 194. Sands argues that the principle of preventive action is distinct form the no-harm rule in that i) its objective is to minimize environmental damage regardless of State sovereignty and ii) because it can oblige a State to take measures to prevent damage within its own jurisdiction. The boundaries between these principles or rules are blurred. See for a recent discussion of the Preventive Principle de Sadeleer, Environmental Principles – From political slogans to legal rules, 2002, 61 ff.

53 On the abuse of rights doctrine see Brownlie, Principles of Public International Law, 446 ff, which

The no-harm rule contains elements of the prohibition of abuse of rights between States: a State shall not willingly use its rights in such a way as to inflict damage on another State. The simple act by a State committed in self-interest which might, as a result, damage another State would not constitute a breach of the abuse of rights doctrine.[54] This corresponds partly to the traditional understanding of subjective State responsibility, according to which a State would only be held responsible for its behaviour (and be obliged to provide reparation) if subjective fault or intent, i.e. *dolus* to breach a rule of international law could be shown.[55]

However, the no-harm rule does not require such intent, and because it is concerned with activities of States in the normal course of conduct also includes a duty to prevent (significant) injury, as well as a duty to reduce or minimize risk of such injury to the extent possible (this will be explored in depth below). It essentially obliges States to continually adapt their behaviour in view of other State's interests.[56] This can be explained by the origin of the rule: it is an expression of "good neighbourliness" and, in effect, of good faith. In its most general form, the no-harm rule sets limitations to State sovereignty in international law.[57]

These limitations are of particular interest in the context of environmental degradation. Over the past century, the increase in transboundary environmental pollution due to industrial activities and the need to share natural resources (e.g. rivers and saltwater fish, but also the atmosphere) has led to a considerable cutback on State sovereignty, and limits the right of States to permanent sovereignty over natural resources.[58] Today, the duty to co-operate and/or substantive rules of conduct replace a State's freedom to act in matters that might also affect other States or the global commons, such as the atmosphere and high seas.[59] Indeed it could be said that because (industrial) activities will frequently have effects on other States' integrity as well as the state of the global commons, States never had absolute sovereignty to exploit their resources and act on their territory as they wish. But similarly, international law also

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he seems to equate to some extent to no-fault responsibility or direct State liability. Brownlie regards the principle of abuse of rights as a general principle of law, quoting, for example, the *Upper Silesia case* as reference (1926 PICJ Ser. A, no. 7, 30). See also Kuokkanen, International Law and the Environment, 2002, 52 ff.

54 See Lammers, Pollution of International Watercourses, 1984, 572 ff.

55 See Brownlie, Principles of Public International Law, 440 ff.

56 See further below and, inclusively, Durner, Common Goods, 53 ff.

57 See for an early analysis of this relationship the 1928 *Palmas* case (Netherlands v USA), II RIAA (1949) 829, 838 ff.

58 Absolute sovereignty connotes a legal situation where a State would be free to do on its territory what it likes regardless of the consequences to other States.

59 See for a discussion Perrez, note 42. See for a summary of existing international duties flowing from the no-harm rule: Rao, First report on prevention of transboundary damage from hazardous activities, A/CN.4/487/Add.1 (1998).

accepted that in exercising sovereignty, States might not be able to avoid some degree of interference with their neighbours' territory, air and water.[60] Accordingly, the multitude of multilateral and bilateral environmental or natural resource treaties restricting or defining States' rights show both a rejection of unrestricted territorial sovereignty[61] and an acceptance of certain interference with another State's territory and interests, i.e. a rejection of the concept of absolute territorial integrity.

Because State sovereignty and integrity form two sides of the same coin, the no-harm rule can be applied in two ways to climate change damage or the risk of such damage. One, a State could argue that there is insufficient international legal basis to permit the emission of greenhouse gases at all or beyond a certain limit. Two, a State could argue that greenhouse gas emissions are prohibited (beyond a certain limit). The approach is important for example with regard to the burden of proof – if approach one is chosen, all the affected State has to prove is that emissions have taken place and that they cause risk or damage to its territory. If approach two is chosen, a State would have to prove that greenhouse gas emissions (or a certain threshold) are prohibited under international law, which would entail proving State practice to that effect.

Threshold of damage

Given the fact that the interests of exercising absolute sovereignty and preserving territorial integrity of States must always be balanced, the no-harm rule has been restricted in scope: both State practice and legal scholars agree that not all types of damage must be prevented. The majority of scholars, as well as the scarce jurisprudence illustrate that only significant or serious damage are seen to be able to trigger the rule as a prevention duty.[62]

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60 Some writers have argued that such a general prohibition against interference exists, but that customary international law allows exemptions to this prohibition (see Bryde, Umweltschutz durch allgemeines Völkerrecht, 31 AVR (1993) 2; Beyerlin, Grenzüberschreitender Umweltschutz und allgemeines Völkerrecht, in: Festschrift für Karl Doerhring, 1989, 37 at 48 f. This is a dogmatic dispute which adds little to the application of the no-harm rule to real life cases.

61 It is questionable whether the so-called Harmon doctrine (which is named after Attorney General y Harmon who argued that the USA had the exclusive right to use the waters of the Rio Grande river, i.e. unrestricted State sovereignty vs. the co-riparian Mexico) was ever accepted in international law. For those writers arguing that State sovereignty always only extended as far as it would not restrict other States' rights, exclusive sovereignty never existed in international law. See Epiney, Das "Verbot erheblicher Grenzüberschreitender Umweltbeeinträchtigung: Relikt oder konkretisierungswürdige Grundnorm? 33 AVR (1995) 309 at 321.

62 The ILC clarified the term "significant damage" by stating that this should mean something more than detectable or appreciable, but not necessarily serious or substantial. See Rao, note 36, 30 and Report of the ILC, Official Records of the General Assembly. 51st session, Supp. 10 (UN Doc. A/51/10), 259 f. as well as Rao (Special Rapporteur), 1st Report on the legal regime for allocation of loss in case of transboundary harm arising out of hazardous activities, ILC Doc. A/CN.4/531, August 2003 (55th ILC Session), 15. See also for further reference the commentary to Article 48 of

The term significant is commonly defined as "having a special or important meaning".[63] On the other hand, the tribunals in *Trail Smelter* and *Lac Lanoux* referred to "serious injury",[64] some writers refer to "serious consequences"[65] and the 1978 UN General Assembly Resolution 2995 prohibits "significant harmful effects" on other States when States utilise their natural resources.[66] The International Law Commission (ILC) has used the term "significant" as a starting point and defined the relevant threshold of harm as "something more than detectable but not at the level of serious or substantial".[67] With respect to the application of the rule to risk, it seems that, in cases where the likelihood of concrete risk turning into damage is small, the expected damage must be massive to trigger the prevention duty. This would apply mostly to accidental pollution. If the risk of damage occurring is high, the expected damage can be smaller.[68] This situation applies to the impacts of climate change. As the projections of the IPCC show, it is almost certain that damage will occur on the territory of various States. On this basis (and on the basis of the concrete scientific projections discussed in Chapter II), it is submitted that almost all injury expected to result from or already resulting from climate change is more than *de minimis* or insignificant. The threshold of damage will therefore not be explored further in this thesis.

Open questions

What must and will be explored (below 4), however, is the standard of care applicable to the obligation to prevent harm. There seems to be a broad consensus that some type of fault or negligence in an objective sense is needed to trigger the rule. This means that while subjective fault (intent to cause damage) is not required, a State is obliged to comply with an objective standard of care ("due diligence"). Neither the *Trail Smelter* case, Principle 21 nor the succeeding UNGA Resolutions expressly refers to any such element. Rather, all they seem to require is a finding of damage (or risk) which is caused by another State's activities. However, this reading of the rule, which leads to what has been called "strict responsibility", was already opposed by States in the drafting committee to the Stockholm Declaration (and confirmed by subsequent

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the IUCN Draft International Covenant on Environment and Development, available at <http://www.iucn.org>. This document is the product of an international consultation and codification effort of the International Law Centre, involving numerous international authorities on international environmental law.

63 Oxford Dictionary 2nd edition 1989.

64 *Lac Lanoux*, Award of 1957, XII RIAA (1963) 281, at 306 (using the french word "essentielle") (English extract in 53 AJIL (1959) 156), *Trail Smelter*, note 46.

65 Perrez, note 42 at 1202.

66 Reprinted in ILM (1978) 109.

67 ILC Report 1998, Chapter 4, Commentary to Art 2, para. 4. This use of terms will be continued, see Rao, 1st Report, A/CN.4/531, note 62, 14 f.

68 Epiney, note 61, at 343.

State practice), where a majority maintained that negligence remained a prerequisite to invoke the controlling State's responsibility under international law.[69] This position must be seen in the context of the law on state responsibility, which would ultimately provide the legal basis for States to request reparation in the event of transboundary injury, and which can only be invoked if some type of wrongdoing is established. What States wanted to ensure was that, at some stage, before affected States could request compensation for damage caused, it would be necessary to show a breach of a standard of care. This will be discussed against the background of the ILC deliberations on the topic of "Injurious consequences" below.

Another point of discussion is whether the no-harm rule constitutes a rule or principle of international law. As was presented earlier (Chapter III, section II.2.b)aa)), the breach of a legal rule will be followed by legal consequences while a legal principle does not contain a precise duty of conduct or result and cannot thus be breached *per se*.

Some authors have concluded, because there are only a few examples of application of the no-harm rule by international tribunals and because of the lack of a detailed definition, that it remains "an abstraction, an empty concept",[70] too vague to extract distinct obligations of conduct for States.[71] Nevertheless, this author is of the opinion that the no-harm rule is indeed a rule of customary international law, not merely a concept or principle. The question is whether the no-harm rule displays a legal content ("Tatbestand") that can be tested against real life incidents and State behaviour. Some of these elements have already been discussed, and as section 4) below will show, the most important one, the standard of care is also determinable for legal use. That the duty to prevent environmental damage and minimize environmental risk is a legal duty is also broadly evidenced by the fact that the ILC has been able to define a set of rules that clarifies and details prevention duties in its project on "Injurious Acts Not Prohibited by International Law". During this exercise, governments never denied the existence of the no-harm rule as such, but commented on the various meanings given to it by the ILC. The ILC's project is discussed further now, precisely to provide an overview of State practice and opinion on the primary obligation(s) contained in the no-harm rule as well as their precise content, preconditions and consequences of breach.

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69 UN Doc. A/CONF.48/P.C.12, Ann. 15, para. 65 (cited by Handl, State Liability for accidental transnational environmental damage, 1980 AJIL 556 at 536). See also Lefeber, Transboundary Environmental Interference and the Origin of State Liability, 1996, 63 ff.

70 Palmer/Weston, International Environmental Law and World Order, 330 ff.

71 For many Beyerlin, Grenzüberschreitender Umweltschutz und allgemeines Völkerrecht, note 60 at 49.

3. The no-harm rule in the context of the ILC's work on International Liability for injurious acts not prohibited by international law

According to the International Law Commission, the obligation not to cause damage to the environment of other States or of areas beyond the limits of national jurisdiction is a *"clear directive to States to employ their best possible efforts to prevent transboundary damage"*.[72] The Commission spent years in an attempt to codify and develop the law on prevention of transboundary environmental damage (primary rule) and the issue of compensation for such damage (secondary rule). In this section, the ILC's Draft Articles on Prevention of Transboundary Harm from Hazardous Activities"[73] (Draft Articles on Prevention of Harm, 2001) and underlying considerations are used as a means to specify the content and State acceptance of the no-harm rule.[74] The Draft Articles do not represent applicable primary rules in themselves as they have not been formally adopted by States, but they do provide an indication of the existing customary international law on this issue, drawing on specialised treaties already in force between States.

As indicated in Chapter I, the topic of "International Liability for injurious acts not prohibited by international law" was originally closely connected to the topic of state responsibility. International lawyers have therefore discussed the ILC's work on this topic mainly in the context of whether or not some type of fault is needed to invoke State responsibility (strict liability or direct/strict State responsibility)[75] i.e. if a State harmed by another State's conduct could ask for reparation without having to show the other State's fault or breach of international obligation.[76] However, the ICL's work on this issue has been much broader, focussing on the primary rules contained in and flowing from, *inter alia*, the no-harm rule with respect to activities that pose a risk of causing environmental pollution and damage.[77] Against the background of the

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72 Rao, First report on prevention of transboundary damage form hazardous activities, (Special Rapporteur Rao), UN Doc. A/CN.4/487, 12. This document contains a summary of the work undertaken and approaches suggested during the work on the topic since 1978.

73 Contained in the report of the ILC, 53rd session, note 50, 370 ff.

74 See generally Erichsen, Das Liability Projekt der ILC, 51 ZaöRV (1991) 94, Tomuschat, International Liability for Injurious Consequences Arising out of Acts not Prohibited by International Law: The Work of the International Law Commissions, in: Francioni, International Responsibility for Environmental Harm, 1991, 37 and Brunnée, Of sense and sensibility: Reflections on international liability regimes as tools for environmental protection, 53 ICLQ (2004) 351/354ff.

75 The use of these terms has been very confusing. While State responsibility always connotes the concept of a State being responsible for its wrongful, i.e. unlawful behaviour under international law, strict liability can mean both strict (not requiring an element of fault) liability of a private entity or of a State. In the context of this topic, the ILC has used the term "international liability" to mean the concept of State responsibility without a wrongful act, and to essentially distinguish between a primary obligation to provide reparation as opposed to State responsibility, where reparation is only due if the State has committed a wrongful act.

76 See notes 77 and 85 for further references.

77 This has been convincingly concluded by, *inter alia*, Horbach, Liability versus Responsibility under

above mentioned open questions on the material content of the no-harm rule, this work is of eminent importance to defining the no-harm rule also in the context of climate change damage. To place the work of the ILC into context, a brief historic introduction is provided (below a). The analysis then moves on to the specific primary duties identified by the ILC and its concept of prevention and risk minimization (below b) as it applies to the issue of climate change damage. Lastly, the discussions in the ILC on the specific duties of prevention is used to discuss whether a specific transboundary effect is necessary for the application of the no-harm rule (c), since, after all, climate change is not a typical example of transboundary pollution.

a) *History of the work in the ILC*

Following discussions after the 1972 Stockholm Conference on the Human Environment, in 1977 the UN General Assembly assigned the ILC the task of *"commence[ing] work on the topic of international liability for injurious consequences arising out of acts not prohibited by international law"*.[78] The phrase "activities not prohibited by international law" was chosen to indicate that the subject of international liability was pursued as a primary obligation as opposed to secondary obligations or consequences arising from a wrongful act, which is the subject of state responsibility (see Chapter V).[79] This distinction between lawful activities and unlawful acts has been criticised as fundamentally misconceived[80] and is indeed doubtful. For example, the above mentioned *Trail Smelter* arbitration was concerned with a generally lawful activity (the operation of a smelter) which caused harm to US farmers – and it was this harm that Canada had failed to prevent and that triggered State responsibility and the duty to compensate. It was the damage to US territory that was unlawful and decisive, not whether the activity under Canada's control was lawful or unlawful *per se*. This is also important with regard to emitting greenhouse gases. This activitiy is not per se unlawful (see the discussion in Chapter III), but the cumulative effect of such emissions, leading to legally relevant damage or some quantity of such emissions (excess) is potentially unlawful.

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international law – defending strict State responsibility, 1996, and Boyle (see for the recent commentary: Codification of International Environmental Law and the International Law Commission: Injurious Consequences revisited, in: Boyle/Freestone: International Law and Sustainable Development – Past Achievements and Future Challenges, Oxford 2000, 61), see also Magraw, Transboundary Harm: The International Law Commission's Study of International Liability, 80 AJIL (1985) 305.

78 UNGA Res. 32/151, 19 December 1977.

79 UN Doc. A/CN.4/510, Rao, Third report on international liability for injurious consequences arising out of acts not prohibited by international law (prevention of transboundary damage from hazardous activities), para 31. See for an overview also Rao, First Report on the legal regime . . ., note 62, 5ff.

80 See only Brownlie, System of the Law of Nations, State responsibility, 1983, at 50.

The first report to the ILC on the issue was submitted in 1980 by Special Rapporteur *Quentin-Baxter*, followed by four more reports.[81] The 3rd report (1982) is of particular importance since it contained a "Schematic Outline", the cornerstone of the liability regime as *Quentin-Baxter* and subsequent Rapporteurs saw it. In essence, the Outline was based on the idea[82] that certain allowed activities[83] could produce adverse results but would remain lawful under the condition that certain obligations of cooperation, negotiation or reparation were met. Failure to comply with these obligations would not in itself represent a wrongful act, i.e. not trigger State responsibility and a corresponding absolute duty to provide reparation for the damage caused. Rather, where injury had occurred, reparation would be due according to the "shared interests of States", i.e. determined through a balancing process. The law on State responsibility would essentially not apply for prevention of transboundary harm, as the Articles on Injurious Consequences would cover all the "different shades of prohibition".[84] While a first draft of articles focusing on activities with physical consequences, i.e. environmental matters, based on the "Schematic Outline" was submitted in 1984, *Quentin-Baxter's* overall approach was never fully accepted and heavily debated within and outside the ILC.[85]

Applied to the present topic of climate change damage, this concept would have meant that the (lawful) emissions of greenhouse gases might become unlawful unless reparation for any damage caused by them is provided by the emitting States to affected States. This is an interesting proposition which will be taken up again in Chapter VI.

From 1985 until 1996 the new Special Rapporteur *Barboza* provided the ILC with twelve more reports[86] which contained various revised sets of draft articles. In 1989, in

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81 1st report, Yearbook ILC 1980-II (Part one), 247, UN Doc. A/CN.4/334 and Add.1-2; 2nd report, Yearbook ILC 1981-II (Part one), 103, UN Doc. A/CN.4/346 and Add.1-2, 3rd report, Yearbook ILC 1982-II (Part one), 51, UN Doc. A/CN.4/360; 4th report, Yearbook ILC 1983-II (Part one), 201, UN Doc. A/CN.4/373; 5th report, Yearbook ILC 1984-II (Part one), 155, UN Doc. A/CN.4/383 and Add.1.

82 Which has been called "illogical" by, *inter alia*, Horbach, note 77, at 73, but which also seems to be at the core of the argument developed by Lefeber, note 69, Chapter 7.

83 These activities were at first not restricted to environmental matters, but also to economic (trade etc.) and monetary (monetary policy of State banks) activities.

84 Quentin-Baxter, 4th report, note 81, at 214.

85 See the following critiques by important international law scholars appearing after 1984: Handl, Liability as an Obligation established by a Primary Rule of International Law, XVI NYIL (1985) 49; Akehurst, International Liability for Injurious Consequences Arising out of Acts not Prohibited by International Law, 16 NYIL (1985) 3; Beyerlin, Grenzüberschreitender Umweltschutz und allgemeines Völkerrecht, note 60; Boyle, State responsibility and International Liability for Injurious Consequences of Acts not prohibited by international Law – A necessary Distinction?, 39 ICLQ (1990) 3; Fitzmaurice, Liability for Environmental Damage Caused to the Global Commons, Vol. 5, Issue 4 RECIEL (1996) 305, and, inclusively, Horbach, note 77, 415 ff.; Lefeber, note 69, 184 ff.

86 1st report, Yearbook ILC 1985-II (Part one), 97, UN Doc. A/CN.4/394; 2nd report, Yearbook ILC 1986-II (Part one), 145, UN Doc. A/CN.4/402, 3rd report, Yearbook ILC 1987-II (Part one), 47, UN

agreement with the majority opinion of States and the opinion within the ILC that the no-harm rule is not limited to immediate neighbouring States, he proposed to extend the scope of the proposed rules to harm caused in areas beyond national jurisdiction.[87] Regarding liability (or rather, legal consequences for damage caused), it was his aim to address in the articles both the liability of States and responsibility for harm by private individuals. Based on the example set by many international treaties, he wanted link the civil liability of private operators with State responsibility. To that end, he proposed a specific duty to negotiate to draw States into adopting problem-specific liability regimes. To regulate both private and State responsibility made sense for the ILC as it focused (not explicitly, but conceptually) on hazardous activities such as nuclear processes, oil transport or the transport of chemicals which, at the time, were already treated in civil liability regimes. The issue of climate change damage is naturally quite different from a nuclear accident or oil spill, and this two-pronged approach would have been difficult to apply.

Barboza's approach was constantly disputed, and it became clear over time that progress on the whole issue was stalled, not because of the detailed prevention duties (designed closely alongside developing law on international watercourses), but because of the linkage between primary and secondary rules (i.e. between prevention duties and remedies (or legal consequences) where damage had already occurred). Moreover, it was observed that State practice did not support the codification of strict liability or, rather, strict/direct State responsibility, and that therefore, the basis for codification of duties to compensate for damage without any breach of obligation would go beyond the mandate of the ILC to codify existing or progressively develop international law.[88]

Therefore, in 1992 the focus of the work was finally shifted towards the prevention of harmful effects of hazardous activities, and the ILC decided to take up the issue of remedial measures later, i.e to deal separately with primary and secondary rules. This work has now begun, with Special Rapporteur Rao proposing the first set of "Principles on the allocation of loss in case of transboundary harm"[89] which essentially constitute a general civil liability regime. As it focuses on operator (private) liability, this latter work is less essential for this thesis.

Doc. A/CN.4/405, 4th report, Yearbook ILC 1988-II (Part one), 251, UN Doc. A/CN.4/413; 5th report, Yearbook ILC 1989-II (Part one), 131, UN Doc. A/CN.4/423; 6th report, Yearbook ILC 1990-II (Part one), 83, UN Doc. A/CN.4/428 and Add.1; 7th report, Yearbook ILC 1991-II (Part one), 71, UN Doc. A/CN.4/437; 8th report, Yearbook ILC 1992-II (Part one), UN Doc. A/CN.4/443; 9th report, Yearbook ILC 1993-II (Part one), UN Doc. A/CN.4/450; 10th report, Yearbook ILC 1994-II (Part one), UN Doc. A/CN.4/459, 11th report, Yearbook ILC 1995-II (Part one), UN Doc. A/CN.4/468, 12th report, Yearbook ILC 1996-II (Part one), UN Doc. A/CN.4/475 and Add.1.

87 5th Report, UN Doc. A/CN.4/423, 25 April 1989, 24

88 Rao, 2nd, (1999), A/CN.4/501, 18 ff., citing Lefeber, (note 69 at 226), who concluded that "neither treaties in force nor other instances of consistent State practice . . . support the procedural approach to liability *sine delicto* as envisaged by the Special Rapporteurs", at 22.

89 Rao, 9th Report, note 84, A/CN.4/450, 20ff.

In 1994 and 1995 the ILC adopted several Articles on first reading, focussing on the scope, definitions, and the specific prevention duties flowing from the no-harm rule such as prior authorisation, risk assessment and measures to minimise risk. In 1998, an ILC Working Group adopted a complete set of Articles,[90] which were submitted to the General Assembly and governments for consideration. At this point, the Articles mostly reflected the procedural and co-operative provisions to prevent harm and minimize the risk thereof already adopted in several conventions, for example the UN Watercourses Convention of 1997.[91]

The new Special Rapporteur *Rao* (since 1997) proceeded to focus on preventive duties regarding certain hazardous activities.[92] In August 2001, based on the set of articles adopted in 1998,[93] *Rao's* third report, and comments and observations of Governments[94] the ILC adopted the final text of a draft preamble and a set of nineteen draft articles on "Prevention of Transboundary Harm from Hazardous Activities"[95] (Draft Articles on Prevention of Harm) and recommended to the General Assembly to elaborate a convention on the basis of the draft articles. This text leaves aside the issue of consequences, or, as indicated by the original title: international liability. As mentioned above, the Articles are not (yet) legally binding.

b) *The concept of prevention and risk minimization*

The main duty of States under the Draft Articles on Prevention of Harm is "to prevent [significant transboundary] harm or at any event to minimize the risk thereof" by taking all "appropriate measures" (Article 3). This duty codifies the customary international law obligation as expressed in Principle 21 of the Stockholm declaration.[96] States must first formulate and then implement suitable measures to either prevent harm or at least to minimize the risk of it, including both *ex ante* and *ex post* measures.

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90 Official Records of the General Assembly, Fifty-first session, Supplement No. 10 (A/51/10), Annex I, p. 238, reproduced in: ILC Report 1998, Chapter 4, footnote 4 (can be viewed at <http://www.un.org/law/ilc/reports/1998/chp4.html>).

91 UN Convention on the Non-Navigational Use of International Watercourses, 21 May 1997, ILM 36 (1997) 700.

92 1st report: Yearbook ILC 1998-II (Part one), U.N. Doc. A/CN.4/487 and Add.1, (containing an overview of the work of the ILC on the topic) 2nd report: Yearbook ILC 1999-II (Part one), U.N. Doc. A/CN.4/501, 3rd report: UN Doc. A/CN.4/510.

93 UN Doc. A/CN.4/509.

94 UN Doc. A/CN.4/516.

95 Contained in the report of the ILC, 53rd session, note 50, 370 ff.

96 Report ILC 53rd session, Commentary, 378. It is not disputed that the no-harm rule is the basic principle both for prevention of harm and responsibility for any damage sustained. See for extensive analysis of jurisprudence, State practice and legal instruments, Okowa, note 41, at 75.

(1) *Scope of the Articles and the Concept of Risk*

The Draft Articles apply to "activities not prohibited by international law which involve a risk of causing significant transboundary harm through their physical consequences" (Article 1). The activities covered by this provision are not listed, but risk is defined as including "risks taking the form of a high probability of causing significant transboundary harm and a low probability of causing disastrous transboundary harm" (Article 2(a)), thus referring to "the combined effect of the probability of occurrence of an accident and the magnitude of its injurious impact".[97] This general definition could in principle also cover activities that increase the natural greenhouse effect and thus increase the risk of or contribute to climate change damage. As discussed in Chapter II, there are generally two approaches to human activites with regard to climate change damage: one, any present emissions of greenhouse gases will increase the risk of substantial damage and two, historic and present emissions contribute to any damage due to observed climate change today. This distinction is followed up in Chapter V.

Concept of Risk

In the context of climate change damage it is therefore of particular importance to understand the approach towards risk taken by the ILC. Firstly, it underpins the understanding that the no-harm rule has legal authority before harm has actually occurred, i.e. that it regulates the behaviour of States with regard to any activities that *might* result in damage. It is, therefore, a prevention duty. Secondly, the approach taken by the ILC to the no-harm rule accepts that even if a State were to adopt all necessary measures to prevent harm, this would not guarantee that no harm will occur. Therefore, even if a State is not capable of fully ensuring that no damage will be done, it has to at least do its best to minimize the risk of harm. This general approach was not criticised by governments during the decades of work on the issue of prevention of transboundary harm, and this failure to criticise could be deemed sufficiently representative of State practice so as to regard this approach to the no-harm rule as accepted in customary international law. In the context of the current analysis, this understanding of the no-harm rule as a primary duty of the State to "do the best it can" is vital. After all, it is unlikely that a State would be capable of single-handedly stabilising greenhouse gas concentrations in the atmosphere or even reversing global emission trends. Therefore, the inclusion of the risk minimization concept allows a complex phenomenon such as climate change to be encompassed by the prevention duty contained in the no-harm rule.

On the contrary *Schröder* has argued that, since climate science and predictions are still riddled with uncertainties, concrete prevention duties cannot be defined, and

97 Report ILC 53rd session, note 50, at 387.

therefore States have a large margin of discretion when deciding whether or not they should take any action to reduce greenhouse gas emissions.[98] In his view, as the no-harm rule is in essence a prevention duty which requires some kind of standard of care to be able to prevent damage from occurring, it cannot be applied to climate change damage.[99] However, based on the discussion in the preceding paragraphs, this argument is not convincing.

As stressed before, the concept of risk reduction or minimization entails the inability of States to fully guarantee that no damage will occur. No international lawyer would argue that there is no duty to equip oil tankers with proper safeguards to minimize the risk of oil escaping accidentally into the ocean. Yet, despite this duty, accidents can lead to damage to other State's coasts. Clearly, the no-harm rule does not require a State to fully prevent damage. Instead, it requires a State to prevent damage where it can and otherwise to minimize the risk as much as possible given the particular situation – including minimizing the risk of climate change damage.

Activities covered

Despite some criticism by Governments, the ILC decided that activities causing harm in the normal course of their operation, as well as harm arising from multiple sources interacting together and harm produced over a period of time in a cumulative fashion, should be excluded from the scope of the Articles.[100] These are now (as with any ILC proposal on liability) essentially confined to accidental damage[101] where a cause-and-effect relationship can easily be established between the activity and the injury.[102] However, some of the earlier versions of the Articles did extend to such activities, and it was recognised within the ILC and amongst governments that "creeping pollution" is a matter of concern.[103] The 1989 version, for example, was still designed to *avoid, reduce or compensate* significant physical effects caused by *all human activities* carried out under

98 Schröder, Klimaschutz als Problem des internationalen Rechts, in: Jahrbuch des Technik und Umweltrechts 1993, 191 at 201. See also Boyle, International Law and the Protection of the Global Atmosphere: Concepts, Categories and Principles, in Churchill/Freestone (eds.), International Law and Climate Change, 1991, 7 at 14, where he argues that "customary international law protects the global atmosphere is of limited significance".

99 Schröder et al., Klimavorhersage und Klimavorsorge, 2002, at 252.

100 Rao, 1st Report, A/CN.4/487, 24 ff. and Rao, 3rd Report, A/CN.4/510, 8 ff.

101 See also Working Group on International Liability for injurious acts arising out of acts not prohibited by international law, A/CN.4/L.627 (2 August 2002), at 2.

102 See discussion in Rao, 1st Report, A/CN.4/487, at 26.

103 In its commentary to the ILC's 1998 draft for example, Austria stated clearly that the assumption that State conduct involving the risk of inevitable significant transboundary harm by creeping pollution did not as such entail that State's obligation to cease and desist from the risk bearing conduct was highly questionable. UN Doc. A/C.6/53/State responsibility.15, para. 5, cited in Rao, 3rd Report, A/CN.4/510, at 4.

the control of one State within the territory of another State (Articles 1 and 2, emphasis added).[104]

While eventually excluding more complex environmental phenomena from the scope of the Articles, the ILC never ventured to say that activities with cumulative effects are not subject to the duty of prevention flowing from the no-harm rule. On the contrary, *Barboza* declared that such activities amounted to a *"continuous violation of the obligation of a State to prevent all significant transboundary harm caused by intentional or negligent conduct"*. This would amount to a wrongful act which would, independently of the ILC's Draft Articles on Prevention of Harm, trigger State responsibility.[105]

The general concept of risk minimization is highly applicable to the issue of climate change, and actually bears some similarity to the hazardous activities covered under the Draft Articles on Prevention of Harm: The activities in question, such as the burning of fossil fuels, the destruction of forests or emissions of other greenhouse gases such as methane or nitrous oxide are not prohibited under international law, just as the operation of a nuclear plant or the maritime transport of chemicals is not prohibited. On the contrary, these processes constitute the basis of economies worldwide. The risk created by greenhouse gas emitting became apparent at the latest in 1990 when the fist IPCC Report was published and sketched the potential impacts of global climate change, just as it is obvious that hazardous activities might cause harm – normally by way of an accident.

Admittedly, there are also differences between the activities covered by the Articles and climate change. As stressed above and in Chapter II, the use of the term risk in relation to climate change is warranted not because the general effect of rising atmospheric concentrations of greenhouse gases in the atmosphere is uncertain but because the precise impacts of climate change on individual States are unknown. The situation is different from a duty to prevent accidents or risks posed by a specific industrial installation. Yet, it could also be argued that the risk of accidents occurring in the course of an industrial operation is similar to the risk of an extreme weather event causing damage in a particular country. In the first case, the human activity *creates* the risk, in the case of climate change, human activities *increase* the risk. Just as safety measures can be taken to prevent the risk of accidents in the first instance, the latter risk can be reduced by mitigation activities.

Minimizing risk is defined in the ILC commentary as pursuing *"the aim of reducing to the lowest point the possibility of harm"*.[106]

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104 Contained in Barboza, 5th report, Yearbook ILC 1989-II (Part one), UN Doc. A/CN.4/423.

105 Barboza, International Liability for Injurious consequences of acts not prohibited by international law and the protection of the environment, RdC 1994-III, 247 at 319.

106 Report ILC 53rd session, Commentary, 391.

This is applicable in the context of climate change damage and results in an obligation to contribute to stabilising greenhouse gas concentrations in the atmosphere to a level where substantial damage to land and people is prevented. This duty extends to all countries, not just the developed countries in the context of the climate regime. The stringency of this duty will largely depend on the standard of care required, which will be discussed further below (4).[107]

As the ILC notes, the non-fulfilment of the duty to minimize risk would not give rise to the implication that an activity itself is prohibited, but the duty would be enforceable through the general law on State responsibility, including the possibility of claiming reparation for any damage caused by the failure to comply with this duty to minimize risk. This approach is consistent with the interpretation of the handful of cases on compensation for environmental damage, such as *Trail Smelter*.[108] Moreover, because the activities responsible for increasing atmospheric concentrations of greenhouse gases are practically innumerable, it certainly would not reflect international law to declare them unlawful *per se* – nevertheless, the damage caused or the emission of greenhouse gases in excess could give rise to legal consequences.

(2) *Risk Management System*

Apart from restating the general obligation to prevent damage or minimize risk, the ILC Draft Articles establish a system of risk management for hazardous activities, translating them into procedural requirements. Building on elements of the Rio Declaration, they are based on the duty of both the State of origin and the potentially affected State to co-operate. The procedural requirements are comprised of prior authorization (national permit system for activities posing a risk of transboundary damage), risk assessment procedures including environmental impact assessment, a requirement to notify and inform the affected State, as well as the duty to enter into consultations to find solutions "based on an equitable balance of interests of the States involved" (Articles 9 and 10).[109] As envisaged by the ILC, these are not due diligence obligations, but absolute duties of a State engaging in a hazardous activity. As mentioned before, they closely mirror the requirements adopted for the 1997 UN Watercourses Convention, which was also developed by the ILC.

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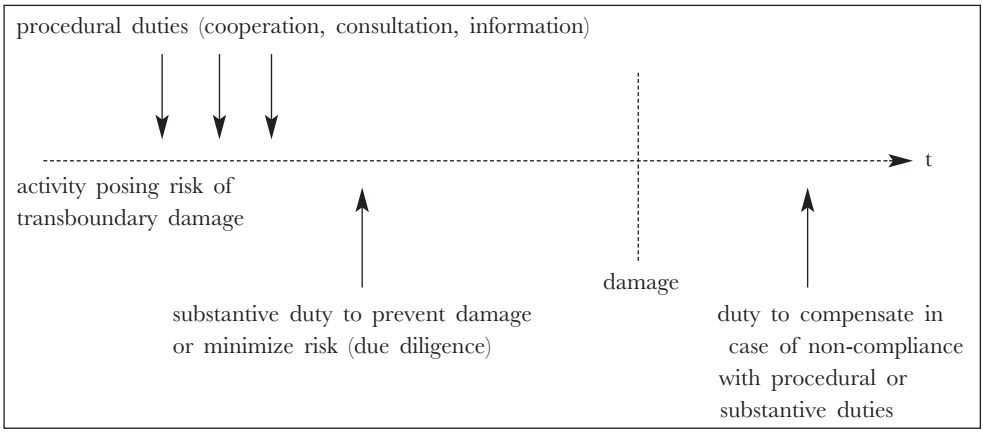
107 Risk of damage could also be reduced by engaging in direct damage preventing activities, i.e. adaptation measures. Yet, these measures only potentially reduce residual damage on the ground. A sea wall built in an area at risk from sea level rise would prevent damage, but not reduce the risk generally posed by the activity in question (emissions of greenhouse gases). It is therefore questionable whether a State could be said to have discharged its duty of care to minimize climate change risks by providing adaptation measures for other States.

108 See also Akehurst, note 85, and Boyle, note 85, at 13.

109 As these duties would constitute primary obligations if the Draft Articles were adopted as treaty law, any violation would entail State responsibility. See Report ILC 54th session, General Assembly, Official Records, 57th session, Suppl. No. 10, UN Doc. A/57/10, at 223.

The basic approach of the ILC to the no-harm rule can be visualised as follows:



Graph IV. 1 – The ILC's prevention system

In the context of climate change damage, it could be argued that the duty to co-operate (Article 4) and to exchange information (Article 8), which arguably are also accepted as part of customary international law,[110] are being fulfilled by States by actively participating in the international climate regime. Prior authorization (Article 6) and risk assessment (Article 7) would only be required duties for particular projects or industrial activities, where damage is not anticipated but could result from an accident during the normal course of operation.

Most interesting in the context of this thesis is the duty to enter into consultations on preventive measures and the duty to find solutions based on an equitable balance of the interests of the Parties (Article 9 and 10).[111] These duties represent an important step forward with regard to specifying the duties flowing from the no-harm rule.[112] While it is recognised that certain activities are not prohibited because they are important for the economic development of a State, it would also be unfair to other States

110 See Stoll, The International Environmental Law of Cooperation, in: Wolfrum (ed.), Enforcing Environmental Standards: Economic Mechanisms as Viable Means?, 1996, 39 and Buck/Verheyen, Umweltvölkerrecht, 15 f. See however, Rao, First Report, A/CN.4/487/Add.1, who argues that "it is difficult to conclude that there is an obligation in customary law to cooperate generally" (at 10) but concludes (with Stoll, op. cit.) that such a customary law duty exists in the field of environmental law.

111 Article 9 of the ILC Draft Articles Prevention of Harm reads: "1. The States concerned shall enter into consultations . . . with a view to achieving acceptable solutions regarding measures to be adopted in order to prevent significant transboundary harm or at any event to minimize the risk thereof. 2. Parties shall seek solutions based on an equitable balance of interests in the light of Article 10 . . .".

112 See favourably Boyle, note 77, 79 ff.

to allow those activities to be conducted without consulting other, potentially affected States and taking appropriate measures to protect their territories and the environment from harm.[113] The Draft Articles afford potentially affected States the right to request consultations on preventive measures, but do not afford them a right to veto any activities conducted under the control of other States.

In the context of hazardous activities and the ILC drafts, States commented favourably on the specific duty to enter into consultations, and in this author's opinion, it can be said that this duty is part of customary law.[114] Drawing on Article 5 of the Espoo Convention,[115] it was even suggested that a binding timeframe for consultations should be stipulated so that an activity is not commenced before consultations have taken place.[116] In the context of climate change damage, the duty to consult would not be applicable to distinct installations or activities as envisaged by the ILC. Rather, consultations would have to concern, for example, nation-wide energy or transport plans which encompass the majority of climate-relevant activities. This approach is comparable to strategic environmental impact assessments (SEA) as enshrined in the new SEA Protocol to the Espoo Convention[117] and the respective legislation of the European Communities.[118]

Customary international law does not contain a general duty to consult with other States about such general plans and programs. Yet, to a certain extent, the climate regime already obliges States to submit such information for assessment. Articles 12 and 7.2(e) FCCC, in conjunction with COP Decision 2/CP.1,[119] enable an independent review of national communications of developed countries, including the mea-

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113 Report ILC 53rd session, Commentary, 409.

114 This duty had been suggested as a core principle of environmental protection and sustainable development by the Expert Group on Environmental Law of the World Commission on Sustainable Development, Principle 17, reprinted in World Commission for Sustainable Development, Our Common Future, 1989, Annex I. See also Munro (ed.) Environmental protection and sustainable development: Legal principles and recommendations – adopted by the Experts Group on Environmental Law of the World Commission on Environment and Development, 1987. See for further references Rao, First Report, A/CN.4/487/Add.1, 8 ff. See in this context also the ITLOS *Mox case* (The Mox Plant Case, (Ireland v. United Kingdom), Request for provisional measures, Order, 3 December 2001, available at <http://www.itlos.org>) which expressly recognises procedural duties of the State of origin, including information exchange and consultations.

115 Convention on Environmental Impact Assessment in a Transboundary Context, 25 Feb. 1991, 30 ILM (1991) 802, in force 10 Sept. 1997: "The Parties shall agree, at the commencement of such consultations, on a reasonable timeframe for the duration of the consultation period".

116 See comments by governments in document A/CN.4/509, 12 ff.

117 A Draft Protocol on SEA was adopted by a working group on 30 January 2003 and signed by 35 parties on 21st May 2003. See further <http://www.unece.org/env/eia/>.

118 Directive 2001/42/EC of the European Parliament and of the Council on the assessment of the effects of certain plans and programmes on the environment of 27.06.2001, OJ L 197, 30 (21.7.2001). See also proposal for ratification of the SEA Protocol (note 117) by the European Communities, COM(2003) 0221.

119 FCCC/CP/1995/7/Add.1.

sures outlined for mitigation and adaptation.[120] These in-depth reviews are then discussed by Parties in the subsidiary bodies of the climate regime. This could be seen as a form of consultation exercise. The climate regime, however, does not include a procedure to reach "equitable solutions".

The duty to reach equitable solutions reflects the principle of equitable utilization, which represents customary international law in the context of international watercourses[121] and was recognised in the *Lac Lanoux* arbitration.[122] The principle of equitable utilisation stipulates that where different user interests collide, but no absolute duty to refrain from certain activities exists, negotiations should be conducted to reach mutually beneficial agreements. It is an allocation principle which does not aim at the prevention of damage *per se*.[123] On this basis, it most probably does not constitute customary law in other areas, such as air pollution or climate change. The 1982 ILA Rules on Transfrontier Pollution, for example, only provide for such a balancing exercise where the utilization of a shared natural resource, such as a shared river system, air mass above the territory of a limited number of States, or a special ecosystem, causes transfrontier pollution (Article 5 of the ILA Rules).[124]

While there is no authoritative definition of shared resources,[125] it could be argued that the climate system, with its limited capacity to bear increasing concentrations of greenhouse gases, constitutes a shared natural resource. The preamble to the FCCC speaks of shares of emissions and per capita emissions, and FCCC Parties are to be guided by equity generally (Article 3.1 FCCC). This hints at the notion that States might have equal user rights to the atmosphere, which corresponds to the concept of shared natural resources. Therefore, the duty to consult and to reach equitable solutions could, in principle, be applied to the issue of climate change damage.

While States have already engaged in extensive negotiations and consultations to agree on ways to prevent dangerous climate change – the results being the FCCC and

120 Restricted reviews are also envisaged for national communications of non-Annex I States. The Consultative Group of Experts established at COP7 (Dec. 31/CP.7, FCCC/2001/13/Add.4) has the objective of improving national communications as well as the mandate to carry out a technical review on the request of Parties. See FCCC/SBI/2003/8, 7ff.

121 See for the principle of equitable utilization the ILA Helsinki Rules in: ILA Helsinki Report, (1966) 484 ff. and UN Convention on the Non-Navigational Use of International Watercourses, 21 May 1997, ILM 36 (1997) 700, Article 5 and 6. See further on the Convention Bruha/Maaß, Schutz der Süßwasserressourcen im Völkerrecht – Prinzipien, Instrumente, neuere Entwicklungen, in: Bruha/Koch (Ed.), Integrierte Gewässerpolitik in Europa, 2001, 69 ff.

122 *Lac Lanoux*, note 64, where the duty was mainly based on an existing treaty between Spain and France.

123 Durner, Common Goods, 311.

124 International Law Association, Report of the 60th Conference, Montreal 1982, 158 ff. "Rules of International Law Applicable to Transfrontier Pollution".

125 See e.g. the 1978 UNEP Principles of Conduct in the Field of Environment for the Guidance of States in the Conservation and Harmonious Utilisation of Natural Resources Shared by Two or More States (available on <http://www.unep.org>), where the experts failed to adopt a concise definition.

the Kyoto Protocol – they have not engaged in these negotiations with a view to balancing the interests of States in continuing to emit greenhouse gases with the interest of States in not incurring damage due to climate change. Rather, the Kyoto targets as well as the FCCC are a result of political bargaining and "grandfathering", i.e. assigning emission budgets to industrialised countries on the basis of their 1990 emissions. Accepting a duty to consult and to reach equitable solutions in relations between States generally would lead to an absolute duty to consult and find equitable solutions to preventing climate change damage in addition to the duty to prevent harm or minimize risk generally.

As the duty to prevent damage could also be fulfilled by undertaking adaptive measures, the duty to enter into consultations and find equitable solutions could complement the Article 4.4 FCCC financial obligations of Annex II Parties to assist developing countries in meeting the costs of adaptating to the adverse effects of climate change. The same would hold true for the obligation to bear the incremental costs of adaptation programmes provided in Articles 4.1(b) and 4.3 FCCC. Under a duty to consult, States would be required to agree on necessary levels of funding for adaptation measures. While affected States would not have the right to veto greenhouse gas emissions per se, they would be given a right to request consultations about "compensation" in the form of direct damage prevention measures. This differs from the right of developing countries to agree costs of measures with the GEF as the financial mechanism of the climate regime. The duty to consult and find equitable solutions would also be independent of the application of State responsibility law where a State has violated its general obligation not to cause harm or minimize risk.

As stated before, it is questionable whether the principle of equitable utilisation, which is the origin of this specific duty, constitutes customary international law generally or only for the specific topic of international watercourses.

c) *The "transboundary" effect*

Both the traditional understanding, as well as the ILC's treatment of the no-harm rule, assume some type of transboundary effect as a precondition for the application of the no-harm rule and the specific absolute duties flowing from it. As will be seen, this element today only describes the international character of the prevention duty as it applies between States. It does not require, however, that pollution can be shown to physically flow between two States in particular.

Schröder's argument provides a good starting point for the discussion. He asserts that the no-harm rule is inapplicable to climate change damage because the pertinent harm is not caused by "transboundary pollution". In the case of climate change, he argues, no one State harms another. Instead, a multitude of States' emissions accumulate in the atmosphere, leading to global change. As the no-harm rule originates in the concept of transboundary pollution, i.e. assumes that a cause-and-effect chain

between two States is clearly discernible, it cannot be applied for damage resulting from climate change.[126]

Clearly, climate change as a phenomenon does not fit the traditional concept of transboundary pollution. However, neither the decades of ILC debates on the issue of prevention of environmental harm nor international jurisprudence provide evidence that complex instances of environmental change are not be covered by the general duty to prevent harm and minimize the risk thereof.

The International Law Association, codifying existing customary law on the issue of transboundary environmental pollution in 1982 defined transfrontier pollution as "pollution of which the physical origin is wholly or in part situated within the territory of one State and which has deleterious effects in the territory of another State".[127] For cumulative emissions of air pollutants, the ILA argued explicitly that as long as contributions to emissions leading to harm can be distinguished the international law principle of prevention can be applied.[128]

Long-distance air pollution can in many ways be compared to climate change. Emissions of several States accumulate and react chemically, causing harm to biological systems in other States. If the prevention duty applies to these kinds of processes, there seems to be no good reason to exempt climate change from its application.

Moreover, as discussed above, the scope of the no-harm rule has been broadened to protect shared resources generally, regardless of whether they are situated on State territory. This is reflected in Principle 21 of the Stockholm Declaration, which expresses the no-harm rule to be applicable to the protection of areas beyond national jurisdiction, e.g. the high seas and the atmosphere.[129] While *Trail Smelter* required a direct link between physical emissions and damage on neighbouring territory, the scope of the prevention duty is much wider today, extending to all kinds of activities with potential for harming shared resources, including those outside territorial jurisdiction. This structural change was accepted by States during the ILC's deliberations on prevention duties, and the fact that the no-harm rule is contained in the Preamble to the FCCC, which does not primarily protect a particular State territory but the global climate system as a shared resource of all mankind, also constitutes evidence that the broader scope of the no-harm rule is accepted by State practice. The same evidence

126 Schröder, Klimaschutz als Problem des internationalen Rechts, 191 at 196; see also Schröder et al., Klimavorhersage und Klimavorsorge, 252 and Hohmann, Präventive Rechtspflichten und -prinzipien des modernen Umweltvölkerrechts, 1992, 374.

127 ILA, Report of the 60th Conference, 1982 (Montreal), at 159.

128 ILA, Report of the 64th Conference, 1990 (Queensland), 282 f. Such cumulative emissions had been excluded from the application before because the contributions of individual countries could not be ascertained in fact, ILA, Report of the 60th Conference, 1982 (Montreal), 159.

129 See Boyle, note 98, 13 ff. The ILC excluded areas beyond national control from the Draft Articles (see for the background to this decisions Rao, First Report, A/CN.4/487, 31).

can be found in the UN Convention on the Law of the Sea (UNCLOS)[130] which reiterates Principle 21 explicitly with regard to areas beyond national jurisdiction and control and refers to any sources of maritime pollution, regardless of whether the impacts are felt immediately or in the future due to the accumulation of pollutants in the maritime environment (Article 194.2 UNCLOS).

It is against this background (and despite having excluded instances of creeping pollution) that the ILC loosened the requirement for a showing of the "transboundary" effect. Article 2(c) of the Draft Articles on the Prevention of Harm defines "transboundary harm" as harm caused in the territory of . . . a State, whether or not the States concerned share a common border".[131] This understanding also reflects statements made by governments and was not criticised in comments made by governments to earlier drafts of the Articles.

Thus, the no-harm rule requires States to prevent damage and minimize the risk thereof for the benefit of other States and shared resources and areas beyond national jurisdiction generally. The "transboundary effect" requirement does not restrict the scope of the duty, which is applicable to all kinds of activities that may cause substantial harm to States or the natural environment.

d) *Some Conclusions*

After this analysis, the legal content of the no-harm rule can be summarised as follows:

The no-harm rule contains a general obligation to prevent substantial transboundary harm and minimize the risk thereof, and thus creates legal obligations before any harm has occurred.[132] It is applicable to all activities that contribute to a particular risk and does not require a State to be capable of preventing the damage altogether. As long as such an activity can be reasonably shown to cause damage or risk thereof, the prevention duty applies, regardless of the physical character of the activity ("transboundary effect").

Regarding the procedural and risk management obligations flowing from the no-harm rule as codified by the ILC, only some are applicable to the issue of climate change damage. The duty to co-operate and exchange information is already codified and applied in the context of the international climate regime. The obligation to enter into consultations in good faith to seek equitable solutions goes beyond the current provisions on co-operation in the climate regime. The obligation flows from the principle of equitable utilisation, which has been developed for the protection of and allo-

130 1982 UN Convention on Law of the Sea (UNCLOS), in force 16 November 1994, 21 ILM (1982) 1261.

131 See also Rao, 1st Report, A/CN.4/487, at 11, who states that while the no-harm rule is certainly associated with the principle of good neighbourliness, today's neighbourhood can be defined so widely as to encompass the entire planet.

132 See for views of States UN Doc. A/CN.4/509, International liability for injurious consequences arising out of acts not prohibited by international law (prevention of transboundary damage from hazardous activities), Report of the Secretary-General, Comments made by States.

cation of rights to shared national resources. Given that the atmosphere and the global climate system could be defined as a shared natural resource, the duty could also be applied as a principle for further negotiations of climate protection measures. Most likely, the duty to consult and reach equitable solutions represents customary law for the area of shared watercourses only.

In sum, the duty to prevent damage and minimize the risk thereof is applicable to climate change as a phenomenon i.e. both damage due to gradual climatic changes and extreme events and addresses all States. However, what has not been determined is the applicable standard of care. Is a State generally obliged to prevent any substantial damage due to climate change or are States only obliged to comply with a specified standard of care, i.e. act with due diligence? This is the topic of discussion in the next section.[133]

4. Standard of care

Determining the standard of care required in the context of the no-harm rule is crucial if the prevention duty is to be applied in real-life situations. Two general approaches emerge: one, to oblige States generally to prevent damage, i.e. hold them responsible for any damage caused by their behaviour, regardless of fault or negligence (below a); and two, to oblige States to act with due diligence, balancing the interests of controlling and potentially affected States against one another other (below b). The main aim of this section is to ascertain the content of a due diligence obligation to prevent climate change damage and minimize the risk thereof. In this context, three main criteria emerge and are considered in depth: the Opportunity to Act, Foreseeability and the Taking of Proportionate Measures.

a) *Strict liability or direct State responsibility*

Industrialisation has given rise to many activities, such as nuclear power generation, the transportation of oil, and the production of hazardous chemicals, which pose such a high risk for the integrity of the environment and human well-being that their stringent regulation is warranted. It is increasingly felt that the person or entity desiring

133 This is also a moral question – see Ginther, Verantwortlichkeit, Haftung und Verantwortung im Völkerrecht, In: Ginther (ed.), Völkerrecht zwischen normativem Anspruch und politischer Realität, 1994, at 345, who says: "Der Haftung für Schäden aus völkerrechtsgemäßem Verhalten liegt die sittliche Idee des "in princiiis obsta" zugrunde. Es handelt sich um die sittliche Grundhaltung der "Verantwortung" für künftige, weitreichende und daher hic et nunc nur unzureichend kalkulierbare Folgen eigenmächtigen Verhaltens. Der Haftungsgedanke gründet hier in der Forderung einer sittlichen Grundhaltung, sich in der Wahrnehmung rechtmäßiger Verfügungsmacht dort Schranken zu setzen, wo das Schadensrisiko in unzumutbarer Weise den eigenen Hoheitsbereich transzendiert".

to enter into such inherently dangerous activities should also bear the full risk of accidents or other damage resulting from them.

As a reaction, domestic regimes on strict liability have evolved (for example the German concept of "Gefährdungshaftung"[134] or the common law approach building on the famous UK *Rylands v Fletcher* case)[135] through which a victim can recover damages simply because the activity has caused her injury, without having to prove any fault on behalf of the operator of the activity.[136] Some international treaties also explicitly stipulate that States, or more often, private operators, provide compensation in the event of damage, regardless of whether there has been a breach of any duties or of the standard of care. These include treaties[137] governing the peaceful use of nuclear energy,[138] space objects and operations,[139] the maritime carriage

134 See Helberg, Allgemeines Umweltverwaltungsrecht, in Koch (ed.), Umweltrecht, 132 f.

135 (1865) 3 H&C 774 (Court of Exchequer), (1866) Law Reports 1 Ex. 265 (Court of Exchequer Chamber), (1868) Law Reports. 3 H.L 330 (House of Lords). Without going deeply into the facts of this case (which involved a defendant mill owner who had built a reservoir, which when filled burst through old (unsuspected) mineshafts under his land, into the mines of the plaintiff), the rule evolving from it is that the person who for his own purposes brings on his lands and collects and keeps there anything likely to do mischief if it escapes, must keep it in at his peril, and, if he does not do so, is *prima facie* answerable for all the damage which is the natural consequence of its escape. Note however, the Statement in *Att-Gen v Geothermal Products (N.Z.) Ltd* 2 N.Z.L.R (New Zealand Law Reports) (1987) 348, 354) that *Rylands v Fletcher* "has hardly been taken seriously by the English courts". This is partly due to the *Cambridge Water* case (*Cambridge Water Co. v Eastern Counties Leather plc* 2 A.C. (Appeal Court) (1994) 264.), in which the House of Lords restricted the rule for policy reasons (strict liability imposed by courts v. by Parliament).

136 See the inclusive analysis of domestic legal systems of strict liability in Horbach, note 77, 83 ff. She shows that most domestic systems have either adopted a statutory system or evolved by means of judicial practice. See also Rao, First Report on the legal regime for allocation of loss, note 62, 40 f.

137 See for an analysis of the nuclear and oil pollution regimes Linneroth-Bayer/Mace/Verheyen, Insurance-Related Actions and Risk Assessment in the Context of the UN FCCC, Background Paper, May 2003, 29ff. A UN ECE treaty on strict (private) liability for activities generally dangerous to the environment has been concluded but never entered into force. (1993 UN ECE Convention on Civil Liability for Damages Resulting from Activities dangerous to the Environment, (1993) 32 ILM 1228). See for status: <http://conventions.coe.int>: 9 signatures and no ratification (April 2003).

138 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy, [1968] UKTS (UK Treaty Series) 69. See also amendments [1989] UKTS 6 and the 1963 Supplementary Convention, (1963) ILM 685; 1963 Vienna Convention on Civil Liability for Nuclear Damage, (1963) 2 ILM 727; Joint Protocol of 21 September 1988 Relating to the Application of the Vienna Convention and the Paris Convention; 1997 Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage, adopted 12 Sept 1997, not yet in force, both available on <http://www.iaea.org>.

139 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 27 Jan. 1967, 6 ILM (1967) 386, in force since 10. Oct. 1967; International Convention on International Liability for Damage caused by Space Objects, 29 March 1972, (1975) 961 UNTS 187, in force since 1 Sept 1972; Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 22 April 1968, (1968) ILM 151. See generally Boyle, Remedying Harm to International Common Spaces and Resources: Compensation and Other Approaches, in Wetterstein, Harm to the Environment, 83 ff.

of nuclear material,[140] oil pollution,[141] and the transportation of dangerous goods.[142]

Mainly on the basis of these treaties some writers have argued that a standard of strict State responsibility (or "international liability") exists generally in the context of environmental damage – at least for ultra hazardous or "abnormally dangerous" activities.[143] This would represent a deviation of the general principle of law as declared by the tribunal in the *Jamaica* case, "[a]ccording to the principles of justice, on which is founded the law of the nations . . . where there is no fault, no omission of duty, there can be nothing whereupon to support a charge of responsibility . . ."[144] Yet, based on the new understanding of the no-harm rule against the background of industrialisation and increased risk, the UN General Assembly mandated the ILC to codify strict international liability (i.e. strict State responsibility) for transboundary damage resulting from hazardous activities alongside State responsibility for wrongful acts (see above, 3.a).

The 1995 Draft International Covenant on Environment and Development by the World Conservation Union (IUCN) supports the existence of strict State responsibility. It provides for "liability of the State" (i.e. strict State responsibility for significant transboundary damage *per se*) as well as State responsibility for environmental harm (i.e. in cases of breach of an international obligation).[145] The Covenant distinguishes

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140 1971 Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material, 1971 UNJYB 100.

141 1969 International Convention on Civil Liability for Oil Pollution Damage (CLC), 9 ILM (1969) 45, Protocol of 1976, 16 ILM (1976) 617, Protocol of 1984 (never in force), 23 ILM (1984) 177; 1992 Protocol to amend the International Convention on Civil Liability for Oil Pollution Damage, Burhenne International Environmental Law 969:88; 1971 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 11 ILM (1971) 284 and amendment 16 ILM (1976) 621; 1992 Protocol to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, Burhenne International Environmental Law 971:94; 1977 Convention on Civil Liability for Oil Pollution Damage Resulting from Exploration for and Exploitation of Seabed Mineral Resources, which did not enter into force, 16 ILM (1976) 1450; International Convention of 23 March 2001 on Civil Liability for Bunker Oil Pollution Damage, see <http://www.imo.org/Conventions>.

142 1989 Convention on Civil Liability for Damage Caused During Carriage of Dangerous Goods by Road, Rail and Inland Vessels, International Transport Treaties IV-81, 10 Oct 1989, see <http://www.unece.org>; International Convention of 3 May 1996 on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, Burhenne, International Environmental Law 996:34. See for further description: Horbach, note 77, 321 ff.

143 See *inter alia*: Goldie, Liability for Damage and the Progressive Development of International Law, (1965) 14 ICLQ 1189; Smith, State responsibility and the Marine Environment, 122-128; to some extent also Handl, State Liability for accidental transnational environmental damage, 1980 AJIL 556, who proposed to apply such strict liability only to damages that are "inherently accidental". See also Pinto, Reflections on International Liability for Injurious Consequences Arising out of Acts not Prohibited by International Law, (1985) 16 NYIL 17. See for the future application of strict liability Berwick, Responsibility and Liability for Environmental Damage: A Roadmap for International Environmental Regimes, 10 Georgetown Int'l Envtl. L. Rev. (1998) 257.

144 *The Jamaica* (GB v US) 4 International Arbitration M.S. 498 at 497-99.

145 IUCN, Draft International Covenant on Environment and Development, note 62, Article 47 and 48.

between them in the following manner: State liability only arises once significant damage has been done, while State responsibility for failure to meet a due diligence obligation might occur before damage is done (failure to reduce or minimize risk).[146]

The issue has occupied various writers. Recently, *Horbach* undertook a thorough analysis of both municipal and international law sources to identify whether a strict application of the no-harm rule in cases of environmental damage exists. She comes to the conclusion that a customary law norm is crystallising with regard to "dangerous activities" impacting on the environment.[147] She argues that a State undertaking any activities in outer space or related to nuclear tests or transport is subject to such a strict duty. Drawing on a multitude of international treaties, jurisprudence and declarations she also asserts that there is a definite trend towards State responsibility based on causation only.[148] Drawing on the various civil liability conventions, however, which only stipulate strict liability for the private operators of an activity, it is not possible to declare the existence of a general rule of customary law.

Similarly, *Okowa* concludes that there is a trend towards strict State responsibility with respect to nuclear operations, but she rejects that a similar customary law rule exists with regard to transboundary air pollution.[149] Many others also reject that there is a general acceptance of strict State responsibility (or liability) for any significant damage to the environment. They also, however, raise the question as to whether a customary law rule exists for these very dangerous activities when a State willingly engages in them, aware of the risks involved.[150] This is also the context in which the ILC now attempts to sketch some rules of "international liability", avoiding the issue of strict State responsibility by putting the onus on private operators.[151]

Many of these authors also argue that some procedural obligations, such as conducting environmental impact assessments, providing information or prior consultations might be absolute obligations of conduct which are not dependent upon any particular standard of care.[152] This means that in some cases, the omission to adhere to such

146 Ibid., commentary to Article 48.

147 Horbach, note 77 at 426.

148 Horbach, note 77 at 434 ff.

149 Okowa, note 41, at 88 and 116 ff.

150 Lefeber, note 69, 61 ff. Pisillo-Mazzeschi, The Due Diligence Rule and the Nature of the International Responsibility of States, 35 German Yearbook of International Law (1992) 9, 37; Durner, Common Goods, 50 ff.; Graefenrath, Responsibility and Damages Caused: Relationship between Responsibility and Damages, Vol. 185 (1984-II) RdC 9, 110 ff.; Epiney, note 61, at 356. Similarly, Boyle would like to see an emergence of strict State responsibility for environmental harm, but rejects the proposition that such a standard already exists. (Boyle, note 85, at 25 and note 77)

151 See Rao, 2nd report on the legal regime for the allocation of loss in case of transboundary harm arising out of hazardous activities, ILC Doc. A/CN.4/540 – ILC 56th session (2004), 20 ff.

152 See for example, Okowa, note 41, at 84. Lefeber, note 69, at 37 f. See also Rao, 1st Report, A/CN.4/487/Add.1, 4 ff. stating that requiring an EIA has become very prevalent, while acknowledging that conducting an EIA might not be an absolute requirement of international law.

procedural duties might in itself constitute a violation of due diligence to prevent harm. As emphasised above, such procedural duties apply between the Parties to the climate regime in any event.

There are reasons why States are reluctan to agree to the notion of a strict liability regime.[153] These have been captured by *Dupuy* with the phrase "solidarity in guilt"[154] – States realise that one of them will always be responsible for the deterioration of or changes to the State of the environment.

But if it is accepted that the very conduct of States can – in exceptional cases – lead to State responsibility in the event of harm *per se*, could this not also shape the legal content of the no-harm rule with respect to climate change? The activities that are found to fit the category of strict State responsibility admittedly appear to be very different from the activities causing climate change. However, as stressed before, there are also various parallels. In particular, from what we know today, the risk of substantial climate change is high, regardless of the stabilisation scenario used. The magnitude of risk resulting from substantial temperature rise such as the shut-down of the thermohaline circulation or the melt-down of the West Antarctic Ice Sheet, releasing enough water to raise sea level by 6m, is certainly comparable to the risk of damage caused by nuclear or space accidents. Furthermore, burning greenhouse gases leads to substantial harm in the normal course of operation, just as the nuclear fallout from a nuclear test does. It is accepted that i) such tests are not necessarily prohibited per se[155] but ii) strict State responsibility is incurred by the operating State for any damage. Similarly, where greenhouse gases are (lawfully) emitted, any emitting nation should also bear the consequences. In essence, this interpretation would amount to the acceptance of the application of the polluter pays principle between States in the area of human induced climate change.

No specific State practice or unified *opinio juris* supports this view in relation to climate change as such. On the contrary, as already discussed in Chapter III, industrialised States rejected the inclusion of the polluter pays principle in the FCCC. Nevertheless, if a customary international law rule exists, which obliges States to bear strict responsibility for the consequences of extremely hazardous activities, this rule

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153 See for an economic assessment of strict liability between States d'Arge/Kneese, State Liability for international environmental damage – an economic perspective, 20 Natural Resource Journal (1980) 427. See also the discussions surrounding the new EC environmental liability regime (COM (2002) 17¸Opinion of the European Parliament, Committee on the Environment, Public Health and Consumer Policy, 2002/0021COD), 24th Jan. 2003. The (amended) proposal was accepted by the European Parliament on 14th May 2003 on 1st reading). See only Godt, Das neue Weißbuch zur Umwelthaftung, ZUR 2001, 188.

154 Dupuy, L'État et la réparation des dommages catastrophiques, in: Francioni, International Responsibility for Environmental Harm, 125 at 142.

155 See Okowa, note 41, 99 ff. See related arguments in the *Nuclear Weapons* opinion, ICJ Rep. (1996) 241 ff.

could in principle also be applied to the issue of climate change, especially as the impacts become more apparent over the coming years.

b) *Acting with due diligence*

If the preceding argument is not accepted, this does not mean that the no-harm rule is not operational with respect to climate change. It means only that the duty to prevent harm or minimize risk will be applied with a due diligence standard.[156] In this case, defining the duty of care is a prerequisite where a State invokes the no-harm rule as a cause of action in seeking an injunction, positive action to prevent harm (or reduce risks thereof), or indeed, compensation once damage has occurred. "Observing due diligence" in this context is a constituent element of the no-harm rule itself (the primary rule) and is a independent of the requirements of the secondary rules on State responsibility (Chapter V).[157]

It has been noted that there is little agreement as to what due diligence means, and how such standard is to be determined.[158] As such, the term amounts to a framework concept which must be given legal meaning for specific activities and risks.

Generally, the due diligence standard can be described as the conduct that can be expected of a good government,[159] in terms of of an objective and international standard.

First of all, this means that a State would be unable to argue that its internal laws set the standard of due diligence. In the case of climate change damage therefore, it would not be acceptable for a government to argue that its internal laws do not oblige or allow the State to reduce emissions.[160] Furthermore, due diligence is not equivalent to the concept of fault in terms of the particular subjective and psychological attitude of an actor (e.g. intent). As emphasised above, such a subjective element is not required when applying the no-harm rule. Rather, what constitutes the appropriate standard of care is determined by looking at a State's means and capacity at disposal in an international context.[161] This notion has been illustrated in international jurisprudence.

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156 Sometimes due diligence is equated with negligence, which can be defined as the failure to perform a legal duty, i.e. an obligation prescribing the observance of a given degree of diligence.

157 See also Brownlie, State responsibility, 38 ff who States that it is pointless to discuss whether or not State responsibility is based on fault (culpa and dolus) or on strict responsibility as this fully depends on the primary rule employed.

158 Okowa, note 41, at 77.

159 Report ILC 53rd session, Commentary, 395.

160 Okowa also argues in this direction, note 41, 81 ff.

161 See Tomuschat, International Law: Ensuring the survival of mankind on the eve of a new century, (1999) 281 Recueil des cours, 1 at 280, and for a review of the deliberations of the IDI: Vicuna, Final Report For the Eighth Committee of the Institute de Droit International (IDI) on the subject of environmental responsibility and liability, 10 Georgetown Int'l Envtl. L. Rev., (1998) 279, 284 ff. Art 3.2 of the IDI resolution reads accordingly: "When due diligence is utilized as a test for engag-

In the 1872 *Alabama case*, which is cited as the main international precedent for the concept of due diligence,[162] the UK urged the tribunal to accept the definition of due diligence as "such care as Governments ordinarily employ in their domestic concerns and might reasonably be expected to exert in matters of international interest and obligation". The tribunal rejected this reference to "domestic concerns" and followed the US argument that due diligence was the standard to be exercised by a neutral government in proportion to the risks that the States would be exposed to.[163]

In the 1925 *Spanish Zone of Morocco* case the arbiter *Huber* stated that while a minimal degree of vigilance was a natural attribute of any government, the degree of diligence to be exercised in a specific case was "a function of the available means and the nature of the [international] interest involved".[164] On this basis, *Cheng* has argued that any due diligence obligation is limited by the ability of that State to adhere to it.[165]

In addition to deciding that Canada would have to pay compensation for the damage already caused, the tribunal in the 1941 *Trail Smelter* case established a regime to control further emissions. In effect, this regime constituted the (international) standard of due diligence independent of the laws of Canada to ensure that the fumes from the smelter would not cause injury to the State of Washington in the future.[166] This regime shows that the prevention duty depends both on the interests of the potentially harmed State and on the actual capacity of the State of origin to reduce pollution. It is an international due diligence standard derived, to a certain extent, by balancing the interests of both parties.

The 1957 *Lac Lanoux* arbitration[167] considered a lack of due diligence on the part of France to prevent damage in Spain. In this case, Spain objected to France's plans to divert the waters of Lake Lanoux for hydropower generation. Spain argued that this project would alter the flow of the River Carol from France into Spain, where farmers depended on it for irrigation. France asserted that the project would not actually affect Spanish agricultural use because the same volume of water would be channelled back into the River Carol through a tunnel. The tribunal applied an international standard, the principle of "good faith", and held that France had not violated Spain's

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ing responsibility, it is appropriate that it be measured in accordance with objective standards related to the conduct to be expected of a good government . . . Generally accepted international rules and standards further provide an objective measure for the due diligence test.", ibid. at 270.

162 See Blomeryer-Bartenstein, Due Diligence, in: Berhardt, R.: Encyclopedia of Public International Law, Vol. I (1992), 1110 ff.

163 The Geneva Arbitration, (The Alabama case) in: J.B. Moore, History and Digest of International Arbitrations to which the United States has been a Party, Vol. I., 1898, at 572.

164 British Claims in the Spanish Zone of Morocco (Affaire des Biens Britanniques au Maroc Espagnol) II RIAA (1949) 615 at 644.

165 Cheng, General Principles of Law, 1953, 223.

166 Trail Smelter note 46 at 1962 ff.

167 XII RIAA 281, reprinted in 53 AJIL (1959) 50.

interests because the diversion would not alter the waters of the Carol in its natural condition.

The tribunal in the *Neer Case*, which was concerned with the murder of an American citizen, even referred explicitly to an "international standard" that had been violated by Mexican authorities.[168]

In summary, international jurisprudence conceives of "due diligence" as an objective and international standard. Furthermore, commentators propose some common elements to arrive at a more concrete standard.[169] These include (i) the opportunity to act or prevent, (ii) foreseeability or knowledge that a certain activity could lead to transboundary damage and (iii) proportionality in the choice of measures to prevent harm or minimize risk. On the basis of this and interpretation of the no-harm rule as discussed above, it seems that this three-pronged test can be conducted for all types of activities, including those leading to climate change damage.

Still, *Schröder* argues that because of the uncertainties in climate science, any requirement of conduct could be unreasonable or disproportionate, thereby affecting the rights of citizens and States to exercise their freedom of economic activity.[170] In his view, the uncertainties in climate science afford States a large margin of discretion and even justify taking no mitigation action at all. This is in stark contrast to the Statement of the ILC in its commentary to the Draft Articles on Prevention of Harm the ILC, where the standard of due diligence is defined as the conduct *"which is generally considered to be appropriate and proportional to the degree of risk of transboundary harm in the particular instance"*.[171] The ILC goes on to state that *"the required degree of care is proportional to the degree of hazard involved. The degree of harm itself should be foreseeable and the State must have known or should have known that the given activity has a risk of causing significant harm. The higher the degree of inadmissible harm, the greater would be the duty of care required to prevent it"*.[172] Both the level of risk and uncertainty therefore are to be taken into account when defining the applicable standard of care. In fact, the standard of care may change over time, where, for example, scientists assess the risk involved is greater

168 *Neer Case*, Mexico-United States General Claims Commission, Award of 1926, IV RIAA (1951), 60 at 61.

169 See the commentary to Article 10 of the 1929 Harvard Law School draft on State responsibility, which reads: "The phrase due diligence implies jurisdiction to take measures of prevention as well as opportunity of the State to act, consequent upon knowledge of impending injury or circumstances which would justify an expectation of a probable injury. Due diligence is a standard, not a definition." (Harvard Law School, Research in International Law, Vol. II, Responsibility of States, 1929, 228). These elements have been reiterated by scholars and tribunals ever since, see Garcia-Amador, 2nd report on State responsibility, Yearbook ILC 1957-II, 122, and 1961-II, 46, where he reiterates the elements of opportunity to act and foreseeability, and Epiney, note 61.

170 See Schröder et al., note 126 at 288.

171 Report ILC 53rd session, Commentary, 394.

172 Report ILC 53rd session, Commentary, 396.

than previously thought (which also plays a role in the foreseeability of damage). Nothing in international law supports a finding that excludes the formulation of an international standard of due diligence merely because the risk of harm is uncertain or lies in the future. Rather, this is a prerequisite for applying the duty to minimize risk contained in the no-harm rule.

The three criteria to test due diligence are now considered in depth.

(1) *Opportunity to act*

"Opportunity to act" means that a State can only fail to exercise due diligence with respect to a specific prevention duty if it does not act where it otherwise could have. Therefore, a State which is not involved in an activity at all or cannot remedy a problem cannot be found to be in non-compliance with the no-harm rule.

In the framework of climate change damage, almost every State[173] has the opportunity to take measures to prevent damage or to minimize the risk of such damage. Every ton of greenhouse gas not emitted and every carbon sink preserved in the long-term can reduce the amount of warming and thus reduce the risk of damage. The question in the context of climate change, when viewed as a problem of accumulation, is whether reduction efforts by one State would actually *effectively* reduce the risk or prevent harm.

As emphasised above, the no-harm rule does not require a State to guarantee that a certain harm will be prevented. This is inherent in the concept of risk minimization and the acceptance that accidents can occur regardless of precautions taken. Due diligence is an obligation to "make every effort".[174] This is particularly important with respect to cumulative pollution and related environmental phenomena, including climate change. If the application of the no-harm rule would depend on proof of the effectiveness of hypothetical measures taken by states, the norm could not be applied at all to complex environmental phenomena – yet, this is clearly not the position of international law. If the due diligence standard requires that a State does the best it can, it seems obvious that the standard itself cannot create an obligation with which the State was incapable of complying. As Principle 21 of the Stockholm Declaration and other formulations of the no harm rule stipulate, a State is obliged to ensure that acts *under its control and jurisdiction* do not harm another State. This is every State's duty, but the respective State charged with failing to observe due diligence to prevent climate change damage or reduce the risk thereof cannot effectively pressure other States to act in a similar way.

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173 Some States like many small islands are actually net-carbon sinks as they emit almost no greenhouse gases and have a rich supply of terrestrial biosphere taking up carbon. It could be argued that these States have no opportunity to prevent climate change damage or reduce the risk thereof, simply due to their negligible contribution to anthropogenic climate change. However, this fact would already exclude the no-harm rule as a cause of action in general.

174 Pisillo-Mazzeschi, note 150, at 48.

In other words, the fact that the emissions from the territories of all States contribute to the increased concentrations of greenhouse gases in the atmosphere and that one State might not be able to effectively reduce all of these emissions or actually prevent all damage cannot lead to a finding that the no-harm rule is inapplicable *per se*. Furthermore, there is a difference between asking a State to do its best to effectively prevent any climate change related damage and asking a State to do its best to reduce or minimize the risks that result from climate change. Any of the bigger industrialised nations would be able to substantially reduce this risk, even if other nations at the same time increased their emissions of greenhouse gases. The USA, for example emitted 5.8 giga tonnes of $CO_{2\ (equiv.)}$ in 2000 (industrial emissions only, excluding land-use change and forestry). This represents about 25% of global CO_2 emissions for that year.[175] Any percentage reduction would substantially reduce the amount of greenhouse gases added to the atmosphere in any future year, and thus the risk of concentrations rising to levels that would lead to dangerous changes in the Earth's climate would be reduced, as also called for in Article 2 of the FCCC.

Any other finding would also be contrary to the precautionary principle as an accepted principle of international law. As set out in Chapter III, while the precise content of the precautionary principle may differ with the field of application and the legal framework in which it operates, in the context of climate change, it requires States to take preventive action regardless of whether they are certain that these actions will prevent all harm. The precautionary principle rests on the assumption that, if at all possible, risks should be reduced as early as possible to prevent them from materialising into environmental harm. Therefore, where it is clear that risks will be reduced by the unilateral activities of one State, the fact that the entire harm could not be prevented is not an excuse for taking no risk-reducing actions. When transferred to the due diligence standard, the precautionary principle therefore strongly supports the notion that almost any State has an opportunity to act.

(2) *Foreseeability*

Foreseeability is the most commonly discussed element for establishing an international due diligence standard for the duty to prevent harm and minimize the risk thereof. In fact, foreseeability is a constituent element of any type of fault. In the context of State responsibility, scholars have discussed the term and definition primarily by asking whether the injurious consequences of a State's conduct were foreseeable and therefore constituted a wrongful act under international law. In the context of the no-harm

175 See FCCC/SB/2002/INF.2, National Communications by Parties included in Annex I to the Convention, Report on national greenhouse gas inventory data from Annex I Parties for 1990 to 2000, Note by the secretariat, Table 5.

rule, foreseeability is essential with regard to prevention duties, but also with respect to the legal situation *ex post*, i.e. when damage actually occurs. Often, a State might be able to foresee that its behaviour will increase some kind of risk, but not be able foresee any specific damage. Informed by scientific estimates, a State may be able to foresee what impact its conduct will have on the territory of other States or the global commons. Since the no-harm rule aims at the protection of these very goods, a State must, to some extent, also monitor and assess scientific developments so that it can take preventive measures.

Foreseeability is a well known item of domestic liability or tort law, where generally a distinction is made between positive (subjective) knowledge and "should have known". The latter standard is objectified, and generally eases the burden of proof on the claimant, as it is more difficult to show what a defendant knew in fact than to establish what a reasonable person should have known under the same circumstances.

International law does not appear to require a State to have positive knowledge of the foreseeability of certain situations. There clearly would be evidentiary problems associated with such a requirement. How would a claimant State be able to prove that a State did have positive knowledge that a risk of harm was foreseeable? Barring a requirement for positive knowledge of foreseeability, it is still unclear what degree of foreseeability is required. Must a State foresee generally that a particular course of conduct will cause damage, or must a particular type or degree of damage be foreseeable?

In the 1949 *Corfu Channel* case, the ICJ had before it a claim of violation of the right of free passage of UK vessels, which were destroyed by mines in Albanian waters (the Corfu Channel). In this case, the court dealt with two unlawful acts. One was the laying of the mines itself, another was the omission to warn the British warships about their existence. With regard to the laying of the mines, Albanian collusion with the mine layers could not be proven. However, the court held that every State had an obligation "*not to allow knowingly its territory to be used for acts contrary to the rights of States*" and that Albania had violated its international obligations by failing to warn the British ships of the mines.[176] The court expressed that generally, in the event of damage to another State, a State cannot exonerate itself by replying that "it is ignorant of the circumstances of the act and of its authors" but that on the other hand "*it cannot be concluded from the mere fact of the control exercised by a State over its territory . . . that that State necessarily knew or ought to have known, of any unlawful act perpetrated therein*".[177] In the Corfu Channel incident, the ICJ concluded that, due to geographical as well as other reasons, the laying of the minefield could not have been accomplished without the knowledge of Albanian officials.

176 *Corfu Channel* (Great Britain v Albania), 1949 ICJ 4 at 22.
177 *Corfu Channel,* 1949 ICJ 4, at 18.

Corfu Channel clearly establishes that circumstantial evidence suffices to prove foreseeability and that positive proof of knowledge is not necessary. Also, it flows from this judgment that a State cannot simply argue that it did not know of certain facts, if it could have or should have been aware of them. This is in line with the observation of *Quentin-Baxter* who argued in the context of the ILC's work on prevention duties that, to establish a breach of care, actual knowledge of a source of danger could be replaced by a test of due diligence with regard to the lack of such knowledge.[178] This test of "what should a State have known" has lead *Cameron* and *Zaelke* to argue that, in the face of the "obligation not to allow the territory of one State to be used to generate conditions leading the to catastrophic consequences of global warming and sea level rise", it may "not be necessary to show that the developed States had knowledge that their activities were damaging".[179]

By accepting an assumption of knowledge as the decisive element in proving a wrongful act, the *Corfu Channel* judgment moved the ICJ close to supporting strict State responsibility, because the foreseeability of damage to ships navigating the channel was the only element of fault.[180] It should also be stressed that this test was supplemented by the real ability of Albania to prevent the disaster by warning the UK warships in time.

The *Trail Smelter* award also offers some insights into the issue of foreseeability. Here, the decision to establish a regulatory regime to reduce fumes from the smelter was based on the fact that Canada could foresee that damage would indeed continue to be caused if the smelter continued to emit to the extent it had before. It was in essence because of the foreseeability of the resulting harm that the tribunal offered protection to farmers in Washington by imposing on Canada the obligation to emit less and thus refrain from causing any future injury.[181] Just as with the Albanian authorities in *Corfu Channel*, the tribunal was not certain about the exact extent and type of damage. Thus, it seems safe to assume that foreseeability does not require a State to foresee all the details of the damage. Instead, as emphasised by the ICJ in *Corfu Channel*, it is sufficient that a State is able to envision the general consequences of an act or omission, i.e. that the severe damage to the British warships and the resulting loss of life caused by the mines was "imaginable" to the Albanian authorities.[182]

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178 Quentin-Baxter, 1st Report, note 81, at 263.

179 Cameron/Zaelke, Global warming and climate change – an overview of the international legal process, 5 American University Journal of International Law & Policy (1990) 262.

180 See for an analysis ILC, Survey of Liability Regimes Relevant to the Topic of International Liability for Injurious Consequences arising out of Acts not Prohibited by International Law, UN Doc. A/CN.4/471 (1995), 36 ff.

181 See for analysis Horbach, note 77, 241 ff.

182 Based on this understanding, the element of foreseeability is very much linked to establishing causation, which is also a constituent element of the no-harm rule (see Straus, Causation as an element of State responsibility, 16 Law and Policy in International Business (1984) 893. See also the ILC

With respect to anthropogenic climate change, there is sufficient certainty today that damage will occur. In fact, IPCC scientists are 67-95% confident that recent regional changes in temperature have had discernible impacts on many physical and biological systems, such as: thawing of permafrost, later freezing and earlier break-up of ice on rivers and lakes, shifts in plant and animal ranges, declines in some plant and animal populations, and earlier emergence of insects. Other studies already show that human activities have increased the risk of extreme weather events.[183] For the 21st century scientists project with certainty (95%+ confident) that numerous Earth systems that sustain human societies will be impacted by changes in climate.

There is thus very limited scope for States to argue that they do not know about the likely effects of anthropogenic climate change today. To trigger the prevention duties of the no-harm rule, i.e. to request a State to reduce its greenhouse gas emissions or prevent harm by undertaking or paying for adaptation measures, the reference point for foreseeability is today's best scientific knowledge. It would also appear that no State could argue that the likelihood-estimates established by the IPCC do not warrant preventive action now. For one, almost all existing States agreed in 1992, by signing and ratifying the FCCC, that climate change is a real threat which must be counteracted. Moreover, the precautionary principle could play a role again when determining what the extent and detail of the knowledge required to argue that a State continued (unmitigated) to undertake climate-relevant activities despite the foreseeable consequences.

It remains questionable at what point in time sufficient foreseeability of climate change damage existed. There is support for the argument that States already knew or should have known about the dangerous effects of anthropogenic climate change in the 20th century. For example, while not detailing potential damages as done in the TAR, the 1990 IPCC First Assessment Report already concluded that without any substantial reduction of greenhouse gas emissions, global mean temperatures could rise by 0.3°C per decade, which would lead to an increase of 1°C above present mean temperatures by 2025 and 3°C by 2100, and in turn to a sea level rise of 6cm on average per decade during the 21st century, i.e. 20cm by 2030 and 65cm by 2100. Similarly, the 1995 Second Assessment Report warned against increases in global mean temperatures by 2°C (1-3,5°C) and sea level rise of 50cm (extreme range 13-94cm) by the end of the 21st century.[184]

Commentary to its draft articles on State responsibility, which stipulates that "causality is a necessary but not a sufficient condition for reparation", and that, to factor in the potential remoteness of injury, attributes such as "directness" or "foreseeability" or "proximity" must qualify the relationship between the wrongful act and the injury. Report ILC 53rd session, General Assembly, Official Records, 56th session, Suppl. No. 10, UN Doc. A/56/10, 227 ff. Causation issues are discussed in Chapter V.

183 Stott/Stone/Allen, Human contribution to the European heatwave of 2003, 432 Nature (2004), 610 ff.

184 See Chapter II for references.

The US President received ample warning of the impacts of climate change in a 1980 report[185] which was based on the most recent science widely available to governments, and in 1987 the Brundtland Commission, referring to a possible sea level rise of 25-140 cm and temperature rise between 1.5-4.5°C, noted that *"there is no way to prove that all this will happen until it actually occurs"*, which raised the question "how much certainty should Governments require before agreeing to take action"?[186] As early as 1987 the Commission suggested a four track strategy to minimize damage and cope with the changing climate and rising sea levels.

If the reference point for foreseeability is not damage but the knowledge of some kind of (potentially risky) interference with the natural climate system, the timeline becomes very broad. As the precise reference point for the foreseeability test is not clearly defined in international law and thus, there is scope for argument.

Knowledge about climate change as such is of course much older than detailed projections of likely damage. As described in Chapter II, the possibility of man-made interference with the climate system was first suggested in 1827 by *Jean Baptiste Fourier* and subsequently by the Swedish scientist *Svante Arrhenius*. They also (coarsely) hinted at the possibility of such interference leading to damage to ecological and human systems. In the 1950s, global interest in the subject revived as monitoring data from Antarctica and Hawaii allowed for in-depth research in atmospheric greenhouse gas concentrations.

Thus, there are several potential points of reference for foreseeability in the framework of the due diligence test: 1) It could be argued that a well-functioning government could have foreseen that emissions of greenhouse gases would cause damage to the territory of other States at some point in the future from the moment the first scientific research about anthropogenic climate change was published, i.e. even before industrialisation really got started. 2) It is also possible to argue that at least since data was available about the increasing greenhouse gas concentrations in the atmosphere, it was foreseeable to governments that "something" would happen, i.e. in the 1980's. 3) Since the 1990 IPCC report, there was almost uniform scientific consensus that human activities were interfering with the climate system and that some changes, such as much accelerated sea level rise would occur. 4) Finally, if one were to argue that more specific knowledge of the potential damage as well increased certainties as to the general causation of warming by human activities are required to acknowledge foreseeability, the TAR as well as its endorsement by governments[187] would serve as a basis for satisfying this part of the due diligence test (i.e. damage was foreseeable after 2000/2001).

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185 Barney, The Global 2000 Report to the President, 1980, 145 ff.

186 Note 114, Chapter 7, para. 23.

187 See Decision 1/CP.8, Delhi Ministerial Declaration on Climate Change and Sustainable Development, FCCC/CP/2002/7/Add.1, para. 3.

Given the composition and status of the IPCC it is probably most convincing to base the reference point on its first report. This would mean that States worldwide could have foreseen from 1990 that their greenhouse gas emitting activities created a risk of damage or even actual damage to the climate system and thus to the territory of other States. Still, since the standard is an objective one, it is also arguable that governments should have been aware of the risk posed by climate change much earlier, i.e. in 1950 or even before.

(3) *Proportionate measures*

Finally, if a State had the opportunity to act to prevent and could foresee damage, what are the measures required of its government? Since there is generally a freedom of choice with respect to the means used to fulfil the international obligations, specificifying required measures will depend on the circumstances of each case.

As experience with domestic legal systems shows, determining whether a measure is proportionate requires a balancing act. Indeed, it has been proposed that the no-harm rule in general leads to a de-facto obligation to balance the legitimate interests of two or more States.[188] This basic understanding of the role of the duty to prevent significant transboundary harm is reflected in the due diligence requirement of States to undertake proportionate (or appropriate) measures to prevent harm or minimize the risk thereof. This also reflects the ILC concept of due diligence which states that it is "proportionate to the degree of risk of or occurrence of transboundary harm in a particular case",[189] also accepted in the 3rd Restatement of US Foreign Relations Law. According to the Restatement, a State shall take measures *"to the extent practicable under the circumstances"* to prevent significant injury.[190] As noted previously, in the context of environmental degradation, the no-harm rule reconciles the territorial sovereignty of the polluting State and the territorial integrity of the injured State.[191]

It flows from this that, in determining whether a State has taken proportionate measures to prevent damage or minimize the risk thereof, the technical and economic abilities and interests of the State controlling/regulating the activity must be balanced against the interests of the potentially harmed State to be protected from a risk or

188 Lauterpacht, The Function of Law in the International Community, (1933), at 295 and Hinds, note 50, 310 ff.

189 This is the understanding of the ILC of the concept, see Rao, 1st Report, A/CN.4/487, 21.

190 Above note 39. A similar test is suggested in Principle 11 of the 1987 Legal Principles for Sustainable Development drafted by the World Commission on Sustainable Development (note 114), Annex I: "Proposed legal principles for environmental protection and sustainable development".

191 See for example Beyerlin, Grenzüberschreitender Umweltschutz und allgemeines Völkerrecht, note 60 at 59, Kiss, Droit International de l'Environnement, 1989, 34 and 72 f. See also the commentary to Art 6 of the 1989 version of the ILC Draft Articles on International Liability for Acts not prohibited by International Law (Barboza, 5th report, Yearbook ILC 1989-II (Part one), 131 ff., UN Doc. A/CN.4/423, at 20).

damage. The balancing test between these interests involved would have to first determine the potential risk or likely damage resulting from the activity of a State.[192] This balancing of interests is, as *Pisillo-Mazzeschi* has demonstrated, the justification and core of the due diligence concept in international law.[193] With regard to climate change damage, this exercise is complicated by the fact that a State's behaviour cannot guarantee the prevention of injury altogether. What is weighed here is the extent to which a State leaves greenhouse gas emissions and the destruction of carbon sinks unmitigated – this is in a sense a "moving target" given the multiplicity of sources and activities leading to the increase in risk and contribution to greenhouse gas concentration levels.

In the following sections, the two sides of the balancing act are discussed in the context of climate change in particular. A more concrete example is provided in case study No. 2 (on sea level rise) in Chapter V.

(a) *Magnitude of risk or injury*

Without a specific case of climate change impact in mind it is difficult to determine what the concrete interests of an affected State are and how to evaluate them against the interests of the emitting State.

However, as stressed previously, the damage likely to be caused by anthropogenic emissions of greenhouse gases under the various emission scenarios could inflict irreversible harm on people and the natural environment worldwide. The degree of risk or harm is very high in the case of climate change impacts. For many types of impacts, the IPCC has issued "warnings" that are near 90% certainty, which must be taken into account when balancing the interests of the affected State against the capacity of another to prevent the harm. The degree of harm to be expected decreases with every tonne of greenhouse gas not being emitted. This is true despite the long lifetime of greenhouse gases already in the atmosphere and speaks to the fact that the atmosphere is already saturated with greenhouse gases and the capacity of terrestrial biospheres to absorb and store carbon is limited, which actually makes every tonne emitted today more dangerous in relative terms than emissions in the past.

States could argue that measures to mitigate climate change, i.e. reducing net emissions of greenhouse gases, are just one possibility for preventing damage or minimizing the risk thereof. States could also undertake or bear the costs of adaptation activities. However, as also pointed out above, such measures do not actually minimize the risk of damage from the activity. They also have a natural limit because some impacts cannot be averted through adaptation activities (e.g. inundation of coastal

192 Lefeber, note 69, at 66 f.
193 Pisillo-Mazzeschi, note 150, at 48 f.

lands and islands at a certain magnitude of sea level rise). It is therefore not arguable that a potentially affected State's interests could be satisfied by undertaking adaptation measures only.

(b) *State's capacity and ability to prevent*

The other side of the balancing test is also difficult to determine in the abstract. Not all States have the same abilities and capacities regarding the extent to which they can reduce their greenhouse gas emissions. While the no-harm rule applies to all countries and not just to developed States, it is logical that, parallel to the ability to foresee damage, the State's actual capacity to prevent or mitigate the damage sets a threshold with regard to measures it can be expected to take.[194]

Here, another principle contained in the FCCC representing an emerging principle of international law might play a role. In line with Art 3.1 FCCC (see for analysis Chapter III) Principle 7 of the Rio Declaration stipulates that States shall co-operatively protect and restore the environment but that *"in view of the different contributions to global environmental degradation, States have common but differentiated responsibilities"*.[195] This principle of common but differentiated responsibility, which evolved out of the principle of equity, represents a departure from the strict and formal equal treatment of States in international law and is a basic principle of climate change law. It could have a major influence on what represents proportionate measures in any given case. As *Kellersmann* has shown, in the context of climate change, States have agreed that they might have differentiated responsibilities with regard to the prevention of environmental harm because of their different levels of economic development.[196] To apply this acknowledgement to the due diligence test leads to differentiated standards with regard to the type, stringency and effectiveness of measures taken to prevent climate change damage.

The proportionality aspect of the due diligence standard also has implications with regard to time. It seems that in cases where harm is due to a multitude of emissions that do not occur accidentally and accumulate over time, States will have to be given a reasonable amount of time to take the necessary measures. This was also considered in the *Trail Smelter* case, where the tribunal decided that until technical measures could be put in place to substantially reduce emissions of the plant, production would have to be reduced to prevent further damage. In the context of the pollution of international watercourses *Lammers* has proposed that States would need to grant other

194 Hinds, note 50 at 323.

195 See Rajmani, L., The Principle of Common but Differentiated Responsibility and the Balance of Commitments under the Climate Regime, 9 RECIEL (2000) 120 and for the various possibly applications Stone, Common but differentiated responsibilities in international law, 98 AJIL (2004) 276.

196 Kellersmann, Die gemeinsame aber differenzierte Verantwortlichkeit von Industriestaaten und Entwicklungsländern für den Schutz der globalen Umwelt, 2000, 46 ff.

States a period of "adaptation" to adapt legislation and industrial processes to the requirements of the obligation to prevent harm.[197] In the context of climate change, it would probably constitute a disproportionate claim to oblige States to reduce emissions of greenhouse gases to zero immediately. Rather, States must exercise due diligence to reduce their net emissions as is appropriate under the circumstances of each country. The precise standard can therefore only be determined in the context of a specific case. However, it should be note that, given the fact that negotiations for the FCCC started in 1990, States have already had more than a decade to accustom their policies to the requirement of minimizing the risk of climate change damage.

(c) *Conclusion*

In conclusion, if one element for determining the degree of diligence required by the respondent State is the latitude of risk involved, it could indeed be argued that the risk from climate change posed to States, in particular to small island States is so great (e.g. loss of territory) that States could reasonably be required to reduce emissions much more quickly than is politically intended at the moment. If, as the IPCC suggests, overall greenhouse gas emissions must be reduced by 80% within the next 50 years, this would mean that indeed, any absolute increase is prohibitive since it would not respond adequately to the risk involved. This statement might be altered in line with equity concerns, for example, when comparing global per capita emissions. It could even be argued that in the face of the potential risks involved any positive emission levels represent a failure to act with due care. This would mean that States which continue to allow greenhouse gas emissions from their territories are in constant breach of the duty to prevent substantial harm or reduce the risk thereof.

c) *Conclusions*

The preceding section showed that, while it is arguable that the standard of care in the context of the duty to prevent damage from climate change or minimize the risk thereof is strict, there seems to be little support for this proposition in international law. In fact, if the standard were strict and States were held responsible for any damage caused due to their climate-relevant activities, a positive duty to take preventive action could not be formulated. States would have no incentive to reduce their emissions as they would be held responsible for any damage caused regardless of their actions to preserve the global climate system.

197 Lammers, note 54, 257 f. and 349.

In light of this, the due diligence standard has been identified as applicable to a State's duties to prevent climate change damage or minimize the risk thereof. It is an objective, international standard which can be determined independently of a country's internal laws or policies. To show that a State has failed to act with due diligence, a State must have:

i) had the opportunity to act. It was shown that this criterion is practically useless as any State has an opportunity to mitigate climate change.
ii) been able to foresee the damage or risk caused by climate change. It was shown that foreseeability is an objective standard and refers to the point in time when the pertinent State could have foreseen that climate change, including its own contribution to rising atmospheric greenhouse gas concentrations could lead to substantial damage to other States. This was the case at the latest from 1990, when the first IPCC report was published.
iii) not taken proportionate measures to reduce the risk or prevent the harm. Only mitigation measures would qualify as proportionate measures as only they can effectively reduce the risk of climate change damage, while adaptation measures only prevent concrete damage. Therefore, a State is required to reduce its net greenhouse gas emissions to the extent possible under national circumstances. In testing whether a country's climate change policies are proportionate in the context of the no-harm rule, measures actually taken will be balanced against the interests of the affected State. Due to its case-by-case nature, it was not possible in this theoretical discussion of proportionality to conclude where exactly the threshold lies; however, this will be done with concrete case examples in Chapter V.

In sum, the no-harm rule is an enforceable primary obligation on States to take measures to mitigate climate change and therefore resembles the obligation identified in Articles 2 and 4.2 FCCC. However, unlike the provisions of the FCCC, the no-harm rule is applicable to all States and allows a distinction only on the level of determining what constitutes proportionate prevention measures. Nevertheless, given the resemblance and the structure and dynamic character of the climate regime, it is necessary to discuss the influence of the regime on the no-harm rule and in particular the due diligence standard. The next section shows that while the rules can stand alone, there are also strong linkages between them.

5. Role of the Climate regime

The question we are concerned with here is whether and how, if treaty standards exist, do they complement or even replace the general standard of due diligence, and render the application of the no-harm rule futile altogether.

It has been said that standards stipulated in international treaties are often derived from the standard of due diligence.[198] On the other hand, where treaty standards are accepted so widely as to constitute State practice for the formation of customary international law, customary law may be heavily influenced by the treaty standards. Most importantly however, an answer to the question posed above gives way to a discussion of whether and to what extent States can legalise their own behaviour by, for example, setting inadequate international standards when examined from the point of view of the protection of the global commons or the territorial integrity of States. The *lex specialis* doctrine discussed in section II above is only of limited use to this very specific problem. Rather than approaching it from a theoretical point of view, it is again important to discern parallels and differences between the various rules and standards applicable, as well as the will of the Parties in this context.

First of all, one major difference between the no-harm rule and its due diligence standard and the international climate regime must be pointed out. The no-harm rule is a rule aimed at solving a particular (originally bilateral) problem "on the ground". As its origins lie in the principle of good neighbourliness and the equality of States, its due diligence standard is objective in that it is derived chiefly from a balancing act between two (or more) countries' interests. Both climate treaties, on the other hand, contain negotiated standards for the protection of the global climate system, which are not intended to solve a particular legal relationship between two (or more) countries. As analysed in Chapter III, Article 2 FCCC, the overarching goal of the climate regime, essentially constitutes an aggregate standard aimed at the prevention of dangerous climate change for the benefit of all States and the natural environment. And while it could be said that Article 2 in conjunction with Article 3 FCCC form a sort of climate-related constitutional law that will have to be taken into account when applying a norm of customary international law, these provisions do not contain a special objective standard protecting the territorial integrity of individual countries. They do not define a clear standard that could replace the due diligence standard with respect to the prevention of or potentially the reparation of climate change damage.

Secondly, Parties never intended to replace the no-harm rule's objective standard of protection with the rules of the climate regime. This was already stressed before, but is worth repeating. The no-harm rule is explicitly contained in the Preamble to the FCCC and various Parties have made explicit reservations upon ratification that they do not intend to exclude the application of any objective international law standards by accepting the climate treaties (*"shall in no way constitute a renunciation of any rights under international law concerning State responsibility for the adverse effects of climate change"*).[199]

198 See for example, Kiss/Shelton, International Environmental Law, 2000, 193.

199 Declarations made by the Governments of Nauru. Tuvalu, Fiji, and Papua New Guinea. See UN Doc. COP1.Inf02, Status of Ratification of the UN FCCC (24/3/1995) (see <http:www.unfccc.int>).

Against this background it does not appear that the Parties agreed to a legitimising effect of compliance with any of the negotiated targets, be it the soft target contained in Article 4.2 FCCC or the Kyoto Protocol's reduction targets. While they (might, in the case of the Kyoto Protocol) constitute internationally agreed standards, they cannot replace the general standard of due diligence because they are not aimed at regulating a legal relationship between various States in a concrete case. While the no-harm rule sets a due diligence standard to protect, the emission reduction targets of the Kyoto Protocol constitute an agreement to refrain from certain behaviour which is relatively unrelated to a specific protection duty. This is a significant difference that supports the argument that the standards exist in parallel.

There are also factual reasons for arguing that an objective due diligence standard can exist alongside the treaty standards. Both the FCCC as well as the Kyoto Protocol acknowledge that the targets set are preliminary, a first step, and are by no means adequate to achieve the aim of Article 2 FCCC. In the Kyoto Protocol, Parties agreed to start discussions about the commitment period starting after 2012 in 2005 at the latest (Article 3.9 Kyoto Protocol). It cannot be foreseen whether these negotiations will produce results that can be seen to be adequate or even in line with an international due diligence standard, and it would be premature to argue that the Kyoto targets should serve as a general yardstick for what measures are required to prevent climate change damage under international law.

Moreover, were the Kyoto targets to replace the international standard of due diligence, this would mean that even non-Parties to this treaty would be implicitly bound by it – an outcome which is contrary to the general principle that treaties can only bind Parties.

Furthermore, the climate regime exempts developing countries as defined in the Annexes to the FCCC entirely from any mitigation commitments. This is not the case, however, for a due diligence obligation to prevent climate change damage flowing from the no-harm rule. While the developing country standard of care will be differentiated from that of industrialised States because the two will have different capacities to mitigate climate change, all States have a duty in general to "do the best they can" to prevent climate change damage and minimize the risk thereof. This is important, given the fact that India, China and Brazil are some of the top emitters of greenhouse gases today.

It is acknowledged that where compliance with Kyoto targets produced a legitimising effect, thus protecting countries against claims on the basis of the no-harm rule, States could be encouraged to take on treaty-based targets and comply. Expectations under international law would be clearly determined and only States outside the regime would bear the risk of being evaluated by a general standard of due diligence, which (as shown above) could in fact be much more rigid than any negotiated targets.

However, the importance of the climate regime is not negated where an objective standard of protection (a due diligence standard) co-exists with the standards of the climate regime.

Environmental treaties are designed to strengthen the general rules of customary international law such as the no-harm rule, both by creating new law and by increasing institutional powers to entice States to take preventive action.[200] Both the FCCC and the Kyoto Protocol are major achievements of environmental diplomacy and essential for the protection of the global climate system. The purpose of concluding treaties in the field of the environment rather than relying on the general concepts of customary law is at least two-fold. The first is to avoid the "free rider problem", i.e. requiring that all States, not just the willing few, contribute to (potentially costly) preventive measures for the common good. Secondly, treaty regimes offer a unique opportunity to strengthen the traditionally weak control and enforcement system of international law. The international control mechanism is comprised of two basic elements: 1) verification – establishing the facts of State behaviour, and 2) qualification – analyzing the facts in light of the legal obligations to determine whether or not a State is in compliance.[201] It is much easier to demonstrate that a State is in not complying with a particular treaty standard (such as the emissions reduction targets of the Kyoto Protocol) than it is to show non-compliance with a more amorphous rule of customary international law, such as the flexible no-harm rule with its due diligence standard that must be re-calibrated depending upon the specific environmental risk or harm and the source activity. In addition, treaty obligations are measured against the objective standard of State responsibility (see Chapter V). The violation of a treaty obligation (automatically) requires that a State i) comply with its obligation and ii) where applicable provide compensation or some other form of remedy. In contrast, attempting to show a violation of the no-harm rule most likely would require the far less concrete and more difficult demonstration of a lack of due care on the part of the respective State. Another advantage of a treaty regime is that it should allow parties to find ways of circumventing the uncertainties of international adjudication. Multilateral environmental treaties generally establish their own compliance procedures, which are aimed mainly at bringing States back into compliance and facilitate disputes amongst parties in the best interests of treaty goals[202] – but not normally with the aim of compensating for damage. Moral pressure and public outing of the treaty violation are the regular *modi operandi* of such treaty regimes, and this is also how the new non-compliance system under the Kyoto Protocol will operate.[203]

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200 See Brownlie, Principles of Public International Law, 286.

201 Dupuy, International control and state responsibility, in: Ginther (ed.), Völkerrecht zwischen normativem Anspruch und politischer Realität, Festschrift für Karl Zemanek, 1994, 309.

202 See for an overview of compliance regimes and their purpose: Buck/Verheyen, Umweltvölkerrecht, 31 ff., Ehrmann, note 20 377, Birnie/Boyle, 1992, 136 ff. See also: Kiss, Present Limits to the Enforcement of State Responsibility for Environmental Damage, in: Francioni (ed), International Responsibility for Environmental Harm, 7 at 8, 11.

203 See Oberthür/Marr, Das System der Erfüllungskontrolle des Kyoto Protokolls, ZUR 2002, 81.

It would appear, therefore, that the obligations of the climate regime are better placed to provide enforcement and mutual recognition than the standard of care derived from the no-harm rule. Nevertheless, while treaty standards are essential, they can operate alongside the objective standard of the no-harm rule, and given the unwillingness of the Parties to exclude the application of this objective standard, it is justifiable to argue parallel application.

It should also be noted, that States are free to agree amongst themselves to exclude the application of the no-harm rule. This would mean that only States outside the treaty regime would bear the risk of being evaluated by the general standard of due diligence, which in fact could be much more rigid than any negotiated targets. Moreover, were the Kyoto Protocol to develop targets capable of achieving the aim of Article 2 FCCC (preventing the most severe impacts of climate change), one could argue that the treaty standards had risen to the level of "diligence" of an objective standard of protection. In other words, the no harm rule's due diligence standard and the treaty prevention standards effectively would have merged. Since this is not currently the case, the conclusion from this discussion remains that the objective due diligence standard stands independently of the agreed mitigation targets of the climate regime.

6. Conclusions

In sum, the no harm rule is an important rule of customary international law applicable to climate change damage. It contains a duty to prevent damage or minimize the risk thereof with due diligence. In the context of climate change, States are obliged to take measures to prevent damage or minimize the risk thereof by taking measures to mitigate climate change, i.e. by reducing their greenhouse gas emissions and preserving carbon sinks.

It is possible to define an objective standard of due diligence using the criteria of (i) opportunity to act or prevent, (ii) foreseeability or knowledge of a certain activity leading to transboundary damage and (iii) proportionality in the choice of measures to prevent harm or minimize risk, which essentially means balancing the interests of the State's involved.

This standard of care is an objective standard of protection and exists independently of any treaty standards set in the context of the international climate regime. Since the risks of climate change are foreseeable for every State at least since 1990, no State can argue that uncertainties as to the extent and precise location of climate change damage provide an exemption from "doing the best they can".

Arguably, the no-harm rule even demands that States are held liable for the consequences of climate change regardless of whether they have taken due care to reduce greenhouse gas emissions. In this interpretation, the primary norm would be reduced to the duty not to cause harm to a State through activities under another State's

jurisdiction and control. However, in no interpretation would this lead to an obligation of States to immediately cease all emissions of greenhouse gases, since implies only a duty to compensate, which would be triggered only after damage had already occurred. The duty of prevention on the other hand could also be enforced in the form of an injunction by way of a claim that a State had not exercised due care to minimize risks or prevent damage due to climate change. The possibility of enforcing this rule through the law of State responsibility will be examined in Chapter V.

As regards the climate regime, the duty to prevent harm or minimize risk by reducing greenhouse gas emissions is applicable to all States, developing and developed. However, the standard of care will depend on the particular country's capacity to prevent harm or minimize the risk of harm and might therefore differ from country to country.

This finding is important with regard to future negotiations within the climate regime. If a general obligation to prevent damage or minimize the risk thereof exists for all States, given the advanced state of climate science and knowledge of the damage to be expected, this legal duty must guide negotiations on future treaty standards and targets. In this sense, it is not a matter of good-will to commit to emission reductions, but a matter of complying with an existing customary international law obligation by way of cooperation and negotiation and the shaping of a treaty.

IV. Other Treaty Law

This section turns to treaty law pertinent to the issue of climate change damage, which flanks the provisions of the climate regime and the no-harm rule. The role of treaty provisions will be discussed from two perspectives: 1) whether they contain any direct prevention obligations relevant to climate change damage (i.e. the identification of primary norms that could also be applied as a cause of action for a State responsibility claim, Chapter V) and 2) to what extent they have already set standards of protection that are relevant in the context of defining Article 2 FCCC (threshold of dangerous interference with the climate system) and that indicate to what extent the impacts of climate change might frustrate the purpose of those treaties. This aspect should also influence any future negotiations within the climate regime, since it displays overlapping membership with many of the treaties discussed in this Chapter.

First, a look into the law of the sea and particularly the UN Law of the Sea Convention shows that the impacts of climate change and particularly sea level rise could have a profound effect on the legal rights of States to their maritime zones. The way in which States may react if such impacts alter their existing rights will be discussed. Next, the provisions for the protection of the maritime environment will be discussed as they provide further primary rules aimed at the prevention of climate change damage (section 1 below).

Nature and biodiversity protection treaties are described and analysed briefly in section 2, to identify the rules most pertinent to the issue of climate change damage. It will be shown that many of the existing treaties already set a threshold of protection which States will have to take into account when defining the threshold in Article 2 FCCC as well as when negotiating further mitigation targets in the framework of the climate regime.

1. Law of the Sea

In its Third Assessment Report, the IPCC predicts a 9 to 88 cm sea level rise during the 21st century as well as regionally varying increases in ocean temperatures. Coral bleaching, fish migration and the extinction of maritime species due to changes in water temperature are only some examples of the detrimental effects of climate change on oceans, coastal and island States. Both the 1982 UN Law of the Sea Convention (UNCLOS)[204] and the 1995 Straddling Fish Stocks Agreement[205] regulate rights and duties of States with regard to the specific jurisdictional regimes of maritime zones and the protection of the maritime environment.[206]

Article 194.2 UNCLOS implicitly prohibits unlimited emissions of greenhouse gases by obliging States to *". . . ensure that activities under their jurisdiction and control are so conducted as to not cause damage by pollution to other States and their environment . . .".* This is an explicit reiteration of the no-harm rule. Article 235 UNCLOS stresses that State responsibility is triggered if States do not fulfil their environmental duties under UNCLOS: *"States are responsible for the fulfilment of their international obligations concerning the protection and preservation of the marine environment. They shall be liable in accordance with international law."*[207] This is mirrored by Article 35 of the Straddling Stocks agreement: *"States are liable in accordance with international law for damage or loss attributable to them in regard to this agreement".*

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204 See note 130.

205 1995 Agreement for the Implementation of the Provisions of the UN Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (Straddling Stocks Agreement), 34 ILM (1995) 1552, in force 11 Dec 2001.

206 See Tol/Verheyen, State responsibility and compensation for climate change damage: A legal and economic assessment, 32 Energy Policy (2004) 1109. It should be noted that the Convention is not universally applicable since for example the US has not ratified it. However, many of its provisions qualify as customary international law, see Brownlie, Principles of Public International Law, 177 ff. at 207.

207 Similar to other treaties UNCLOS also requests States to co-operate in the implementation of existing liability rules and the "further development of international law for damage and the settlements of disputes, as well as, where appropriate, development of criteria and procedures for payment of adequate compensation such as compulsory insurance or compensation funds." (Article 235.3).

As far reaching ranging regimes for the law of the sea, UNCLOS and the Straddling Stocks agreement could provide additional primary rules obliging States to prevent or minimize climate change damage.[208] Some of these are discussed in the context of the preservation of the maritime environment in section b). First, however, sea level rise as an impact of climate change and the resulting damage from the loss of territory and maritime zones in the context of UNCLOS provisions is considered in section a) below.

While this thesis does not tackle issues of jurisdiction, it is interesting to note that UNLCOS foresees binding dispute resolution under its Part XV, which also applies to disputes arising on the basis of the Straddling Stocks Agreement (Article 30 of the Straddling Stocks Agreement).

a) *Maritime Zones and Loss of Territory*

(1) *The Problem*

UNCLOS defines different maritime zones, including territorial waters (up to ~22 km off the coastline or "baseline"), the exclusive economic zone, EEZ (~370 km) and the continental shelf area. Beyond these maritime areas defined by UNCLOS, on the high seas all States have equal rights (freedom of the high seas).

Most fishing and tourism-related activities occur in the territorial waters and the EEZ of coastal States. Both the loss of territorial waters and EEZ could be highly economically significant in the case of an island State – notwithstanding the loss of land itself (which is not protected by UNLCOS). Many small islands depend on fisheries as a major part of their annual income. If, due to sea level rise, part of the EEZ and/or territorial waters would (legally) disappear, this could have economically disastrous effects on States' economies. This could happen either through the inundation of entire islands or, as will be shown, even the partial inundation of islands rendering them uninhabitable.

The maritime zones are generally determined by drawing a line around land territories (the baseline) based on a special methodology, and it is likely that sea level rise would affect the positioning and/or scale of a State's maritime zones.[209] As islands also serve as the basis for drawing this baseline, States particularly likely to be affected by diminishing territorial waters and EEZ are archipelagic States, i.e. States that are

208 The author wishes to thank Mr Duncan Currie (Legal Advisor to Greenpeace International) for most helpful remarks on this section. Some of the ideas displayed here are his and were only developed further by the present author.

209 Soons, The effect of a rising sea level on maritime limits and boundaries, XXXVII Netherlands International Law Review (1990) 207 and Freestone, International Law and Sea Level Rise, in: Churchill/Freestone (eds.), International Law and Global Climate Change, 1991, 109.

composed of a group of islands or parts of islands and interconnecting waters (Article 46 UNCLOS).[210] For example, two of Kiribati's islands have already disappeared: the uninhabited islands, Tebua Tarawa and Abanuea, were covered in 1999 by a rising sea which was publicly attributed to global warming.[211] In 1998, Japan undertook extensive seawall fortifications to prevent the disappearance of Okino-tori-shima, located 1,100 miles southwest of Tokyo, a collection of reefs which entitles Japan to over 150,000 square miles of fisheries.[212] Of less significance, yet still legally relevant is the shifting of maritime zones through the shifting of coastline as a result from inundation.

In both cases, a maritime area that was the territorial water or EEZ of a coastal State could legally become high seas again, and thus *res communis,* at everyone's disposal within the legal limits set by UNCLOS and the Straddling Fish Stocks Agreement[213]. It is therefore a very real possibility that sea level rise and its impact on maritime zones could lead to significant economic damage. While UNCLOS does not protect the maritime zones as such, its definitions of these zones in conjunction with the impacts of climate change could severely affect the sovereign rights of States. Given the complicated system of determining maritime zones, however, further legal analysis is warranted to estimate the likely impacts and discuss the legal consequences of sea level rise.

(2) *Determination of Maritime Zones and Rights of the Coastal State*

The rules for the determination of the shape of the territorial sea and most other maritime zones are laid out in Article 5 ff. UNCLOS. A State has full sovereignty[214] in the **territorial sea** (Article 2.1), i.e. 12 nautical miles from the baseline (Article 3), which is usually the low-water-line along the coast (Article 5). For island States and atolls, the rules are more complicated, allowing States, for example, to draw straight baselines around fringed coastline and islands in the immediate vicinity of the coast (Article 7 UNCLOS) or archipelagic baselines joining the outermost points of the outermost islands and drying reefs (Article 47: this provision applies to many of the island

210 Archipelagic States include the Bahamas, Cape Verde, Comoros, Fiji, Indonesia, the Maldives, Mauritius, Papua New-Guinea, the Philippines, Sao Tomé and Principe, the Seychelles, the Solomon Islands, Trinidad and Tobago, and Vanuatu.

211 Chang, Exclusive Economic Zones, (accessed 24 April 2002).

212 Chang, note 211, citing Geographica, "Lonely Rocks Important to Japan," *National Geographic Magazine*, November, 1988 (Vol. 174, No. 5).

213 1995 Agreement for the Implementation of the Provisions of the UN Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (Straddling Stocks Agreement), 34 ILM (1995) 1552, in force 11 December 2001.

214 This sovereignty is only subject to some limited rights of other States such as the right of innocent passage. This is regarded as customary international law and was already codified in the 1958 Convention on the Territorial Sea.

States such as the Maldives or the Cook Islands, both of which as archipelagic States).[215] States can even build lighthouses or similar installations on low-tide elevations and use these to draw lines (Article 7.4 UNLCOS). This (straight baseline) method was approved by the ICJ in the *Fisheries*[216] case and the UNCLOS provisions reflect the several judgments made on coastal delimitation by the ICJ. Based on these provisions, the coastal State has a considerable degree of flexibility in baseline determination.

The **EEZ** is determined in accordance with Articles 55-57 UNCLOS. Article 57 provides that a coastal State has the right to establish an exclusive economic zone to the maximum breadth of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured. This means that the above described principles for baseline determination apply, including the use of islands as outer limits of a baseline. Article 56 confers specific rights on the coastal State in the EEZ: sovereign rights (in particular with regard to exploring and exploiting, conserving and managing natural resources) and jurisdiction. The most important right in question is the right to fish and allow fishing activities by other States. The existence of the EEZ is optional and depends on an actual claim. It should be seen as a right rather than a fact (i.e. the existence of the territorial sea).

(3) *The case of inundation of islands*

Islands have a territorial sea (and EEZ) and will therefore be able to join a coastal State's maritime zones if (i) the formation is natural and not an artificial installation and (ii) the formation is always above sea level.[217] As stated above, they are also generally relevant for the drawing of baselines. Where an island or collection of reefs disappears below water level completely, the effect is relatively simple: the maritime zone is lost.[218] Partial inundation of an island on the other hand poses significant legal problems. This issue is discussed in the next section, after which arguments of defence against the loss of maritime zones will be explored.

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215 See for example Maritime Zones of Maldives Act No 6/96 at <http://www.un.org/Depts/los/LEGISLATIONANDTREATIES>.

216 Anglo-Norwegian Fisheries Case (Great Britain v. Norway), 1951 ICJ Rep. 116 at 129.

217 Article 121. 1 UNCLOS defines an island as a naturally formed area of land, surrounded by water, which is above water at high tide.

218 It should be noted however, that an island State might still maintain its legal personality. While UNCLOS does not protect State territory *per se*, other claims under customary law might be possible in such cases. This is an issue of uncertainty in international law. While the 1933 Montevideo Convention on Rights and Duties of States (165 LNTS 19) lists "a defined territory" as a necessary element to qualify as a person for purposes of international law, there is also the view that a State which "disappears" must still qualify as a State under international law so as to protect its citizens. They could then be regarded as special (*sui generis*) international persons. The general interest of a State in its survival was recognised in the ICJ Advisory Opinion on *Nuclear Weapons*, ICJ Rep. 1996, 263 para. 96; see also: Declaration of President Bedjaoui, ICJ Rep. 1996, 273 para. 22.

(a) *Article 121.3 UNCLOS – Rocks*

Article 121.3 UNCLOS provides explicitly that rocks which cannot sustain human habitation or economic life on their own shall have no exclusive economic zone or continental shelf.[219] Therefore, one consequence of sea level rise and the (partial) inundation of an island which can, as a result, no longer sustain human life (for example because sea level rise has led to the intrusion of sea water in drinking water resources), is the loss of the islands' EEZ. Legally, this results in the loss of the rights of the island State in these maritime areas.

Another consequence of the transformation from an island to a rock in the sense of Article 121.3 is that the land mass can no longer be used to draw a baseline, e.g. in the case of archipelagic States. This could lead to a loss of a large area of a State's EEZ. As one commentator has suggested,[220] the provision is badly drafted, and could be interpreted in a less threatening way: Article 121.3 could simply provide that a freestanding rock which cannot sustain human habitation cannot itself give rise to an EEZ. Another author who has traced the historical development of Article 121[221] observes that the distinction in Article 121.3 between 'islands' and 'rocks' may be traced to the concern of some States that islets or small uninhabited islands located outside the territorial sea would be used in delimiting ocean space between neighbouring States. A historical interpretation therefore indicates that Article 121.3 is indeed meant to prevent rocks from forming the outer rim of a baseline.

Given the fact that it is likely that several currently inhabited islands could be affected by sea level rise such that they would lose their capacity to sustain human life, it is important to determine exactly when a rock would be unable to sustain human habitation or economic life in the sense Article 121.3. Clearly, if an island is uninhabited and holds no drinking water resources, it could still sustain economic life. For example, if a rock supports coral reefs and its products, it does provide the basis for economic as well as biological life.[222] Certainly economic life emanating from a coral reef, whether in the form of tourism or fisheries, for instance, would constitute "economic life" in the sense of Article 121.3. This interpretation might alleviate significantly the consequences of an application of Article 121.3.

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219 Examples are "Rockall" near the United Kingdom or "L'Esperance Rock" near New Zealand.

220 Churchill/Lowe, Law of the Sea, 1999, at 48.

221 Hafetz, Fostering Protection of the Marine Environment and Economic Development: Article 121(3) of the Third Law of the Sea Convention, 15 American University International Law Review (2000), 590. See also Nandan/Rosenne, United Nations Convention on the Law of the Sea 1982: A Commentary, 330 (Satya N. Nandan & Shabtai Rosenne eds.), (1995). See generally Fusillo, The Legal Regime of Uninhabited 'Rocks' Lacking An Economic Life of Their Own, IV Ital. Y.B. Int'l L. (1978-79) 47, who States that the only case known of an island being denied its right to an exclusive jurisdiction area of its own is that of the island of Rockall in the Atlantic Ocean. Cited in Hafetz, op. cit., n. 16.

222 Hafetz, note 221, 627.

Such a result would be in line with an interpretation of the provisions in accordance with the context of the treaty as well in light of its object and purpose (Article 31.1. VCLT):

If the purpose of Article 121.3 is to avoid expansive claims of maritime zones, the situation of an island State faced with losing parts of its maritime area due to sea level rise would not fit the situation originally envisaged of a State claiming large maritime areas based on rocks that cannot sustain human life. Moreover, if even low-tide elevations (naturally formed area of land which is surrounded by and above water at low tide but submerged at high tide, Article 13 UNCLOS) can form part of the baseline under Articles 7(4) (for the purpose of straight baselines) and 47(4) (for archipelagic baselines), there seems to be no strength to the argument suggesting that islands that are inundated over time due to climate change should not continue to form part of a baseline.

Moreover, Articles 13 and Article 121 UNCLOS indicate that the existence of land area can have different consequences for the formation of maritime zones and the drawing of baselines.[223] The drawing of baselines is not synonymous with the existence of maritime zones. This means that, where an island disappears or is partially inundated, it might lose its territorial waters and EEZ, but not its usefulness for baseline-drawing. This could significantly restrict the potential territorial loss facing many nations.

(b) *Arguments to defend existing maritime zones*

States faced with the inundation of islands could rely on Article 6 UNCLOS to preserve their territorial waters and the EEZ. Article 6 provides that for islands situated on atolls or with fringing reefs, the baseline for measuring the breadth of the territorial sea is the seaward low-water line of the reef, as shown by the appropriate symbol on charts officially recognized by the coastal State.[224] This means that in the case of an inundated island, the baseline can still be drawn from the outside reef. This has implications for archipelagic islands with coral reefs affected by warmed seas. They may need to take action to preserve the integrity of the reefs, while bearing in mind that artificial islands do not serve as baselines.[225]

Some changes in the natural condition of coastlines captured by UNCLOS might prevent the loss of territory due to sea level rise. Article 7.2 (on straight baselines)

223 Article 13.2 UNCLOS: Where a low-tide elevation is wholly situated at a distance exceeding the breadth of the territorial sea from the mainland or an island, it has no territorial sea of its own.

224 See Kawaley, Delimitation of islands fringed with reefs: Article 6 of the 1982 Law of the Sea Convention, 41 ICLQ (1992) 152.

225 UNCLOS Art 60(8): Artificial islands, installations and structures do not possess the status of islands. They have no territorial sea of their own, and their presence does not affect the delimitation of the territorial sea, the exclusive economic zone or the continental shelf.

provides that *"[w]here because of the presence of a delta and other natural conditions the coastline is highly unstable, the appropriate points may be selected along the furthest seaward extent of the low-water line and, notwithstanding subsequent regression of the low-water line, the straight baselines shall remain effective until changed by the coastal State in accordance with this Convention."* This article, apparently drafted to address Bangladeshi concerns,[226] has been the subject of little State practice to date.[227] Yet, inundation of parts of the coastline could well be considered an "other natural condition", which makes the coastline highly unstable. Where a fringe of islands is present and straight baselines have been drawn under Article 7.1, inundation of one island may be disregarded pursuant Article 7.2. This would mean that no loss of territory occurs and no damage is done. This is consistent with the ICJ's judgment on straight baselines in the *Fisheries* case where it was held that when drawing straight baselines around the Norwegian coastline, it was legitimate to take into account "certain economic interests peculiar to a region, the reality and importance of which are clearly evidenced by a long usage."[228] The change of coastlines due to sea level rise resulting from anthropogenic climate change would alter the "long usage" as respected by the ICJ in this case. Moreover, it would certainly be in the economic interests of States not to alter baselines.

Non-affected States may argue that this provision only applies where the coastline is highly unstable due to some (pre-existing) natural condition. However, there is no such qualification in Article 7.2, and the provision does indicate the intent of the Parties in such a situation.

Adverse States may also argue that inundation caused by anthropogenic climate change is not "natural". Anthropogenic climate change might be said to be a more natural phenomenon than direct interventions such as dam building, but it is not a natural geographical condition, like a river delta. Nevertheless, the purpose of the article is to avoid inequitable changes to alterations by geographical phenomena outside a State's control, such as changing river deltas, which themselves most likely would change due to rising sea levels. Moreover, not changing baselines would be "equitable" especially when it concerns the coastlines of developing States which are hardly responsible for the sea level rise resulting from anthropogenic climate change. In the 1984 *Gulf of Maine* case[229] the ICJ accepted that *"equitable criteria"* can be applied in the drawing of baselines as well as the *"use of practical methods capable of ensuring, with*

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226 See Churchill/Lowe, Law of the Sea, 38, citing Prescott and Bird, The influence of rising sea levels on baselines from which national maritime claims are measured and an assessment of the possibility of applying article 7(2) of the 1982 Convention on the Law of the Sea to offset any retreat of the baseline, in C. Grundy-Warr (ed.), International Boundaries and Boundary Conflict Resolution (Durham, University of Durham, 1990), 279.

227 Churchill and Lowe, Law of the Sea, 56.

228 1951 ICJ Rep. 116 at 133.

229 Case concerning Delimitation of the Maritime Boundary in the Gulf of Maine Area (Canada/United States of America), 1984 ICJ Rep. 246 (*Gulf of Maine*).

regard to the geographic configuration of the area and other relevant circumstances, an equitable result".[230] If a State was challenged to change its baseline and thus lose some of its maritime zones, it could argue that such a claim would not be *"intrinsically equitable in the light of all the circumstances"*.[231]

A State wishing to argue that its maritime zones remain the same on the basis of Article 7.2 despite sea level rise and the inundation of an island could also draw on the following analogy: If a river forming the boundary between adjacent States changes its course as the result of gradual expansion of one bank and destruction of the other, the general rule is that the boundary line continues to be the mid-channel or middle-line but shifts with the shifting course of the river.[232] However if a boundary river suddenly leaves its old bed and forms a new one, the boundary remains where it was.[233] This situation is analogous to the disappearance of an island, which while becoming more and more inundated over time, loses its island (as opposed to rock) status suddenly due to extraordinary tidal waves.

(4) *The case of inundation of coastline*

The alteration of a coastline due to sea level rise would lead to a shift of the normal baseline and thus of both the territorial waters and the EEZ. Maritime zones would not be diminished, as the overall size of a country's territorial sea and EEZ would remain the same but shift landwards. As UNCLOS does not protect inundated land area *per se* this situation seems of little relevance.

However, damage might occur in a different way. Since many fish stocks are dependent on the topography of the seabed rather than the distance from the coast, such shifts could lead to fish stocks becoming high seas stocks that were formerly located in or straddled the EEZ of a given country. Since coastal States would lose their (restricted) sovereign rights over these stocks, this shift of maritime zones could also be defined as damage.

(5) *Conclusions*

Due to the specific legal conditions for the existence and definition of maritime zones under UNCLOS, sea level rise could lead to substantial losses of maritime zones and the corresponding sovereign rights. While UNCLOS does not provide affected States with a primary norm entitling them to the permanence of their maritime zones or,

230 *Gulf of Maine* case, 1984 ICJ Rep. 246, para. 112.
231 *Gulf of Maine* case, 1984 ICJ Rep. 246, para. 230.
232 Oppenheim, International Law, at 665.
233 Oppenheim, International Law, at 666, citing Andrassy, Hag R 79 (1969), 60 ff., and suggesting reference to Bouchez, ICLQ, 12 (1963), 789-817 and Jayewardene, the Regime of Islands in International Law (1990), 201 ff.

for that matter, to compensation should these be shifted or disappear, States could use the no-harm rule as a general primary norm to protect their rights.

Archipelagic States are particularly affected as the inundation or even partial inundation of islands could lead to a loss of a vast area of EEZ due to a shift in the original baseline. While some arguments exist to defend the existing maritime zones even if sea level rise were to inundate islands, there is considerable legal uncertainty as to whether these could fully prevent damage due to sea level rise. Overall, it is likely that States will have to consider the likely impacts of sea level rise on their maritime zones and the sovereign rights in them as established under international law. Disputes between States could arise where physical changes occur that affect the delimitation of maritime zones, in particular between an island State "renting out" fishing rights in its EEZ to other fishing nations. The latter States would be have an interest in arguing that the EEZ had been diminished due to the effects of sea level rise, therefore, shifting the area in which they fished to the high seas, free of the sovereign rights of the coastal State.

b) *Maritime Environment*

As noted above, the law of the sea treaties contain provisions aimed at the protection of the maritime environment which could be classified as primary rules to prevent and minimize climate change damage, since the predicted temperature changes in the ocean could have profound effects on marine biodiversity.

Because minor changes of temperature can cause the migration of fish stocks, climate change has been identified as a stress that will heavily influence fishery resources in the 21st century. Both fish and marine resources have already been affected by overfishing, pollution, the food needs of growing populations, etc.[234] The effects of climate change are likely to exacerbate existing stresses on fish stocks, such as diminishing wetlands and nursery areas, pollution, and ultraviolet radiation.[235] It will be very difficult to attribute particular changes in fish stocks to climate change, and attribution attempts in the future will be complicated by the lack of historical data on stock sizes. The same holds true for the spatial distribution of stocks. Little information is available on historic variations in the distribution of stocks or the processes driving them. Yet, as the UN Food and Agriculture Organisation (FAO) notes, it is now scientifically accepted that because fish stocks react to temperature changes, *"long-term climatic changes could determine major epochal increases in fish production from some stocks in some*

234 See GESAMP, Sea of Troubles, The State of the World's Oceans (2000) 19 f. and FAO, The State of World Fisheries and Aquaculture, 2002, 87 ff.

235 See Watson (ed.), Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Change, (IPCC SAR) Chapter 16: Fisheries: A. Krovnin et al. An Executive Summary is at <http://www.st.nmfs.gov/st2/climatec.htm>, accessed 7 April 2002.

areas, and equivalent declines from other stocks and areas, some, if not most, major commercial fish stocks".[236] Financial losses due to the impacts of climate change on fisheries therefore are very likely to occur.

Rising water temperatures are also identified as the cause of coral bleaching which has severe impacts on coastal and marine ecosystems, the development of fish stocks and tourism in island and coastal States. Coral reefs and atolls also will be impacted by sea level rise and any changes in storm frequency and intensity.[237] While healthy coral reefs might be able to keep up with sea level rise, this is less certain for reefs degraded by coral bleaching. Scientists have already attributed observed damage of coral reefs to anthropogenic climate change; and this sort of damage is likely to continue in the future, especially given the fact that increased temperatures are considered the major cause of coral bleaching. Because many reefs are currently close to their temperature tolerance thresholds, even small temperature increases are bound to have an impact.[238]

(1) *Obligation to protect*

According to Article 192 UNCLOS, States have the "obligation to protect and preserve the maritime environment". This is supplemented by Article 207 ff. UNCLOS which contain more detailed duties regarding all sources of pollution to prevent harm and to protect the marine environment, e.g. "States shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment from land-based sources . . . taking into account internationally agreed rules, standards and recommended practices and procedures" (Article 207.1). It has been argued that the wording of Article 192 reflects the precautionary principle.[239] However, as *Marr* notes, the provision sets out a general obligation to "protect and preserve" the marine environment rather than a specific risk assessment tool for the marine environment (which the precautionary principle is).[240] This is evidenced by Article 194, which recognizes the need for "preventive action" to avoid negative impact. This means that Article 192 UNCLOS captures a substantive duty to prevent pollution of any kind.

The 1995 Straddling Stocks Agreement aims explicitly at the conservation and management of straddling and migratory fish stocks and their ecosystems in areas beyond national jurisdiction, i.e. the high seas (Article 3). Article 1(b) of the Agreement

236 FAO, note 234, at 91.

237 IPCC TAR WG II, 361; Sydney Centre for International and Global Law/Faculty of Law, University of Sydney, Global Climate Change and the Great Barrier Reef: Australia's Obligations under the World Heritage Convention, 15 September 2004, 10 ff.

238 IPCC, Ibid.

239 Freestone, International Fisheries Law Since Rio: The Continued Rise of the Precautionary Principle, in: Boyle/Freestone (eds.), International Law and Sustainable Development, 1999, 135 at 148.

240 Marr, The Precautionary Principle in the Law of the Sea, 2002, 51.

defines "conservation and management measures" as *"measures to conserve and manage one or more species of living marine resources that are adopted and applied consistent with the relevant rules of international law as reflected in the Convention [UNLCOS] and this Agreement.*" Article 5 States that there is a need to address marine ecosystems as a whole if fishery conservation and management is to succeed, and Article 5(a) obliges States to "*adopt measures to ensure long-term sustainability of straddling fish stocks and highly migratory fish stocks and promote the objective of their optimum utilization.*" In addition, Article 5(f) stipulates that States shall, *"minimize pollution . . ."* and 5(g) emphasises that States shall protect biodiversity in the marine environment. Because the Straddling Stocks Agreement is based on UNCLOS, it *"shall be interpreted and applied in the context of and in a manner consistent with the Convention"* (Article 4). The Agreement does not define pollution or the necessary measures to be taken to ensure conserve, manage and promote the sustainability of living marine resources, therefore the following analysis provides some guidance on these provisions.[241]

For Article 192 UNCLOS and Article 5(f) Straddling Stock Agreement to serve as primary rules for the prevention of climate change damage, such as coral bleaching or adverse impacts on fish stocks, rising water temperatures would have to qualify as maritime pollution, since greenhouse gases do not directly affect the marine environment, other than by increasing the amount of CO_2 available for uptake. Marine pollution is defined in Article 1.1(4) UNCLOS as the *"introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to the living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities".* This is a very broad definition, and it could be argued that Article 1.1.(4) UNCLOS uses precautionary language.[242] "Pollution" is not defined as something which "results" in hazards to human health or harm to living resources, but "is *likely* to result", which implies a mandate that protective measures be taken before harm actually occurs.[243]

As the definition explicitly States, pollution need not be direct, as for example the introduction of oil into the sea. Therefore, in principle, activities such as emitting greenhouse gases could be covered. Questionable is whether in the case of climate change, resulting in ocean temperature increases, any "substances or energy" are introduced into the marine environment. The fact that the term "energy" is included in Article 1.1 indicates that States wished to cover not only maritime pollution with chemical or organic substances, but also the introduction of heat (for example by

241 This might be important as some States (such as the USA) have ratified the Straddling Stocks Agreement, but not UNCLOS.

242 Marr, note 240.

243 See Lagoni, "Die Abwehr von Gefahren für die Marine Umwelt, in Kunig (ed.), Umweltschutz im Völkerrecht und Kollisionsrecht, 1992, 87 at 117.

waste water from production processes), which frequently is a problem in coastal areas. Warming up waters disturbs the ecological balance and can lead to eutrophication. The climate change processes leading to higher ocean temperatures are at least similar – warmer surface temperatures caused by higher (anthropogenic) concentrations of greenhouse gases in the atmosphere lead to an increased heat up-take of the upper ocean layers. Therefore, there seems to be no reason why indirect activities that are likely to result in harm to living resources and marine life should be excluded merely because the heat is introduced through rising air temperatures. Air-borne pollution is also explicitly covered by Article 194.3(a), which calls on States to take measures to *"minimize to the fullest possible extent: . . . the release of toxic, harmful or noxious substances . . . from land-based sources, from or through the atmosphere . . ."*, as well as by Article 212 which calls on States to adopt laws and regulations to *"prevent, reduce and control pollution of the marine environment from or through the atmosphere"* (Article 212.1). Moreover, during the negotiating process, States were aware of the potential threat of climate change to marine life.[244] Therefore, it would appear that the negotiating Parties, had they wanted to, had the opportunity to exclude climate change from the definition of pollution.

Generally, therefore, the law of the sea prevention duties could be construed to cover climate change damage inflicted on the maritime environment (and thus possibly harvesting yields) through rising surface and resulting rising water temperatures.

Nevertheless, the above mentioned obligations do not represent an absolute prohibition to pollute (or, in the case of climate change, to emit greenhouse gases). Rather, they represent due diligence obligations with the goal of minimizing rather than eliminating pollution.[245] This is clearly indicated in Article 194.1 UNCLOS which reads, *"States shall take . . . all measures . . . that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities . . ."*. Thus, to comply with Article 192 UNCLOS or 5(f) Straddling Stocks Agreement, a State must act with appropriate care.[246] The test of due diligence employed would be similar to the one described in the context of the no-harm-rule (above III.4).

In the context of what constitutes due diligence, it should be noted that Article 204 ff. UNCLOS prescribe specific environmental impact assessment duties. Art 206 provides that when States have reasonable grounds for believing that planned activ-

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244 See UN Secretary General "Law of the Sea – Protection and preservation of the marine environment", 18 September 1989, UN Doc. A/44/461, para. 114.

245 General opinion, see UN Secretary General "Law of the Sea – Protection and preservation of the marine environment", 18 September 1989, UN Doc. A/44/461, para. 30.

246 Some have argued that UNCLOS contains direct or strict State responsibility in Article 139 which is concerned with sea bed activities. However, a State can exonerate itself if it has taken all "necessary and appropriate measures to ensure effective compliance" (Article 139.2 2nd sentence UNCLOS). This article is not therefore an example of direct State responsibility, rather it sets forth a special due diligence threshold.

ities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment, they shall, as far as practicable, assess the potential effects of such activities on the marine environment and shall communicate reports of the results of such assessments in the manner provided in Article 205. Given the current State of climate science, States have reasonable grounds to believe that their continued greenhouse gas emissions will lead to harmful changes in the maritime environment. They are obliged therefore to assess, in light of the specific UNCLOS provisions, whether their actions to control anthropogenic climate change are sufficient.

Both the general prevention and protection duty for the benefit of the marine environment (Articles 192 ff.) and the specific assessment duties in Article 204 ff. UNCLOS must be taken into account by Parties to the UNFCCC, which are also Parties to UNCLOS, as they develop the regime to reach the objective of Article 2 FCCC. Although Article 2 FCCC does not make explicit mention of the maritime environment (and biodiversity) which must be protected, the binding UNCLOS provisions, which are also likely to represent customary international law, influence the margin of discretion which FCCC Parties have in this respect.

Finally, it should be noted that any claims made under UNCLOS would only cover damage resulting from maritime pollution or changes in maritime zones, fishing rights, etc. Recoverable damage under UNCLOS would not encompass agricultural or health damages, but would cover all coastal territory and adaptation/protection costs.

(2) *Co-operation*

Further specific duties (primary norms) applicable to climate change damage can be found among the far reaching co-operation duties under UNCLOS.

The International Tribunal for the Law of Sea (ITLOS) recently considered the scope and content of the duty to co-operate in the context of the *Mox* case.[247] In this case, Ireland claimed, *inter alia*, that the United Kingdom had not respected its co-operation duties under Articles 123 and 197 UNCLOS because it had not shared information regarding the radioactive discharge of the Mox Plant into the Irish Sea.

ITLOS held that the *"the duty to cooperate is a fundamental principle in the prevention of pollution of the marine environment under Part XII of the Convention and general international law and that rights arise therefrom which the Tribunal may consider appropriate to preserve under article 290 of the Convention"*[248] and that *"in the view of the Tribunal, prudence and caution require that Ireland and the United Kingdom cooperate in exchanging information concerning risks or effects*

247 The *Mox Plant* Case, (Ireland v. United Kingdom), ITLOS case No. 10, Request for provisional measures, Order, 3 December 2001, available at <http://www.itlos.org>, see for an analysis Churchill/Scott, The MOX Plant Litigation – The first half life, 53 ICLQ (2004) 643.

248 *Mox* case, Order, para. 82.

of the operation of the MOX plant and in devising ways to deal with them, as appropriate".[249] As Judge *Wolfrum* expressed, the *"obligation to co-operate with other States whose interests may be affected is a Grundnorm of Part XII of the Convention as of international customary law for the protection of the environment".*[250]

In the *Mox* case, the Court therefore prescribed provisional measures including that Ireland and the United Kingdom shall cooperate and, for this purpose, shall enter into consultations in order to (a) exchange further information with regard to possible consequences for the Irish Sea arising out of the commissioning of the MOX plant; (b) monitor risks or the effects of the operation of the MOX plant for the Irish Sea; (c) devise, as appropriate, measures to prevent pollution of the marine environment which might result from the operation of the MOX plant.

Therefore, with respect to the impacts of climate change which can be characterised as "pollution", Articles 123 and 197 UNCLOS oblige States to exchange information with regard to possible consequences of increases in sea temperature and other impacts on fisheries, marine mammals and the marine ecosystem arising out of further greenhouse gas emissions; to monitor risks or the effects of the operation of climate change on the marine environment including fisheries; and devise measures to minimize pollution leading to climate change and prevent further impacts on the marine environment which might result from climate change. This duty corresponds to the duty already identified in Article 4.1(e) UNFCCC which requires that States co-operate in preparing for adaptation to the impacts of climate change; and develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture.

In the ITLOS *Southern Bluefin Tuna* case,[251] States were ordered to negotiate without delay with a view to reaching agreement on the allowable catch of southern bluefin tuna. A similar approach could be taken for Parties to the FCCC. Measures for the protection of the marine environment against climate change could include specific adaptation measures rather than aggregate mitigation obligations. Such co-operation could either be achieved through the climate regime, but – in as much as concrete protection measures are concerned to protect coral reefs, for example – just as easily in the context of UNCLOS.

c) *Conclusions*

The law of the sea is pertinent to the issue of climate change damage from various perspectives. First, sea level rise could significantly alter the existing maritime zones

249 *Mox* case, Order, para. 84.

250 Seperate opinion in the *Mox* Case (note 247) at 6. See also Stoll, note 110, 44 ff.

251 *Southern Bluefin Tuna* Cases (New Zealand v. Japan; Australia v. Japan) (Provisional Measures) (1999) 38 ILM 1624, ITLOS Order of 27 August 1999. Jurisdiction was declined in the arbitral phase, at 39 ILM 1959 (2000).

as determined under the rules set by UNCLOS. A loss of maritime areas under sovereign control of States could result in significant losses in particular for Archipelagic and other island States. Whether or not such damage will occur will depend significantly on the interpretation of certain provisions of UNCLOS, such as Article 121.3 on the role of uninhabited rocks for the purposes of baseline determination. While UNCLOS itself neither protects the existence of maritime zones nor land areas from inundation, affected States could make use of other primary norms such as the no-harm rule to call on States to prevent negative impacts on or damage to their sovereign rights within their maritime zones.

Second, the duty to protect the maritime environment contained in, *inter alia*, Articles 192 UNCLOS and 5(f) Straddling Stocks Agreement is a due diligence obligation which can be applied to climate change as a phenomenon, since the associated rise in sea temperature should be regarded as maritime pollution.

Third, this prevention duty is flanked by a general duty to co-operate (Articles 123 and 197 UNCLOS), which more specifically requires an exchange of information with regard to possible consequences for increases in sea temperature and other impacts on fisheries, the monitoring of specific effects of climate change on the marine environment and devising measures that prevent or reduce damage to it. This co-operation duty acts to complement the obligations under the FCCC which require Parties to enter into negotiations to arrive at adequate solutions to protect the marine environment (Article 4.1(e)).

Fourth, given the protection regime established for the benefit of the marine environment, parties to the FCCC must take into account the impacts of climate change on this resource when defining Article 2 and further action to reach this goal.

2. Nature Conservation and Biological Diversity

The development of nature conservation in international and national law represents an attempt to reconcile the sovereign interests of States to exploit the natural resources living within their territory and conservation interests "for nature's sake", or in the interest of current and future generations. Hundreds of regional and international treaties exist in this area. While this thesis cannot touch on all of them, some will be discussed in detail below. This section aims to determine (i) whether these treaties contain any primary obligations to prevent or reduce climate change damage; (ii) to what extent their normative structure and purpose might be frustrated by the impacts of climate change; and (iii) what role the protective status afforded to certain species could play in the implementation of the climate regime.[252]

252 It should be noted, however, that because the Parties to the various treaties differ, nature conservation treaties cannot serve as a binding threshold for the operation of Article 2 FCCC – treaty norms

a) *Introduction*

Treaties regulating the use of natural resources represent the starting point of international environmental law (for example regional fishery treaties or treaties to regulate the use of shared watercourses and the resources they contain) and the first international instruments on nature conservation are closely related as they protect "useful" or exploitable species. Later treaties also aim to protect the natural environment *per se*. Examples include the 1950 International Convention for the Protection of Birds,[253] the 1979 Bern Convention on the Conservation of European Wildlife[254] and the 1979 Bonn Convention on the Conservation of Migratory Species of Wild Animals (CMS),[255] which provide a binding conservation framework for all contracting States. The 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO Convention)[256] also contains binding protection obligations in relation to specific sites for the benefit of the "world heritage of mankind as a whole" (preamble, paragraph 6). Similarly, the 1971 Ramsar Convention[257] obliges the signatories to protect specific, registered wetlands on their territories to preserve their value and characteristics as waterfowl habitat.

The tension between exploitation and conservation, which also mirrors differences between industrialised and developing countries, has now been fully accepted by the international community. Treaties like the 1992 Convention on Biological Diversity[258] represent a new approach under the overarching notion of sustainable development.[259] Biological diversity, defined as the variability among living organisms from all sources and the ecological complexes of which they are part (Article 2 CBD), is protected, *inter alia*, for its intrinsic ecological, economic, social, and cultural value (preamble to the CBD).

Climate change is likely to have a profound impact on the effectiveness of international treaties in the area of biodiversity and nature conservation.[260] This is recognised by the climate regime, and potential interlinkages and areas of common action

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only become binding on Parties to the specific treaty once the Party has ratified th treaty and the treaty has entered into force. Unless treaty provisions represent customary international law binding on all States, they cannot develop binding force "through the backdoor" on all Parties to the FCCC.

253 Paris, 18 Oct. 1950, in force 17 Jan. 1963, 683 UNTS 186.

254 Bern Convention on the Conservation of European Wildlife and Natural Habitats, 19 Sept. 1979, in force 1 June 1982, E.T.S. 104.

255 Bonn 23 June 1979, in force 1 Nov. 1983, 19 ILM (1980) 15.

256 Paris 23 Nov. 1972, in force 17 Dec. 1975, 11 ILM (1972) 1358.

257 Convention on Wetlands of International Importance Especially as Waterfowl Habitat, 2 Feb. 1971, in force 21 Dec. 1975, 11 ILM (1971) 963.

258 Rio 5 June 1992, in force 29 Dec. 1993, 31 ILM (1992) 818.

259 The CBD follows in spirit the 1982 (non-binding) World Charter for Nature, adopted by the UN Assembly, UN Doc. GA RES 37/7.

260 See IPCC Technical Paper V, Climate Change and Biodiversity, April 2002.

are now being explored in a Joint Liaison Group between the CBD, the UN Convention to Combat Desertification (CCD),[261] and the Ramsar Convention established by the FCCC Subsidiary Body for Scientific and Technological Advice (SBSTA).[262]

Biologists identify three main problems of the impacts of climate change on biodiversity: 1) individual species loss; 2) ecosystem loss; and 3) species movement. Although species have responded to climatic changes throughout their evolutionary histories, a primary concern for wild species and their ecosystems is the rapid rate of change. The IPCC found (67-95% confidence) that recent regional changes in temperature have had discernible impacts on many physical and biological systems.[263] Eighty per cent of the studies examined in the TAR show that species have changed in the manner expected of global warming, thus linking changes in population and the locations of those populations to regional temperature rise. Similarly, a more recent synthesis of more than 1,700 species-related studies and one piece of research comparing and summarising 143 specific studies on biodiversity and global climate change discerned a significant impact of global warming in animal and plant populations. According to this team of researchers, most field biologists are now convinced that they are already seeing important biological impacts of climate change. One example is species forsaking their ranges to find cooler or higher habitats (for example, a shift of 6.1 km per decade towards the poles). From a climate perspective, the reports show that spring events have advanced by 2.3 days per decade.[264]

Clearly, climate change is (only) an additional stress on biological diversity, which is already threatened by exploitation, the destruction of habitats, pollution, the failure of markets to ascribe value to natural resources, etc. The rate of extinction today is 1,000 times the natural rate, which is estimated at 9% extinction every million years. Much of these extinctions are due to the disproportionate destruction of the biodiversity rich tropical forests.[265] Where climate change negatively affects forests, it might also wipe out species that are still unknown, and at the same time increase the anthropogenic greenhouse effect by setting free carbon stored in those forests.

Against this general overview, the next sections discuss various treaties and their relationship with climate change damage in detail.

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261 Paris 17 June 1994, 33 ILM (1994)1328, in force 26 Dec. 1996.

262 See FCCC/SBSTA/1999/14, FCCC/SBSTA/2002/INF.16 and FCCC/SBSTA/2002/13, 19 ff.; Ramsar Resolution VIII.5, at 2.

263 IPCC TAR WG II, 2 and 244 ff. (Terrestrial Biosphere), see in particular Table 5-3 showing the species and processes that were found to be significantly associated with regional temperature change (at 246). See also the IPCC Technical Paper on Climate Change and Biodiversity, 11 ff.

264 Parmesan/Yohe, A globally coherent fingerprint of climate change impacts across natural systems, 421 Nature (2003), 37 and Root, et al. Fingerprints of global warming on wild animals and plants, 421 Nature (2003), 57; Thomas/Cameron/Green/et al. Extinction risk from climate change, 427 Nature (2004), 145.

265 See Kiss/Shelton, International Environmental Law, 302.

b) *The Convention on Biological Diversity*

The CBD aims at the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising from the use of genetic resources (Article 1 CBD).[266] The majority of living and genetic resources protected by this treaty are found in those areas of the world that are also most vulnerable to the impacts of climate change and where these impacts are expected to be most disastrous, i.e. in the tropical regions of Asia, Latin America and Africa. Also in other areas, rare species occur at or close to their temperature tolerance, for example species depending on permafrost, and these are also highly at risk from the impacts of climate change such as surface temperature rise. As discussed above, many marine species are highly vulnerable to alterations in ocean heat content, extreme events such as the phases of El Niño phases, and extreme storms. The fact that insufficient action to halt climate change will have severe impacts on biodiversity has been noted by both the Parties to the CBD and the FCCC.[267]

The CDB is primarily concerned with rights and responsibilities of States at the national level. Accordingly, the "Contracting Parties shall, as far as possible and as appropriate" take national action to halt the destruction of species, habitats and ecosystems (Article 8 CBD, in-situ conservation). Article 7 obliges States to "identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation or sustainable use of biological diversity", and Article 8(1) stipulates that "where a significant adverse effect on biological diversity has been determined [Parties shall] regulate and manage the relevant processes and categories of activities". This broad obligation also applies to processes causing anthropogenic climate change, i.e. all greenhouse gas emitting processes and land-use change or forestry activities that reduce the carbon storage capacity of the terrestrial biosphere. Moreover, by reiterating the no-harm rule in its Article 3, the CBD provides a standard of protection for all activities that could harm biodiversity. The rule is part of the CBD's operational treaty provisions – contrary to the FCCC, which only contains this rule in its preamble. Still, the CBD itself does not clarify either the constituent elements of the rule or the standard of care required for fulfilling Articles 8(1) or 3 CBD. In fact, the CBD's general obligation to prevent damage to biodiversity resulting from

266 See for an overview Kiss/Shelton, International Environmental Law, 306 ff.; Beyerlin, Umweltvölkerrecht 198 ff.; Sands, Principles of International Environmental Law, 381 ff.

267 The CBD has established an *ad hoc* technical expert group on climate change and biodiversity which focuses on: (1) the impact of climate change (as well options for adaptation and mitigation) on biodiversity, including forest biodiversity and coral reefs; and (2) the integration of biodiversity considerations in the implementation of the FCCC and the Kyoto Protocol. CBD Decisions V/3, V/4, V/15 and V/21, available at <http://www.biodiv.org>. See Verheyen, The Legal Framework of Adaptation and Adaptive Capacity, in Klein/Huq/Smith, Climate Change, Adaptive Capacity and Development, 2003, 163.

climate change is restricted in that, similar to the greenhouse gas reduction commitments in the climate regime, this obligation is subject to the principle of common but differentiated responsibility. As in the FCCC, developing country commitments are connected to the financial obligations of the developed country parties to provide new and additional financial resources to meet the "agreed full incremental costs" of implementation (Article 20). Therefore, the CBD does not provide primary rules that go beyond or alter the ones already described in the context of the climate regime and the no-harm rule.

As of February 2004, the CBD enjoyed almost universal membership (with 187 State Parties, not including the USA, Brunei and Iraq). Given this level of membership, its operational provisions provide a good basis for concretising Article 2 FCCC. Unfortunately, no "hard" standards or prohibitions are contained in this instrument which go beyond the criteria already contained in Article 2 FCCC itself.

Before turning to another treaty instrument, following are some brief remarks with respect to the role of the CBD on direct damage prevention, i.e. adaptation. Adaptation to climate change can have both negative and positive impacts on the objectives of the CBD. As the IPCC has suggested, some adaptation options might actively contribute to the conservation and sustainable use of biological diversity.[268] These include expanding aquaculture to relieve stress on natural fisheries; designing terrestrial and marine multiple-use reserves and protected areas that incorporate corridors which would allow for the migration of organisms as a response to climate change; efficient use of natural resources; small-scale restoration of inland wetlands; restoration of degraded soils especially in rangelands; and adjustments in the timing and intensity of livestock grazing. It is probably fair to say that – at least when seeking the conservation of biodiversity – adaptation activities that conserve or restore natural ecosystems are generally positive, while activities that use hard technologies and that change natural ecosystems are generally negative. For example, defending a country's coast against sea level rise can save ecosystems, but also has very negative impacts on coastal species and interferes with the "natural development" of such regions. Similarly, building defences against extreme weather events could be achieved by replacing vulnerable ecosystems with other, artificial systems (flood protection, storm shelters, etc.).[269] However, since the CBD has not defined further what type of biodiversity it aims to protect (ecosystem or species or genetic diversity), the legal rules to be followed by decision makers are almost absent. The ecosystem approach, which tries to assess all human activities impacting on the ecosystem,[270] might serve as a guideline for adap-

268 IPCC, note 260, 42 ff.

269 See Öko-Institut, Requirements of climate protection with regard to the quality of ecosystems, 2001, Chapter II.

270 Kiss/Shelton, International Environmental Law, 309.

tation measures. However, there is a lack of binding implementation guidelines, such as criteria for sustainable forest management, so, for example, if enhancing adaptive capacity were to affect forest ecosystems, there are no "hard standards" against which such measures could be tested.

Overall, the CBD provides little guidance for the issue of preventing, minimizing or restoring climate change damage.

c) *Ramsar*

The 1971 Ramsar Convention is based on the acknowledgement that wetlands are among the most productive ecosystems in the world, acting as habitat for birds and other species, constituting effective flood control and representing enormous economic, cultural and recreational value. Article 1 Ramsar Convention defines wetlands as *"areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres."* Wetlands are therefore both coastal lands, with many marine living organisms depending on them for their reproduction and nutrition, and inland areas with connection to ground- and other freshwater systems. The IPCC TAR concludes that some wetlands, (including reefs, atolls, mangroves, and those in prairies, tropical and boreal forests, arctic (including permafrost) and alpine ecosystems), are considered to be amongst those natural systems especially vulnerable to climate change because of their limited adaptive capacity. As such, they may undergo significant and irreversible damage.[271]

The purpose of the Ramsar Convention is to stop the loss of wetlands and to promote the conservation and "wise use" of wetlands (Article 3). To this end, Parties are to select and submit lists of wetlands (at least one, Article 2.4), which together constitute the List of Wetlands of International Importance (Article 2). The Convention bodies have elaborated criteria for the selection of suitable wetlands.[272] However, it is the decision of each of the Parties which wetlands to list, and they have the right to delete areas or restrict their boundaries (Article 2.5). However, in doing so States must take into account their *"international responsibility for the conservation, management and wise use of migratory stocks of waterfowl"* (Article 2.6) and compensate for the loss of wetland resource (Article 4.2). The wetlands registered and listed shall be conserved, and each

271 This is expressly recognised in Ramsar Resolution VII.3 (Climate change and wetlands: impacts, adaptation, and mitigation) which States: "Recognizing that climate change may substantially affect the ecological character of wetlands and their sustainable use . . ." and calls upon Parties to manage wetlands to increase their resilience to climate change and extreme events. See also "Climate Change and Wetlands", Ramsar COP8 DOC. 11 and COP8DOC. 40.

272 Kiss/Shelton, International Environmental Law, 328; the various recommendations and criteria are available under: <http://www.ramsar.org>.

Party must make arrangements so that any changes resulting from *"pollution or other human interference"* to these lands are reported to the Ramsar Bureau, operated by the IUCN (Articles 3.2 and 8). Specific duties of States include the establishment of nature reserves and adequate warding of the designated areas.

The Ramsar Convention protects the ecological status quo in the form of very specific sites. It does not, however, provide any specific prohibition against the impacts of climate change nor does it oblige States to take general protection measures to reduce the risk of climate change damage. However, the systems protected by the treaty are definitely threatened by the impacts of climate change.

For example, among the 1,060 wetlands designated by the 122 State Parties by spring 2001[273] is the Olango Island Wildlife Sanctuary in the Philippines, which is a low-lying island. Even the coarse projections of climate change for this region show that its intertidal sandflats, mangroves, seagrass beds, coral reefs and islets are very likely to be affected both by even small amounts of sea level rise as well as by increased storm and tidal wave activity expected for that region.[274] This also means that over 10,000 shorebirds depending on this site could be severely affected. As very few small island States are party to the Ramsar Convention, their threatened ecosystems are not protected by the Convention. The Ramsar Bureau is, however, actively seeking the ratification of these States, which are also especially vulnerable to the impacts of climate change.[275]

Because climate change might frustrate the purpose of the Ramsar Convention, its Scientific and Technical Review Panel has set up a working group on climate change.[276] This work is likely to lead to an extension of the list of Ramsar sites where changes in ecological character have occurred, are occurring or are likely to occur (the so-called Montreux Record).[277] This list already includes the Everglades in Florida, an area of 566,143 hectares, which has also been identified as at severe risk from climate change.[278]

To operationalise Article 2 FCCC, the list of wetlands of international importance might provide an important criterion. These wetlands are not only vulnerable to the impacts of climate change, but many systems, especially those sustaining species with limited tolerance ranges are likely to be *"unable to adapt naturally"* to them in the sense

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273 The designated sites total over 80.6 million hectares See report by C. Shine in 11 YBIEL (2000) 267 ff.

274 See Philippines Initial National Communication on climate change, 1999 (FCCC website), 43 ff.

275 See Ramsar Recommendation 7.2, noting the direct and urgent interests which the Small Island Developing States have in the impacts of climate change and the important roles of wetlands in addressing these threats.

276 See Ramsar Resolution VII.4,7; Resolution VII.4 (on cooperation with other conventions) and Recommendation 7.1.5, <http://www.ramsar.org> and FCCC/SBSTA/1999/14.

277 Ramsar Recommendation 4.8.

278 IPCC TAR WG II, 753.

of Article 2 FCCC. The Ramsar technical bodies themselves identify a risk of extinction of vulnerable species for very minimal changes in climate (e.g. 1-3°C additional warming in high latitude/altitude wetlands). As mentioned, such changes are virtually certain for any stabilisation scenario over 450 ppm.

With respect to adaptation, the issues mentioned in the previous section for the CBD apply equally here. There is potential for synergies as well as conflicts between both Conventions. Flood protection, rehabilitation and restoration of natural wetlands are recommended, which would provide mutual benefits under both FCCC and the Ramsar Convention. Potential conflicts between objectives of the Ramsar Convention and objectives under the FCCC could arise from activities to adapt to sea level rise in coastal zones, especially from so-called hard adaptation technologies such as the construction of dikes, levees and floodwalls, floodgates and tidal barriers, the prevention of saltwater intrusion in coastal estuaries and groundwater aquifers using barriers, and the artificial movement of freshwater inlets further upstream.[279]

In sum, given its specific site protection system, the Ramsar list of wetlands can provide an important basis to the Parties to the FCCC for the definition of the "dangerous" threshold in Article 2 FCCC. Given its wide membership and the ecological importance of those listed sites unable to adapt to changes in climate, the Ramsar Convention sets a benchmark for the stabilisation of atmospheric greenhouse gas concentrations. It does not, however, provide any particular primary rules designed to prevent or reduce climate change damage *per se*.

d) *UNESCO*

The UNESCO Convention does not aim at the protection of ecosystems or habitats, but at the preservation of single, unique natural sites or objects of *"outstanding universal value from the aesthetic or scientific point of view"*, as defined in its Article 2 as well as unique monuments, groups of buildings or other cultural sites (Article 1). Similar to the Ramsar Convention, it is for each party to identify and delineate these heritage sites (Article 3).

The core instrument of the UNESCO Convention is the World Heritage List. Each Party must ("in so far as possible") submit an inventory of property forming part of natural or cultural heritage, which will then form part of the World Heritage List established by the World Heritage Committee (Articles 11 and 8).[280] The inclusion in the list of a site requires the consent of the State in which the site is located, and the sovereign and property rights to the object on the list remain subject to that State. Article 4 imposes a duty on contracting States to ensure the identification, pro-

279 See for in-depth analysis COP8 DOC. 11, note 271.

280 The full list can be accessed at <http://whc.unesco.org/nwhc/pages/sites/main.htm>.

tection and conservation of the natural and cultural heritage. The State concerned *"will do all it can to this end, to the utmost of its own resources and, where appropriate, with any international assistance . . .".*

Climate change is expressly referred to as one of two examples of "Environmental Pressures" countries should take account of when submitting a site for inclusion in the World Heritage List.[281] UNESCO is aware of the danger posed to sites by climate change: *"natural World Heritage sites are under major threat due to reductions in biodiversity, species extinction and desertification. Climate change will dramatically magnify these problems in the short and the long term. A comprehensive assessment of the extent of the threat posed by climate change to all sites urgently needs to be undertaken."*[282] Projections show, however, that climate change is already threatening major sites.

The World Heritage List includes, for example, the Sunderbans in Bangladesh which are already at risk due to sea level rise and salt water intrusion.[283] The listed Aldabra Atoll in the Seychelles could lose substantial land mass with the mean projected sea level rise of about 50cm and is already in the direct track of tropical cyclones which are likely to increase with 21st century climate change.[284] Consequently, many of the species (tortoises, reptiles) depending on the Atoll might be under threat of extinction. Studies show that three of Australia's World Heritage sites are being, and will continue to be, significantly damaged by low levels of climate change (0.9-1.3°C average surface temperature rise) – the freshwater wetlands of Kakadu National Park,[285] the Great Barrier Reef[286] and the Wet Tropics Rainforests of North Queensland.[287] In terms of already observed changes in climatic conditions, the mountain and glacier sites listed are very likely already affected today by rising temperatures. This includes the Sagarmatha/Everest (Nepal/China), the Nanda Devi (India), the Huascaran (Peru), the Kulane/Wrangell-St. Elias (US and Canada) and the Waterton Glacier International Peace Park (Canada). This short list shows how climate change could frustrate the protection aims of the UNESCO Convention.

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281 See Operational Guidelines for the Implementation of the World Heritage Convention, 2001; section 5.b), available at the UNESCO website.

282 World Heritage Newsletter, August-October 2002, available at the UNESCO website.

283 See Huq/Ali/Rahman, The implications of sea-level rise and Bangladesh: A preliminary analysis. Journal of Coastal Research, Special Issue 14 (1995), 44 ff.

284 See Seychelles Initial National Communication Under the United Nations Framework Convention on Climate Change (FCCC website), Chapter 4, in particular 101 ff.

285 The coastal plains in Kakadu are just 0.2-1.2 metres above mean high water level. There is scientific evidence that freshwater environments are converting to saltwater wetlands, leading to extensive dieback of paperbark and freshwater grasses. Aboriginal owners of Kakadu are finding that the rate of sea-level intrusion is faster than normal and is reaching new areas. See for reference Reynolds, A., Warnings from the Bush, The impact of climate change on the nature of Australia, 2002, 16 ff.

286 See Spalding/Teleki/Spencer, Climate change and coral bleaching in: Green et al., Impacts of Climate Change on Wildlife, 2001, 40 ff.

287 See for reference Reynolds, note 285.

Article 5 of the Convention stipulates duties for States where heritage sites are located and *inter alia* obliges them *"in so far as possible, and as appropriate for each country"* to take legal, scientific, technical, administrative and financial measures necessary to fulfil the general duty contained in Article 4 (see above). In addition, apart from the relevant territorial State, the entire international community has a duty to cooperate to preserve cultural and natural heritage sites (Article 6.1) and Parties undertake to help other States with the identification, protection, conservation and preservation of their sites (Article 6.2) – classic due diligence obligations. The standard of care however must depend on the Convention-specific objectives, i.e. the preservation of natural and cultural heritage sites for the benefit of mankind as a whole (preamble paragraph 6).

Art 6.3 stipulates that *"each State Party . . . undertakes not to take any deliberate measures which might damage directly or indirectly the [listed] heritage . . . situated on the territory of other States Parties to this Convention"*. This latter duty could be read as a bar on unrestrained greenhouse gas emissions by Parties, since these might indirectly damage the sites located on another State's territory. The Aldabra Atoll in the Maldives is a good example. The term "might damage" refers to creating a risk of damage, and the provision therefore contains a prevention duty similar to the no-harm rule.[288] However, the term "deliberate" substantially qualifies this duty and it could well be argued that in contrast to the general duties contained in Articles 6.1 and 6.2, only deliberate behaviour in the sense of intent to harm is prohibited. It cannot be argued convincingly that States continue to emit greenhouse gases because in a deliberate attempt to damage UNESCO sites, and therefore Article 6.3 is likely inapplicable unless intent on the part of a Party to the Convention can be shown.

The World Heritage Committee also establishes a "List of World Heritage in Danger" (Article 11.4), which includes sites that are threatened by "serious and specific dangers", such as, *inter alia*, the threat of disappearance caused by accelerated deterioration or changes in water level, floods and tidal waves.

One item on the list of Danger since 1990 is the settlement of Timbuktu in Mali. Buildings dating back to the 15th and 16th century, part of an ancient spiritual capital of Islam, are under threat of desertification by encroaching desert sands. The west-African region is predicted to suffer even more from drought with projected climate change, and it is likely that other cultural heritage sites are at risk from impacts of climate change.[289]

The list in Article 11.4 does not include climate change *per se*, since this phenomenon, while already subject to research in the 1970s, did not feature high on the

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288 See Sands, Principles of international environmental law, at 193, who equates Article 6.3 with the no-harm rule.

289 A petition has been handed to UNESCO in November 2004 to include various sites (e.g. the Sagarmatha/Everest area) in the "List of World Heritage Sites in Danger", see <www.climatelaw.org>.

political agenda at the time the UNCESO Convention was concluded. But the list is not conclusive and clearly extends to natural disasters and environmental change, as indicated by the inclusion of "serious fires, earthquakes, landslides". Climate change impacts could qualify as a threat both to cultural and natural heritage sites and more importantly, the risk of climate change impacts should be sufficient for listing sites on the danger list. Imminent danger is not a pre-requisite, but potential danger suffices, i.e. a listing is justified if the *"property is faced with threats which could have deleterious effects on its inherent characteristics"*.[290]

The list in Article 11.4 UNESCO Convention also indicates that the State in which the site is located may itself be the cause of the threat, as highlighted by the inclusion of the threat of "large scale public or private projects or rapid urban or tourist development projects". Consequently, the inclusion of a site on this list does not require the consent of the State on whose territory the heritage site resides,[291] and in urgent cases the Committee can enter and publicize a new site immediately. Once on the Danger List, the Committee *"shall develop, and adopt, as far as possible, in consultation with the State Party concerned, a programme for corrective measures"*.[292] As long as physically possible, such measures would include measures to adapt a site long-term to the impacts of climate change.

If a State considers a world heritage site is in danger from the impacts of climate change, it may submit the site to the danger list and file a request for financial assistance with the World Heritage Committee (Article 13.1).[293] This way, adaptation costs for a concrete site might be recoverable from the 176 States that are parties to the UNESCO Convention and have contributed to the Fund for the Protection of the World Heritage in accordance with Article 15 of the Convention. This specific mechanism could complement the provisions of the climate regime aimed at adaptation.

Compensatory payments are not possible in this framework and it is questionable to what extent adaptive measures could be taken realistically to protect sites. Moreover, the fund is quantitatively ill-equipped to meet large requests – it currently only carries a balance of approximately US$3 million annually.[294]

In sum, the UNESCO Convention establishes a special system which could help States to recover adaptation costs for the specific sites on the World Heritage list. A threat to sites from the impacts of climate change would warrant the listing of those (potentially numerous) sites on the "List of World Heritage in Danger". Moreover, the duty to conserve World Heritage sites is a strong indicator for Parties as to how

290 See Operational Guidelines note 281, para. 82.

291 This was debated at the 24th session of the World Heritage Committee, where opinion was divided and a legal opinion requested, see report by C. Shine in 11 YBIEL (2000) 272.

292 Operational Guidelines, note 290, para. 86.

293 See Operational Guidelines for the Implementation of the World Heritage Convention, 2001.

294 See Beyerlin, Umweltvölkerrecht, 193.

to develop the climate regime, and in particular how to operationalise Article 2 FCCC. These sites are protected *per se* and their protective status can be taken into account with more precise climate models and predictions.

e) *Endangered Species*

The 1979 ***Bonn Convention (CMS)*** constitutes a global wildlife protection treaty with growing acceptance by States.[295] It applies only to migratory species, i.e. species which cyclically and predictably cross one or more national jurisdictional boundaries (Article I.1 a) CMS). The CMS Parties have recognised that the impacts of climate change could seriously impede the protected status of the CMS species and have mandated the Scientific Council of the CMS to undertake studies and other activities in this regard.[296] For example, the Council has discussed link between the failure of CMS protected turtle eggs to hatch and changing temperatures.

The CMS identifies species threatened with extinction (Article III and Appendix I) and species having unfavourable conservation status,[297] therefore requiring international agreements for their conservation (Article IV and Appendix II). With respect to species contained in Appendix II, Parties "shall endeavour to conclude Agreements" to better manage and conserve the respective migratory species. This provision has already led to the agreement of many important regional protection treaties.

Model results show that many birds included in Appendices I and II CMS are threatened by severe habitat loss, even under a scenario of moderate climate change. For example, the Tundra Bean Goose is included in Appendices I and II CMS and habitat loss for this species is predicted between 76-93%.[298] Many varieties of eagle[299] which depend on mountain ecosystems are listed in Appendix I. Mountain ecosystems are among the most vulnerable and will undergo substantial change due to climate change.

The range States of species contained in Appendix I "shall endeavour to conserve" these species and habitats, as well as "to the extent feasible and appropriate, to prevent, reduce or control factors" that are or are likely to endanger these species (Article III.4 CMS). This duty could be fulfilled both by undertaking measures to mitigate climate change, but more directly by supporting measures to ensure the range habitat of the species is preserved regardless of the impacts of climate change. This introduces a specific obligation upon Parties to the CMS to consider adaptation options for Appendix I species if and when they might be affected by climate change.

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295 89 State parties in February 2005, see <http://www.cms.int/index.html>.

296 See CMS Recommendation 5.5, Doc. ScC10/Doc. 15 and Report of the Tenth Meeting of the CMS Scientific Council, 2001, 20, all available via the official website, note 295.

297 Unfavourable conservation status is (negatively) defined by Article I.1(c) CMS and depends on population dynamics, status of habitat, range status, etc.

298 Zöckler/Lysenko, Waterbirds on the edge: climate change impact on Arctic breeding waterbirds, in Green, et al., Impacts of climate change on wildlife, 20 ff.

299 See for common names of CMS Species UNEP/CMS/Inf. 7.9.

The appendices of the CMS can be amended by a two-thirds majority of the Conference of the Parties (Article XI). Species contained in Appendix I can be removed when the Conference of the Parties determines that "reliable evidence, including the best scientific evidence available, indicates that the species is no longer endangered, and the species is not likely to become endangered again". It is possible that some species might be positively affected by rising temperatures or changes in precipitation patterns. Climate change might therefore affect the composition of the CMS operations. In the reverse situation, species might be added to the relevant appendix to reflect their vulnerability to climate change. Similarly, a State feeling unable to respond to the threat posed to a species ranging its territory could submit a proposal for the elimination of that species to the secretariat. In these latter cases, the CMS's goal would have been frustrated because of climate change.

Another well-known instrument for the protection of endangered species is **CITES** – the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora.[300] It uses trade prohibitions, regulations and sanctions to protect the species listed in its Appendices threatened with extinction now (Appendix I) or in future unless protection measures are taken (Appendix II), or are subject to national legislation for the purpose of restricting exploitation (Appendix III). These Appendices are important evidence of a global consensus as to which animal and plant species are most threatened and must be protected by any means. While climate change or the activities causing it are not covered by CITES, the Appendices may provide some guidelines for specifying what could constitute dangerous interference with the climate system in accordance with Article 2 FCCC. There are 167 Parties to CITES, all of which are also Party to the FCCC.

An example of how climate change might frustrate the aims of CITES aims is the extinction of the Golden Toad in Costa Rica's Monteverde Cloud Forest Preserve, which has been attributed to climate change.[301] Reduced mist frequency and a warmer, dryer climate in the mountain forest reserve has led to a disappearance of 20 of the original 50 frog and toad species from a 30 km^2 study area following a warm, dry period in 1987 (ENSO event). As a result, biologists believe that the Golden Toad, which was endemic to Monteverde, is now globally extinct. This species is included in CITES Appendices I and II as well as on the IUCN Red List of Threatened Species.

A similar source of endangered species is the Annexes to the 1979 **Bern Convention**.[302] The Convention represents the basis of European Community legislation in this area, implemented, *inter alia*, through the EEC Directive 92/43 on the Conservation

300 Washington, 3 March 1973, in force 1 July 1975, 12 ILM (1973) 1085. <http://www.cites.org/>.

301 Pounds, Impacts of climate change on birds, amphibians and reptiles in a tropical montane cloud forest reserve, in: Green, et al., Impacts of Climate Change on Wildlife, 30 ff.

302 Forty-five Member States, including four African States. For full texts of Convention and Annexes see <http://www.conventions.coe.int>.

of Natural Habitats and of Wild Fauna and Flora. The Bern Convention obliges the Parties to take "requisite measures" to maintain the population of wild flora and fauna at a level which corresponds in particular to ecological, scientific and cultural requirements, and especially to protect those species contained in the Appendices. As in the context of the CMS Convention, this duty can be translated into a specific duty to prevent climate change damage to protected species by taking adaptation measures. For example, a species contained in the Appendix II on strictly protected fauna species, the Golden Plover is at risk because its habitat, saltwater marshes in the UK, is threatened by above-average sea-level rise due to climate change.[303] Various measures could be envisaged to protect the habitat from sea level rise. Moreover, habitat loss of up 67-85% has been projected for the Red-breasted Goose due to climate change impacts in the Arctic, which is used as by those birds as a breeding ground.[304] In this case, adaptation options are difficult to envisage as temperature change and its impacts in the Arctic cannot easily be reversed.

In sum, both the CMS and Bern Convention contain primary duties obliging Parties to take measures to protect listed species from harm resulting from the impacts of climate change. They do not contain specific primary rules aimed directly at preventing or reducing the impacts of climate change.

Taken together, the lists of protected species provide an important guideline for the interpretation of Article 2 FCCC. Together, these appendices represent an indication of what wildlife and species States wish to conserve for the benefit of mankind – the protected status enjoyed by these species will allow thresholds to be set in terms of atmospheric concentrations of greenhouse gases in the atmosphere. Moreover, as indicated in the context of the CBD, measures to reduce the vulnerability of human systems to climate change must take into account the interests of these protected species. Any measures infringing upon these international treaties could also be said to be inadequate in the sense of Article 4.1(b) FCCC and therefore ineligible for funding through the FCCC–GEF framework.

f) *Antarctica*

The Antarctic Treaty system represents a specific regional regime to protect species and biodiversity in the Antarctic.[305] The IPCC TAR has concluded that *"climate change in polar regions is expected to be among the largest and most rapid of any region on the Earth, and will cause major physical, ecological, sociological and economic impacts . . ."*.[306] Over the past

303 Möller/Garbutt/Wolters, Managed realignment of sea defences and the re-creation of saltmarshes in south-east England, in: Green et al., Impacts of Climate Change on Wildlife, 42 ff.

304 See Zöckler/Lysenko, note 298.

305 The Antarctic or the South Pole is a frozen continent surrounded by ocean.

306 TAR WG II, para. 5.7, established with "high confidence".

half-century there has been a substantial warming trend in the Antarctic Peninsula (67-95% confidence). The projected warming in the 21st century is likely to break up ice shelves in the southern part of the Peninsula, exposing more bare ground and thus causing changes in terrestrial biology, such as the introduction of exotic plants and animals (67-95% confidence). Marine biodiversity in the area will be affected by warming waters in the Southern Ocean, leading to shifts in their habitats (33-67% confidence). For example, with the increase in temperatures in the last 50 years and the ensuing changes in winter sea ice patterns, populations of Adélie penguins which depend on pack ice, have decreased by 22% over the last 25 years, while populations of an open water-dependent penguin species (Chinstraps) has increased by over 400%.[307]

Against this background, a closer look at the relationship between this regime and the issue of climate change damage is warranted.

Antarctica is governed jointly by States on the basis of the 1959 Antarctic Treaty[308] and other treaty instruments aimed at the protection of the environment and the regulation of mineral resource activities.[309] It is legally an area *res nullius*, which means that it is, in principle, open to acquisition by any State and free for use and exploitation by all.[310] Following Article IV of the Antarctic Treaty and international customary law however, Antarctica is not free for exploitation of any kind and will remain *res nullius* (beyond national jurisdiction) indefinitely. No sovereign rights can be asserted by any State.[311] The aim of the Antarctic Treaty is to ensure that the area is used for peaceful purposes only (Article I) and to ensure freedom of scientific investigation. Two environmental protection treaties have complemented the general provisions of the Antarctic Treaty.[312]

The first, the 1980 Convention on the Conservation of Antarctic Marine Living Resources is meant to protect marine resources from over-harvesting, sets out several general principles for harvesting of species and is therefore not directly relevant to the topic of this thesis. The 1991 Protocol to the Antarctic Treaty on Environmental Protection, however, designates the Antarctic as a natural reserve, which is highly relevant given the projected impacts of climate change on polar species. The Protocol

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307 TAR WG II, 275.

308 Antarctic Treaty, Washington 1 December 1959, in force 23 June 1961, 19 ILM (1980) 860. Antarctica is defined as the area south of 60° south latitude, including all ice shelves, Art VI Antarctic Treaty.

309 Convention on the Regulation of Antarctic Mineral Resource Activities, Wellington 2 June 1988, 27 ILM (1988) 868. See for all treaties: <http://www.polarlaw.org/treaties.htm>.

310 Brownlie, Principles of Public International Law, 262 and 173 f.

311 Art IV.2 Antarctic Treaty provides: "No acts or activities taking place . . . shall constitute a basis for asserting, supporting or denying a claim to territorial sovereignty in Antarctica or create any rights of sovereignty in Antarctica. . . ."

312 Convention on the Conservation of Antarctic Marine Living Resources, Canberra 20 May 1980, in force 7 April 1982, 19 ILM (1980) 841; Protocol to the Antarctic Treaty on Environmental Protection, Madrid, 4 October 1991, in force since 14 Jan. 1998, 30 ILM (1991) 1461. See also the information material provided by the British Antarctic Survey <http://www.antarctica.ac.uk>

has four Annexes, of which Annexes II (Conservation of Antarctic Flora and Fauna) and IV (Prevention of Marine Pollution) are the most important in the present context. The Parties are committed to the "comprehensive protection of the Antarctic environment and associated ecosystems" (Article 2 of the 1991 Protocol). Therefore, all activities in the Antarctic Treaty area must be planned to limit adverse impacts. Yet, the specific duties contained in Articles 3-6 are limited to activities *in* the Antarctic Treaty area, such as scientific investigations and excursions. The activities causing climate change, however, are conducted outside this area, by emissions of greenhouse gases on the territory of nation States. Therefore, the Protocol does not contain primary rules aimed at the prevention of climate change damage.[313]

While not providing the basis for a new primary rule, the Antarctic treaties could influence the application of customary international law. The Arctic environment is preserved in the "interest of mankind as a whole" (preamble to the 1991 Protocol). The absolute protection status of the area is regarded today as customary international law and thus also applicable also towards third States.[314] Thus, every State is committed to prevent any type of harm to the Antarctic environment. This absolute protection status could alter the application of the no-harm rule in that any damage to the area is prohibited, not just significant damage. This is particularly relevant as the polar ecosystems have very limited ability to adapt since many species already live close to their tolerance range. Naturally, the impact of global warming is not always harmful for species, and can even be beneficial.[315] As will be discussed in Chapter V, every State could seek to enforce the no-harm rule against another State that does not consider the impacts of its climate policies on the Antarctic.

Moreover, given the absolute protection status of the Antarctic, Parties to the FCCC must be guided by the need to limit climate change so as to not cause any damage to the Antarctic environment, which is threatened even by small changes in climate.

g) *Conclusions*

The analysis of various nature conservation and wildlife protection treaties has shown that their protection aims will be affected profoundly by the impacts of climate change.

313 Neither will the proposed Annex on liability to the 1991 Protocol (Article 16 of the Protocol) result in a regime covering liability for climate change damage. A proposal for the Annex was tabled by the USA in 1996. It proposes a self-contained regime for the Antarctic restricted to liability for non-compliance of the protection obligations of the Protocol. Interestingly, the proposal suggests that States must maintain financial security and insurance to be able to respond to environmental emergencies at any time. See Lefeber, General Developments: International/Civil Liability and Compensation, in YbIEL 2000, 147 f. and Rao, 1st Report on the legal regime for allocation of loss, note 62, 38 ff, Brunnée, Of Sense and Sensibility, 53 ICLQ (2004), 351 at 363.

314 Durner, Common Goods, 151 ff.

315 See Zöckler, Climate Change in Polar Regions, in: Green et al., Impacts of Climate Change on Wildlife, 16 ff.

This analysis could certainly be illustrative to even greater effect if regional protection treaties were considered.

While few additional primary rules aimed at the prevention and reduction of climate change damage are provided by the treaties examined, the selection and protected status of specific species and areas identified in them are of major importance for the implementation of Article 2 FCCC and thus the development of the climate regime. This is particularly true since many of these species or sites (protected Ramsar and UNESCO) will be unable to adapt to even small changes in temperature brought on by climate change. The various lists and annexes of these treaties provide a clear benchmark for the desire of States to conserve wildlife and nature for the benefit of mankind. With the improved forecasting abilities of climate models, the protected status of these species will allow concrete thresholds to be set for atmospheric concentrations of greenhouse gases in the atmosphere.

Each of the treaties discussed provides due diligence provisions obliging States to take measures to protect the relevant sites and species. These are operational in particular with regard to direct damage prevention, i.e. adaptation and the reduction of vulnerability. The UNESCO Convention also provides the possibility for developing nations to recover adaptation costs independently of the climate regime's financial obligations through support from the Fund for Protection of the World Heritage where sites are listed on the "List of World Heritage in Danger".

The Antarctic treaties and the 1991 Protocol do not contain primary rules aimed at the prevention of climate change damage. However, the customary law and treaty-based absolute protection status of the Antarctic environment sets limits on the threshold of "dangerous interference" in Article 2 FCCC which should guide the types of measures to be taken to stabilize greenhouse gas concentrations.

V. Conclusions

This Chapter has analysed various customary international and treaty law rules that pertain to climate change damage.

First of all, an analysis of the self-contained regime theory as well as the principle of *lex specialis* revealed that the existence of the international climate regime does not bar the application of other international law, be it in the form of separate primary rules aimed at the prevention, reduction or restoration of climate change damage, or as benchmarks for the implementation of the climate regime.

The most important primary rule identified in this Chapter is the no harm rule in customary international law. It imposes a general obligation to prevent damage or minimize the risk thereof with due diligence. Having concluded that it is possible to define an objective standard of due diligence, the obligation applies to all States equally and obliges them to take action to mitigate human activities contributing to climate

change. The standard of care will depend on the particular country's capacity to prevent harm or minimize the risk of harm which means that it may differ from country to country. Nevertheless, it constitutes an objective standard of protection which exists independently of treaty standards set in the context of the international climate regime. Since the risks of climate change have been foreseeable for all States at least since 1990, no State can argue that uncertainties in the extent and precise location of climate change damage will exempt them from "doing the best they can".

The analysis of other international treaty law has shown that the impacts of climate change could alter the effectiveness and functioning of these treaties.

Applying the existing the law of the sea, States could be faced with a situation in which sea level rise inundates islands and stretches of coastline, leading to a loss of maritime zones such as territorial waters and EEZ. The corresponding loss of sovereign rights in fisheries and other resources of the ocean could constitute a considerable economic loss, especially for archipelagic States. States could ask, on the basis of the duty to prevent harm or minimize the risk of harm imposed by the no-harm rule and in Article 194.2 UNCLOS (UNCLOS does not protect the maritime zones as such), other States to take preventive measures to limit such effects on maritime zones. Moreover, Articles 192 UNCLOS and 5(f) Straddling Stocks Agreement impose a due diligence obligation to protect the marine environment, including from the impacts of climate change. In addition, the effects that warmer ocean temperatures could have on fish stocks and marine biodiversity will oblige UNCLOS Parties to co-operate (Articles 123 and 197 UNCLOS) and to enter into negotiations to arrive at adequate solutions. This duty to take co-ordinated action against climate change as a phenomenon complements and strengthens the cooperation duties under the international climate regime.

Nature protection treaties include a wealth of benchmarks for the international community in determining what constitutes "dangerous climate change". In fact, the absolute protection status of some species (CMS, Bern Convention), regions (Antarctica, Ramsar) and sites (Ramsar, UNESCO) as well as the broad global participation in these treaties calls into question the breadth of discretion enjoyed by Parties to the FCCC in defining thresholds of atmospheric greenhouse gas concentrations. The fact that many protected species and areas are "unable to adapt" to the adverse effects of climate change in the sense of Article 2 FCCC further limits this margin of discretion. Furthermore, the duty to protect sites and species under these specialised treaties complements the duty to adapt to the impacts of climate change pursuant to Article 4.1 FCCC. State Parties to these treaties are obliged to take measures to protect biodiversity and wildlife for the benefit of mankind. These treaties establish a duty to adapt independently of the climate regime, and do not foresee any trade-off between mitigation and adaptation measures.

Having analysed primary rules and the influence of climate change impacts on international treaties in this Chapter, the next Chapter seeks to apply some of the primary rules identified through the law of State responsibility.

Chapter Five

ESTABLISHING STATE RESPONSIBILITY FOR CLIMATE CHANGE DAMAGE

"The concept of responsibility is both very simple and yet sophisticated".[1]

I. Introduction

In the previous chapters, the substantive international law rules (primary rules) and principles aiming at the prevention and regulation of climate change damage were presented. This chapter will analyze how these rules could be enforced, i.e. whether any legal consequences arise primary rules are not complied with (according to secondary rules) or when climate change damage occurs. The focus of this analysis is the question of whether States can be held responsible under international law for current or future climate change damage.[2]

The proposition that State responsibility flows from breaches of international obligations has been accepted and developed by tribunals since the beginning of the 20th century, but many areas of dispute or ambiguity remain. Naturally, State responsibility as the traditional means of enforcing international law has been the subject of much debate, with some authors venturing to propose that the international legal order is "most probably a sham"[3] because of the serious enforcement deficits from the point of view of both substantive and procedural law and institutions, and others declaring that State responsibility is a necessary and useful "legal tool for sanctioning violations

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1 Brownlie, State responsibility, at 2.

2 This does not pre-empt the potential for civil liability of private entities emitting greenhouse gases. Such liability would in many respects require a similar legal analysis as pursued in this Chapter. See for a nuisance action (no claim for damages but an injunction) against US power utilities, requesting greenhouse gas reduction measures: District Court for the Southern District of New York, State of Connecticut et al. v. American Electric Power Company Inc. et al. (04CV 05669), and Open Space Institute Inc. et al. v. American Electric Power Company Inc. et al. (04CV 05670), court papers on file with author (see also <www.climatelaw.org>).

3 H.L.A. Hart, The Concept of Law, 1994, 77.

of international law".[4] In the context of environmental degradation it has also been noted that States can only be expected to take the necessary precautionary measures where liability is entailed.[5] Against this background, section II will briefly introduce the concept and history of State responsibility.

Because the primary concern of this thesis is the particular application of the law of State responsibility to climate change damage, the law of State responsibility will be applied first in a generic way to introduce its main legal features (Section III) and then specifically to three case studies (Section IV). The cases introduced are hypothetical examples of the kinds of remedies States may seek when faced with the impacts of climate change. They are hypothetical in that no actual claims have been made, but they are not hypothetical in the sense that the examples selected could very well form part of a dispute between States about who should bear the costs of climate change damage. The examples include a case in which Bhutan and Nepal seek support for preventing glacial outburst floods from increased glacial melting, a case where the Cook Islands seek compensation for reduced value of coastal property due to sea level rise and a case in which China seeks to insure its infrastructure against extreme precipitation events and floods.

The International Law Commission's "Draft Articles on State Responsibility for Internationally Wrongful Acts",[6] adopted in 2001, will serve as a tool for assessing and defining the applicable legal rules and standards in Section III. Using the set of rules suggested by the ILC is justified since for the most part they reflect international law on the subject and flow from the accepted sources of international law, in particular international custom as evidence of general practice accepted as law by States (Article 38.1(b) ICJ Statute), general principles of (municipal) law (Article 38.1(c) ICJ Statute) and judicial decisions as well as scholarly opinion (Article 38.1(d) ICJ Statute).[7] In addition, much of the analysis depends on the primary rules identified in Chapters III and IV. The existence and nature of the legal consequences which would apply when a breach occurs is more a matter of case-by-case application of these primary rules than of defining the exact legal requirements of the law on State responsibility.

It should also be noted that applying general rules of State responsibility in this context is legally possible. The legal analysis in Chapter IV shows that the international climate regime lacks secondary rules and thus cannot form a "self-contained regime".

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4 Dupuy, International Control and State Responsibility, in: Ginther et al. (eds.), FS für Karl Zemanek, 1994, 305.

5 Tomuschat, International law: Ensuring the survival of mankind on the eve of a new century, 281 Recueil des cours (1999) 1 at 56.

6 See Chapter IV of the "Report of the International Law Commission, 53rd session", General Assembly, Official Records, 56th session, Suppl. No. 10, UN Doc. A/56/10 (Hereinafter: Report ILC 53rd session).

7 See on sources of international law Brownlie, Principles of Public International Law, 1998, 1 ff.

Conclusions from this chapter will be used in Chapter VI to evaluate possible solutions to the issue of climate change damage and to propose regulatory measures/a negotiated approach designed to take account of the specific problems identified in this and the preceding Chapters.

II. Origins and development of the State responsibility doctrine

1. General

Responsibility is a general concept which can be employed in moral, religious, general societal and legal contexts. Etymologically, it is a combination of "response" and "able", i.e. it means "the ability to respond".[8] In most languages (Responsabilité, Verantwortlichkeit) it is used in a wide sense as, for example, in the context of institutions, such as Article 24 UN Charter: the Security Council has the responsibility to ensure peace and security. In the climate change context, it has been argued that industrialised countries are both responsible for preventing further greenhouse gas emissions as well as for any damage caused to the economies and peoples of other States (responsibility for damage prevention and compensation). This understanding is also at the core of the concept of common but differentiated responsibility as set out in Article 3.1 FCCC (see Chapter III).

In a legal context, generally, the invasion of the legal interest of one subject of law by another subject creates responsibility. In international law, as *Brownlie* puts it, on can *"regard responsibility as a general principle . . . a concomitant of substantive rules and of the supposition that acts and omissions may be categorised as illegal by reference to the rules establishing rights and duties"*.[9] Consequently, as *Verdross* famously said, international public law would cease to be a legal system were States to negate that they are responsible for any infringement of a norm of public international law, and that they have to make good the damage caused.[10] In sum, legal consequences must arise when international law is breached (in today's terminology: "internationally wrongful act") or another State's rights and interests are violated.

The roots of today's concept of "State responsibility" or "international responsibility" go back to the 1925 *Spanish Zone of Morocco* case,[11] in which the general principle that responsibility is the necessary corollary of a right, and that all rights of an

8 Oxford English Dictionary, 2000.
9 Brownlie, Principles of Public International Law, 436.
10 Verdross, Völkerrecht, (5.A, 1964), 373.
11 British Claims in the Spanish Zone of Morocco (Affaire des Biens Britanniques au Maroc Espagnol) II RIAA (1925) 615 at 641.

international character involve international responsibility was proclaimed. The Permanent International Court of Justice (PCIJ) firmly established that rules on State responsibility are generally applicable for all kinds of breaches of international law in its 1928 ruling in the *Chorzów Factory* case, where it Stated that: *"reparation is the indispensable complement of a failure to apply a convention and there is no necessity for this to be Stated in the convention itself"*.[12] Other courts, such as the Inter-American Court of Human Rights,[13] as well as arbitration tribunals,[14] have echoed the PCIJ, emphasising that the responsibility of States is a rule of customary law and one of the fundamental principles of modern international law. The ICJ has pointed out repeatedly that the idea is enshrined in the idea of international law itself.[15]

State responsibility has been applied in only a few international adjudications,[16] but these are all the more famous as a result, e.g. the 1941 *Trail Smelter* arbitration, the ICJ's *Corfu Channel* case and others. While the number of inter-State cases involving State responsibility law is still small,[17] the number of cases where States demand reparation in general or compensation in particular is considerable.[18]

At the core of any legal analysis of State responsibility in the 20th century (including in the context of environmental damage) is the groundwork provided by the ILC (see below) and in particular its Special Rapporteur from 1963 to 1979, *Ago*[19] (building on the Italian theory heavily influenced by *Anzilotti*),[20] the criticism by *Allott*[21] (who

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12 Case concerning the factory at Chorzów (1927) PCIJ, Ser A, No. 9, 21 (Jurisdiction) and (1928) PCIJ Ser A, No. 17, 29 (Merits) (*Chorzów Factory*).

13 See for example *Garrido and Baigorria* case, Inter-Am. Ct. HR (Ser. C) No. 39 (1998), para. 40.

14 See for example the *Rainbow Warrior* arbitration, Rainbow Warrior (New Zealand v France) XX RIAA (1990), 217 at 251.

15 Case concerning the Barcelona Traction, Light and Power Company *(Barcelona Traction)*, 1970 ICJ Rep. 4, at 33, and *Corfu Cannel* (UK v Albania), 1949 ICJ Rep. 4.

16 As McCaffrey says, "States don't want to bring cases", in: Liability for Transfrontier Environmental Harm: The relationship between public and private International Law, in: v. Bar, Internationales Haftungsrecht, 1997, 81 at 91.

17 This has been recently emphasised by Brunnée, Of sense and sensibility, 53 ICLQ (2004) 351 at 352 f.

18 See for example, the ICJ cases *Gabcicovo-Nagymaros Project* (Hungary v Slovakia), 1997 ICJ Rep. 7, *La Grand*, *Land and Maritime Boundary between Cameroon and Nigeria*, *Aerial Incident of 10 Aug 1999* (Pakistan v India) etc., all available at <http://www.cij-icj.org>.

19 Ago. R., 2nd Report, UN Doc. A/CN.4/233, ILC Yearbook 1970-II; 3rd Report UN Doc. A/CN.4/246 & Add. 1-3, ILC Yearbook 1971-II Part 1 and already in 1939: Le délit international, 68 RdC (1939) 415. See on Ago's theory Dupuy, P.-M., Reviewing the Difficulties of Codification: On Ago's Classification of Obligations of Means and Obligations of Result in Relation to State responsibility, (1999) 10 EJIL 371.

20 Anzilotti, Teoria generale della responsibilità dello stato nel diritto internazionale, 1902.

21 Allott, State responsibility and the unmaking of International Law, Harvard ILJ 29 (1988), 1. He criticised the ILC's system of State responsibility as an artificial concept between wrongdoing and liability, which practically would lead to the negation of the rule of law – in particular by codifying exceptions to wrongfulness.

held that State responsibility is not a distinct concept involving a distinct set of rules but is inseparable from the primary international law rules from which it is derived), *Brownlie*,[22] *Combacau* and *Alland*,[23] *Crawford*[24] (who from 1997 has served as Special Rapporteur of the ILC on the issue), and others.[25]

2. The ILC's State responsibility project

The ILC's project on State responsibility (which took 49 years and 32 major reports to be concluded) and the General Assembly's repeated pleas for submission of a proposal codifying the issue underlines both the existence of the concept as well as its importance in the eyes of governments.

The ILC commenced its considerations of the issue in 1955. *Garcia-Amador*, the first Special Rapporteur, followed a "principles-approach" to the issue, seeking to determine rules and principles applicable to all kinds of unlawful acts.[26] Between 1956 and 1961, he submitted six reports to the ILC on the topic,[27] which was at that time still confined to "International responsibility of the State for injuries caused in its territory to the person or property of aliens". This restriction was justified historically, since the issue of State responsibility had been concerned mainly with the treatment of aliens.[28] However, after the Second World War, this restriction proved to be undesirable, and under the guidance of *Ago* (who was appointed Special Rapporteur in 1963), the scope of the work was extended to cover all general rules governing the international responsibility of States.[29] Between 1969 and 1979 *Ago* presented eight

22 Brownlie, System of the Law of the Nations, State responsibility, Part I, 1983.

23 Combacau, J./Alland, D., Primary" and "Secondary" Rules in the Law of State Responsibility: Categorizing International Obligations, (1985) 16 NYIL 81.

24 Crawford, J. Peel, J., Olleson, S., The ILC Articles on Responsibility of States for Internationally Wrongful Acts: Completion of the Second Reading, 13 European Journal of International Law (2001) 963.

25 See Caron, The ILC Articles on State Responsibility: The Paradoxical Relationship Between Form and Authority, 96 AJIL (2002) 857 and others writing on the same issue in the same volume of the AJIL; Pellet, Les Articles de la CDI sur la responisabilité de l'Etat pour fait internationalement illicité – et fin?, 48 Annuaire français de droit international, (2002) 23.

26 For a more detailed account of the different approaches see Allott, note 21, 3f.

27 1st report, Yearbook ILC 1956-II, 173; 2nd report Yearbook ILC 1957-II, UN Doc. A/CN.4/106; 3rd report, Yearbook ILC 1958-II, UN Doc A/CN.4/111; 4th report Yearbook ILC 1959-II, UN Doc. A/CN.4/119; 5th report, Yearbook ILC 1960-II, UN Doc A/CN.4/1125, 6th report, Yearbook ILC 1961-II, UN Doc. A/CN.4/134 and A/CN.4/134/Add. 1.

28 See for the historical background on the issue since the late 19th century Ago's first report (1969), below note 30, 125 and Allott, note 21, 3 f.

29 See Yearbook ILC 1963-II, UN Doc. A/Cn.4/152, 227.

reports to the ILC,[30] and based on his thinking, in 1980 the Commission finally adopted, on first reading, a first set of articles on State responsibility.[31]

The ILC's work was inspired mainly by "civilian modes of thought" as it sought to synthesise rules from different legal fields to form a general set of secondary rules applicable to breaches of all kinds of primary rules.[32] This approach attracted criticism, with regard to both the structure and content of the rules, and even led one commentator to declare that "*the Commission's long and laborious work on State responsibility is doing serious long-term damage to international law and international society*".[33] The criticism was directed mainly toward the differentiation between crimes and delict (contained in the old Article 19), the extensive exonerations offered to States, the system of countermeasures, and the lack of categorisation of primary norms. At the core of this criticism was the conviction that secondary rules cannot be developed or applied independently of the primary rule, the breach of which gives rise to State responsibility in the first place. Nevertheless, the ILC's general approach prevailed and it is the 1980 set of articles which was published in many law books as the basis for State responsibility and which has served as the guideline for jurisprudence to this day.[34]

Work progressed slowly – another seven reports attempting to reconcile the different views on the issue were submitted by *Ago*'s successor, *Riphagen*[35] – and the UN General Assembly called on the ILC several times to continue its work and present the Assembly with a set of rules at quickly as possible.[36] Another set of Articles (1-5) was adopted

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30 1st report: Yearbook ILC 1969-II, UN Doc. A/CN.4/217, and Add.1; 2nd report: Yearbook ILC 1970-II, UN Doc. A/CN.4/233; 3rd report: Yearbook ILC 1971-II (Part one), UN Doc. A/CN.4/246 and Add.1-3; 4th report: Yearbook ILC 1972-II, UN Doc. A/CN.4/264 and Add.1; 5th report: Yearbook ILC 1976-II (Part one), UN Doc.A/CN.4/291 and Add.1-2; 6th report: Yearbook ILC 1977-II (Part one), UN Doc. A/CN.4/302 and Add.1-3; 7th report: Yearbook ILC 1978-II (Part one), UN Doc. A/CN.4/318, and Add.1-4; 8th report: Yearbook ILC 1980-II, UN Doc. A/CN.4/318 Add.5-7.

31 Yearbook ILC 1980-II (Part two), 26-63. The Articles were structured in three parts: I: Origin of international responsibility, II: Content, form and degrees of international responsibility, III: Settlement of disputes. Only Part I was adopted.

32 See Crawford, Responsibility to the international community as a whole, 8 INJGLS (2001) 303 at 304.

33 Allott, note 21, at 1.

34 Most recently, the ICJ referred to the articles in the *Gabčikovo* case, concerning the Gabčikovo-Nagymaros Project, Hungary v. Slovakia, 1997 ICJ Rep. 7 as well as in the case concerning immunity: Difference Relating to Immunity from Legal Process of a Special Rapporteur of the Commission on Human Rights, 1999 ICJ Rep. 62.

35 1st (preliminary) report, Yearbook ILC 1980-II-1, 107, UN Doc. A/CN.4/330; 2nd report, Yearbook ILC 1981-II-1, 79, UN Doc. A/CN.4/334, 3rd report, Yearbook ILC 1982-II-1, 22, UN Doc. A/CN.4/354,4th report, Yearbook ILC 1983-II-1, 3, UN Doc. A/CN.4/366 and A/CN.4/366/Add.1; 5th report, Yearbook ILC 1984-II-1, 1, UN Doc. A/CN.4/380; 6th report, Yearbook ILC 1985-II-1, 3, UN Doc. A/CN.4/389; 7th report, Yearbook ILC 1986-II-1, 1, UN Doc. A/CN.4/397 and A/CN.4/397/Add.1.

36 See for example UNGA Res. 3315 (XXIX) of 14 December 1974, UNGA Res. 31/97 of 15 December 1976, and more recently, UNGA Res. 50/45 of 11 December 1995, where the Assembly urged the ILC to resume its work. A general overview of the work of the ILC on the matter can be found at <http://www.un.org/law/ilc/archives/statfra.htm>.

at first reading in 1986, introducing some legal consequences of internationally wrongful acts, and another Special Rapporteur was appointed in 1987 (*Arangio-Ruiz*). *Arangio-Ruiz* submitted eight reports, focussing on the issue of consequences arising from an international wrongful act as well as on the settlement of disputes.[37] In 1996 the Commission completed the first reading of Parts II and III of the Draft Articles,[38] and they were submitted to governments for views, which were compiled and reflected in the final drafts by the new Special Rapporteur (*Crawford*).[39]

At its 52nd session, the ILC considered the full set of Articles as adopted by the drafting committee[40] as well as *Crawford's* third report[41] and decided to refer a substantial part of the work back to the Drafting Committee.[42] Even at the ILC's subsequent (53rd) session some issues remained contentious – these being, *inter alia*, the chapter on serious breaches of obligations to the international community as a whole,[43] countermeasures,[44] and dispute settlement.[45]

Finally, in August 2001, the ILC was able to adopt its "Draft Articles on Responsibility of States for Internationally Wrongful Acts" (DASR).

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37 1st (preliminary) report: Yearbook ILC 1988-II (Part one), UN Doc. A/CN.4/416 and Add.1; 2nd report: Yearbook ILC 1989-II (Part one), UN Doc. A/CN.4/425 and Add.1; 3rd report: Yearbook ILC 1991-II (Part one), UN Doc. A/CN.4/440 and Add.1; 4th report: Yearbook ILC 1992-II (Part one), UN Doc. A/CN.4/444 and Add. 1-3; 5th report: Yearbook ILC 1993-II (Part one), UN Doc. A/CN.4/453 and Add. 1-3; 6th report: UN Doc. A/CN.4/461 and Add.1-2 and Add.2/Corr.1 and Add.3; 7th report, UN Doc. A/CN.4/469 and Corr.1 and Add.1-2; 8th report: UN Doc. A/CN.4/476 and Corr.1 and Add.1.

38 See the 1996 version of the Articles in: ILC Report 1996 – Draft Articles on State responsibility, available on <http://www.un.org/law/ilc/reports/1996>.

39 Crawford submitted four reports to the ILC, which incorporated the views of governments (A/CN.4/488 and Add.1-3, A/CN.4/483, A/CN.4/492, A/CN.4/496, A/CN.4/504 and Add1; A/CN.4/515 and Add.1-3.). 1st report: UN Doc. A/CN.4/490 and Add. 1-6; 2nd report: UN Doc. A/CN.4/498 and Add.1-4, 3rd report: UN Doc. A/CN.4/507 and Add. 1-4; 4th report: UN Doc. A/CN.4/517 and Add.1.

40 The full set of articles was contained in UN Doc. A/CN.4/L.600. A 1998 version of the articles is contained in 37 ILM 440 (1998).

41 UN Doc. A/CN.4/507 and Add.1 and Add.1/Corr.1 and 2 (French only), Add.2 and Add.2/Corr.1 and 2, Add.3 and Add.3/Corr.1, and Add.4) containing his proposals for Part Two (legal consequences of an internationally wrongful act of a State).

42 General Assembly, Official Records, 55th session, Suppl. No. 10 (A/55/10) – Report of the International Law Commission on the work of its fifty-second session, chapter IV.

43 See note 6, paras. 45 ff. The chapter was retained in part II, but some amendments made compared to the version contained in UN Doc. A/CN.4/L.600.

44 See note 6, paras. 50 ff. A reference to countermeasures remains in part I and the chapter was retained in part III.

45 See note 6, paras. 56 ff.

3. State Responsibility and the Environment

In the context of environmental degradation or transboundary pollution, State responsibility has two main functions: 1) to support prevention rules stipulated by treaty or customary law and 2) to provide injured States (and through them individuals and the natural environment) with a right to restoration and compensation. Thus, *". . . responsibility and liability for environmental damage should not always be regarded as a negative sanction, but rather . . . as a positive inducement to prevention, restoration or compensation as the case may be".* [46] While there is little empirical evidence to support this effect on State behaviour, it seems likely that the political/diplomatic implications of unlawful behaviour will result in this kind of compliance incentive.

It has been argued that in spite of the prevalence of instruments to prevent environmental damage, *"an efficient environmental law cannot do without legal provisions on liability".*[47] Rules stipulating liability and responsibility for environmental damage, it was argued, have an important role to play in the protection of the environment, but the development of such rules has been largely neglected by governments and policy makers in the past decades.[48] Accordingly, *Kiss* has asked whether *"the usual concept of responsibility for transfrontier pollution . . . is not progressively dissolved in a broader approach to environmental problems: a growing sub-regional and regional co-operation between States"*,[49] thus suggesting that the functions of State responsibility might be gradually replaced by co-operative arrangements and prevention treaties.

Indeed, as discussed in Chapters III and IV, the primary rules relevant to climate change are not designed to regulate damage *per se*, let alone liability for such damage. However, there is no lack of political statements regarding the importance of a more effective law of State responsibility or liability. Principle 22 of the 1972 Stockholm Declaration,[50] as repeated in Principle 13 of the 1992 Rio Declaration,[51] provides:

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46 See Orrego Vicuña, Institut de Droit International – Resolution on Responsibility and Liability: Responsibility and Liability for Environmental Damage Under International Law: Issues and Trends, (1998) 10 Georgetown Int'l. Env. L. Rev. 279 at 280.

47 Rest, Responsibility and Liability for Transboundary Air Pollution Damage, in: Flintermann/Kwiatkowska/Lammers (eds.): Transboundary Air Pollution: International Legal Aspects of the Cooperation of States, 1986, 299 at 335.

48 See Gaines, International Principles for Transnational Environmental Liability: Can municipal law break the impasse? 30 Harvard Int'l L.J. (1989) 311, at 313; Kiss, Present Limits to the Enforcement of State Responsibility for Environmental Damage, in: Francioni (ed), International Responsibility for Environmental Harm, 1991, 7 at 8, 11.

49 Kiss, note 48, 13 f.

50 Stockholm Declaration on the United Nations Conference on the Human Environment, 11 ILM (1972), 1416.

51 "States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their

> States shall cooperate to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such States to areas beyond their jurisdiction.

Some positive movement in terms of the development of special civil liability regimes rather than State responsibility provisions can be discerned,[52] even though the Plan of Implementation adopted at the World Summit for Sustainable Development (WSSD, the so-called Rio+10 summit) in 2002 only mentions the need for effective liability schemes in the context of radioactive waste.[53]

Behind these political demands, as well as the academic debate about State responsibility in the context of environmental law, is the desire to establish regimes of strict liability, i.e. State responsibility regardless of fault or breach of treaty, simply triggered by the occurrence of damage (see Chapter IV). It is this desire in part that also provided the motor for the ILC project on international liability for injurious acts not prohibited by international law,[54] introduced in Chapter IV. The law of State responsibility, it was argued, does not respond sufficiently to the risks posed to the natural environment by many human activities that are in fact lawful and do not involve, on their face, the breach of an obligation (wrongful act).

Thus, in the past decades, the discussion around State responsibility has not been about whether States are responsible for their behaviour but under what conditions legal consequences arise and what form these can take[55] and how these can be applied to the special problems of environmental damage. As *Tomuschat* put it, *"establishing the dogmatic system of State responsibility constitutes an intellectual feat performed at a relatively late date in the development of international law"*.[56]

Notable in this respect is the more recent work of *Lefeber*[57] and *Okowa*[58] who have applied State responsibility to transboundary air pollution, as well as the major theoretical approach made by *Horbach*.[59] As already established in Chapter IV, in the context of the no harm rule, *Horbach* has argued that there is a gradual acceptance

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jurisdiction". Rio Declaration on Environment and Development, United Nations Conference on Environment and Development, 31 ILM 874 (1992).

52 See Brunnée, note 17.

53 WSSD "Plan of Implementation", para. 33 bis "stressing the importance of having effective liability mechanisms in place", <http://www.un.org>.

54 See for the most recent developments of this project Report ILC 53rd session, note 6, 366 ff.

55 See Schröder, Verantwortung. Völkerstrafrecht, Streitbeilegung und Sanktionen, in Vitzhum (ed.) Völkerrecht, 2001, VII, para. 7 ff.

56 Tomuschat, International Law: Ensuring the Survival of Mankind on the Eve of a New Century, (1999) 281 Recueil des Cours, 1 at 269 ff.

57 Lefeber, Transboundary Environmental Interference and the Origin of State Liability, 1996.

58 Okowa, State responsibility for transboundary air pollution in international law, 2000.

59 Horbach, Liability versus responsibility under international law – defending strict State responsibility, 1996.

of a type of State responsibility based upon the mere occurrence of transboundary damage at least with respect to ultra-hazardous activities, and that generally States must observe due diligence with respect to all kinds of activities that can be shown to cause significant damage – the lawfulness or unlawfulness of the polluting activity itself thus no longer is a decisive element of State responsibility.

III. The law on State responsibility – initial considerations on legal consequences for climate change damage

As mentioned in the introduction, the ILC's Draft Articles will serve as a tool for describing the elements of the law on State responsibility. While it is well understood that the ILC does not create law and that the Articles do not replace any of the accepted sources of international law, this approach can be used because, for the most part, the Articles re-state the law on State responsibility and make it easier to understand. However, in some instances in the Articles, the ILC has developed the law, so that the rules laid down in them may not be applicable to a dispute without further proof of State practice on the specific issue in question. *Caron* and others have cautioned against treating the Articles as customary law or even as if they were adopted by all States in a Convention.[60] In the present context, however, it is sufficient to discuss divergence between the ILC Articles and customary law where it arises and where it is relevant to the subject of this thesis. From the perspective of a lawyer trained in a civil law system and from the perspective of the reader, this approach also has the great advantage of setting out a relatively clear set of rules, which can immediately be applied to the specific problems that arise with regard to climate change damage.

Broadly speaking, the DASR are concerned with the general question of the performance of obligations. The draft consists of four parts: I: The International Wrongful Act of a State, II: Content of the International Responsibility of a State, III: The Implementation of the International Responsibility of a State and IV: General Provisions. Where relevant, the law on State responsibility which exists beyond the codification in the DASR will be described. Many of the elements will be revisited in the context of the case studies.

Generally, the system set out in the DASR is the following: Legal consequences arise if an internationally wrongful act has been committed. Such act must constitute a breach of an international obligation and must be attributable to a State. Once a breach has been established, another State can demand cessation of the wrongful act, i.e. re-instatement of lawful behaviour, and/or reparation, including compensation if

60 Caron, The ILC Articles on State responsibility: The paradoxical relationship between form and authority, 96 AJIL (2002) 857.

the wrongful act has caused injury. Legal consequences will not arise if the culprit State can draw on the available exemptions from wrongfulness. These elements will be discussed below, together with, an analysis of the pertinent issues when applied to cases of climate change damage, where possible.

1. Breach of obligation

The primary norms pertaining to preventing climate change damage that could possibly be breached are described in Chapters III and IV. Articles 12-15 DASR define the notion of "breach of international obligation" in general, regardless of the origin of the obligation.[61] According to Article 12 (and consistent with customary law on this issue)[62] a wrongful act is committed when the conduct required of a State and the conduct it actually adopts do not conform. This means that the determination as to whether a primary rule has been breached is made solely on the basis of the substantive elements of the relevant rule, and is not dependent on the law on State responsibility. The ILC expressly states: *"It is [the primary obligation] which has to be interpreted and applied to the situation, determining thereby the substance of the conduct required, the standard to be observed, the result to be achieved, etc."*[63]

Naturally, the international obligation must be in force for the State at the time of the breach (Article 13). Therefore, for example, the USA or Australia cannot be held responsible for non-compliance with the Kyoto Protocol's reduction targets, even after its entry into force because they have not ratified it.[64] Article 13 DASR also codifies the prohibition of any retrospective assumption of responsibility. However, where a general rule of customary international law (such as the no harm rule) is the primary obligation used for establishing State responsibility for climate change damage, Article 13 indicates the relevant period of time for determining whether an obligation exists is not when the *damage* occurs but when climate-damaging *activity* occurs.[65] This is important in the context of climate change damage in particular because of the time-lag between emissions and impacts: If a treaty rule were to be adopted which rendered a specific emission behaviour lawful, this would not impact the applicability of the no harm rule to future damage claims as long as activities causing the damage were in breach of international law when they were performed.

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61 This means that in international law there is no distinction between tortuous and contractual or criminal and civil responsibility. See *Rainbow Warrior*, note 14.

62 See for jurisprudence on this issue Report ILC 53rd session, note 6, 125.

63 Report ILC 53rd session, note 6, 123.

64 The reader is reminded that the Kyoto Protocol's compliance system does not regulate climate change damage as such, but only compliance with the Kyoto targets within the treaty regime (see Chapter III).

65 Generally, the wrongfulness of an act must be established on the basis of the obligation in force at the time when the act was performed – references in Report ILC 53rd session, note 6, 133.

If the emission behaviour of a State is giving rise to the breach of obligation, it will be important to determine when the breach begins and when it ends. Article 14 DASR divides primary obligations into obligations (i) having and (ii) not having a continuing character and stipulates that for the latter type the breach of obligation extends over the entire period in which the act continues (Article 14.2).[66] This corresponds to some extent to the distinction drawn between obligations of result and obligations of conduct referred to in Chapter III. However, this distinction, contained in Article 20 and 21 of the 1980 version of the DASR, was not included in the new draft.[67] Article 15 complements this framework by addressing composite acts, i.e. "a series of acts or omissions defined in aggregate as wrongful". The wrongful act will occur when an act or omission takes place that is then, together with others, sufficient to constitute a wrongful act, and the breach then starts from the first act or omission in the series and lasts as long as the acts in the series are repeated. Article 15 was originally intended to refer to the breach of primary rules where the cumulative conduct constitutes the wrongful act (e.g. acts of genocide, systematic acts of racial or trade-related discrimination).[68] Yet, it might also be invoked where the cumulative behaviour of a State does not conform to a standard of care for preventing damage or the risk thereof, in the context of the no harm rule.

Anthropogenic emissions of greenhouse gases have occurred since the time humans discovered fire, and particularly since the beginning of the industrial age. It is thus important to test strictly whether a (continuous) breach as opposed to a potentially damaging activity has occurred, and thus whether such behaviour fits into the framework of Article 15. In other words, while an activity might have contributed to an injury, it may not represent a wrongful act for its entire duration.

Obligations such as the duty to reverse emissions trends derived from Articles 2 and 4.2 FCCC clearly have a continuing character, whereas it could well be argued that where a State breaches the no harm rule, it will no longer in breach when it has rectified the damage – even if it continues to emit greenhouse gases (above a due diligence threshold). Using the FCCC obligation to reverse emission trends as an example, Article 14.2 DASR, which provides that a continuing wrongful act extends over the period during which the act continues, could lead to the conclusion that breach of the obligation would end only when the respective State sufficiently reduces its emissions. This approach was taken in the *Trail Smelter* arbitration,[69] where the oblig-

66 An example of such breaches would be keeping laws in effect which are incompatible with an international treaty, the unlawful detention of an official, the unlawful occupation of the territory of another State etc. (Report ILC 53rd session, note 6, 139).

67 Report ILC 53rd session, note 6, 130 ff. See for a critique of this distinction: Dupuy, Reviewing the Difficulties of Codification, 10 EJIL (1999) 371.

68 Report ILC 53rd session, note 6, 146 f.

69 *Trail Smelter*, (US v Canada), III RIAA 1911. See further Chapter IV.

ation to prevent transboundary air pollution was found to be breached as long as the pollution continued. As the ILC stresses, in such cases the breach can be *"progressively aggravated by failure to suppress it"*.[70]

In the context of risk-increasing activities it must be stressed that Articles 14-15 do not make the application of the law on State responsibility contingent upon the actual occurrence of damage as opposed to an increase in the risk of damage. On the contrary, as soon as the increase in risk constitutes a breach of obligation, these rules are satisfied. The question of whether legally relevant injury has occurred if a risk has only been increased must be discussed in the context of proof of damage, i.e. within the determination of consequence (see the discussion of preparatory activities by the ICJ in the *Gabčikovo* case and below, in the second case study).[71]

A related issue and a requirement for invocation of State responsibility as such is the determination of whether the obligation breached was owed to the claimant State, individually (Article 42(a)), or to the international community as a whole with the breach specifically affecting the claimant State (Article 42(b)). An example of the former would be the violation of a bilateral treaty obligation or the no harm rule. An example of the latter – according to the ILC – would be a violation of Article 194 UNCLOS, which prohibits pollution of the high seas and therefore is an obligation owed to all Parties to the Convention, but nevertheless affects certain the beaches and fisheries of some States more than others (an oil-accident being a prime example).[72] The latter example holds for the case of climate change damage as well. The emissions behaviour of a State will affect the atmosphere as a global commons, but will also affect certain States in particular, as emphasised in Chapter II. While the effects will not be as direct as in the UNCLOS pollution example, it would be difficult to support an argument denying the applicability of the law of State responsibility because the protection of the global climate is not an obligation that is "owed" to one State in particular. In effect, this protection is owed to all States, as all States will be affected, yet some will be particularly injured.

Apart from invoking State responsibility,[73] the injured State can also resort to the use of countermeasures to induce compliance or may request reparations, as provided in Articles 49-53.[74] Since obligations can also be owed to several States, other States

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70 Report ILC 53rd session, note 6, 145.

71 ICJ, note 34, at 54.

72 Report ILC 53rd session, note 6, 299.

73 The invocation by a State of the responsibility of another State could be the raising of a claim or the institution of proceedings before an international court or tribunal, this should be preceded by a notice of claim, Article 43 DASR.

74 Countermeasures are measures that are contrary to an international obligation of a State vis à vis the State that are taken against, but are justified because the latter is already in breach of an obligation vis à vis the former. They are a form of self-help accepted in international law under certain circumstances and with restrictions. These were discussed heavily during the ILC codification effort

are similarly entitled to invoke State responsibility. Article 46 clarifies that in such cases, each injured State can invoke separately the responsibility of the State which committed the wrongful act.[75] This structure of rights of invocation (see also Article 48, below 7) reflects the fact that many international obligations are not bipolar. The broad understanding of an injured State is important in the context of climate change damage. For example, as was stressed in Chapter III, the climate regime is mainly concerned with general prevention duties, and not with an individual country's damage. Yet, Article 42 and 46 DASR show that such general approach taken by the primary norm will not hamper the invocation of State responsibility in principle.

2. Attribution

A general, traditional rule of State responsibility law is that only acts or omissions of State organs or agents are attributable to the State, irrespective of the internal subdivision of such organs or components (Article 4 DASR). This includes situations where internal laws of a country, legal decisions or administrative measures of any kind lead to an internationally wrongful act.[76] A claimant State need not show exactly which part of government or the administration authorised the relevant activity, since it is often *"practically impossible to specify which officials or organs were the source of the harm and legally and evidentially unnecessary to make such a specification"*.[77]

In the context of damage caused by environmental pollution, or rather emissions of greenhouse gases, it will be mostly private entities that actually undertake the polluting activities although State-owned companies may also play a role,[78] this also holds true for the destruction of carbon sinks. For the determination of State responsibility it is the *State's* obligations that determine whether the conduct is lawful – not the private conduct itself.[79] As ILC Special Rapporteur *Rao* notes, it is not always possible to pro-

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(Report ILC 53rd session, note 6, 324 ff.) Fitzmaurice has argued that countermeasures are not applicable in the framework of environmental obligations in: International Environmental Law as special field, 1994 NYIL 181, at 216. See for analysis of countermeasures in general: Ginther, Verantwortlichkeit, Haftung und Verantwortung im Völkerrecht, in: Ginther: Völkerrecht zwischen normativem Anspruch und politischer Realität, 1994, 339.

75 This principle finds confirmation in State practice. The ILC commentary cites several instances where several States claimed reparation for the same wrongful act, Report ILC 53rd session, note 6, 312 f.

76 Art 4 DASR, taken from Certain German Interests in Polish Upper Silesia, Merits, 1926 PCIJ Ser.A, No. 7 at 19 (*Upper Silesia*).

77 Brownlie, State responsibility, 151, citing examples such as the *Corfu Channel* case and the *Cosmos 954* incident, where a Soviet-owned nuclear powered satellite crashed onto Canadian territory, but the claimant State did not have to specify the responsible organ.

78 The behaviour of State-owned corporations is only considered an act of State if they exercise public powers, Report ILC 53rd session, note 6, 107 f., citing mostly jurisprudence of the Iran-United States Claims Tribunal.

79 Report ILC 53rd session, note 6, 122.

hibit engagement in risk-bearing activities because they are crucial for economic development. However, *"States are under an obligation to authorize them only under controlled conditions and under strict monitoring while discharging their duty of prevention of transboundary harm"*.[80]

Where an environmental treaty is breached (for example a norm of the climate regime) because the proper compliance measures are not put into place, the breach is attributable to the State regardless of the source of emissions. The ILC DASR commentary do not refer directly to such cases. When looking at polluting activities in general, it notes merely that it will be necessary *"in order to attribute an act to a State . . . to identify with reasonable certainty the actors and their association with the State"*,[81] or to show that in accordance with Article 8 DASR "effective control" was exercised by the State over the activities conducted by private persons.[82] Article 8 DASR stipulates that the conduct of a person or group of persons shall be considered an act of State under international law if they are acting on the instructions of or under the direction or control of the State. A State therefore can be held responsible for the effects of the behaviour of private parties if it in fact directed or approved of the activities.[83]

In cases where private conduct leads to transboundary damage, the "effective control formula" as well as the principle in Article 11 DASR (which stipulates that any conduct of private entities or persons will be attributable as soon as a state acknowledges or adopts the conduct as its own) would lead to a situation where a State, by approving such private conduct through active (permitting) policies, implicitly or explicitly approves of it and thus incurs legal responsibility. Generally, the breach of duty to exercise due diligence in control of private persons is an acknowledged principle in the law of State responsibility.[84] It was applied, implicitly, by Judge *Shahabuddeen* in his dissenting opinion to the 1992 *Nauru* case. This case was concerned with the exploitation of phosphor mines and the resulting destruction of land on Nauru under the administration of Australia, New Zealand and the UK on the basis of the 1919 Nauru Island Agreement. A provision of that agreement explicitly stated that the phosphor business should be conducted without governmental intervention. Judge *Shahabuddeen* stated that it was not possible to conceive a major industry being beyond the competence

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80 Rao, 2nd report on the legal regime for the allocation of loss in case of transboundary harm arising out of hazardous activities, ILC Doc. A/CN.4/540 – ILC 56th session (2004), 14.

81 Yeager v Islamic Republic of Iran, 17 Iran-United States Claims Tribunal Report (1987) 92, at 101 f.

82 The "effective control" formula was used by the ICJ in the case concerning the operations of the Contras in Nicaragua, Military and Paramilitary Activities in and against Nicaragua, (Nicaragua v. US), Merits, 1986 ICJ Rep. 14, at 58 ff. (*Nicaragua*).

83 Brownlie calls this category "Breach of duty to exercise due diligence in control of private persons", in: State responsibility, 161. The cases cited mostly related to damage done by a mob of people, failure to punish criminals, etc.

84 See the findings in the *Youmans Claim*, IV RIAA 110, the *Janes Claim*, IV RIAA 82, and the *Massey Claim*, IV RIAA 155. These cases were primarily concerned with the inadequate punishment of individuals having committed crimes on foreign persons. See also Brownlie, State responsibility, 162.

of the legislative and administrative powers of the State and that thus, responsibility would arise for that State (in this case, Australia).[85]

An examination of State control over greenhouse gas emitting activities on State territory would have to lead to the same conclusion. A State therefore could not exonerate itself from an invocation of, say, the no harm rule by stating that the physical activities leading to climate change damage were not undertaken directly by State organs.

3. Fault

As discussed previously, activities leading to climate change are not conducted to induce climate change damage, but are part of general economic activities worldwide. It would be difficult therefore to declare that any State is at fault for wilfully bringing about climate change damage. However, this level of intent is not a required element of State responsibility:

Since the beginning of the 20th century, discussions about the nature and characteristics of State responsibility under international law have focussed on whether such responsibility is subjective or objective. The former theory was based on Roman law and essentially required a proof of *culpa* or some form of subjective fault or intent on behalf of the State. The latter and prevailing theory argued that the responsibility of States flows directly from the breach of an international obligation, and that no additional subjective element was required.[86] Today, as reflected in the DASR, international law does not require an element of intentional (*dolus*) or negligent (*culpa*) conduct on the part of the State to trigger State responsibility for the injury suffered by another State.[87] Rather, the application of the secondary norms of State responsibility depends solely on whether a breach of the primary obligation can be established.[88] This means that if and to what extent fault is required will depend on the

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85 *Certain Phosphate Lands in Nauru* (Nauru v Australia), Preliminary Objections, 1992 ICJ Rep. 240, at 281.

86 See for an overview Brownlie, Principles, 440 ff. Brownlie, State responsibility, 38 ff.; Bedjaoui, Responsibility of States, Fault and Strict Liabilities, Encyclopaedia of Public International Law, Vol. 10, 358 at 359 f.

87 Tomuschat, International Law: Ensuring the Survival of Mankind on the eve of a new century, 281 (1999) Recueil des Cours, 1 at 281. Similarly, Crawford States that there is no "general rule or principle about the place of fault in relation to any primary norm" (in: Revising the Draft Articles on State Responsibility, 10 EJIL (1999) 435 at 438).

88 The distinction between primary and secondary norms has been subject of much debate within the academic community, but was eventually accepted by the ILC as well as by the ICJ, see Crawford, note 87 at 438 and the ICJ's *Gabcicovo-Nagymaros* judgment, ICJ Rep. 1997, 7, at para. 47. See for discussion Comabacau/Alland, "Primary" and "Secondary" Rules in the Law of State Responsibility: Categorizing International Obligations, 16 (1985) NYIL 81; Crawford, On re-reading the draft articles on State responsibility, 92 (1998) American Society of International Law Proceedings, 295; Zemanek, Responsibility of States: General Principles, Encyclopaedia of Public International Law, Vol. 10, 362 at 365.

primary obligation and is in no way pre-supposed by the secondary norms. Bearing this in mind, it should be noted that the no harm rule is a primary rule which requires a showing of negligence.

4. Exemptions

Articles 20-27 deal with circumstances that exonerate an individual State from its factually wrongful behaviour ("circumstances precluding wrongfulness"). The six circumstances providing justification are: consent (Article 20), self-defence (Article 21), countermeasures (Article 22), force majeure (Article 23), distress (Article 24) and necessity (Article 25).

The system and consequences of exemptions were discussed extensively in the *Gabčikovo* case.[89] However, while the circumstances in the case related to environmental issues (ecological necessity), the legal considerations discussed therein do not readily apply to legal questions surrounding climate change damage. More specifically, Hungary did not comply with its treaty obligations regarding the diversion of the river Danube because it felt that the diversion would cause great environmental damage. It is difficult to envision how breaches of international obligations causing climate change damage could be excused via the exemptions stipulated in Article 20-27 DASR. In particular, the exception of non-performance, i.e. a situation where one State breaches an obligation because another State has breached the same duty (for example emissions reduction commitments under the climate regime) is neither included in the DASR nor is it part of customary international law, particularly where such a breach actually harms the global environment.[90] That breaches can affect the international community as whole is recognised in Articles 33 and 42 DASR.

5. Legal Consequences

The legal consequences of a wrongful act of State are similar to those available under domestic tort law, but are only roughly sketched out in international law. The ILC made some attempts to identify the general principles of law recognised in municipal systems that could be regarded as part of international law (see Article 38.1(c)) ICJ Statute), but such efforts were complicated by the fact that the law of remedies varies greatly across domestic jurisdictions. In some areas, the DASR therefore most probably

89 ICJ, note 34, paras. 40 ff. and 49 ff.

90 In that sense, environmental obligations are not synallagmatic – see Report ILC 53rd session, note 6, 173. See also Fitzmaurice, International Environmental Law as special field, 1994 NYIL 181 at 216 ff.

progressively develops rather than codifies international law on this issue.[91] However, some principles of legal consequences are well accepted.

Firstly, the primary obligation, i.e. the original duty of performance persists (Article 29). Secondly, the State is obliged to cease the wrongful conduct (Article 30) and thirdly, to make full reparation for any injury caused (Article 31). These (secondary) obligations are owed to either one or several States, or even to the international community as a whole (Article 33.1),[92] depending on the primary rule breached.

Article 33.2 emphasises that legal consequences can also arise between the delinquent State and persons or entities other than States, such as in the case of human rights violations.[93] This is relevant for instances of climate change damage where the beneficiaries of the primary obligation (for example the no harm rule) may actually not be States but the natural environment as well as individuals and private entities (property, livelihoods and lives). Procedurally though, individuals would have to seek diplomatic protection[94] and persuade their government to seek cessation or reparation on their behalf – individuals cannot invoke the law of State responsibility directly.

a) *Cessation*

The obligation to cease the wrongful conduct applies equally to acts and omissions since *"there may be cessation consisting in abstaining from certain actions"*.[95] Demands for cessation are, in most cases, at the heart of State responsibility disputes, since States are interested primarily in the re-establishment of the (legal) situation before the wrongful conduct occurred (i.e. often in the performance of a treaty), rather than in specific reparation.[96] In the context of climate change damage, as mentioned above, ceasing the emission of greenhouse gases or supporting the increase of carbon sinks is not an exercise that can be accomplished in a matter of days or months. The DASR does not provide flexibility on how and by when the activity must be ceased. Instead, cessation is an absolute obligation, regulated in some cases by court order (as done in

91 See Shelton, Righting Wrongs: Reparations in the Articles on State Responsibility, 96 AJIL (2002) 833, 843.

92 Article 33.1 essentially refers to cases of damage to areas beyond national jurisdiction such as the high seas or the atmosphere and was discussed extensively in the ILC. It might not (yet) represent international law on the subject.

93 Report ILC 53rd session, note 6, 214 and 234.

94 Diplomatic Protection connotes a relationship between the national of a State and the State's organs in which the State assumes the interests of the individual in order to protect the rights of this individual vis-à-vis another State. See further for the preconditions for assuming diplomatic protection the famous *Nottebohm* case, 1955 ICJ Rep. 55 ff.; Brownlie, Principles, 482 ff.

95 *Rainbow Warrior*, note 14, 270.

96 See the recent ICJ case *Arrest Warrant* (Congo v. Belgium), 41 ILM (2002) 536, where Congo sought the cancellation of an arrest warrant issued by Belgium for the Congo's Foreign Minister because it was in violation of international immunity rules.

the *Trail Smelter* arbitration which prescribed a particular course of conduct for the future that resulted in cessation of the wrongful act, i.e. injury to farmers in Washington). In other cases, the damage caused might be irreversible, and cessation might only be realistic in the form of restitution or compensation.[97] The detailed conditions of the enforcement of the duty of cessation is an issue only partially covered by the DASR (Part III – Implementation) and requires analysis of the primary obligation breached.

It is important to note that injury or material damage is not a prerequisite for the existence of a wrongful act, i.e. for the invocation of State responsibility.[98] Determining a breach of an international obligation could involve the need to show damage or injury (for example when the no harm rule is used as a primary norm), but in other cases, a pure breach of treaty would constitute the "wrong" in itself. Thus, while a claimant State must, under the DASR, show a causal relationship between the activity and the damage caused to be eligible for reparations ("for the injury caused by", see more detail below), the State can, without showing a causal relationship, demand cessation, as long as a breach of an international obligation has taken place. This is in line with customary law and, as the ILC commentary notes, is also adequate, especially as there are cases where the harm that follows from a breach is distant or uncertain, such as in the case of *"harm to the environment by emissions exceeding the prescribed limit"*.[99] In these cases, the breach of obligation cannot be allowed to persist. Here, international law differs greatly from municipal civil law, which regularly requires, at least for tort cases, that damage to a protected interest or right has occurred.

b) *Reparation for injury*

Since the analysis in Chapters III and IV revealed that no provisions have been made for repairing or compensating climate change damage which occurs or will occur in developing countries, reparation is the remedy that most likely will be sought by States faced with the severe impacts of climate change. Reparation in the context of climate change damage generally refers to the implementation of measures that prevent residual damage, including the financing of concrete adaptation measures and monetary compensation for damage which has already occurred.

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97 The ILC (citing international adjudications) notes the difficulty of distinguishing between cessation and restitution. This distinction is important since restitution, but not cessation is subject to a proportionality test (Art 35(b)). Report ILC 53rd session, note 6, 218.

98 Report ILC 53rd session, note 6, 225, see for evidence of customary law on this question: Graefenrath, Responsibility and Damages Caused: Relationship between Responsibility and Damages, Vol. 185 (1984-II) RdC 9, 34 ff.

99 Report ILC 53rd session, note 6, 226.

The view that a duty to make reparation should automatically flow from a breach of obligation was not shared by *Kelsen*, who argued that reparation duties should only arise by special agreement.[100] However, State practice clearly supports the approach taken by the ILC. Consequently, during the ILC codification discussion, no State objected to the proposition that a general obligation of full reparation exists, regardless of the character of the primary obligation.[101] In the *Chorzów Factory* case, the PCIJ summarised the legal position in the following manner:

> . . . reparation must, so far as possible, wipe out all the consequences of the illegal act and re-establish the situation which would, in all probability, have existed if the act had not been committed. Restitution in kind, or, if this is not possible payment of a sum corresponding to the value which a restitution in kind would bear; the award . . . of damages for loss sustained which would not be covered by restitution in kind or payment in the place of it.[102]

Both the principle of "wiping out all consequences", the corresponding mechanisms of restitution, compensation and damages and the definition of injury are at the core of most domestic legal systems, both in contract and tort law (even though the scope of these remedies differs).

Article 31 DASR establishes the duty to make "full reparation for the injury caused by the internationally wrongful act" and defines injury as "including any damage, whether material or moral,[103] caused by the internationally wrongful act". In the context of climate change damage, and as explored in Chapter II, the definition of injury is important. Often, a change in natural systems will occur, which, if left unaltered, will lead to the destruction of property and infrastructure. As can be discerned both from ILC deliberations and State practice, classic "environmental or ecological damage" is captured by the duty to provide reparation, which is decisive in enabling claims for preventive (adaptive) measures (see case Study No. 1 below, Nepalese glacial melting).

While the ILC makes clear in its commentary to Article 31 that "material injury" refers to damage to property or other interest of States and nationals which is "assessable in financial terms",[104] it does not state precisely what type of damages are covered

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100 Kelsen, Unrecht und Unrechtsfolge im Völkerrecht, Zeitschrift f. öffentliches Recht 1932, 548.

101 See UN Doc. A/CN.4/448 and Add. 1-3; A/CN.4/492 (both 1988) and A/CN.4/496 and A/CN.4/504 (1998 and 1999, respectively), see also the discussion of the ILC, Chapter IV of the "Report of the International Law Commission, 52nd session", General Assembly, Official Records, 55th session, Suppl. No. 10, UN Doc. A/55/10 (Report ILC 52nd session), at 31 where it was found that the concept of full reparation "had not been criticized by Governments".

102 *Chorzów Factory*, note 12, Merits, at 47.

103 By including "moral damage" the ILC departs from some domestic practice (e.g. German tort law), where moral injury is only taken into account in exceptional cases, § 253 BGB (German Civil Code), see Palandt, 61. Auflage, § 823, para. 200 ff. See also Graefenrath, note 98 at 95.

104 Report ILC 53rd session, note 6, 225.

by the duty of reparation, referring instead to the content of the violated primary rule. The phrase "financially assessable" is certainly broad and encompasses many types of possible injuries brought about by the impacts of climate change. It covers all potential losses in human infrastructure, property and other clearly defined economic assets, including *"costs incurred in responding to pollution damage"*[105] – taken literally, any adaptation measures could qualify as costs incurred in responding to pollution damage, i.e. the changes resulting from increased greenhouse gas concentrations in the atmosphere.

Some attempts to define categories of damage so as to clearly include ecological damage were made by the ILC during its work on "International Liability for Injurious Consequences" (see Chapter IV). For example, the 1992-version of the Articles on Prevention contained the following definition:

> Damage means (a) any loss of life, impairment of health or any personal injury; (b) damage to property; (c) detrimental alteration of the environment, provided that the corresponding compensation would comprise, in addition to loss of profit, the cost of reasonable reinstatement or restorative measures actually taken or to be taken; (d) the cost of preventive measures and additional harm caused by such measures.[106]

Similar to the formula used by the ILC in it commentary to Article 31 DASR, the ILC has suggested in the context of the this work that the harm must lead to a detrimental effect to some thing, such as human health, industry, property, environment or agriculture, and must be *"capable of being measured by factual and objective standards"*.[107] More clearly even, the proposed "Principles on allocation of loss in case of transboundary harm" proposed by Special Rapporteur *Rao* in 2004 include *"loss or damage by impairment of the environment or natural resources"*, including *"the costs of response measures"*.[108]

Naturally, such ecological damage is often very difficult to quantify, and there is a moral debate as to whether this should in fact be done at all, given the incomparability of assets of nature with human assets.[109] However, there are certainly ways of

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105 Report ILC 53rd session, note 6, 248 and 250 ff.

106 ILC 8th report, Yearbook ILC 1992-II (Part one), UN Doc. A/CN.4/443.

107 Rao, 3rd report on international liability for injurious consequences arising out of acts not prohibited by international law (prevention of transboundary damage from hazardous activities), UN Doc. A/CN.4/510, at 17. This report also discusses whether only significant harm should be covered by the Draft. Significant harm is explained as something more than measurable, but need not be at the level of serious or substantial harm.

108 Rao, 2nd report on the legal regime for allocation of loss in case of transboundary harm arising out of hazardous activities, ILC Doc. A/CN.4/540, (56th ILC Session), 21. However, it should be noted that this set of Principles is essentially aimed at establishing private/civil liability.

109 See the series of articles in Wetterstein, Harm to the environment: the right to compensation and the assessment of damages, 1997; Meyer-Abich, Haftungsrechtliche Erfassung ökologischer Schäden, 2000 and Spinedi, Les conséquences juridiques d'un fait internationalement illicite causant un dommage à l'environnement, in: Francioni, International Responsibility for Environmental Harm, 75 at 103 ff.

assessing, for example, the financial value of a coral reef, which forms the basis of economic activities such as fisheries and tourism, and thus it loss (due to "coal bleaching").[110] It is also well established that personal injury is generally compensable.[111] Enabling recovery of ecological damage is also in line with developments in European Union and municipal law.[112] The most recent EU directive on environmental liability[113] for example only covers damage to ecosystems and biodiversity and excludes other categories of damage such as property and personal injury.

The general acceptance of ecological damage in international law is important as it allows States to claim damages on the basis of changes in the natural environment with the aim of preventing further damage to "hard" assets such as houses or streets. In this sense, the new EU directive on environmental liability expressly covers preventive measures "taken in response to an event, act or omission that has created an imminent threat of environmental damage, with a view to preventing or minimising that damage" (Article 2.10).

Articles 34-38 DASR lay down further conditions for and types of reparation, differentiating between restitution, compensation and satisfaction. At their core is the principle of proportionality, i.e. reparation must not lead to crippling effects on the culprit State.[114] Primarily, the respondent State must re-establish the situation which existed before the wrongful act (Article 35), i.e. provide restitution to the extent that this is not "materially impossible" or disproportionate.[115] In cases of climate change damage, it might in fact be physically impossible to restore the situation *ex ante*. For example, if parts of an island or a country's coastline have been inundated or if temperature change has caused shifts in vegetation zones, restoration will be impossible. In such cases, if and to the extent that restitution is not provided, compensation is due, covering any financially assessable damage (limited by the causation requirement, below). This excludes compensation for moral damages covered by Article 31.2.[116]

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110 This is also the position of the ILC which States that "environmental damage will often extend beyond that which can be readily quantified . . . [but] is as a matter of principle no less real and compensable than damage to property" (note 6 at 252), and of the International Law Association, see ILA, Report of the 64th conference (Rapp. Rauschning) (1990), at 302 ff.

111 Personal injury encompasses not only material losses, but also non-material or "moral damage", see for example the *Lusitania* case (USA v. Germany), Award of 1923, VII RIAA (1956), 32 at 40 ff.

112 See in depth: Kokott et al., Ökologische Schäden und ihre Bewertung in internationalen, europäischen und nationalen Haftungssystemen, 2003, 346 ff.

113 Directive 2004/35/EC of the European Parliament and of the Council on environmental liability with regard to the prevention and remedying of environmental damage of 21 April 2004, OJ L 143/56.

114 Report ILC 53rd session, note 6, 236.

115 The ILC argues that this exemption applies only where there is a "grave disproportionality between the burden which restitution would impose on the responsible State and the benefit which would be gained" (Report ILC 53rd session, note 6, 243).

116 As in domestic legal systems it is a rule of international law that the court or tribunal hearing the merits of a case can also award such damages (see the two-pronged *Chorzów Factory* case, note 12).

The reference point for valuation purposes is the loss suffered by the claimant, usually the property value ("fair market value" or "net book value"). Insofar as restitution and compensation are not satisfactory, satisfaction must be provided. Essentially, satisfaction means some type of acknowledgement of the wrongful act or an apology.[117]

In the context of compensation for climate change damage, the damage category "loss of profits", which is expressly included in Article 36.2 is of particular interest. Since the impacts of climate change are projected/anticipated by climate science, States or private entities may wish to seek redress for devaluation of property or losses due to changes in land use as a result of climate change. For example, if sea level rise is expected to inundate a stretch of coast or at least result in particularly strong risks from extreme weather events (tidal waves), potential users or buyers will take this risk into account when acquiring property rights. Similarly, in cases where land is no longer arable due to, say, reductions in rainfall, not only the loss in value of the land itself may be claimed, but the economic loss associated with the inability to produce agricultural products may be claimable.

The ILC stresses, that *"tribunals have been reluctant to provide compensation for claims with inherently speculative elements"*,[118] and it is well recognised that compensation might not be awarded for lost business, where such damage seems too remote or unsubstantiated (see below, causation).[119] Admittedly, any case resting on a claim of future climate change damage will include estimations of both the impacts and the resulting damage. Still, as long these estimates are based on, e.g. existing income streams or increased costs for insurance policies, a tribunal should not be barred from awarding damages for loss of profits resulting from future damage. As long as a party is able to substantiate a claim, courts can either commission expert studies or, as is common practice in many domestic codes of civil procedure, provide an estimate of the damage themselves, e.g. §287 German civil procedure code (ZPO), which is applied by courts in cases of cumulative air pollution/emissions).[120] This is discussed in more detail in case study nos. 2 and 3 below.

The ICJ naturally assumes the right of injured States to claim compensation and that material jurisdiction for a State responsibility case includes the competence to award compensation. See most recently the *Gabčikovo* case, note 34, at 81. States have frequently also negotiated and agreed on the amount of compensation due, in many cases on an ex gratia basis, i.e. without admitting legal responsibility, see for references Report ILC 53rd session, note 6, 250.

117 On the role of this type of reparation in the context of environmental damage: World Commission on Environment and Development – Proposal of legal principles, Principle 21, 1987, and Barboza, The ILC and Environmental Damage, in: Wetterstein, Harm to the Environment, 73 at 78, listing these as the "customary law approaches" to reparation.

118 Report ILC 53rd session, note 6, 259.

119 See *Trail Smelter* III RIAA (1941) 1911 at 1930 ff and commentary: ILA, Report of the 64th conference (Rapp. Rauschning) (1990), at 300 ff.

120 BGHZ 66, 70, 75 ff. See Ott/Paschke, Ausgleichswürdige Summations- und Distanzschäden am Beispiel der neuartigen Waldschäden, 1997, 305.

In the case of climate change damage, the claimant State will also have emitted greenhouse gases to some extent and thus be partly responsible for the ensuing damage. This issue (contribution to the injury) is regulated in Article 39 DASR which states that where the claimant State (or any individual or entity on whose behalf reparation is sought) has, through wilful or negligent behaviour, contributed to the injury, the extent of reparation must be adjusted accordingly. Thus, contribution to damage will not lead to exclusion of the wrongful act altogether, but could limit the legal consequences flowing from it. Note however that the claimant State would have to have acted negligently – the mere fact that emissions occur everywhere, including in the claimant State, will not reduce the compensation due.[121]

It should be noted that punitive damages are not recognised under international law.[122]

6. Causation

Causation issues are at the core of both criminal and civil law and also form the basis for any international law claim for reparation. There has been no in-depth academic discussion about climate change damage and legal causation issues. However, this issue is clearly of great importance for determining whether for climate change induced damage an obligation to compensate or bear adaptation costs exists[123] in international law. First, this section will define causation as a requirement, establishing the two categories of "causation in fact" and "normative causation". This section serves as a "mind map" for the case studies. It will also present the opinions of the ILC, scholars and courts, with respect to establishing causation in cases of transboundary air pollution. It will then move on to describe approaches to establishing causation in fact, discussing mostly the *sine qua non* or "but for test" as well as the contribution-based approach suitable for cumulative causation as in the case of climate change – introducing another differentiation: general and specific causation in fact.

On the level of general causation, a causal link is then established between human activities and temperature rise, while issues of specific causation and normative causation are deferred to the case studies. The first (scientific) analysis of causation will require a discussion of the legal standard of proof.

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121 Report ILC 53rd session, note 6, 275.

122 See Chile-United States Commission – Decision with regard to the dispute concerning responsibility for the death of Letelier and Moffitt, 31 ILM 1 (1992) at 21 ff.

123 As highlighted in Chapter III, an obligation to bear some cost of the adaptation measures in developing countries exists pursuant to Articles 4.3 and 4.4 FCCC. However, the obligation to bear adaptation costs could also form a specific remedy under the law of State responsibility.

It must be emphasised that damage or injury is not a precondition for the existence of a wrongful act and thus, it is possible to require cessation without showing any causal link aside from the mere breach of an international obligation by a State.[124]

a) *Defining causation*

Establishing causation means establishing a causal relationship between a certain legally relevant behaviour and a loss or injury. In this framework, the legal evidence is inextricably linked to scientific findings and the ability of courts and tribunals to rely on such scientific evidence.[125]

Causation and causality are in fact scientific (natural sciences) not legal terms. This is where the theories of science, philosophy and law meet. While determining a question of law is based on linear reasoning and logic, explaining and determining facts or real-life incidents is normally non-linear and relies on a set of assumptions. Very often, science cannot determine cause-effect relationships with 100% certainty. This is certainly the case for the climate system, which is highly non-linear. It is also true for the many cases involving toxics or drugs, where scientists find only a high likelihood that certain substances cause injury in human beings or the environment. This fact is also the main reason for the establishment of the precautionary principle in environmental law and policy.

There is a fundamental difference between the approach lawyers and scientists take to the issue of causation. Experimental science focuses on the discovery of generalisations and the construction of general theories of causation. By contrast, law attempts to construct causal statements based on particulars, and to that end applies and uses laws of generalisation that stem from the natural sciences as well as common sense.

Following the scientific approach, the cause of an event is the sum of the conditions which are jointly sufficient to produce the event. In real life, there are numerous causes that pre-condition the happening of an event. Therefore, supporters of the "Equivalence Theory" have argued that all conditions that lead to an event are considered causes of that event.[126] Clearly, this is an unsatisfactory result for lawyers who wish to establish the responsibility of a particular individual or State. Thus, causation as applied by lawyers is a social construct, and often does not concern questions of fact. Instead, legal causation is about deciding whether an individual, based on underlying legal

124 See for example BGHZ 53, 245 (250) "jede Partei trägt die Beweislast für all Voraussetzungen einer von ihr in Anspruch genommenen Norm" and Prütting, Gegenwartsprobleme der Beweislast, at 8 ff. For the ICJ practice see Fitzmaurice, The Law and Procedure of the International Court of Justice, Vol. II, 576.

125 See for an inclusive analysis of such issues Sandifer, Evidence before International Tribunals, 1975.

126 On the equivalence theory see Honoré, Causation and Remoteness of Damage, in: Tunc, International Encyclopaedia of Comparative Law, Vol. XI, Torts, 7-58, 7-60 ff.

norms or principles or public policy should be held liable for a certain injury,[127] which individual should be held liable where several actors have contributed to an injury, and whether responsibility in a certain case should be wide or narrow. Various theories to this end have been developed by lawyers in different jurisdictions. These include the "Proximity Theory", the "Efficiency Theory", the "Adequacy Theory", and the "Foreseeability Theory", but there is no agreement between domestic legal systems or in international law on the validity of these theories.[128] In this thesis, this element will be called *normative causation*, whereas the question of whether certain conduct is in fact a pre-condition for a specific event is treated as *causation in fact*. The analysis of normative causation depends on the specific claim and the parties to it, as well as the underlying legal norm or the primary rule breached. Aspects of normative causation are therefore left to the case studies.

b) *The ILC's treatment of causation*

Generally, Article 31.2 DASR addresses the issue of causation – or the customary law need for the existence of a causal link between the internationally wrongful act and the injury. With this provision, the ILC emphasises that *"the subject matter of reparation is . . . the injury resulting from and ascribable to the wrongful act, rather than any and all consequences flowing from an internationally wrongful act"*.[129] While failing to define the legal requirement of a causal link further in its Draft Articles, the ILC indeed discussed the issue in depth, over all the phases of its work leading to the adoption of the DASR and on the issue of "International Liability". In its commentary to the DASR the ILC recognised, as a caveat to the state of international law on the issue, that *"the allocation of injury or loss to a wrongful act [i.e. establishing causation between activity and damage] is, in principle, a legal and not only a historical or causal process"* and that the issue cannot be solved *"by search for a single verbal formula"*.[130] Only a year before the adoption of the DASR, it was in fact suggested that, given the lack of clarity and internationally accepted criteria for establishing the required causal link between activity and injury, the ILC should conduct a *"general study of causation."*[131]

Proceeding to define what criteria might help to establish a causal link between act and injury, the ILC cites phrases used by international tribunals and courts such as *"losses attributable as a proximate cause"*, or *"any direct loss, damage, including environmen-*

127 See for a general analysis Hart, Causation in the Law, 4 ff.

128 Honoré, note 126, 7-20.

129 Report ILC 53rd session, note 6, 227.

130 Report ILC 53rd session, note 6, 227 and 228, respectively.

131 Report ILC 52nd session note 101 at 32. See on this also Rao, 1st Report on the legal regime for allocation of loss in case of transboundary harm arising out of hazardous activities, ILC Doc. A/CN.4/531, August 2003 (55th ILC Session), 42 ff.

tal damage and the depletion of natural resources, or injury to foreign Governments, nationals and corporations as a result of the wrongful act" and, negatively, *"damage which is too indirect remote and uncertain to be appraised"*.[132] The commentary then contends that *"causality is a necessary but not a sufficient condition for reparation"*, and that, to factor in the potential remoteness of injury, attributes such as "directness" or "foreseeability" or "proximity" must qualify the relationship between the wrongful act and the injury. This multitude of suggested criteria suggests that there is no specific established formula or requirement for determining causation in international law. Moreover, the criteria found in international case law and scrutinised by the ILC seem to be aimed not at establishing factual causation, but at restricting liability where (scientifically) a causal relationship has already been established. The "proximate cause" test for example is designed to arrive at a normative statement about whether a factor should be judged to be the cause of an event – it does not answer the question whether the factor has in fact caused or contributed to a certain injury.

c) *Some opinions*

This thesis argues that a causal link can be established between a State's (human) activities and climate change (in particular global temperature rise), as well as in some cases, between anthropogenic climate change and specific types of damage. Still, some have argued that climate change does not fit into the general framework of State responsibility, torts[133] or the civil law of damages because of the difficulties in proving causation. This opinion is mostly based on the legal analysis of liability for long range air pollution with its well-known impacts such as acid rain and forest and soil degradation.[134] *Schachter* was of the opinion that injuries from long-range air pollution could

132 Similarly, at its 52nd session, the ILC argued that "the chain of causality, or "transitivity" must be direct and uninterrupted, whereas the cause might not be immediate", (note 131). See also the separate opinion by Orrego-Vicuña in: Chile-United States Commission, note 122, 22 ff.

133 Tort arises when someone has sustained injury or loss from the acts of another in breach of a duty owed to him by that other, or in contravention of a right conferred on him by law (see Lyall, An Introduction to British Law, 210).

134 Ever since the beginning of industrialisation air pollutants have caused significant amounts of local air pollution, both in Western and Eastern Europe and North America. During the 1960s and 70s, however, high smokestacks plus increasing pollution levels transformed the local problem into a transboundary problem. Crudely speaking, light-weight air pollutants such as sulphur dioxide, nitric oxide and nitrogen dioxide are dispersed widely by way of atmospheric transport while other industrial pollutants, such as lead, cadmium and nickel drop much closer to their source than the gaseous pollutants. The question of whether damages could be claimed by forest and land owners for the detrimental effects of the pollution on their property was the subject of academic discussion. See for an extensive overview of the problem: Alcamo/Runca, Some Technical Dimensions of Transboundary Air Pollution, in: Flintermann/Kwiatkowska/Lammers (eds.): Transboundary Air Pollution: International Legal Aspects of the Cooperation of States, 1; Okowa, note 58, 6 ff.

not be recovered by judicial means because proof of causation and apportionment of responsibility was impossible.[135] For the German civil law framework, *Ott/Paschke* conclude that causation cannot be proved *de lege lata* in cases of long range air pollution from multiple sources, mainly because emitters cannot be identified and no clear casual link can be established between emissions and damage due to the synergetic effects of the pollutants.[136] Behind both these Statements seems to be the belief that neither causation in fact, nor normative causation can be proven.

Boyle has argued that both in the case of long range air pollution and global climate change, where States have opted for regulatory regimes, effective solutions are better provided by co-operative regimes than by inter-State claims for compensation, because of the difficult issues in proving causation and fault.[137] However, *Boyle* also seems to imply that causation issues are not impossible to solve because he proposes the creation of a regime for compensation for environmental damage *"in terms of civil law liabilities of individual actors"*, rather than of States.[138] Such a system would have to overcome the problem of causation. *Durner* also concludes that the law of State responsibility is practically impossible to apply to transboundary air pollution and global climate change because of the complexities in proving causation.[139] Neither of these writers examines in detail whether causation in fact can be shown. In contrast, in the context of US national tort law, both *Grossmann* and *Peñalver* arrive at the conclusion that emitters can be held liable, when applying modern causation theories – in terms of both cause in fact and normative causation.[140]

In its judgment on emissions of air pollutants, the phenomenon of "acid rain", and damage to forest owners, the German High Court argued that because the contributions by multiple emitters cannot be separated, it is practically impossible to establish a causal relationship between particular emissions contributions and damage to trees and soil, and thus to attribute damage to a particular emitter.[141] In this case, a forest owner brought a claim against the public authorities for failure to adequately regulate air pollution. The case was rejected because of the inability to establish fault on the part of the public authorities, not on the grounds of causation. Nevertheless, in the court's opinion, the environmental degradation or interference which eventually

135 Schachter, International Law in Theory and Practice, 1991, 380.

136 Ott/Paschke, note 120, 309 and 523 ff.

137 Boyle, Remedying Harm to International Common Spaces and Resources: Compensation and Other Approaches, in Wetterstein, Harm to the Environment, 83 at 89.

138 Boyle, note 137, at 92.

139 Durner, Common Goods, 54, referring to the problems of concretisation of the no harm rule in this context ("Konkretisierungsprobleme").

140 Peñalver, Acts of God or Toxic Torts? Applying Tort Principles to the Problem of Climate Change, 38 Nat.Res.J. (1998) 563; Grossmann, Warming up to a not-so-radical idea, 28 Colum. J. Envtl. L. (2003) 1.

141 BGHZ 102, 350, (Entscheidungsgründe, 2.a). See for further analysis Ott/Paschke, note 120, 346 ff.

caused damage to the trees of the plaintiff could not be individualised and thus could not be captured by civil law principles. It would be "virtually impossible" for the injured forest owner to identify the polluter and prove that his contribution had caused the claimed damage. It is worth noting that this case applied both substantive and procedural German law, not principles of international law.

For similar injuries, but applying international law, *Okowa* has argued that it is possible to determine the relative causal contribution of States to damage caused and thus to apply State responsibility rules. She examines causation in fact and notes that scientifically air pollution damage (degradation of forests and soils) is caused by multiple factors, thus of the scientific and evidentiary problems associated with apportioning responsibility, only some are due to causal behaviour (normative causation).[142] In *Trail Smelter*, multiple causes did not deter the tribunal in its award of damages. The fact that the injury was at least partially caused by the air pollution originating at the smelter in Trail, Canada appeared to be sufficient.[143]

d) *Causation in-fact – approaches*

To determine whether certain conduct, as a matter of fact, can be regarded as the cause of a specific result or injury, both domestic and international law tribunals and scholars have used the *"but for test"* or the *"sine qua non"* formula as tools to establish causation.[144] In other words, *but for* the act, there would be no loss, i.e. the act is an indispensable condition for the result (*sine qua non*). This formula is however of limited use in instances where multiple actors contribute individually to the legally relevant outcome.

It would be difficult to establish that removing the time-specific emissions of one State actor from the overall climate change equation would have a significant effect on the impacts of climate change. Accordingly, it has been acknowledged that the *but for, sine qua non* and other related tests must be amended where cumulative or contributory cases of causation are concerned.[145]

In domestic civil/or criminal law theory, *cumulative* (or contributory or partial) causation refers to cases where several actors contribute to an injury or event, but no one behaviour is sufficient to bring about the injury. Sometimes it is unclear to what

142 Okowa, note 58, 186 f.

143 *Trail Smelter* III RIAA (1941) 1911 at 1930 f.

144 See on international law: Garcia-Amador, 6th report on State responsibility, 6th report, Yearbook ILC 1961-II, UN Doc A/CN.4/134, 6; Arangio-Ruiz, 2nd Report on State responsibility, Yearbook ILC 1989 Vol. II, Part I, A/CN.4/426, 33. Gray, Judicial Remedies in international Law, 1996, 169. See, on domestic law inclusively, Honoré, note 126, 7-106 ff., for German theory: Palandt, BGB, vor § 249 para. 57 f.

145 This is generally accepted, see for transboundary air pollution Okowa, note 58, 185 ff. and Ott/Paschke, note 120 at 307.

extent these actors contribute to the injury. As envisaged by many legal systems, such tortfeasors, having acted jointly, are also jointly liable.[146] *Alternative* causation refers to cases where several acts by several authors could have led to the damage, however it remains unclear which of the acts was actually decisive in bringing about a certain result. These are cases where, even if the tortfeasors had acted lawfully, the victim would have suffered similar harm.[147] *Additional* (or competitive) causation refers to cases where several acts have caused an injury, while one act would have sufficed to bring about the result.[148] Such acts are each sufficient causes in the legal sense and thus distinguishable from circumstances giving rise to alternative causation.[149]

Climate change (as well as transboundary air pollution)[150] is clearly a matter of cumulative causation. Yet, it is theoretically possible to design a climate model that only takes account of a certain share of emissions. A *sine qua non* relationship could be established by comparing the baseline (describing the world including the pertinent wrongful behaviour) to a model run describing legally relevant behaviour. This kind of exercise is certainly possible, even if the results would depend very much on how this model was designed, including the choice of end dates etc.[151]

Another approach is to establish causation on the basis of a contribution to the problem from a specific actor, and leave the issue of how much of the damage might have been caused by this contribution to the stage of apportioning damages. In other words, if we know climate change is caused by human activities, evidence of a contribution to these pertinent activities is sufficient to establish causation for a particular actor. Indeed, according to some (domestic) causation theories it is not necessary to establish that a specific share of emissions is the sole cause or necessary condition to an injury.[152]

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146 See Esser/Schmidt, Schuldrecht, Band I, 1993, 210 ff., Ott/Paschke, note 120 at 307 ("komplementäre Kausalität"). For a comparative law analysis Hart/Honoré, Causation in the Law, 188 ff and Loser, Kausalitätsprobleme bei der Haftung für Umweltschäden, 1994. For cases in German law see RG 69, 58 and BGH NJW 1990, 2884; in common law *Grant v Sun Shipping Co.* [1948] Appeal Cases (UK) 549 and *Boy Andrew v St Rognwald* [1948] Appeal Cases (UK) 140.

147 See Honoré, Causation and Remoteness of Damage, in: Tunc (ed.) International Encyclopedia of comparative Law, Vol. XI, Torts, 7-126 ff., discussing mainly German and US cases and doctrine.

148 See for the theory in German law BGH VersR 71,819 and 83, 732. For common law see *Anderson v Minneapolis Ry* (1920), 146 Minnesota Supreme Court Reports, 430 and 179 North Western Reporter 45. Loser (note 146) refers to this kind of hypothetical causation as cumulative causation. This terminology is regarded as misleading in the present context and therefore not used.

149 Honoré, note 147, 7-129 ff.

150 See the analysis of Rauschning in ILA, Report of the 64th conference (1990), 296 ff., who speaks of "composite causes".

151 See for an analysis of contribution modelling den Elzen et al., RIVM Report: Responsibility for past and future global warming, 2003. This analysis was undertaken to model regional contributions to observed warming following the "Brazilian Proposal", see Chapter II.

152 It should be noted that, in stark contrast to air pollutants responsible for phenomena such as acid rain, the contributions of countries to present levels of greenhouse gas emissions are relatively well established. Under the FCCC, countries have an obligation to submit greenhouse gas inventories from

That a contribution to the legally relevant outcome can be sufficient to establish causation is accepted in many jurisdictions around the world ("the substantial factor test").[153] For example, the US Restatement (Torts) stipulates that *"a conduct or event in question is a cause in fact of the harm if it is a substantial factor in producing it"*.[154] In US law, "substantial" denotes the fact that the defendant's conduct *"has such an effect in producing the harm as to lead responsible men to regard it as a cause, using that word in the popular sense . . ."*[155] However, the threshold is very low in the context of public nuisance law, as a US court once held in a case against mining companies: *"One drop of poison in a person's cup may have no injurious effect. But when a dozen, or twenty, or fifty, each put in a drop, fatal results may follow. It would not do to say that neither was to be held responsible"*.[156] In German criminal law, an approach to cases of cumulative causation is to hold a person responsible for an increase in risk which then materialises into damage ("Risikoerhöhungslehre").[157] This theory matches the phenomenon of climate change very well, as any emissions will increase the risk of damage by contributing to the increased concentrations of greenhouse gases. In addition, the rationale of § 830 paragraph 1 2nd sentence of the German Civil Code, Bürgerliches Gesetzbuch (BGB), could be applied. This rule was developed especially to overcome evidentiary problems in determining causation.[158] While the majority opinion applies this sentence both to cases of alternative and unclear causation, but not to cases of cumulative causation, i.e. where only activities of various actors together cause the damage (such as climate change),[159] the underlying principle is still interesting. § 830 I 2nd sentence stipulates that if it is impossible to determine which activity in which one of parties involved ("Beteiligte") has caused the damage, each of them shall be responsible for the damage caused. There is no need to demonstrate joint and deliberate activities. The provisions applies in situations where it has been proven that several parties have been involved in relevant activities and that damage was caused, but where it remains unclear whether and to what extent the damage was caused by a particular party

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1990 onwards and data is available for the most important greenhouse gas, CO_2, from 1800 onwards for many industrialised States. These figures are estimated by using emission factors for physical processes such as the burning of coal or the production of cement.

153 Honoré, note 126, 7-108 ff.

154 American Law Institute, Restatement of Torts (Second), §§ 431, 432, 465 (1965). See also in the case of public nuisance § 834 ("One is subject to liability for a nuisance caused by an activity, not only when he carries on the activity but also when he participates to a substantial extent in carrying it on".).

155 Restatement of Torts (Second) § 431 cmt. a (1965). See also § 433. That a third party is also a substantial factor does not in itself protect the actor from liability: § 439.

156 *Woodyear v Schaeffer*, 57 Md 1 (Md 1881) at 9 f.

157 This theory stems from criminal law considerations of causation and attribution and has not been adopted as such as part of the civil law of torts, see Wessels, Strafrecht, Allgemeiner Teil, 55 f.

158 Palandt, 61. Auflage, § 830 para. 7.

159 See discussion in Ott/Paschke, note 120, 527 ff.

(Gesamtkausalität).[160] The rationale behind this provision is that where various activities infringe on the rights and interests of others, the victim should not bear the burden proving whose share caused which damage. In the opinion of the present author, the application of this principle would also be justified in cases of cumulative causation, i.e. in the case of climate change. Several German scholars share this opinion.[161]

While there has not been an international award dealing in-depth with this issue – even the *Trail Smelter* case does not provide insights – the ILC accepted that an unlawful act might not be the exclusive cause of an outcome, and assumed that establishing causation would be possible if the State in question played not the exclusive, but a "decisive" role in causing the injury.[162] Similarly, the ILA suggests that all contributory States be regarded as *"co-authors of the inadmissible harm",* which would suffice as a casual link.[163] Thus, these two important international law bodies agree that a finding of causation on the basis of contribution rather than a strict *sine qua non* test is permissible.

A finding of causation in fact on the basis of contributions or, in essence, an increase in risk, also makes sense from the point of view of the 'Equivalence Theory' (see above). This theory declares every condition or occasion a cause for a particular result. The equivalence theory is not supported in many legal systems, but it is often used as a first step in the determination of causation. Indeed, all greenhouse gas emissions are have the same potential for creating the ensuing problem of anthropogenic climate change. This approach also corresponds to the scientific view which logically states that the sum of conditions is the cause of an event. In other words, this approach would find that a *sine qua non* relationship exists if the harm would not have occurred as and when it did in the absence of the condition,[164] while in no way pre-empting a limitation of responsibility by way of normative causation. This could indeed be shown, at least theoretically – in the absence of any emissions, the radiative forcing of the atmosphere and ensuing temperature rise would be different from a situation including the legally relevant contribution.

It should also be noted that use of this approach, which amends the *but for* and *sine qua non* tests, would be perfectly plausible in an international tribunal in the absence of an agreed international approach for establishing causation in fact. This

160 See BGH NJW 1996, 3205. This rule is applicable also to the statutory cases of strict (non-fault) liability, BGH ZIP 1999, 1560 ff. See also Münchner Kommentar zum BGB (Grunsky), Vor § 249, para. 50.

161 See Gmehling, Die Beweislastverteilung bei Schäden aus Industrieemmissionen, 217 ff. and Loser, note 146, 196 ff.

162 Arangio-Ruiz, note 144, 14.

163 Note 150 at 297.

164 This is also the approach taken by the International Law Association, see Report of the 64th Conference, 1990 (Queensland) 294: "not the same extent [of damage would] have occurred".

is not a matter of *non-liquet*[165] – should such a concept exist in international law[166] – but a necessary procedure for applying the rules of State responsibility. Yet, if a causation analysis were to operate on the basis of contribution rather than the *but for* test, some qualification of the contribution might be necessary. For example, as with the US domestic approach, a "substantial contribution" might be required. It is worth nothing that an international tribunal would not have to follow this approach. After all, the "substantial" criterion is nothing more than a particular way of restricting causation in fact on the basis of justice or equity considerations (i.e. the outcome of this approach is a blurring of the distinction between causation in fact and normative causation).

This thesis will proceed to establish causation on the basis of contribution to the problem, i.e. as a problem of cumulative causation. A more detailed discussion of issues of causation in fact is also undertaken in the context of the case studies.

e) *Climate change damage – a preliminary case for establishing general causation*

At the level of causation in fact, a (preliminary) case can be made for the first link in the causal chain, the one between human behaviour (greenhouse gas emissions) and climate change. In this context it is useful to distinguish between general and specific causation. General causation requires proof that anthropogenic emissions cause changes in radiative forcing and thus the global climate, specific causation requires proof that a particular impact or injury is attributable to (particular) anthropogenic emissions or to the global warming caused by them.

This kind of distinction can be observed in the *Trail Smelter* case. Even though the Canada's responsibility for the damages had been presumed in the Dispute Settlement Convention concluded between the USA and Canada in 1935,[167] and previous judgments regarding the damage caused by the sulphur dioxide emissions from the smelter had been issued, the tribunal went through a substantial fact finding exercise to establish

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165 *Non liquet* = "it is not clear". In its legal application the term refers to the finding of a court that the law does not allow a conclusion; that the law is insufficient to decide the question before it, i.e. the failure of a competent court to decide the merits of an admissible case (Fitzmaurice, G., The Problem of Non-liquet, Melanges offert à Charles Rousseau, Paris, 1974, 92 at 93, see *SS Lotus*, PCIJ Series A No.10 (1927), 18). There is a scholary debate about whether *non liquet* exists in international law, and under what conditions legal principles could fill gaps, without leading to legal activism (see Stone, J., Non Liquet and the Function of Law in the International Community, 35 BYbIL (1959) 135 and Aznar-Gómez, The 1996 Nuclear Weapons Advisory Opinion and Non Liquet in International Law, 48 ICLQ (1999) 3).

166 See the dissenting opinion of Judge Higgins in the *Nuclear Weapons* Advisory Opinion, where is it argued that the ICJ had in fact declared *non liquet* on the main issue of the merits (Legality of the Threat or Use of Nuclear Weapons, ICJ Rep. 1996, 226 at 583). See also the discussion in Aznar-Gómez, note 165.

167 US Treaty Series No. 893 and III RIAA 1907.

causation. The general causal link between the sulphur dioxide emissions and the damages to US soil was not questioned. Instead, the tribunal was asked to determine whether *"the damage caused by the Trail Smelter . . . has occurred since the first day of January 1932 and if so what indemnity should be paid"*. Thus in effect, the tribunal dealt only with issues of specific causation and how to determine which categories of damages should be compensated. In the course of this exercise, the tribunal had to tackle questions such as whether the damage done by sulphur fumigation could be distinguished from other factors, to what extent the fumigation had caused which particular damage and how to deal with natural circumstances in the Columbia River Valley. This kind of analysis is only possible in the context of a specific case and thus further discussion is deferred to the case studies.

Nevertheless, as a first step, it can be shown that human activities cause climate change, and in particular cause rising surface temperatures globally. The IPCC is 90-99% confident that global mean surface temperature has increased by 0.6°C (± 0.2°C) and has Stated that *"in the light of new evidence and taking into account the remaining uncertainties, most of the observed warming over the last 50 years is likely (66-90% confidence) to have been due to the increase in greenhouse gas concentrations"*,[168] i.e. attributable to human activities. This finding has since been much substantiated and reinforced.

Admittedly, this kind of statement cannot be made with 100% certainty. All scientists ever observe directly is weather, meaning the actual trajectory of the system over the climate indicator (e.g., temperature, precipitation) during a limited period of time, and not "climate", and given the finite nature of observations and the imperfections inherent in models, scientists will never be absolutely certain of how it is changing. Still, this uncertainty can be *"rigorously quantified, allowing formal probabilistic attribution statements"*.[169]

Of importance is the fact that the anthropogenic origin of greenhouse gases in the atmosphere is certain because, the fossil fuel origin of CO_2 can be chemically detected,[170] and the so called F-gases are purely of anthropogenic origin. This observational statement is supplemented by a negative one, which is of explanatory character: the warming over the last 100 years is very unlikely to be due to climate variability alone (1-10% chance), i.e. natural forcings are unable to explain the observed warming in the second half of the 20th century. This is illustrated by figure V.1, taken from the IPCC TAR.[171]

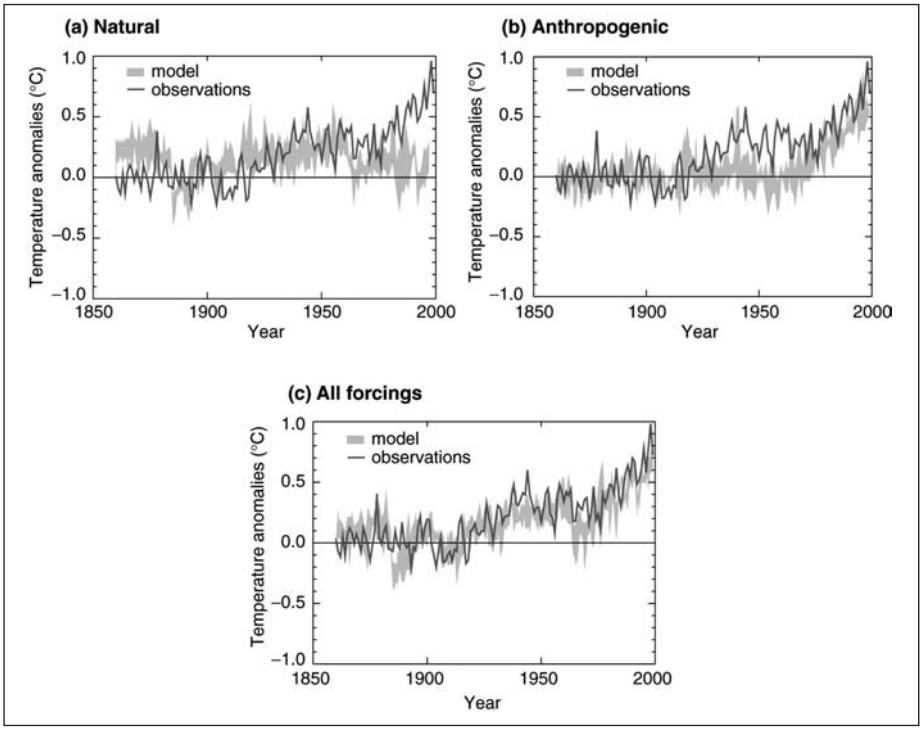
168 TAR WG I, 10.

169 See Allen, Liability for climate change, 42 Nature (2003), 891.

170 See TAR WG I, 92, referring to the changing isotopic composition of atmospheric CO_2.

171 TAR WG I, Summary for Policymakers, 11.

Simulated annual global mean surface temperatures



In all figures, the observed temperature curves are the same. Figure (a) shows that the observed temperature changes cannot be explained by models only including natural forcing such as solar irradiance and volcanic eruptions. Instead, from the 1950s onwards, these factors, based on the best judgment of climate scientists, would have led to a general cooling trend. Figure (b) shows that anthropogenic forcing (i.e. increased concentrations of greenhouse gases) corresponds to the observed temperature trends. When the models take into account both natural and anthropogenic forcing (c), the results are almost identical to the observed trends. This is compelling evidence that human activities are responsible for a large proportion of the observed warming in the past 50 years.

Moreover, the statistical analysis of global temperature change undertaken by *Schönwiese et al.*, which is based on observations rather than models, has shown with over 99% certainty that human behaviour is responsible for 60-70% of the observed warming.[172] In other words, changes already observed in climate are not just due to

172 See Grieser/Staeger/Schönwiese, Statistische Analysen zur Früherkennung globaler und regionaler Klimaänderungen aufgrund des anthropogenen Treibhauseffektes. Kurzfassung, 14 ff. This study takes

natural climate variability but are caused by human beings emitting greenhouse gases (i.e. human activity). The IPCC has also found (with 67-95% confidence) that changes in temperature have already had discernible impacts on many physical and biological systems, and there is scientific consensus (more than 95% confidence) about the fact that damage to both biological and human systems will occur, regardless of any emissions reduction efforts undertaken by the international community in the future.

f) *Standard of Proof*

Given that the weight of international consensus on scientific evidence has already established a causal link between human activities and temperature rise in the second half of the 20th century, the next conceptual question is: would such evidence be accepted by an international tribunal to establish causation? The answer to this question turns on the standard of proof that would be applied and the factors that a tribunal might take into account in approaching causation. The only possible argument that such evidence would not be accepted is that all statements regarding climate change inherently involve uncertainty (see Chapter II) due to the non-linearity of the system, imperfect models and knowledge and as such cannot be relied upon by a court of law. On the basis of current science, this argument could only be persuasive if the standard of proof required by an international tribunal were similar to that for criminal proceedings, i.e. full proof or "beyond a reasonable doubt".

In domestic jurisdictions, thresholds of proof vary from certainty or probability bordering on certainty to a preponderance of probability standard. While he German civil law system and others operate on the principle of "full proof" (Vollbeweis), the courts must generally form their opinion on the basis of all the evidence presented (e.g. § 286 German Civil Procedure Code) and high scientific probability of a fact can form the basis for the conviction of the court that the fact is true.[173] In common law countries, while proof on the balance of probabilities might suffice in general, the court must be convinced of a fact if it is to base a judgment on it (also referred to as the "more-likely-than-not" or "preponderance of evidence" standard).[174] This "51%" threshold is also advocated for civil law systems like Germany in cases of unclear causation and environmental risk.[175] In common law, this standard has led to many toxics

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into account all potential causes for the observed global temperature rises in the 20th century and concludes that neither solar/volcanic activity, variability nor any other causes can explain up to 70% of the observed warming (based on observational data from Europe). Importantly, this is a statistical (rather than modelling) evidence, which tribunals are familiar with from toxics and medical cases.

173 See for the strict standard of evidence Ott/Paschke, note 120 at 306, which has been qualified by the German High Court once, applying a more lenient standard to causation in a 1978 judgment (BGHZ 70, 102).

174 See Honoré, note 126, 7-201 ff., Loser, note 146, 205 ff.

175 See Prütting, Gegenwartsprobleme der Beweislast, 108 f.

and medical cases being brought and won on the basis of statistical evidence stating a higher than 51% likelihood that a specific substance has caused a specific injury. Where this threshold could be met, plaintiffs were entitled to full compensation.[176]

It is difficult to ascertain a required quantum of proof on the basis of the existing jurisprudence of international tribunals and courts,[177] but there is no evidence that full proof would be required. In *Corfu Channel* the ICJ indicated that some degree of certainty would suffice as proof, such as the "on the balance of probabilities" approach. With respect to the allegations made by Albania that the mines in the channel (which led to the destruction of British warships) had actually been laid by another State, the court emphasised that *"a charge of such exceptional gravity against a State would require a high degree of certainty"*.[178] On the other hand, despite the fact that it could not be established with 100% certainty that the mines were actually the cause of the damage or even in the channel before the explosions, the court ruled that the damage had been caused by them. In *Corfu Channel*, circumstantial evidence was also explicitly allowed and in *Trail Smelter* the tribunal did not insist on absolute certainty of proof, either. Naturally, the quantum of proof required might differ from forum to forum. As *Cheng* shows, tribunals exercise complete freedom to admit and evaluate evidence so as to *"arrive at the moral conviction of the truth of the whole case"*[179] and to aid this process allow for sufficient certainty, a tribunal might also commission independent expert advice, such as that allowed by Article 50 ICJ Statute and Article 67 of the ICJ Rules of Procedure.

In a climate change case, given the complexity of the evidence likely to be placed before a tribunal, it might also be wise to remember the words of Judge *Azevedo* in his dissenting opinion in the *Corfu Channel* case: *"It would be going too far for an international court to insist on direct and visual evidence and to refuse to admit, after reflection, a reasonable amount of human presumptions with a view to reaching that State of moral, human certainty with which, despite the risks of occasional errors, a court of justice must be content."*[180]

Other principles and instruments in international law underpin the finding that a claim relating to climate change damage would not be dismissed on the basis that the scientific evidence (on this first-tier level only) is not certain enough. For example, Article 10 of the 1993 Council of Europe Convention on Civil Liability[181] clearly enables a finding of causation on the basis of probability. When determining the causal

176 See Goldberg, Causation and Risks in the Law of Torts: Scientific Evidence and Medicinal Product Liability.

177 See for a discussion in international practice until 1952 Cheng, note 300, 302 ff., until 1985 Fitzmaurice, The Law and Procedure of the International Court of Justice, Vol. I, 126 ff. and Vol. II, 575 ff.

178 *Corfu Channel*, Merits, 1949 ICJ Rep. 4 at 17.

179 Cheng, General Principles of International Law, 307.

180 ICJ Rep. 1949, 4 at 90-91.

181 1993 Lugano Convention on Civil Liability for Damages Resulting from Activities Dangerous to the Environment, 32 ILM 1228 (1993), not in force, see also Chapter IV.

link between "the incident and the damage" or "the activity and the damage" Article 10 enables the court to take "due account of the increased danger of causing such damage inherent in the dangerous activity". This implies that even if proving causation in a specific case is difficult, the probability that an activity will lead to some kind of impact would allow the court to link the activity to the damage. Article 10 in fact contains a sort of presumption of causation if it can be shown that an increased danger of causing such harm is inherent in the activity.

The precautionary principle also has a bearing on this issue. Given the fact that it is provided for in the FCCC and that the FCCC has near universal membership, it should be applicable to any climate change related dispute. While the relationship between the precautionary principle and State responsibility has yet to be fully defined,[182] it has already been used by tribunals to reverse the burden of proof or effectively lower the standard of proof. This was done in the *Southern Bluefin Tuna* case before the International Tribunal of the Law of the Sea.[183] As discussed in Chapter III, there is support in the literature and amongst (international) judges for the proposition that the precautionary principle indeed leads to a reversal of burden proof. While the burden of proof is a matter different from that of the standard of proof, the application of the principle in this sense would mean that defendant States would be required to prove that their activities (greenhouse gas emissions) had not led to the injury of the claimant State. This is an interesting prospect, given the fact that climate science will always remain riddled with uncertainties.

In fact, a reversal of the burden of proof has been suggested by the German advisory council on global change (WBGU) for all cases of environmental damage and risk. Aside from opting towards the balance-of-probability rather than the full-proof-standard, it has drawn on German law examples which reverse the burden of proof (§ 6 of the Environmental Liability Act, UmweltHG) and the draft German Environmental Code (Article 176 paragraph 1) which proposes an assumption of causation where, given the circumstances of the specific case, the balance of the evidence suggests that the damage has been caused by an action relevant to the case.[184] Easing the burden of proof is applied in various legal systems particularly in the context of environmental damage.[185] In a case of water pollution the German High Court for example stated that as long as a particular substance was generally capable of causing the relevant damage in conjunction with other substances, causation would be presumed.[186]

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182 Tinker, State Responsibility and the Precautionary Principle, in: Freestone/Hey, The Precautionary Principle in International Law, 1996, 53 at 57.

183 The *Southern Bluefin Tuna* Case (New Zealand v. Japan, Australia v. Japan) Request for provisional measures, Order of 29th August 1999 (<http://www.itlos.org>); see for commentary Marr, The Southern Bluefin Tuna Case, 11 EJIL (2000), 815.

184 WBGU, World in Transition: Strategies for Managing Global Environmental Risks, Annual Report 1998, 221 ff.

185 See Loser, note 146, 159 ff.

186 BGHZ 57, 257 at 262 ("Hühnergülle-Fall").

Were a full reversal of the burden of proof not accepted, in a climate-related case it would be difficult for States to argue that full proof was required. The Parties explicitly acknowledged that climate change can be caused by anthropogenic emissions when they signed the FCCC, this being the underlying reason for conclusion of this Convention in the first place.

In addition, confronted with the question of whether human activities caused climate change, an IPCC scientist acting as an expert witness in accordance with, for example, Article 62 of the ICJ Rules of Procedure, would most certainly answer the question in the affirmative.[187] This kind of evidence would be permissible and persuasive – especially given the technical nature of climate change science and its systematic inherent uncertainties. Here, the weight of IPCC reviewed science rather than individual views, as discussed in Chapter II would come to bear.

Taken together, therefore, it is the view of the present author that certainty ranges like those employed by the IPCC would suffice to establish a causal link between human activities, i.e. emissions of greenhouse gases, and temperature change. Whether such scientific evidence also exists for precise, local impacts will be discussed in the context of the case studies.

g) *Concurrent causes and the role of the situation ex-ante*

Besides the general criteria for establishing causation, a generic problem of particular importance exists in the context of climate change damage and causation – the issue of "concurrent causes". Concurrent causes are conditions for an injury which are not the result of internationally wrongful acts. In a claim for climate change damage a tribunal will almost certainly have to take into account concurrent causes and decide on their role in the question of causation. First, emissions from many sources and over long periods of time accumulate in the atmosphere, eventually leading to damage. However, much of the accumulated volume was not necessarily caused by wrongful acts. Second, climate change damage will often bear some relation to impacts from other causes, such as the overuse of natural resources, which could lead to soil erosion or the increased exposure of coastal lands resulting from the eradication of mangroves. In cases like these, other causes have rendered a natural system vulnerable, with climate change only providing an additional stress. Third, climate variability will in many cases be a concurrent cause in that it is the "noise" against which climate change has to be detected.[188]

187 International Court of Justice, Rules of the Court (1978), as amended on 5 December 2000, available at <http://www.cij-icj.org>.

188 These instances must be separated from the situation where several States can be held responsible for a certain injury (plurality of responsible States). This issue, i.e. the position of multiple wrongdoers towards the victim State and amongst themselves, is discussed below.

The question that must be asked is: Would the existence of concurrent causes that are not the result of internationally wrongful acts limit an injured State's entitlement to recover compensation from just one State? Some statements taken from the ILC's report assist in answering this question. In particular, the ILC concludes that *"international practice and the decisions of international tribunals do not support the reduction or attenuation of reparation for concurrent causes, except in the cases of contributory fault"*.[189] For support, the ILC cites the ICJ's *Corfu Channel* case, where damage to UK ships was caused both by the action of a third State in laying the mines and the action of Albania in not warning of their presence, yet the UK was entitled to recover full compensation.[190] The ILC further concludes that *"such a result [as in the Corfu Channel case] should follow a fortitori in cases where the concurrent cause is not the act of another State (which might be held separately responsible) but of private individuals, or some natural event such as a flood"*. Thus, *"unless some part of the injury can be shown to be separable in causal terms from that attributed to the responsible State, the latter is held responsible for all the consequences, not being too remote, of its wrongful act"*.[191] This is comparable to the common law principle of nuisance where the defendant is responsible for the nuisance as a whole, regardless of whether or not he created it, once he knows or should have known of its existence and fails to take reasonable precautions to abate it.[192] Indeed, citing the *Zafiro* arbitration as precedence[193] the ILC suggests that the onus should be on the respondent State to show what proportion of the damage is not attributable to its behaviour, rather than the burden being on the injured State to show how the different causes interact.

If the ILC's view were to be applied in the context of climate change, the answer to the question posed above would be a clear no: the existence of concurrent causes of climate change damage that are not the result of internationally wrongful acts do not limit an injured State's entitlement to recover compensation from one particular State.

There is no reason why this principle should not be applied, firstly, to concurrent causes, i.e. the existing vulnerabilities of systems prior the occurrence of climate change damage. For example, a coral reef might already be under stress from tourism or fisheries with rising water temperatures (due to climate change) destroying the reef altogether. The wrongdoer cannot argue in this case that the duty to provide reparation should be eased. Rather, the relevant State would be required to bear the full consequences of its wrongful behaviour in a given situation. In domestic tort law, an often cited example is an attack on a person with a pre-disposition ("soft skull") lead-

189 Report ILC 53rd session, note 6, 229.

190 *Corfu Channel*, Assessment of Amount of Compensation, 1949 ICJ Rep. 244 at 250.

191 Report ILC 53rd session, note 6, 230.

192 For English Tort Law: Winfield & Jolowicz on Tort, 1998, 506 ff. Winfield/Jolowicz also quote a case for the proposition that in such case, "[t]he burden of proof would appear to lie upon the plaintiff" (*Sedleigh-Denfield v O'Callaghan*) A.C. (Appeal Court) (1940) 880, at 887, 899, 908.

193 "The Zafiro" (Great Britain v. United States), RIAA Vol. VI (1925) 160 at 164 f. (*Zafiro*).

ing to the person's death. The same wrongful behaviour inflicted on another person would not lead to serious injuries or death, but the tortfeasor cannot use the person's pre-disposition as a defence.

Similarly, climate variability is an inherent natural feature which cannot be influenced and which predetermines what effect climate change will have on a given system. The wrongdoing State cannot argue that it is not responsible for the situation created by climate variability (for example, an El Niño event) – it has to accept the situation as it is just as the victim of the impact does.

A second question is whether this principle is applicable to historic emissions and current emissions of third party States in light of the wrongful contribution of a State? There are two possible approaches to this question.

On the one hand it could be argued that a State must accept the legal consequences of its breach on the basis of the situation that prevailed when the breach occurred, similar to the reasoning just given in the case of the coral reef. For example, if a State which does not comply with the reduction targets of the Kyoto Protocol by 2012, it must accept that its "excess" contribution led to even higher concentration of greenhouse gases, already at dangerous levels. In tort theory, a tortfeasor is always held responsible for the entire damage, even if some of part of his behaviour was not unlawful. For instance, where the driver of an automobile, travelling at excess speed, collides with a pedestrian, he would be obliged (even in the absence any strict liability rules) to bear the full cost of the personal injury suffered by the victim, not just that proportion caused by his excess speed. In addition, from a fairness perspective: If there are no other wrongdoers, it would be inequitable for the victim State to be left with only a proportion of damages remedied.

On the other hand, it could be argued that greenhouse gas emissions accumulate in the atmosphere, and jointly contribute to damage. There is no point at which a particular share of emissions from the territory of a particular State could be the entire source of damage, or even cause a particular effect on the climate system.[194] In this way, the situation is different from the (non-climatic) causes just explored (the coral reef and automobile driver examples). In those two instances the particular wrongdoer triggered the ensuing damage. It is also different from the situation in the *Corfu Channel* case where a warning from Albania would have prevented injury entirely, not just in part.

Causation theories, such as adequacy or scope of the rule (see discussion below), propose that a wrongdoer should only be held responsible for his share in the wrongdoing.[195] If it is likely that even without the wrongdoing of a particular State some

194 As science tells us, this could be the case in the future, if, with a specific concentration level, overall feedback effects become so strong that today's climate system collapses entirely.

195 This approach seems to be taken by German courts in cases of multiple, accumulating causes. If damage is caused by several emission sources and the damage is only aggravated by a particular contribution, the contributors will only be liable proportionate to their share. See BGHZ 66, 70; NJW-RR 1986, 688.

damage would have occurred (depending upon the specific case and primary rule breached), it might be unreasonable to hold a State responsible for all of the harm suffered by the affected State. If this position were adopted, the defendant State would be held liable only for "its" wrongful share of the contribution to the problem. This could be done by calculating the contribution to temperature rise as suggested in section d) above. This would mean that the victim State would not be able to seek redress for the full extent of its injury under any circumstances.

The analysis of causation will be taken up again more specifically in the case studies each of which provides a concrete causation argument. At this point, various other aspects of the law on State responsibility will be explored, including the issue of multiple responsible parties which was touched on briefly above.

7. *Ius cogens* and *erga omnes*

Particular problems during the ILC's codification of the international law of State responsibility were *ius cogens* norms, i.e. norms of international law from which no derogation is permitted (cf. Article 53 VCLT, also called peremptory norms)[196] and *erga omnes* obligations, i.e. obligations owed to the international community as a whole. The preservation of the climate system has been made the common concern of mankind and therefore, scholars contend that climate protection duties are actually of *erga omnes* character.[197]

With respect to *erga omnes* obligations (which often overlap with, or are even identical to, *ius cogens* norms)[198] the ICJ established in the *Barcelona Traction* case that a distinction should be drawn for the purposes of State responsibility between breaches of bilateral obligations and breaches of *erga omnes* rules, the enforcement and compliance of which every State has an interest.[199] Following the view that the protection of the climate system is an *erga omnes* obligation, all States are able to invoke State respon-

196 Examples are the prohibition of the use of force, genocide, slavery and racial discrimination. See Barcelona Traction, Light and Power Company (ICJ Rep. 1970, 3, 32 (*Barcelona Traction*)) and Brownlie, Principles of Public International Law, 514 ff.

197 Most prominently argued by Kirgis, Standing to Challenge Human Endeavors that Could Change the Climate, 84 AJIL (1990), 525; see further Durner, Common Goods, 240 f. Durner has also suggested that climate protection might form an obligation *ius cogens*, 268 ff.

198 The latter position is taken in Judge Weerramantry's seperate opinion in the *Gabcicovo* case, ICJ Rep. 1997, 7 at 117 ff. The debates in the ILC show that there is no consensus about these concepts being identical: "obligations *erga omnes* could not necessarily be equated with fundamental obligations, peremptory norms or *jus cogens*", Report of the ILC, 52nd session, note 101 at 40. For in-depth discussion see Kornicker, Ius Cogens und Umweltvölkerrecht, 1997.

199 Note 196. This was repeated by the ICJ in numerous cases, see e.g. East Timor (Portugal v. Australia) 1995 ICJ Rep. 90, 102 and Legality of the use of nuclear weapons (Advisory Opinion) 1996 ICJ Rep. 226, 258.

sibility for breaches of obligations directed at preserving the climate system, such as Article 2 and 4.2 FCCC or the Kyoto targets, regardless of injury.

Similarly, the ICJ has acknowledged the special role *ius cogens* obligations play in the international legal order although there is no established international law position on what kinds of legal consequences should arise if a State violates these rules. The ILC's approach to these concepts it therefore a remarkable innovation.[200] Initially, to mark the contrast between the various rules, the ILC had suggested a distinction between international delicts and international crimes. The old Article 19 in the 1980-version of the Draft Articles provided that an "international crime" may result from various serious breaches of international obligations, including the prohibition of "massive pollution" of the atmosphere or the seas (and more conventional obligations such as maintenance of international peace, the right to self-determination, prohibitions of slavery and genocide). However, the ILC recognised that special penalties for such "crimes" are as yet not part of international law, and that the distinction would thus be fruitless.[201] While the concept of international crimes was abandoned, the ILC clearly operated on the basis of a common understanding that the protection of certain natural resources and spheres were of common interest and thus of an *erga omnes* character, which supports the conclusions by *Kirgis* and *Durner* referred to above.[202] Nevertheless, the ILC did not take a view on whether the behaviours listed in the former Article 19 actually form part of the body of *ius cogens*.

Articles 40 and 41 DASR (complementing the general rules on legal consequences in Articles 28-39) provide for specific consequences where a State has grossly and systematically breached a norm of "peremptory" character ("serious breach"). In particular, States must co-operate to bring an end through lawful means to any serious breach (Article 41.1) and abstain from recognising or supporting situations arising from serious breaches (Article 41.2). At the very least the latter consequence already forms part of customary international law.

Erga omnes obligations are explicitly covered by Article 48. This provision allows States to invoke State responsibility if the obligation breached is a) owed to a group of States and is established for the protection of a collective interest of the group or b) owed to the international community as a whole. The State not directly injured can demand cessation and performance of reparation for the benefit of the injured State. Thus, any State would be entitled to invoke State responsibility and demand cessation and reparation where a State breaches its climate protection duties.

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200 Shelton, note 91, 842.

201 See commentary Report ILC 53rd session, note 6, 279 ff. and discussion in Report ILC 52nd session, note 131, 33 ff.

202 Okowa (note 58) has also argued that the prohibition of massive air pollution is an *erga omnes* obligation, the breach of which would entitle all States to resort to international law remedies, including self-help (countermeasures), at 61 f. and 212 ff., with further references.

It has been debated among scholars whether reparation can be sought if no State is directly injured, i.e. in cases of damage to the global commons such as the high seas or the atmosphere. Obligations in the common interest such as environmental duties are comparatively new and might, in as much as they are *erga omnes* obligations, not make much sense unless States can act as "trustees" and enforce them through the rules on State responsibility. The ICJ, in its *Barcelona Traction* case was seen to be in favour of the possibility of this reason behind invocation. Moreover, the practice of international tribunals such as the European Court of Human Rights shows that direct injury is not necessarily a precondition for standing.[203] Article 48.2 DASR is progressive and goes beyond traditional State practice in that it recognises the need for reparation regardless of the existence of an injured State. The ILC did not depart however from more fundamental principles. For example, even though Article 48(b) refers to "the international community as a whole" and not to the "international community of States as a whole" (as provided in Article 53 VCLT), the ILC – in line with current State practice – did not intend to recognise any right of non-State entities to rely on the law on State responsibility to enforce *erga-omnes* norms.[204] Thus, for example, the international network of non-governmental organisations concerned with global climate change (Climate Action Network) would not be able to challenge a State for breach of its climate protection duties, despite the fact that these duties are owed to the international community as a whole.

This aspect of the rules on State responsibility is not crucial to this analysis, since it is assumed that specific climate change damage can be claimed, as a result of State behaviour, by individual States, making reliance on Article 48 DASR unnecessary.

8. Plurality of responsible States

Climate change is the result of a multitude of emissions and emitters. It is evident that any analysis of State responsibility for climate change damage must make some suggestion as to how to divide responsibility, or, in fact, how an injured State should select a defendant where more than one State has committed a wrongful act. This is a distinct issue, not to be confused with the surrounding concurrent causes discussed above.

Article 47 DASR stipulates that where several States are responsible for the same wrongful act the "responsibility of each State may be invoked in relation to that act". Thus, a State's responsibility is not diminished or reduced by the fact that one or more other States are also responsible. While this appears to mirror the domestic common and civil law principle of joint and several liability, the ILC makes this analogy "with

203 See Brown-Weiss, Invoking State Responsibility in the 21st century, 96 AJIL (2002) 798, 805 ff.

204 See Brown-Weiss, note 203, 800 ff.; Report ILC 53rd session, note 6, 323, discussion in: Report ILC 52nd session, note 101, 41 ff.

care".[205] In fact, Article 47 DASR only applies to instances where several States are responsible for "the same wrongful act" and not to instances where several States independently commit acts that contribute to a (possibly indivisible) harm. The latter most likely would be the case in a climate change related claim – for example, one State might infringe the FCCC, and another the no harm rule. Hence, the DASR does not provide a solution to the issue of several polluters or responsible States. This can be explained by the fact that, as *Okowa* puts it, international law *"has not developed sophisticated rules and procedures for adjudicating and apportioning responsibility between States in the position of multiple tortfeasors"*.[206]

Principally, in international law a State remains individually responsible for conduct which is attributable to it. The first question that emerges from this situation is whether and how contributions to harm can be assessed. This is a technical issue which will depend on the primary norm being breached and the extent to which other States are also responsible, i.e. have committed a wrongful act. While this will be discussed further in the first case study, it is worth examining now whether the principle of independent responsibility precludes the injured State from recovering the full measure of were not able to join all States committing the wrongful act prior to making a claim to an international tribunal. This is a legal question which is vitally important to the success of the claimant State.

The analysis of this question revolves primarily around the legal construct of joint and several liability, which would allow a State claiming climate change damage to seek full compensation from any one State found to have committed a wrongful act, independent of that particular State's contribution to the harm. In the 1955 *Aerial Incident* case, the USA relied on joint and several liability concept in its claim against Bulgaria for the full amount of damages, despite the fact that other States had contributed to the injury incurred.[207] It claimed that in all civilized countries, this rule existed and thus should qualify as a general principle of law in the sense of Article 38.1(c) ICJ Statute. However, *Brownlie* finds absence of State practice and ignorance in international law literature on this issue generally and therefore concludes that joint and several liability as a concept does not exist in international law.[208] This conclusion is not shared by the ILC, and given the existence of the concept in almost all domestic legal systems, some accepted principle of law easing the victim's procedural burden appears discernible. The following sections discuss both the domestic and international law approaches to plural responsibility, concluding that international law does not exclude the application of such a concept.

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205 Report ILC 53rd session, note 6, 314.

206 Okowa, note 58, 198. This is also the position of the ILA, Report of the 64th conference (Rapp. Rauschning) (1990), at 297.

207 Aerial Incident (United States v. Bulgaria), Memorial of 2 December 1958, in: ICJ Pleadings, Aerial Incident of July 1955, 229.

208 Brownlie, State responsibility, 189.

a) *Domestic law approach*

In most domestic legal systems, the general principle behind the joint and several liability or solidarity concept allows a victim to recover the full measure of damages from one tortfeasor notwithstanding the presence of concurrent causes or additional tortfeasors (liability *in solidum*).[209] For example, German civil law provides that where several actors have caused harm, be it as tortfeasors or in a contractual relationship, they are jointly liable for the all damage caused, and are left to settle apportionment of their loss amongst themselves on the basis of §§ 840, 421, 426 of the German Civil Code (BGB): joint and several liability or "Gesamtschuldnerschaft".[210] This approach is also applied to torts in common law jurisdictions, where it is sometimes referred to as the "unitary harm" concept. Similar to the German provisions, the English system (Civil Liability Contribution Act of 1978), as well as others, has established statutory provisions to regulate relationships between various tortfeasors.[211] Therefore, in instances of cumulative causes (such as climate change), multiple actors or indivisible (unitary) injury, such as death or bodily harm, domestic law generally allows one wrongdoer to be held responsible for full damages even if he only contributed to the legally relevant outcome, i.e. was not its sole cause. In the Swiss system, even a minimal contribution to the legally relevant outcome is sufficient, where the small contribution represents a tort,[212] i.e. a wrongful act in the international law equivalent. In a system employing the joint and several liability concept, the person found liable has indemnification rights with respect to his fellow wrongdoers.

The policy reason underlying this concept is evident: as soon the victim is able to show wrongdoing resulting in injury, justice requires that he be made whole without bearing the additional burden of finding and suing all potential tortfeasors or wrongdoers. In addition, the victim should not be made to bear the burden of the risk that one or more of the wrongdoers is insolvent. Instead, this risk will be borne by the other defendants who are jointly and severally liable.[213] Clearly, the application of this concept would be beneficial in a case of State responsibility for climate change damage.

Nevertheless, even at the domestic level, this area of law is intrinsically complex, simply because more than two parties are involved, making any lawyer's work more difficult and more costly than the usual bilateral conflict. This is particularly true for

209 See Weir, Complex Liabilities, in Tunc (ed.) International Encyclopedia of Comparative Law, Vol. XI, Torts, Chapter 12, 12-76 ff.

210 See for conditions and application Münchner Kommentar, § 840 (Stein) and § 420 ff. (Selb).

211 See for an overview Weir, note 209, 12-63 ff.

212 See for a comparative law analysis Loser, note 146, at 121 (see also 31, 110 ff.), who refers to "Teilkausalität" (partial causation) for cumulative emitters, each of whom contributes to the harm.

213 See further on the concept Kionka, Recent Developments in the Law of Joint and Several Liability and Impact of Plaintiff's Employer's Fault, 54 La. L. Rev (1994) 1619.

incidents with independent tortfeasors (such as environmental pollution cases). For this reason, the *American Law Institute* has refrained from stating a universal rule on apportioning damages between several independent tortfeasors,[214] a stance which is mirrored by a variety of courts around the world in such situations. The joint liability approach was actually used by US courts with respect to industrial air pollution,[215] and it has been continuously upheld in pollution cases arguing a public nuisance[216] although it was not adopted by the German High Court in its "Acid Rain" judgment, which even refused to find causation of the various polluters. *Ott/Paschke* argue that joint liability is not justified where the contributions of the various actors are separable ("Tatbeiträge"). Yet, in their opinion, in some cases, the interest of the victim in receiving full compensation from any of the tortfeasors might still outweigh the interest of the wrongdoers in not being held responsible for acts they did not commit.[217]

A precondition for applying the concept of joint and several liability in domestic law is that victim's is indivisible. As such, it is worth discussing here whether the various types of harm resulting from climate change are indivisible in this sense. In this context it is vital to distinguish between the various activities which can represent wrongful behaviour, and the harm caused.

Anthropogenic emissions from global sources have changed atmospheric concentrations of greenhouse gases, which has led to global mean surface temperature warming. However, this average warming will not constitute the relevant harm for a country relying on State responsibility as the basis of a claim of cessation or reparation. Rather, the starting point must be the regional and local impacts leading to damage of property, infrastructure and ecosystems. Such harm would normally be considered indivisible. Yet, even in cases where the harm is physically indivisible, and especially in pollution cases, where each actor's contribution to a harm might be determined (it is possible to determine net greenhouse gas emissions on a country-by-country basis),

214 American Law Institute, Restatement (Third) of Torts, (2002), § 17: Joint And Several Or Several Liability For Independent Tortfeasors: "If the independent tortious conduct of two or more persons is a legal cause of an indivisible injury, the law of the applicable jurisdiction determines whether those persons are jointly and severally liable, severally liable, or liable under some hybrid of joint and several and several liability".

215 Okowa, note 58, 198, referring to Mitchie v. Great Lakes Steel, 495 F.2D 213 (Sixth Circuit 1974). It should be noted though, that this case only involved a few emitting factories. The case was cited in several later decisions, some of which adopted the same apporach, while others did not. See a well pollution case in 1987, 534 A.2d 1130, 1138, Pa. Cmwlth; an asbestos case in 1986, 801 F.2d 810, 814-15, 6th Cir., and the Agent Orange litigation in 1984 (597 F.Supp. 740, 822-23, D.C.N.Y.).

216 *California v. Gold Run Ditch & Mining Co.*, 4 Pac 1152/1157 (Cal. 1884): "all persons engaged in the commission of wrongful acts which constitute the nuisance may be enjoined, jointly or severally" and, for the federal law of public nuisance: *United States v. Luce*, 141 F. 385,412 (C.C.D. Del. 1905). For a statutory example see the US Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9601 et seq.

217 Ott/Paschke, note 120, 308 ff.

domestic courts have held that property or financial injury is actually divisible.[218] In these cases the courts would seek *"some means of fair and rational apportionment . . . without causing injustice to any of the parties"*,[219] and the defendant would only be held liable on the basis of his relative responsibility for (contribution to) the harm. In common law terms this would represent an approach of "several liability" or liability on the basis of "comparative responsibility" (i.e. relative to causal share). *Grossmann*, drawing parallels between the climate change situation and the Agent Orange settlement (where damages were assessed damages on the basis of a formula that balanced market-share and dioxin content)[220] states that under US domestic tort law: *"in the climate change context, this could involve apportioning damages based on a combination of defendants' market-shares and the greenhouse gas emissions of their products, to correspond as much as possible to each defendant's contributions to global warming"*.[221]

It should be noted that in these cases, it was in fact no longer the indivisibility of the harm that determined whether joint and several liability should apply, but the question of whether the contributions of the various actors could be singled out. In domestic systems this apportionment of contribution is normally the issue wrongdoers must settle amongst themselves after the victim has been compensated. Therefore, rather than applying a hard and fast rule one could argue, that the interests of the victims and the tortfeasors must be weighed in determining the exact approach to be take in a given situation.

b) *International law*

Some international treaty instruments regulating (lawful) activities or particular risks refer to the concept of joint and several liability both for private operator liability (e.g. Articles 6.2 and 6.3 of the 1993 UNECE Convention on Civil Liability)[222] and between States (e.g. Articles IV.2 and V.2 of the Convention on the International Liability for Damages caused by Space Objects).[223] The latter provision clearly allows for an apportionment of the burden of compensation according to the "extent to which they were at fault", but also emphasises the right of the injured State to seek full compensation from "any or all" States liable under the Convention. These provisions must be seen in their specific treaty context, however, and cannot be taken to represent customary law on this issue *per se*.

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218 See for example Restatement of Torts (Second) § 433A commentary d (1965).
219 See note 218 § 433B commentary e.
220 See Peñalver note 140 at 592.
221 Grossmann, note 140 at 11.
222 32 ILM 1228 (1993), not in force.
223 UNTS 961, 187.

Indeed, some arguments have been raised against applying any concept of joint liability. For example, *Okowa* states that domestic law provides the tortfeasor, who is held liable for the entire damage, with statutory or customary possibilities to seek the contributions of other tortfeasors. Such procedures have not yet been developed in international law.[224] Conceptually different but with the same result, *Arangio-Ruiz*, as Special Rapporteur to the ILC, argued that a wrongdoer can only be held responsible for that part of the injury he is incurred because there is a "lack of full causality" between the behaviour of the defendant State and the resulting harm.[225]

Admittedly, the situation of the victim of a tort in a domestic setting cannot automatically be transferred to the situation of a State which is in breach of an international obligation. The main objective of domestic tort law is that the victim be compensated, and accordingly, the victim is afforded considerable protection in the face of multiple polluters. The law on State responsibility has many purposes, and ensuring compliance with the international legal order is a first priority. Thus, where several States are in breach of a legal duty, they are responsible for ceasing the wrongful conduct and a "one-off" claim by a State against only one of the wrongdoers might actually leave the others to continue their illegal conduct. On the other hand, given the differing range of interests, sizes and capabilities for coping with climate change damage among States, an argument could also be made that application of the joint and several liability concept is necessary to ensure effective exercise of the rights afforded to States under the law on State responsibility. If for example, a small island State claims damage prevention costs, it would be unjust to require this (small) State to join all possible (large) wrongdoers so that it might recover the full measure of damages – and possibly too late to prevent specific damage anyway.

Little clarity on the issue is provided in existing international case law, because it has been discussed primarily in the context of the admissibility of claims or jurisdiction and not on its merits. This is why Article 47 DASR is found in the section on implementation rather than in the core section on breach of obligation and reparation.

In the 1954 *Monetary Gold* case the Italian claim against the defendant States, France, the United Kingdom and the United States, was dependent on whether Italy had a claim against Albania, arising from confiscations made by Albania in 1945. On the basis of this claim against Albania, Italy requested that monetary gold recovered in Germany be delivered to it and not to the UK, which claimed it as payment of compensation awarded in the *Corfu Channel* case. The ICJ had no jurisdiction against Albania, but due to the specifics of the case, the ICJ ruled that Albania's legal interests were "not just affected by the dispute" and any potential finding, but were "the

224 Okowa, note 58, 198, with further references.

225 Arangio-Ruiz, note 144, 15. See also Gray, Judicial Remedies in International Law, 23, ILA, Report (1990), note 317, 297 and Ott/Paschke, note 120 at 308 f.

very subject-matter of the decision": Albania was an "indispensable party".[226] As Albania could not be forced to join the dispute, the court held that it could not consider the merits of the case. Still, this case is not automatically comparable to a climate change case. A claim against one State for damages resulting from climate change will not depend on the legal relationship between the claimant State and another State which is not party to the dispute.

Moreover, Article 59 ICJ Statute stipulates that orders are only binding upon parties, so it is not clear how the legal interests of States might be affected in practice if they do not join a dispute. This was noted in the 1984 *Nicaragua* case, where the court considered the *Monetary Gold* principle of the "indispensable party" to represent "the limits of the power of the court to refuse to exercise jurisdiction".[227]

In the 1992 *Nauru* case,[228] Nauru sought compensation for harm caused by phosphate mining undertaken by Australia, New Zealand and the UK as joint administrators of the territory.[229] In its decision on jurisdiction (Preliminary Objections) the ICJ allowed Nauru to bring a claim against Australia alone, even though New Zealand and the UK had (or likely would have) not submitted to the jurisdiction of the court. In that case, the ICJ argued *"a finding by the Court regarding the existence of or the content of the responsibility attributed to Australia by Nauru may well have implications for the legal situation of the two other States concerned, but no finding in respect of that legal situation will be needed as a basis for the Court's decision . . ."*.[230]

Different from a potential case regarding climate change damage, however, the *Nauru* case did not concern independent wrongful behaviour by States, but the behaviour of the joint administration, i.e. the legal duty of all three countries, which had in practice been governed by Australia alone. But the ICJ considered the concerted behaviour of those States and stated clearly that even if a finding had legal implications for the non-parties to the dispute, the claim was admissible. This seems to be comparable to some extent to claims involving climate change damages.

The ICJ never actually apportioned responsibility or otherwise ruled on the merits though. Therefore, the Australian claim that States would be jointly liable (*solidaire*)

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226 Monetary Gold Removed from Rome (Italy v. France, Great Britain, USA) 1954 ICJ Rep. 19, at 32 f. (*Monetary Gold*).

227 *Nicaragua* case (note 82) Jurisdiction and Admissibility, 1984 ICJ Rep. 392 at 431. See also Case concerning Land, Island and Maritime Frontier Dispute (El Salvador v. Honduras) 1990 ICJ Rep. 3 at 122.

228 *Certain Phosphate Lands in Nauru* (Nauru v. Australia), Preliminary Objections, 1992 ICJ Rep. 240. See for an analysis Anghie, The Heart of my Home: Colonialism, Environmental Damage and the Nauru Case, 34 Harv. Int'l L.J. (1993) 445.

229 These nations had jointly held trusteeship over the island of Nauru, first under a League of Nations mandate of 1920 and until 1968 on the basis of a Trusteeship Agreement approved by the UN General Assembly in 1947. During the time of administration by (de-facto) Australia, extensive phosphate mining severely damaged the island's environment.

230 *Nauru* case, 1992 ICJ Rep. 240, at 265 f.

"so that any one of the three would be liable to make full reparation . . . and not merely one third or some other proportionate share", as suggested by Nauru, was never addressed.[231] Rather, the court explicitly reserved this issue for the merits, pointing out that *"it is independent of the question whether Australia can be sued alone"*.[232] The case did produce, however, several dissenting opinions, which are notable. Judge *Schwebel* for example argued that the court had disregarded the fact that not Australia, but the Joint Authority, i.e. all three States, would be legally responsible for Nauru's injury and the rehabilitation of the land. In his opinion, the general rule is that *"if a judgement [sic] of the court against a present State will effectively determine the legal obligations of one or more States which are not before the court, the court should not proceed"*. [233] As all three States were responsible for the activity of the Joint Authority, the ICJ would have had to dismiss jurisdiction. However, he also referred to the *Corfu Channel* case where the court would not dismiss a case *"because of the absence of an unnamed tortfeasor"*.[234] Judge *Ago* noted that the decision of the court was wrong because in deciding on the merits of the case, the court would have to determine the share of responsibility falling on Australia. He therefore ruled out the application of joint liability. In his opinion, such a finding would be grounded on an "extremely questionable basis".[235] Finally, Judge *Shahabuddeen* relied on the preliminary stage of the proceedings and argued that any determination of the relationship of responsibility between the three trustee nations was a matter for the merits.[236] This implies that a case involving multiple wrongdoers should not be dismissed before the factual and legal situation has been examined, i.e. the pertinent primary norm must be analysed on its merits.

In the 1995 *East Timor* case, the ICJ again resorted to some extent to the "indispensable party" theory. In this case, Portugal, colonial power over East Timor until 1975, claimed that Australia had violated international law (right of self-determination) by accepting Indonesian rule over East Timor and signing a treaty with Indonesia for the purposes of joint exploration and exploitation of the continental shelf area between Australia and East Timor. The court declined jurisdiction on the grounds that any ruling on the merits as required by Australia and Portugal would involve a finding on the lawfulness of the military intervention of Indonesia in East Timor in 1975. This would be the *"very subject-matter of the court's decision"*.[237] Indonesia, however, had not submitted to the jurisdiction of the court. Again, as in the *Monetary Gold* case,

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231 A settlement was reached between the Parties and the case was discontinued in 1993. See 1993 ICJ Rep. 322.

232 *Nauru* case, 1992 ICJ Rep. 240, at 258.

233 *Nauru* case, note 228, at 331. Judge Jennings agrees with this proposition, ibid. at. 301.

234 *Nauru* case, note 228, at 330.

235 *Nauru* case, note 228, at 328.

236 *Nauru* case, note 228, at 276.

237 *East Timor* (Portugal v. Australia) 1995 ICJ Rep. 90 at 102.

the answer to the legal question posed by Portugal depended on the conduct of other parties not before the court.

One overriding principle flowing from the case law on multiple State actors is that jurisdictional issues might bar a court from ruling in a case of State responsibility where only some of the responsible States are party to the dispute. However, again based on the case law, a bar would only occur if proof of the illegal behaviour of a third State not party to the dispute was a pre-requisite for the establishment of the State responsibility of parties to the dispute or where the legal interest of the third party was the "very subject-matter" of the dispute.[238] It is difficult to envisage how this could be the case in a claim for reparation for climate change damage.

On the level of the merits of a potential claim, nothing in the case law prescribes a particular method of apportionment of responsibility (on the basis of fault or causation) or prohibits the application of the concept of joint and several liability. In fact, while Judge *Ago* questioned the application of the latter in his opinion on the *Nauru* case, Judge *Shahabuddeen* supported Nauru's view that all three States are joint and severally liable because of the *nexus* between them, the Joint Authority. He therefore considered that the concept as such does exist in international law.[239] Similarly, in his opinion to the *Corfu Channel* Judge *Azevedo* referred to the possibility of the victim submitting a claim only against one of the responsible parties *in solidum*.[240] The general concept of holding one tortfeasor liable for the full measure of damages could be seen to be supported by the *Corfu Channel* case.[241] In this case, the ICJ obliged Albania to provide full compensation to the UK despite the fact that Yugoslavia (most likely) had laid the mines and was thus at least as responsible for the resulting harm to British ships and seamen as Albania was as a result of its failure to warn. This case is also an example of a situation where several States separately contribute to the same injury, another likely climate change case scenario. The behaviour and share of responsibility of the States involved must be determined in accordance with the respective primary obligation that they have breached individually. In the case of Albania, it failed to warn and was thus held to be responsible for all damages, regardless of the potential other States. This is also the position taken by the ILC in its commentary to Article 47.[242]

On the contrary, the 1925 *Zafiro* arbitration might support a finding that compensation duties in international law arise only relative to fault, excluding the concept of joint and several liability altogether. In this case, the arbitrator ruled that if

238 This is also concluded by Larson, Racing the rising tide: Legal options for the Marshall Islands, 21 Michigan J. Int'l L. (2000) 495 at 505.

239 *Nauru* case, note 228, at 284 ff.

240 *Corfu Channel*, note 190 at 92.

241 *Corfu Channel* (Albania v. UK), Merits, 1949 ICJ Rep. 4 at 23.

242 Report ILC 53rd session, note 6, 317, citing, *inter alia*, the example of several States contributing to the pollution of a river by individually discharging pollutants.

concurrent tortfeasors have caused injury, a tortfeasor sued separately will benefit from a reduction of damages.[243] On the other hand, the arbiter was not actually faced with a claim for the full amount of damages.

c) *Discussion*

As this overview shows, international law does not state clearly how several States should be treated when they independently contribute to harm. However, when looking at domestic law theories and the international case law, it would appear that one method of apportioning responsibility could depend on the primary norm breached, as well as general equity or justice considerations, i.e. a balancing based on which concept (joint or several liability or liability relative to fault) seemed most just in a given case. This issue goes to the heart of the concept of State responsibility as a whole, at least with regard to situations in which a multitude of polluters act. As *Rauschning* has pointed out, requiring a State to claim from each contributing State its part of compensation would essentially *"make the concept of State responsibility a useless weapon against unlawful transfrontier pollution"*. On the other hand, *Rauschning* also states that a joint and several liability approach might lead to "great injustice" because a State found liable for the full damages would not be able to bring the community of contributing States before a tribunal.[244]

Nonetheless, holding one country responsible for all the harm in a specific case could be warranted because it is also questionable whether such strict mechanisms are necessary where States interact. While it is true that international law does not expressly provide a mechanism for joint tortfeasors to recover damages amongst themselves, States have diplomatic and other legal means available to them as a substitute. Specifically, should a State responsibility claim for climate change damage be brought and won against one particular State, there is a strong likelihood that this would spill over to the climate regime, giving rise to potentially new mechanisms for the provision of aid to injured countries (see also Chapter VI).

Moreover, the principles of the climate regime might provide some guidance. As discussed in Chapter III, one component of the principle of common but differentiated responsibility is that a State's obligations should be dependent upon its ability to act. To be held liable *in solidum* for certain damage might have a crippling effect on some countries and thus go beyond their "capability". Of course, this would depend on the case at hand. As will be seen, State responsibility claims could be envisaged that in no way would exceed the capability of the wrongdoing State. At the same time it would be unfair to defer the claimant (developing) country in an effort to receive full

243 *Zafiro* case, note 193, at 163 f.

244 ILA, Report of the 64th conference (Rapp. Rauschning) (1990), at 298.

reparation. There are cases where it might be more appropriate to award reparation relative to the level of the fault or contribution of the defendant State. As discussed above, for guidance on this sort of weighing of interests, international courts might draw on general principles existing in domestic law.

As a corollary to this discussion, it should be noted that any division of responsibility must not result in double recovery. Article 47.2 DASR therefore stipulates that compensation is due for no more than the damages actually suffered.[245]

9. Conclusions

The preceding analysis has shown that it is generally possible to invoke State responsibility for climate change damage, including demanding reparation for any harm done. While a detailed analysis will always depend on the primary rule breached, i.e. the nature of the wrongful act, some important statements can already be made.

Firstly, any (objective) breach of a treaty or customary law can be followed by legal consequences. It is not necessary to show that a State intended to bring about harm. This is important in the case of climate change damage as States normally will not be interested in bringing about harm but will intend to act in their general economic interest.

Secondly, while emissions of greenhouse gases originate from many sources within the territory of a State, including private sources, wrongful behaviour may be attributed to the State either on the basis of a direct breach of treaty, or based on the fact that the State is responsible for exercising its regulatory power to prevent breaches of international law. States have the power to regulate the volume and type of emissions occurring on their territory, and they must use this power in such as way as not to cause harm to other States.

Thirdly, as soon as a wrongful act has been committed, States have the right to demand cessation, which would require the wrongdoing State to bring its behaviour back in line with international law. Given the global nature of climate change and the fact that the atmosphere constitutes a common natural resource, any State might be entitled to invoke State responsibility (depending upon the rule breached). This right is independent of any requirement to establish a causal link between the wrongful act and any harm done. Where a causal link can be shown, the injured State will have a right to demand reparation, primarily in the form of restoration, but also as compensation.

Fourthly, despite remaining uncertainties, it is possible to establish general causation in fact with respect to anthropogenic emissions of greenhouse gases and observed increases in average global temperature in the latter half of the 20th century. This

245 See *Chorzów Factory*, Merits, note 12, at 59.

can be done either by providing evidence that a State's activities have contributed to the overall phenomenon of climate change or have increased the risk of climate change occurring. Either of these two approaches should satisfy the standard of proof set by an international tribunal. Establishing a link between the wrongful behaviour of a State and specific injury resulting from climate change can only be done on a case by case basis and therefore has been left to the discussion of specific cases below.

Fifth, there is no clear international law rule on how to apportion damage between multiple wrongdoers or causes of/contributions to climate change. Both domestic law theories and the available international case law indicate that apportioning responsibility will depend not only on the primary norm being breached, but on general considerations of equity. The choice of which concept is more appropriate (joint liability, several liability or liability relative to contribution/fault) will depend upon the facts of a given case. It is possible, therefore, that even where several States have contributed to a breach of international law, the injured State would be able to seek reparation for its injury from only one of them.

Sixth, a State committing a wrongful act will have to bear the consequences of having committed that act in an environment which is subject to impacts from sources other than those leading to climate change. These outside impacts resulting from concurrent causes could leave the environment vulnerable to the impacts of climate change. Concurrent causes, which stem from lawful behaviour, are ignored for the purposes of establishing causation for the harm caused by a wrongful act.

Nevertheless, this approach is not easily to apply where the concurrent cause is emissions which are not attributable to the wrongdoing State. It could be argued either that as with all concurrent causes a State will have to bear all the consequences because it has committed a wrongful act. This would benefit the victim State which could recover full damages. On the other hand, it could be argued that because the wrongful act (excess emissions) has not actually caused all of the damage, causation should only be established for part of the harm, for example, on the basis of the State's wrongful contribution to the average warming observed.

The following three case studies will apply these findings and elaborate more on issues, e.g. normative causation, that were touched on only briefly in the preceding section.

IV. Case Studies

The preceding section made generic statements as to how climate change damage-related claims fit the framework of the international law on State responsibility. This section seeks to apply these findings to specific case studies.

From the existing climate science described in Chapter II three general categories of climate change damage scenarios can be distinguished: 1) observed changes in

climatic conditions, resulting, for example, in shrinkage of glaciers and the thawing of permafrost; 2) projected gradual changes, especially sea level rise, and 3) projected increased intensity and frequency of extreme weather events. These scenarios form the basis for the three case studies examined in the following section.

The case studies are based on the law as identified and discussed in both the section above (State responsibility) and some of the primary norms analysed in Chapter III and IV. The choice of cause of action (for the civil lawyer: basis of the claim) as well as the choice of defendant and claimant States are arbitrary, and do not suggest that other cases and causes of action might be feasible. The scientific statements made in the case-studies are, unless otherwise indicated taken from the IPCC Third Assessment Report (see Chapter II). The case studies generally do not discuss issues of jurisdiction or venue. While these issues are important, as indicated in Chapter I, they have no bearing on the legal question of concern here: Does State responsibility exist and is there an obligation to provide a remedy for climate change damage under international law?

1. Mountain Glaciers and GLOFs

a) *The problem*

Amongst other phenomena, the IPCC is confident (90-99%) that the extent of snow cover has decreased by about 10% since the late 1960s, and that worldwide mountain glaciers are retreating in non-polar regions.[246] The recession of mountain glaciers already served as evidence for higher post-industrial temperatures in the first IPCC report in 1990.[247]

Despite precipitation and cloud cover, air temperature is the *"most important factor reflecting glacier retreat"*.[248] For example, in the Himalayas (which have nearly 1,500 glaciers covering an area of about 33,000 square kilometres) temperatures have increased in the past decades, and steady melting of mountain glaciers is occurring. According to monitoring data from World Glacier Monitoring Service (WGMS), all seven glaciers monitored in Nepal are receding. For six glaciers in India over the period of monitoring from 1986, all glaciers have been in recession.[249] Almost 67% of glaciers in the Himalayan and Tien Shan mountain ranges have retreated in the past decade, and

246 TAR WG I, 4 and 127 ff.
247 TAR WG I, 127.
248 TAR WG I, 128.
249 For both Statements: Dyurgerov, M., Glacier mass balance and regime: Data measurements and analysis. Meier and Armstrong (eds.), Inst Arc & Alpr Research Occasional paper No. 55, 2002.

22% of the ice volume in the Tien Shan glaciers has disappeared in the last 40 years.[250] The whole region will be affected as glaciers retreat, as some countries such as India and Nepal are highly dependent on the water from mountain runoff and on the electricity generated by these waters.[251] Another more immediate impact is the forecasted glacial outburst floods (GLOFs) caused by growing glacial meltwater lakes.[252] When the banks of these lakes (formed by moraines) burst, either because of internal factors (such as a full lake behind an unstable moraine dam) or external factors (such as an ice avalanche), they send large volumes of water downstream. Major GLOFs occurred in Nepal in 1985 and in Bhutan in 1994, causing deaths and millions of dollars of damage.[253] Today, 44 lakes in the Himalayas could burst as early as 2007 with their flood waters threatening thousands of lives in Nepal and Bhutan. The flood waters would also destroy property, tourism infrastructure, bridges and hydroelectric plants.[254]

For example Bhutan's Raphstreng Tsho glacial lake measured 1.6 km long, 0.96 km wide and was 80 metres deep in 1986. In 1995 the lake had swollen to be 1.94 km long, 1.13 km wide and a depth of 107 metres. Similarly, Nepal's Tsho Rolpa Lake has grown six-fold since the late 1950's.[255] Apart from preventing further temperature increase that would accelerate the melting of these glaciers, preventive action would include further monitoring of glacial lakes, the setting up of early warning systems as well as engineering work to lower the water levels of the lakes, which has already been undertaken on Bhutan's Raphstreng Tsho glacial lake.

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250 TAR WG II, 553.

251 Singh, P./Kumar, N., Impact assessment of climate change on the hydrological response of a snow and glacier melt runoff dominated Himalayan river, Journal of Hydrology 193, pp. 316-350. This paper provides estimates of the impacts of various climate scenarios on the hydrological response of the high altitude Spiti river in the Himalayas.

252 See generally UNEP's Glacial Lake Outburst Flood Monitoring and Early Warning System, <http://www.rrcap.unep.org/issues/glof/> and Dyce/Reynolds, GLOF Risk Assessment: a role for multi-criteria analysis. Working Paper 4, Water Resources Management Plan, Department of Power, Ministry for Trade and Industry, Royal Government of Bhutan, 2002.

253 UNEP Regional Resource Centre-Asia and the Pacific et al., Global Warming Triggers Glacial Lakes Flood Threat, 2002, site as at note 252.

254 See also reports in Nepali newpapers, Kantipur (Nepali Language), 7 March 2003, reporting that a 2-day workshop on "Climate Change Impacts and Adaptation Options in Nepal's Hydropower Sector" jointly organised by the Department of Hydrology and Meteorology and Asian Disaster preparedness Centre, experts recommended setting up early warning systems and resettlement of vulnerable communities as options to deal with glacier hazards in mountain areas.

255 UNEP Regional Resource Centre-Asia and the Pacific et al., Global Warming Triggers Glacial Lakes Flood Threat, 2002. In August 1985, a sudden out burst flood from the Dig Tsho glacial lake in Nepal destroyed 14 bridges and $1.5 million worth of damage was caused to the Namche Small Hydropower Plant. The research began in 1999 and is based on topographic maps, aerial photographs and satellite images from Landsat, Spot and IRS craft. The survey identified 3,252 glaciers and 2,323 glacial lakes in Nepal and 677 glaciers and 2,674 glacial lakes in Bhutan. http://www.rrcap.unep.org/glofnepal/Nepal/Report/chap13/chap13main.htm.

The IPCC TAR examined 16 studies on glaciers, sea ice, and snow cover analysing their development over time in the presence of rising temperatures. The studies showed snow cover declining and ice melting (taking into account that systematic mapping of glaciers only started 100 years ago). The probability of these changes occurring by chance is negligible.[256] The IPCC concludes with high confidence (67-95%) that observations of widespread accelerated glacier retreat and shifts in the timing of streamflow from spring towards winter in many areas are associated with observed increases in temperature. Similarly, recent studies of 95 Chilean glaciers show that 88% of those glaciers have retreated primarily due to temperature increase.[257] For the above examples in the Himalayas, some scientists relate the risk of further GLOFs to temperature rise in the past 50 and coming years, i.e. human induced warming, and glacier-specific attribution studies are on their way.[258]

b) *The claim*

It is assumed here that Nepal or Bhutan wish to make a claim for monetary support to assist in monitoring the Himalayas glacial lakes as well as to pay for the engineering work necessary to prevent GLOFs. It also assumed that were a GLOF to occur, these countries would demand compensation for the damage incurred. The two countries plan to seek redress from a major emitter of greenhouse gases, the USA. Article 4.2 in conjunction with Article 2 FCCC is chosen as a cause of action. Naturally, other suitable primary norms on which to base a claim exist, such as bilateral treaties of friendship, nature conservation related treaties, or the no harm rule.

c) *Breach*

As shown in Chapter III, Article 4.2 in conjunction with Article 2 FCCC contains a duty of conduct to modify/reverse trends of greenhouse gas emissions in the long term although States are not bound to the concrete volume/time target of returning emissions to the 1990 levels by the year 2000. For Nepal/Bhutan to successfully invoke State responsibility on the basis of these treaty norms, they will have to show that

256 TAR WG I, 129.

257 Rivera/Acuña et al., Use of remotely sensed and field data to estimate the contribution of Chilean glaciers to eustatic sea-level rise. Annals of Glaciology, Vol. 34, 2002, GLACIOLOGICAL SOC. 34: 367 ff. See also BBC: "Satellite Watches Disaster Hazard", 17 April 2003 (http://news.bbc.co.uk/2/hi/science/nature/2951093.stm) which reports that images taken from space are being used to monitor a potentially dangerous glacier in Peru to prevent possible GLOFS.

258 See "Himalaya glaciers melt unnoticed", 10.11.2004, http://news.bbc.co.uk/1/hi/sci/tech/3998967.stm and OECD Report COM/ENV/EPOC/DCD/DAC(2003)1/FINAL, Development and Climate Change in Nepal: Focus on Water Resources and Hydropower, Paris 2003 as well as the Nepalese National Communication to the FCCC, 2004, <www.unfccc.int>.

the USA, which has not met the year-2000 target in Article 4.2 and has not ratified the Kyoto Protocol, has failed to discharge this duty of conduct by continually increasing its greenhouse gas emissions and failing to reverse absolute emission trends despite its objective ability to comply.

In 1992, by signing the FCCC the USA agreed to co-operatively *"prevent dangerous anthropogenic interference with the climate system"* (Article 2). It ratified the Convention in 1992 and has been bound by is provisions since its entry into force in 1994. Between 1992 and 1994 it was bound not to defeat the objective of the treaty by Article 18 VCLT, which constitutes customary international law and thus also binds the US as non-Party to the VCLT.

Since it is difficult to determine exactly whether a duty of conduct to modify emission trends will or will not be met in the longer term, a baseline of "legal" behaviour can be established to support the analysis of whether or not the USA is in breach of Articles 2 and 4.2 FCCC. Given the scientific basis and findings discussed in Chapter II, behaviour providing evidence of compliance with the obligation would include the following characteristics:

- A Party to the FCCC would have made real efforts to achieve the year-2000 target, even if this does not constitute a binding obligation of result
- A Party to the FCCC would comply with the co-operation duties under the FCCC to find adequate regulatory solutions to reach the objective of Article 2 FCCC and, most importantly
- A Party to the FCCC would act on the basis of the scientific findings accepting that absolute emission levels have to be lowered in the medium and long term to achieve the objective of the Convention, i.e. it would enact suitable legislation to pursue this aim.

The activities and plans of the federal government of the USA, the entity bound by the FCCC, are not in compliance with these characteristics.

The first compelling evidence is the fact that the USA has increased its aggregate emissions (excluding land use change and forestry) by 13% between 1990 and 2002. Anthropogenic CO_2 emissions alone have risen by 16%.[259]

This rise is in volume is unprecedented and signals little or no effective action to mitigate climate change by reducing or at least stabilising greenhouse gas emissions. Industrial CO_2 emissions, which account for roughly 85% of the US greenhouse gas emissions, grew faster after 1994, the year the FCCC became binding law, than in the time period before. For example, between 1974 and 1984 emissions decreased slightly, while emissions rose by 1.7% per year on average between 1984 and 1994.

259 See FCCC/CP/2004/5, Table 4 and 5 and for earlier data FCCC/SB/2002/INF.2 and FCCC/WEB/2002/10.

Since 1994, the same emissions have increased by an average of 1.6% per year, i.e. at almost the same pace.

Since 1995, a full five years after the first IPCC report and the starting point of negotiations leading to the FCCC, US emissions have constantly risen – in contrast to its neighbour Canada which has experienced an 8.9% decline in fossil-fuel CO_2 emissions in this time period.[260] Per capita emissions have been consistently high (~5.6 tC/yr) and well above those for any other region (average world ~1 tC/yr.).

Secondly, the USA has by far exceeded its own projections of emission levels expected by 2000, which indicates that possible measures to reverse emission trends as listed in its own climate action programmes have not been sufficiently implemented.

In October 1993, the US Administration issued the Climate Change Action Plan (CCAP),[261] which proposed many different measures to reduce US emissions. Based on a model, which took all of these measures into account, the USA itself estimated that it would be able to return its emissions to 1990 levels by the year 2000.[262] This was also publicly announced as a target by President Clinton after his election in April 1993.[263] Given the fact that the FCCC had been negotiated by his predecessor, and that the USA had been the country most opposed to a binding target in the FCCC, this statement could even provide evidence of "subsequent agreement" regarding the interpretation of the treaty or the application of its provisions in the sense of Article 31.1(a) VCLT (which again constitutes customary international law). Still, the political statement was not made with the understanding that all other FCCC Parties would now regard Article 4.2(b) as a binding emission reduction target and it can therefore hardly be regarded as an "agreement between the parties" (Japan, for example, did not make such a declaration and has increased its aggregate greenhouse gas emissions by 11% over 1990 levels). Nevertheless, the statement is important since it shows that the US administration believed that it could meet the target of returning emissions to 1990 levels by the year 2000. The 1993 CCAP anticipated that energy-related carbon emissions would increase by approximately 3% between 1900 and 2000, but that this increase could be offset by absolute reductions in emissions of other greenhouse gases.

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260 Marland, G., T.A. Boden, and R.J. Andres. 2002. Global, Regional, and National CO_2 Emissions. In Trends: A Compendium of Data on Global Change. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. (see <http://cdiac.esd.ornl.gov/trends/emis/tre_nam.htm>). In 1999, 39% of U.S. fossil-fuel emissions come from the consumption of petroleum products and 38% form coal usage.

261 Available at <http://gcrio.gcrio.org/usccap>. Additional information can be found in the 1995 U.S Climate Action Report: Submission of the United States of America Under the United Nations Framework Convention on Climate Change (Washington, D.C: U.S. Government, Printing Office, 1995), not available online.

262 See FCCC/NC/7, Executive Summary of the First National Communication of the USA, 25 July 1995. Total emissions for 1990 were estimated to be 1.462 million metric tonnes of carbon equivalent (MMTCE), those for 2000 (on the basis of the CCAP) were projected to be 1.459 MMTCE.

263 See for verbatim record: 16 International Environmental Reporter (1993) 320.

In its second national communication submitted in 1997 (equivalent to "The Climate Action Report, CAR"), the USA stated that to achieve the objective of the FCCC *"actions to mitigate climate change would need to be more aggressive than anticipated"* but it also noted that the US would focus on the post-2000 period instead of taking *"draconian measures"* to meet the year-2000 target of Article 4.2 FCCC.[264] The CAR estimated an increase in greenhouse gas emissions of 188 MMTCE, *inter alia*, due to lack of funding for the CCAP.[265] Both reports acknowledge that further cuts would have been possible, but these were not realised.

Third, the USA has firmly rejected the Kyoto Protocol[266] as well as participation in any other forum aimed at determining how Article 2 FCCC could be achieved through greenhouse gas emission reductions agreed on the international level. As discussed in Chapter III, the FCCC obliges Parties to co-operate to achieve its objective. For example, paragraph 6 of the preamble to the FCCC acknowledges that *"the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response . . ."* The provisions of the FCCC, the Berlin Mandate[267] and the Geneva Ministerial Declaration[268] (the latter two being strong indications regarding *opinio juris* of Parties)[269] indicate that all Parties to the FCCC acknowledge that the regulatory force of the Convention alone will not be sufficient to achieve its aims and that the "soft" target set in Article 4.2 FCCC is inadequate to achieve Article 2 FCCC. This acknowledgement formed the basis for further negotiations, and finally the adoption of the Kyoto Protocol. While no State can be forced to ratify a particular treaty, the USA has failed to display the co-operative behaviour required to achieve the aims of the FCCC.

Since its rejection of the Kyoto Protocol, the USA has engaged in bilateral partnerships with Australia, Canada, China, seven Central American countries (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama), the European Union, India, Italy, Japan, New Zealand, Republic of Korea, and the Russian Federation. In substance, these partnerships are concerned with enhancing and supporting climate

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264 Climate Action Report (CAR), 1997 Submission of the USA under the UN FCCC, Department of State, July 1997, to be obtained via <http:www.unfccc.int>, 6.

265 CAR, note 264 at 106.

266 President Bush first pronounced in a letter to Republican Senators Hagel, Helms, Craig and Roberts on 13 March 2001: "I oppose the Kyoto Protocol because it exempts 80 percent of the world, including major population centers such as China and India". (<http://www.whitehouse.gov/news/releases/2001/03/>). The USA has since participated in FCCC negotiations, but rejected any re-engagement with the Protocol.

267 At COP1 Parties to the FCCC agreed that the mitigation duties contained in Article 4.2(a) and (b) FCCC, were "inadequate" according to Article 4.2(d) FCCC, Decision 1/CP.1, FCCC/CP/1995/7/Add.1.

268 The Geneva Ministerial Declaration is contained in FCCC/CP/1996/15/Add.1, 71.

269 *Opinio juris* is the conviction that a certain behaviour (here the co-operation effort leading to the Kyoto Protocol) is the correct behaviour also in legal terms. This conviction plus the corresponding State practice is, according to the traditional view of public international law, required to form customary international law.

change science (modelling) as well as research into energy and sequestration technologies.[270] They are not concerned with absolute emission reductions. In the view of the USA, the Kyoto Protocol is "not sound policy", because *"the emission targets are not scientifically based or environmentally effective, given the Protocol's exclusion of developing countries from its emission limitation requirements"*[271] Given the fact that the USA agreed to, *inter alia*, the principle of common but differentiated responsibility in the FCCC this statement could in itself be viewed as contradictory to the treaty. But more importantly, the USA has not presented the Parties to the FCCC with an alternative that might represent sound policy. To reject – despite the scientific evidence that shows how urgently absolute cuts in emissions are needed – co-operation to achieve emission reduction in the near future within the framework of the FCCC itself is not in line with the co-operation duties agreed to under the FCCC.[272] While this might not in itself constitute a breach of Articles 4.2 and 2 FCCC, it is an important indicator of whether, and if so, how the USA is fulfilling its obligation of conduct to adequately contribute to the objective of the FCCC by reversing emission trends.

Fourth, the current climate policy plan, the Global Climate Change Policy book released in February 2002, indicates that the USA actually accepts a *steady increase* in total emissions in relation to 1990.[273] The U.S. plan seeks to reduce the greenhouse gas intensity of the U.S. economy by 18% in ten years. This is only a relative target. In fact, the suggested course of action will allow US emissions to grow by 12% until 2012, i.e. at nearly the same rate as at present, which will result in total emissions of approximately 32% above 1990 levels in 2012 (excluding any effects from land use change and forestry, aggregate greenhouse gas emissions for all six Kyoto gases).[274] Among others the *Pew Centre* criticises the plan by pointing out that no measures are put in place to ensure that the intensity target is met.

While the official plan estimates that that this represents a 4.5% emission reduction

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270 See President Bush, Announcement on climate change Review Initiatives, July 13, 2001, and Fact Sheet: United States Global Climate Change Policy, February 27, 2003, Paula J. Dobriansky, Under Secretary of State for Global Affairs, Closing Statement to the Seventh Conference of the Parties to the UN FCCC, November 9, 2001. All available on: <http://State.gov/g/oes/climate/rmks>.

271 Statement by Paula J. Dobriansky at COP7, note 270.

272 See Buck/Verheyen, International Trade Law and Climate Change – A Positive Way Forward, 2001, 30 ff.

273 See for a summary of the plan and policy actions after the withdrawal from the Kyoto Protocol Wirth, The sixth session (part two) and seventh session of the Conference of the Parties to the Framework Convention on Climate Change 96 AJIL (2002), 648, 658 ff. and an economic analysis in: van Vurren et al, An evaluation of the level of ambition and implications of the Bush Climate Change Initiative, 2 Climate Policy (2002) 293.

274 See, *inter alia*, Pew Center, Analysis of President Bush's February 14th Climate Change Plan, 2002; Pew Center, Climate Change Activities in the United States, Update 2004, 3, both available at <http://www.pewclimate.org>, and van Vuuren et al., note 273.

compared to the hypothetical baseline (business-as-usual emissions by 2012), commentators have observed that the plan in fact describes business-as-usual. During the 1990s greenhouse gas intensity in the US economy fell by an average of 16%. In fact, as *van Vuuren et al.* note, *"it might even be that no additional policies are needed to meet the policy target"*. Moreover, according to the same team of scientists, the claim that this target is comparable to the average progress of Annex I regions under the Kyoto Protocol is false. The total effort of other countries is likely to amount to a 25% reduction under baseline levels in the EU and in Japan (the baseline corresponds to a business-as-usual emissions scenario in these countries).[275]

This combined course of action shows that the USA is in breach of its obligation of conduct to reverse emissions trends in order to stabilise greenhouse gas concentrations with the aim of preventing dangerous interference with the global climate system (Articles 4.2 and 2 FCCC). The USA does not plan to reverse emissions trends. Rather, it is one of the few countries in the world that openly advocates net increases in emissions levels. This openly advocated policy would qualify as an "act to defeat the purpose and objective" of the FCCC (Article 18 VCLT) and certainly runs counter to the obligation to positively contribute to achieving the aim of the FCCC.

Therefore, countries in danger of being affected by GLOFs could argue that the USA (and potentially other countries) has breached its treaty obligations.

This breach is also attributable to the USA (Article 4 ff. of the DASR). It is the USA as a State that is Party to the treaty, which would require the USA as a subject of public international law to take sufficient measures to meet its obligations. The fact that the majority of actual greenhouse gas emissions on US territory are caused by private persons (transport, energy consumption) or entities (energy generation, etc.) is irrelevant for the issue of attribution.

As the law on State responsibility does not require any element of intent, it is sufficient to show that the international obligation has been breached. On this basis, Nepal and Bhutan as Parties to the FCCC[276] could demand that the USA bring its behaviour in line with its obligation, i.e. cease its unlawful behaviour[277] and move towards a legally benign behaviour which meets the characteristics described above.

d) *Invocation of State responsibility*

Nepal and Bhutan would have to show that they have a right to invoke the provisions of the FCCC to their individual benefit.

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275 van Vuuren et al., note 273 at 295 and 297.

276 Nepal since 31.07.1994, Bhutan since 23.11.1995.

277 As shown above, injury or material damage is not a prerequisite for the existence of a wrongful act, i.e. State responsibility. See above note 98 and Zemanek, note 88 at 365.

From the analysis in Chapter III it is clear that the FCCC was adopted as a general prevention instrument for the benefit of all mankind.[278] Therefore, a breach could be claimed by many States on the basis of Article 48 DASR even if they were not injured. In this particular instance, Nepal and Bhutan are injured States in the sense of Article 42(b)(i) DASR: The obligation to comply with Articles 2 and 4.2 FCCC is owed to the international community as a whole, since the FCCC seeks to protect the global climate system as common concern of mankind. The breach of obligation by the USA also specifically affects the two countries faced with the risk of GLOFs as they seek to help to prevent damage. Therefore, Bhutan and Nepal could invoke State responsibility on the basis of the breach of treaty by the USA.

e) *Causation*

Nepal or Bhutan have to show that the US breach of the FCCC, i.e. its failure to take measures to reverse emissions trends caused/contributed to the melting of glaciers in the Himalayas, leading to dangerous water levels in the glacial lakes which in turn threaten their countries and people with GLOFs. As the primary aim of Bhutan and Nepal would be to prevent damage to property and people from GLOFs, the claim is concerned with a risk of damage due to the current impacts of anthropogenic climate change. What has to be linked by the causal chain therefore is the change in a natural system (glacial melting) and the human activity. This would then warrant measures to protect human infrastructure to prevent the materialisation of environmental damage (glacial melting) into property and other damage.

As noted by the IPCC, attribution of causality is very difficult with observed effects or groups of effects. One must be able to demonstrate that a regional change in climate is a significant cause of an observed effect and that the regional change in climate is linked to global climate change.[279] While, as pointed out above, the fact that Himalayan glaciers are retreating is certain – that the retreat is largely due to the rise in temperature attributable to human activity, is harder to establish.

The "mindmap" introduced in section III.6 (Causation in fact and normative causation) will assist Bhutan and Nepal in showing causation, which should be sufficient for legal purposes.

First, building on the general causal link between human activities and the last 50 years of warming, causation in fact is discussed with respect to the specific case and impact (specific causation). Second, approaches to and the criteria of normative causation as well as their status in international law are discussed. This includes the criterion

278 See already the acceptance of the UN General Assembly that "climate change is a common concern of mankind", UNGA Res. 43/53, 6 December 1988, UN Doc. A/43/905, para. 1.

279 TAR WG I, 700 ff. and WG II, 953.

of "proximate cause" or foreseeability ((2)(a), the domestic law "Adequacy Theory" ((2)(c) and a discussion of the "scope of the rule" (2)(d).

(1) *Causation in fact*

As shown in section III.6.e) human activities have contributed, by as much as 70%, to the observed warming trend of the latter half of the 20th century. Relevant activities are emissions of greenhouse gases as well as any activities that have decreased the carbon storage capacity of the terrestrial biosphere. On this basis it is necessary for Bhutan and Nepal to show that the observed global warming has been *the* or *a* cause for the increased melting of glaciers locally and that the US, in breaching the provisions of the FCCC, has contributed to this effect (global warming in the latter half of the 20th century). That US emissions, including those emitted since the 1994 entry into force of the FCCC contribute to the overall climate change phenomenon cannot be in doubt, even if recent emissions only add to the overall climate response to historic emissions which today cause the majority of the warming. However, whether any particular threshold of contribution (above *de minimis*) is necessary to establish causal behaviour is in essence a normative question and thus will be discussed in the context of normative causation.

In this section, a scientific case is made for a causal link between the increased melting of Himalayan glaciers and the warming attributed to human activities. A brief discussion follows on whether the physical processes leading to the actual impact and damage (high water levels in the glacial lakes) constitute a break in the causal chain. Lastly, given the uncertainties identified and the possibility that the accumulated uncertainties (from general to specific causation in fact) might not satisfy a given standard of proof as identified in III.6.f), this section takes a look at other approaches for establishing causation in fact, revolving around causation based on probability and a different standard of proof.

(a) *Specific causation*

Bhutan and Nepal would have to show that the regional temperature changes are attributable to global average warming, because increased runoff from the Himalayan glaciers is the result of regional rather than global temperature increases. For example, the average air temperature calculated using measurements from 49 stations in Nepal has risen by 1°C since the mid-1970s, with high elevation sites warming the most. This is nearly twice as fast as the 0.6°C average warming for the mid-latitudinal Northern Hemisphere (24 to 40°N) over the same time period.[280] Also, ice core records from the Dasuopu Glacier indicate that the last decade and last 50 years have been

280 Shrestha et al., Maximum temperature trends in the Himalaya and its vicinity: An analysis based on temperature records from Nepal for the period 1971-94, 12 Journal of Climate (1999) 2775.

the warmest in 1,000 years.[281] Such regional temperature changes however can also be due to climate variability (i.e. a non-human influence/condition) and are not necessarily directly related to the aggregate warming observed over the last 50 years. In fact, many glaciers had already begun retreating in the mid-19th century, a phenomenon that cannot be linked (at this stage) to the warming attributed to human activities although it is possibly related to changes in cloudiness and precipitation.[282] Even if the temperature record is quite well established, according to the IPCC the observational record of glaciers (mass volume, runoff characteristics) is limited. It is certainly difficult therefore to separate the increase in runoff due to glacial melting from other sources of variation in runoff.

However, from a scientific point of view, it is by no means impossible to relate regional temperature increases to anthropogenic warming. The specific case would rely on available data, for example Holocene glacial core records, satellite images and Digital Elevation Models. Bhutan and Nepal would have to commission (or rely on existing) scientific studies, focusing on comparatively well-monitored glaciers and corresponding glacial lakes. Such attribution studies would have to expose and evaluate potential causes of glacial melting other than temperature, but would most likely be able to state with some degree of confidence that i) the specific glacier has lost mass balance and/or length and thus more melting water is released into the glacial lake than in previous years and decades, ii) that temperature increases are the major cause of these phenomena, and iii) that the temperature increase is not due to climate variability but corresponds to the aggregate warming observed over the 20th century and especially in the past 50 years.[283] Attribution studies of this kind are rare since scientists are only beginning to grapple with the problems of attributing specific impacts to anthropogenic warming. Nevertheless, they are becoming more common especially with the aid of official support.

In such a study, only the observed temperature changes and volume changes would be "certain" in the sense of 100% certainty from observations (above i). On the other hand no study of this kind would ever be able to attribute the melting of the glacier as a whole to anthropogenic climate change, or to state with 100% certainty that the temperature rise observed is due to anthropogenic changes in the radiative forcing of the atmosphere (above ii and iii). Instead, some value of certainty would be

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281 Thompson et al., A high-resolution millennial record of the South Asian Monsoon from Himalayan Ice Cores, 289 Science (2000) 1916.

282 See TAR WG I, 128.

283 Bhutan and Nepal could also argue that the projections of future climate change for the Himalayan glaciers *indicate* that the risk of GLOFs will increase significantly in the future. The climate change scenarios used by the IPCC model the impact human industrial emissions and man-made changes in the terrestrial carbon storage capacity will have on the climate system. Thus, the projected impacts are associated with human activities. With respect to the specific case, however, such an argument would significantly change the potential remedy.

chosen by glaciologists and climatologists to take account of the inherent practical and theoretical uncertainties. Because of the system's non-linearity and our imperfect understanding of it, some uncertainty will always remain.[284]

Assuming that the attribution studies were to indicate with a high degree of certainty that the increased runoff from the glacier cannot be explained by natural forcings alone and that it is more likely than not that global warming has contributed to the regional warming, the parties would again be faced not with a general incapability of establishing a causal chain but with matters of requirements of proof.

Admittedly, the uncertainties at both the level of establishing general causation and the specific causation level, pose a problem for lawyers and scientist attempting to show that a State is responsible for the impacts of climate change. If the quantum of proof required was full proof, Nepal and Bhutan likely would fail to make a case. However, as discussed previously (section III.6.f), it is unlikely that an international tribunal would adopt the full proof standard. Moreover, the uncertainties encountered are mostly due to insufficient databases and the imperfect state of our knowledge, not to the lack of conviction on the part of scientists that greenhouse gas emissions have given rise to glacial melting. In fact, when making projections about the future, scientists (the IPCC) are virtually certain (99%) that anthropogenic emissions will cause major changes. Given the high probability of a causal link, a court ruling on whether causation has been established might wish to consider which of the parties is in the best position to bear the burden of these uncertainties – the injured developing country party faced with the risk of real harm or the developed country party in violation of international law. Depending upon the court's assessment of the evidence, it may decide to apply a reversal of proof rule. If such an approach were adopted, the defendant, here the USA, would have to prove that its emissions did not contribute to global climate change and/or that any observed regional temperature changes were unrelated to the global warming trend or, indeed, that the pertinent glaciers are in fact not melting more than they have in the past.

For the remainder of this case-study it will be assumed that a regional attribution study has been undertaken produced results that convince a court on the basis of the "preponderance of evidence" that the GLOF-threatening water levels in the glacial lakes are at least partly to the result of climate change. Since it is also established that US emissions, in breach of Articles 2 and 4.2 FCCC, have contributed to the observed global warming in the latter half of the 20th century, the causal chain can be established.

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284 See as an example the finding in Karoly/Braganza/Stott/et al., Detection of a Human Influence on North American Climate, 302 Science (2003), 1200, which concludes that "it is likely that there has been a significant human influence on North American Warming in the 2nd half of the 20th century . . ." (at 1203) but see Stott (Attribution of regional scale temperature changes to anthropogenic and natural causes, 30 Geophysical Research Letters (2003) 1728) who concludes his regional study by saying that "greenhouse gases are estimated to have caused generally warming as the century progressed".

(b) *Break of the causal chain?*

A substantive argument which could be made against a finding of causation is that of directness or the interruption of the causal chain by physical processes. After all, the climate relevant activities of greenhouse gas emissions and decreasing the carbon storage capacity of the terrestrial biosphere do not lead directly to the observed melting of Himalayan glaciers. The molecules of greenhouse gases emitted by the USA (or others) are not traceably responsible for the increased surface temperature in the Himalayas, rather, they accumulate in the atmosphere and react with others substances. The US could argue therefore that the various chemical processes cause a break in the causal chain. But, as the Mixed Claims Commission expressed in its 1923 ruling *"it matters not how many links there may be in the chain of causation connecting Germany's act with the loss sustained, provided there is no break in the chain and the loss can be clearly, unmistakeably and definitely traced, link by link to Germany's act"*.[285]

This is in line with the scientific understanding that every condition is a cause for an injury. There appears to be no tendency in international law to assume a break of the chain of causation when injury occurs indirectly, i.e. when there are natural physical processes necessary to bring about the injury. The natural process leading from emissions of greenhouse gases to harm for Bhutan and Nepal by way of glacial melting does not represent a "break in the chain".

(c) *Other approaches to causation / standard of proof*

What has been established so far is that US emissions in breach of the FCCC have contributed to the harm, i.e. dangerous levels of melting water in glacial lakes fed from glaciers in the Himalayas. Relying on a "51%" standard of proof, the claimant States would thus be able to link the wrongful act with the injury on the basis of recorded contributions to climate change made by the respondent, here the USA. If full proof were required, different theories of causation might apply. Given the remaining (accumulated) uncertainties and the likelihood that a court might question the reliability of the scientific information, some of these are discussed here.

Theories easing the *sine qua non* standard (in conjunction with the standard of proof) have been developed by many theorists and tribunals since the 1970s. For example, the US scholar *Calabresi* argued in 1975 that to increase the economic efficiency of tort law his concept of a causal link should replace the "but for test": *"There is a causal link between an act or activity and an injury when we conclude on the basis of the available evidence that the recurrence of that act or activity will increase the chances that the injury will occur"*.[286] This thought is similar to the already introduced German "Risikoer-

285 *Administrative Decision No. II*; Award of 1923, VII RIAA (1956) 23 at 29 ff. (War Risk Insurance Premium Claim).

286 Concerning cause and the law of torts: An essay for Harry Kalven Jr., 43 University of Chicago Law Review (1975), 69 ff.

höhungslehre". In the German context, *Bodewig* also argued that for cases where multiple polluters and victims must be dealt with and the general causal link between the activities of the polluters and the injury of the victims can be established, victims should be awarded damages on the basis of the statistical shares of damage and contribution to it.[287]

These and the following approaches are deviations from the "everything-or-nothing" notion of tort where a plaintiff will either win his case or lose it, but will normally not be able to receive partial justice. It is understood that these examples are taken from domestic law and are not as such theories of international law. However, since the international law doctrine on causation is still not settled, tribunals would certainly have the space to draw on some of the basic principles, which are, in the end, based on notions of equity and justice.

Some modern theories in US American tort law have relieved the plaintiff of having to prove that the defendant's act actually contributed to a specific injury, where there is a multitude of possible actors but it is not possible to ascertain which one of them actually contributed to the injury. While such a theory might not be applied by international tribunals, it is definitely a departure from the general causation-in-fact test.

Such a theory, the so-called market-share theory was employed by many US courts to enable cancer victims to receive compensation from drug producers in the "DES cases".[288] DES was a synthetic form of the female hormone oestrogen and was prescribed by doctors to up to 3 million women in the USA between 1947 and 1971, *inter alia*, to prevent miscarriages. Scientific studies showed that prenatal exposure to DES had led to a higher incidence of an unusual type of cancer in young women. These studies were able to establish general causation of this kind of cancer by DES. (This is comparable to the finding that the observed warming over the second half of the 20th century is attributable to anthropogenic emissions.)

Because the plaintiffs could not prove that their mothers had taken pills manufactured by a specific manufacturer, the courts accepted proof of causation on the basis of

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287 Probleme alternativer Kausalität bei Massenschäden, 185 AcP (1985) 505 ff. See for further ideas of legal scholars Loser, note 146, 223 ff.

288 Sindell v Abbott Laboratories 26 Cal. 3d 588, 607 P 2d 924 (1980); Martin v. Abbott Laboratories 689 P 2d 368 (Wash. 1984); Brown v Superior Court (Abbott Laboratories) 751 P 2d 470 (Cal. 1988); Hymowitz v Eli Lilly 541 NYS 2d 941 (CA 1989) – where, it has been said, liability for a percentage was found notwithstanding that a particular manufacturer could show that its product could not have caused the injury as it had not been used. Market share liability has been rejected by the Supreme Courts of Missouri (Zafft v. Eli Lilly 676 SW 2d 241 (Mo. Banc 1984)), Iowa (Mulcahy v. Eli Lilly 386 NW 2d 67 (Iowa 1986)), New Jersey (Shackil v. Lederle Laboratories 561 A 2d 511 (NJ 1989), a vaccine case), and Rhode Island (Gorman v. Abbott Laboratories 599 A 2d 1364 (RI 1991); but was applied by the Hawaiian Supreme Court in a Factor VIII-causing-HIV case (Smith v. Cutter Biological 823 P 2d 717 (Hawaii 1991). The Dutch Supreme Court also rejected market share liability in a DES case, preferring the "alternative causation" test (Van Ballegooijen v. Bayer Nederland BV (Rvdw 1992, No. 219).

market share: if a manufacturer had marketed DES and if DES leads to increased incidence of cancer, the various manufacturers were held liable on the basis of their market share in sales of the drug at the time. The New York court of appeals even reasoned that the manufacturers should be liable on the basis of the overall risk they created not only to the plaintiffs but to the society at large.[289] While this theory was rejected by other US courts,[290] it is a good example of how far the requirement of causation can be reduced, even beyond having to prove that the defendant's behaviour (production and marketing of the drug) was actually a condition for the result (cancer in a particular woman). Legal and policy-oriented institutions have been suspicious of such theories, because, as the WBGU notes, it is *"essential that liability does not degenerate to mere liability on suspicion"*.[291]

Obviously, this climate change damage case is different. First of all, all emitters of greenhouse gas contribute to the problem, i.e. it is possible to prove the contribution of the wrongdoer. Also, while liability in the DES cases was strict and thus all manufacturers were equally potentially liable, this is not the case with respect to States and their climate change relevant behaviour. Unless a breach of treaty or customary law can be ascertained, emissions will not entail State responsibility today. Moreover, the actions where the theory was first accepted (e.g. *Sindell*) were so-called class actions, i.e. suits in which the plaintiff represented many other persons affected by DES. Class actions are not mirrored by procedural rules in international law, even if tribunals are able to join cases where appropriate (see e.g. Article 47 of the ICJ Rules of Procedure).

Better suited seems therefore the untried theory of pollution share liability according to which a polluter would be held liable according to his contribution to a given kind of or pollution incident. This theory intends to ease the burden of joining all polluters to a suit, by enabling the plaintiff to sue only the main emitters and then apportion liability on the basis of the proportionate liability of the defendants (share of emissions).[292]

These theories could provide an important starting point for the apportionment of damages between several causing actors. In this specific case, Bhutan and Nepal could claim that the USA is responsible for the costs of preventing GLOFS relative to their emission share in the legally relevant time period (1994-2005).

From a different angle, but also with the intent of tackling unclear causal relationships, a Swiss High-Level Commission for the Revision of Swiss Liability Law has suggested

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289 *Hymowitz v. Eli Lilly and Company* 539 N.E.2d 1069 (N.Y. 1989).

290 See for example the Ohio Supreme Court in *Sutowski v. Eli Lilly & Co.*, 696 N.E.2d 187 (Ohio 1998).

291 Note 184, at 222.

292 See Müller-Chen, Entwicklungen im europäischen Umwelthaftungsrecht, Schweizerische Zeitschrift für Internationales und Europäisches Recht 1997, 213. See further on US American theories Loser, note 146, 206 ff. and Rosenberg, Toxic Torts Litigation: crysis or cysalis, 24 Houston Law Review (1987) 183, at 189 ff.

the application of a probability concept: where there is a high probability of a causal link between the actor's activity and the harm caused, the court should be able to confirm causation on the basis of its conviction. Where probability is low, it need not necessarily reject causation, but might afford only a portion of damages, based on that probability.[293] Similarly, for the specific case of air pollutants, *Fikentscher* has argued that the sheer statistical probability of causation should suffice to capture cases of cumulative causation.[294] This concept could be applied to climate change damage as it would apportion the burden of the scientific uncertainties between claimant and defendant States. Such "probability liability" was also discussed by the WBGU,[295] and for the German legal system *Prütting* and *Bydlinski* have argued that in exceptional cases it is reasonable to apply the term "causation" as a legal construct and therefore let (high) probability suffice for the proof of causation. In their opinion, it is the potentially causal negligent or purposeful activity that forms the basis of legal responsibility – not the damage inflicted itself.[296]

Yet, these theories should be seen as additional argument only. If regional attribution studies can show that global average warming of the latter half of the 20th century is responsible for at least part of the melting, and a non-full-proof standard is applied, the contribution of the USA can be established as a cause of the impact suffered by Bhutan and Nepal: Its behaviour is a factual condition for the occurrence of the damage.

(2) *Normative causation*

Having demonstrated causation in fact, is the US automatically responsible for the injury, i.e. must the US bear the costs of preventing GLOFs in Bhutan and Nepal, or, should a GLOF occur, is the US liable for any damage done? As discussed above, lawyers have sought to restrict liability or responsibility by employing normative (i.e. non-scientific) theories and criteria. These are designed to prevent every condition from contributing to a result which leads to responsibility for the individual or State in control of the condition (see section III.6.a). In this section, both international law and domestic theories providing suggestions and ideas for restricting responsibility are discussed. None of the domestic law theories or methods constitutes international law or generally accepted principles of law in the sense of Article 38.1 of the ICJ Statute. Rather, as comparative law analysis has shown, different tests are employed in jurisdictions around the world to limit responsibility or liability. An international tribunal

293 See Loser, note 146, 134 f.

294 Fikentscher, Schuldrecht, 1997, §51 IV.

295 WBGU, note 184, at 222.

296 Prütting, Gegenwartsprobleme der Beweislast, at 109; Bydlinski, Aktuelle Streitfragen um die alternative Kausalität, in: Sandrock (Hrsg.), Festschrift für Günther Beitzke, Berlin/New York 1979, 3 ff.

faced with a case such as the one between Nepal/Bhutan and the USA could chose to employ any of them, or none of them. This is not an incident of *lacunae* or *non-liquet*, but a matter of interpretation of the existing law on State responsibility. The following sections scrutinise some of this case law and theories and discuss how they could be applied to this specific case in order to limit the responsibility of the USA.

(a) *Substantive contribution*

Some domestic theories, which accept the contribution approach to causation in fact, demand that the defendant's behaviour must contribute to the relevant outcome (here: global warming in the latter half of the 20th century) in a substantive way, i.e. the behaviour must lie above a *de minimis* threshold. While this approach cannot be said to constitute international law, it is possible that an international tribunal, taking into account justice and equity considerations, would adopt a similar approach to supplement the contribution-based causation in fact argument. As mentioned before, showing that US emissions have contributed to the rising levels of greenhouse gases in the atmosphere is an easy task, since country emission data is available in the context of the FCCC reporting obligations, at least since 1990.

As the cause of action in this specific case-study is the breach of Articles 4.2 and 2 FCCC, contributions pre-dating the entry into force of this treaty are not legally relevant. Thus, only emissions in excess of the prevention obligations in the FCCC can be challenged by Nepal and Bhutan. This is difficult since the argument is not that the USA has infringed the FCCC by emitting over and above a particular threshold, but that it has failed to reverse the trend of emissions. The magnitude of this failure is difficult to measure.

Taking aggregate emission figures, US greenhouse gas emissions in 1990 amounted to 5,032,977 Gg CO_2 equivalent, rising to 6,098,730 Gg in 2000. Had the USA taken all measures required to return emissions to 1990 levels as promised in the first climate action plan, over 1,000,000 Gg of CO_2 equivalent would not have been emitted. This represents the accumulated net emissions of the UK and Spain in 2000.[297] And in comparison, Bhutan's CO_2 emissions in 1994 amounted to only 228.46 Gg (net emissions cannot be estimated for Bhutan).[298] Even if it cannot be argued that returning emissions to 1990 levels was an obligation of result, the volume of additional emissions since 1990 surely lies above a *de minimis* threshold. Thus, looking at it in this specific way, the USA's emissions emitted in breach of the FCCC would constitute a substantial contribution to anthropogenic warming.

Another way of calculating the US contribution and determining whether it lies

297 Figures taken from FCCC/FCCC/WEB/2002/10, table B.2.

298 Initial National Communication for Bhutan under the UN FCCCC, Sept. 2000 (available on <http://unfccc.int>).

over a *de minimis* threshold would be to use a model to compute the contribution of post-1994 emissions of the USA to overall warming, i.e. the contribution in terms of °C rather than absolute emissions. This could be done by taking the 1992 status of atmospheric concentrations as a baseline and either factoring in only US emissions or US emissions as a percentage of global emissions. Even though overall emissions of the USA would be in the order of 25% of global emissions, such an exercise might lead to a statement that US "excess" emissions have contributed only (in the order of) 2% to the actual warming observed globally because naturally, emissions dating from 1950 or before which remain in the atmosphere have had a much larger impact on the climatic response than emissions emitted only recently. However, if this percentage is projected into the future, the contribution will again be significant due to the long atmospheric lifetimes of greenhouse gases (e.g. of CO_2 emissions released today, about 20-30% will still be in the atmosphere after 1,000 years).[299]

(b) *Proximate cause or foreseeability*

International tribunals have held governments responsible only for the proximate and natural consequences of their acts and have denied compensation for remote consequences in the absence of evidence of deliberate intention to injure.[300] Tribunals have sought to exclude damages that were too remote, while differing on reasons and definitions. Because of the difference in case characteristics and facts, as well as the composition of courts and tribunals, a common or generally accepted theory is not discernible in the various decisions.

The US-German Commission (as well as other international tribunals) based its decision on the *proximate cause* rule: *"The proximate cause of the loss must have been in legal contemplation of the act by Germany. The proximate result or consequence of that act must have been the loss, damage, or injury suffered . . ."*[301] Drawing from this case law, international scholars have argued that the proximate cause rule is the one to be used in international law,[302] and the ILC suggests various test phrases including "proximate cause"[303] to restrict causation while failing to define how this criterion might be applied in a specific case. Domestic practice provides some insight.

The "Proximate Cause Theory", applied mostly in the USA, and to a lesser extent in other common law countries, argues that only those conditions of harm which are proximate to it can be regarded as cause in law. To establish proximity, both time

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299 See for analysis of the methods and techniques usable den Elzen et al., note 151 and FCCC/SBSTA/2002/INF.14. See also Chapter II on the "Brazilian Proposal".

300 See *Dix* case IX RIAA 119 at 121, Garcia Amador, Yearbook ILC 1982, Vol II, 41; Brownlie, System of the Law of the Nations, 224; Cheng, General Principles of International Law, 251 ff.

301 Administrative Decision No. II, VII RIAA 23 at 29 f.

302 Okowa, note 58, 181 and ILA (Rauschning), Report of the 64th Conference, 1990 (Queensland) 295 f.

303 See for ILC quotes above section Chapter I:III.6.b).

and place proximity are possible criteria.[304] It has been criticised as a *"rough and ready rule of thumb"*, which serves mainly to decide who, out of several wrongdoers, should be held responsible for an injury.[305] However, when looking closely at the tests employed by international tribunals, they are wider than the traditional theory.

Some early arbitrary rulings draw a distinction between "direct" and "indirect" damages, which is not congruent with the proximity of the damage. The Mexican-US Claims commission, for example, expressed that *"it is clear that only those damages can be considered as losses or damages caused by [the defendant] which are immediate and direct results of his [conduct]"*.[306] This corresponds to a domestic law theory – "direct consequence" or "immediate cause" theory – which, like the proximate cause theory, is an attempt to make liability stop at some point. The problem in cases where this theory is employed is usually that a minor offence or conduct causes major damage, including loss of business, etc. and it would seem unjust to hold the tortfeasor responsible for all the indirect damages his act might have caused.[307] At least in international law there has never been a clear notion of "indirect damage". The approach has been criticised as too restrictive and too vague and both domestic and international tribunals have included "indirect" damages where it was deemed appropriate: *"All indirect losses should be covered as long as the [tortfeasor's] act was the effective and proximate cause and source from which they flow"*.[308]

Other awards reveal that causation is not excluded even if there was no time/place proximity but only the damage was foreseeable. This was held by the tribunals in the *Portuguese Colonies* case[309] and the *War Risk Insurance Premiums Claims* case.[310] As stated once explicitly, tribunals hesitate to *"unravel a tangled network of causes and of effects"*,[311] and would rather find that an injury is the *"logical consequence of an act"*.[312] State practice is inconclusive on this issue. In their reactions to the various drafts of the DASR, some States preferred foreseeability or predictability, some "normality" as the main criterion for establishing causation, and *Arangio-Ruiz* found that predictability prevails in international judicial practice.[313] He rejected, however, any application of the criterion "proximity".

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304 See for a historical analysis of this rule: Hart/Honoré, who described this approach, relying on the proximity (in space and time) of an effect to the cause, as misleading (Causation in the law, at 82 and 126 ff.).

305 Honoré, note 126, 7-76.

306 Cited after Cheng, note 300, 241.

307 Honoré, note 126, 7-71 ff.

308 See the Portugo-Anglos Arbitral Tribunal in the *Angola* case: II RIAA (1928) 1011: "arbitrators have quite often allowed compensation for damages that are not direct" (at 1031). See also Arangio-Ruiz, note 144 (1989), 12.

309 (Portugal v. Germany), Award of 1928, II RIAA (1949) 1013, at 1032

310 *War Risks Insurance Premium Claims*, Award of 1923, VII RIAA (1956) 44.

311 Ibid., at 54.

312 Arangio-Ruiz, note 144 (1989), 13, referring to the criteria "normality and predictability".

313 Ibid.

As these few examples show, the terms proximate or effective do not provide clear guidance, but are used somewhat metaphorically. *Okowa* has analysed the international jurisprudence in depth only recently and suggests (in line with *Cheng*) that there are in fact two tests employed by tribunals: "the objective normality test" and the "subjective ability-to-foresee test". Similarly, the ILA states that a proper causal link can be established if the State *"actually knew or foresaw or ought to have known or foreseen that [its] individual conduct was or would be part of a composite cause bringing about inadmissible harm"*.[314]

The former test requires that the loss in question be considered "the normal and natural consequence" of the act of the wrongdoer.[315] This test intends to exclude losses that are *"unconnected with the initial act . . . which could only have occurred with the help of causes that are independent of the author of the act"*[316] – thus, it is an objective foreseeability test.[317] This test is also part of the elements of the no harm rule.

If applied to the current case, the objective normality test would not lead to the exclusion of causation. It was objectively known at the time the breach of treaty (1994-2005) that climate change would lead to impacts such as melting of mountain glaciers. The GLOF prevention measures demanded by Nepal and Bhutan are a logical reaction to the physical changes to which the US emissions has contributed. The impacts are not "unconnected with the initial act" but rather a direct result of the rising temperatures, which are partly due to US emissions in breach of Articles 2 and 4.2 FCCC.

The foreseeability test responds to the specific circumstances of the defendant and asks whether he could have foreseen the consequences of his act. While it would be difficult to argue that the US in particular could not have foreseen the adverse effects of climate change in general and their contribution to the rising atmospheric concentrations of greenhouse gases, the US could argue that actually, its wrongful behaviour post-1994 contributed to such a small extent to the ensuing temperature rise that it could not have foreseen specific impacts as "consequence" of this act, i.e. the breach of treaty. Indeed, in the *Samoan Claims* case, the tribunal stated that the wrongdoer was responsible *"for damages which are both in fact, caused by his action, and could not be attributed to any other cause, and which a reasonable man in the position of the wrongdoer at the time would have foreseen as likely to ensue from his action"* (emphasis added).[318] In this ruling, the tribunal not only analysed whether the damage was foreseeable, but also if it could be

314 Note 150, at 297.

315 Okowa, note 58, at 180. She quotes several reports of the Special Rapporteur of the ILC project on State responsibility, here Arangio-Ruiz, 2nd Report on State responsibility, Yearbook ILC 1989 Vol. II, Part I, A/CN.4/426, 13 as well as the *War Risk Insurance Premium Claim* note 310. Brownlie also refers to losses that are "proximate" to the act in question, in: State responsibility, 225.

316 *Portuguese Colonies* case, note 309, at 1031.

317 See also ILA, Report of the 64th Conference, 1990 (Queensland) 295 and Cheng, note 300, 251.

318 *Samoan Claims* case (Germany v. Great Britain and USA) Award of 1902, IX RIAA (1963) 15. This case was concerned with damages payable to German nationals as a result of activities by British and US officials.

explained in any other way, or if other explanations were more "reasonable". This approach resembles the so-called explanatory theory, which attempts to limit responsibility of the wrongdoer if the harm can be adequately explained by a condition other than his conduct.[319]

Using this "explanatory" approach, the USA could argue that the increase of surface temperatures is the result of other greenhouse gas emissions, not the ones emitted by the USA post-1994. While the effect of (well-mixed) greenhouse gas emissions on radiative forcing is almost instantaneous, the climatic response is different. One Gt of greenhouse gases emitted in 1950 has a larger effect on the climate than 1 Gt emitted in 1994 because the Gt from the 1950s has been in the atmosphere longer. As noted above, the contribution to the actual warming caused by emissions in breach of the FCCC might be small. However, Nepal and Bhutan could counter this argument by reference to the fact that unlawful behaviour must always be seen in the context of the situation in which it occurred. Thus, even if it was the behaviour (historical emissions) of many States which led to high greenhouse gas concentrations before 1994, the US has unlawfully contributed to this phenomenon and it is on the basis of this wrongful behaviour that the US and not other States are held responsible for ensuing damage. Moreover, tribunals have not hesitated to award damages even if the injury or loss was not foreseeable to the source State.[320] In fact, as pointed out in Chapter IV, there is no international law rule that implies that the wrongdoer (here the USA) must have foreseen the precise magnitude or location of the injury. For example, in the *Corfu Channel* case, the ICJ did not require that Albania know or foresee exactly which ships might be damaged by the mines. A requirement of "specific foreseeability" would be unrealistic for damage brought about by the reactions of natural systems. What was foreseeable is the interference with the climate system brought on about by anthropogenic emissions – to which the US contributed. This eventuality is even codified in Article 2 FCCC.

Notably, this approach to establishing causation by reference to foreseeability blurs the distinction between causation and fault. *Hart and Honoré* have suggested that foreseeability of damage or risk could form the primary test of causation, over and above other criteria to limit liability.[321]

If a proximity test (time/place) were to be used to complement causation in fact, it would not serve to restrict the US's responsibility in this case. All greenhouse gas emissions are equally "proximate" to the resulting change in climate. Once the greenhouse gases are mixed in the atmosphere, they contribute equally to positive radia-

319 Honoré, note 126, 7-59.

320 See Garcia Amador, note 27 (1957), 6 and Arangio-Ruiz, note 144 (1989), 14. It should be noted that, while foreseeability was used by tribunals as a limiting factor, it could just as well be applied so as to extend causation: everything that was foreseeable could be attributed to the wrongdoer.

321 Hart/Honoré, Causation in the Law, 230 ff.

tive forcing. That these physical processes, which were known to the USA, as early as the first IPCC assessment report issued in 1990, alter temperatures, precipitation and are most likely to cause substantive damage on Earth is both natural (in a natural science context), and logical in that it was predicted by the majority of climate scientists at the time and today. The damage is also proximate in time relative to the period of breach of treaty.

In sum, neither a restriction based on foreseeability nor one based on the proximity of the damage would preclude a finding of a causal link between the wrongful behaviour of the US and the injury incurred by Nepal and Bhutan. As pointed out above, the proximate cause theory is used only as a metaphor to restrict liability where the pure application of causation in fact would lead to unjust results. Therefore, other suggested theories taken from municipal law will be discussed briefly, to determine whether they might serve to exonerate the USA in this specific case.

(c) *Adequacy Theory*

One of the most commonly applied restrictions to causation in fact is the so-called "Adequacy Theory".[322] According to this theory, an event must increase the likelihood of an outcome and this event must not be an unlikely result of a given behaviour; in other words, the cause of an event is the condition which increases the probability of the outcome of the event by a significant amount. Interestingly for the present situation, this theory is based on the concept of risk. The wrongdoer intervenes (in a natural process) either by increasing an existing risk or by creating a new one. This concept matches the realities of anthropogenic climate change. Every emitter increases the risk that damage will occur in the future, thus increasing the necessity of preventive measures like lowering water levels in glacial lakes. At the same time the "significant" threshold has the same function as it does in the "substantial contribution" test discussed above at (a). The aim of this theory is to exclude outcomes which cannot be attributed to the wrongdoer because his conduct has not contributed substantively to a risk. As stated above, however, US emissions have *de-facto* contributed to the problem (or risk of further warming in the future).

This theory has its roots in German criminal law and the desire not to punish a delinquent for the results of his actions which were unforeseeable or are not perceived to be the "natural course of things".[323] This is important since the criminal code includes provisions for stricter penalties where an act results in extremely harmful consequences. For example, where a simple slap in the face results in the death of the victim, because the slap led to the death mandates a much stronger penalty than the slap itself would.

322 See Honoré, 7-58 and 7-80 ff.

323 See for the German theory on this: BGB Münchner Kommentar (Grunsky) Vor § 249 para 40 ff. and Esser/Schmidt, note 146, 216 ff.

However, jurisprudence shows that as long as the result of an act is not completely beyond the boundaries of the imaginable, in applying civil law the causal relationship will be found to exist.[324] Whether an event is causal in terms of the theory of adequacy is not determined ex-post but ex-ante. Could the effect of a certain behaviour have been reasonably foreseen by an observer?[325] As already stated, the fact that emissions of greenhouse gases lead to severe damage elsewhere is not beyond the natural cause of things – the outcome was foreseeable in this sense. The theory of adequacy is consistent therefore with what appear to be the elements of the normative causation test in international law, since it involves both objective and subjective foreseeability.

(d) *Scope of the Rule*

Both in Germany and other civil law systems, the "scope of the rule" is also used to limit liability (Schutzzweck der Norm).[326] If a statutory or customary rule does not intend to prevent a certain loss or injury, a defendant cannot be found liable for damages even if he has behaved contrary to the norm. In another formulation, there must be a connection between the wrongdoer's conduct and the harm, such that it is unlawful to occasion harm in this way (Rechtswidrigkeitszusammenhang).[327]

This theory might in fact limit the US's responsibility to some degree.

One, as argued in Chapter III, Articles 2 and 4 FCCC are designed to protect the global climate system, not the climate system of a specific country or region. It could be argued that when the FCCC was signed and ratified it could not have been foreseen that breach of the FCCC might lead to responsibility for specific damage in a specific country. On the other hand, from the FCCC's negotiating history it is clear that States agreed to enter into such a far reaching agreement because science indicated that anthropogenic climate change could lead to severe damage. The fact that States were unwilling to regulate compensation for climate change damage in the treaty does not indicate a restriction of the protective purpose of the FCCC as such. The purpose of the FCCC, as noted in Chapter III is both long-term and aggregate (i.e. protection of the climate system for the benefit of mankind) and immediate and specific, referring to specific impacts which (as predicted by the IPCC in 1990) would affect mostly developing countries. It is precisely the purpose of State responsibility to enforce such obligations, both by obliging States to comply with their obligations and by awarding reparation to countries that are adversely affected by the breach of treaty. Therefore, holding the USA responsible for specific prevention measures in Nepal or Bhutan is within the scope of the norm.

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324 See BGHZ 3, 261 ff.; BGHZ 57, 245 (255) relying on an objective and ex-post observer to determine whether the result of an act is within the normal possibilities and was thus foreseeable.

325 BGHZ 3, 261 at 266 f.

326 Münchner Kommentar zum BGB, (Grunsky), Vor § 249, para 44 ff.

327 See Fikentscher, Schuldrecht, § 49 III and Münchner Kommentar, § 823, para. 185 ff. (Mertens).

Two, a consideration is important in this framework, which is closely connected to the issues discussed under the heading of concurrent causes in section III.6.g). The scope of the primary norm breached in this case is to prevent emissions (over and above those that would result from domestic policies) in compliance with the duty of conduct contained in Articles 2 and 4.2 FCCC. This means that the application of this theory would prevent the US from being held responsible for any proportion of the damage (translated into GLOF prevention costs) that cannot be attributed to its particular wrongful behaviour.

(3) *Conclusions*

Both the requirements of causation in fact (provided that a regional attribution study yields adequate results) and normative causation can be met in this specific case. Using a contribution-based approach, it can be shown that the behaviour of the USA is a cause of the problems faced by Nepal and Bhutan. In other words, by breaching its obligation of conduct under Articles 2 and 4.2 FCCC, the US has contributed to the rising water levels in glacial lakes, which threaten people and infrastructure with GLOFs. Moreover, none of the theories used in international and domestic law for restricting liability or responsibility appear to have an exonerating effect.

When the US engaged in this wrongful behaviour, it was well aware of the dangers posed by climate change, including its probable specific impacts, as outlined by the IPCC. The fact that the relevant obligations of the FCCC are not directly aimed at protecting the Himalayan glaciers cannot prevent the system of State responsibility from enforcing international obligations which are (at least indirectly) aimed at preventing climate change damage.

Nevertheless, the scope of the responsibility might be limited by applying the scope of the rule theory. On the basis of this theory, the USA would not be held liable for the proportion of the damage that cannot be attributed directly to its wrongful behaviour. Related to this, the next section discusses the issue of multiple polluters.

f) *The problem of multiple polluters*

Even though the claim in this case study is made against the wrongful behaviour of one State, the USA, it is worth considering a situation where multiple States have committed wrongful acts.

The basic theories applying to this are discussed in section III.8. To recapitulate, under international law, a State is generally only responsible for the conduct attributable to it (independent responsibility). However, State responsibility law also acknowledges that there might indeed be several States responsible for the same harm (Article 47 DASR), but in this particular case international law does not provide a clear answer whether the USA should be held fully liable for the harm, or whether it should

only be held liable proportional to its contribution. Domestic theories do not provide a (coherent) general principle of law (in the sense of Article 38 ICJ Statute) on this issue. Under the rule of joint and several liability, one tortfeasor will be held liable for the full damage and then must recover from other tortfeasors. However, there are many exemptions to this rule, especially in cases where the contribution of each tortfeasor can be determined. In such cases, a mixed solution between joint and several liability and partial responsibility might be sought. Two possible scenarios are discussed below.

(1) *Several breaches of the FCCC*

Applying the rule of joint and several liability, where multiple States are in breach of the FCCC, i.e. of the same primary rule, the USA could still be held responsible for the overall damage attributable to the sum of wrongdoers. Applying this rule can be justified from both a practical and equitable standpoint. From the practical standpoint, obtaining jurisdiction over multiple States simultaneously and in the same international venue could be extremely difficult (not to mention time consuming, where time is of the essence). From an equitable standpoint, because the GLOF prevention measures must be undertaken as quickly as possible, it would be unfair to deny Nepal and Bhutan the full set of resources required to do so. It would also be possible, however, to award damages on the basis of "relative fault". This would require a determination of the respective faults or the relative causation of other wrongdoers (States) in order to affect some form of apportionment. In this case, apportionment could be based of emission contributions (in essence using the polluter-share theory introduced above).

In practice, a court could award reparation on the basis of approximation. Approximation, as employed in domestic systems, is certainly not prohibited in international law.[328] Indeed, as the tribunal in *Trail Smelter*, noted, in inter-State cases encompassing claims of several private individuals and public institutions, the tort will often be of a nature where the exact determination of damages with absolute certainty is impossible.[329] Approximation could also be used to determine the share of responsibility, as figures will differ depending on databases and models used.

(2) *Several breaches of various primary norms*

It is also imaginable that several States are in violation of various rules of international law, which might lead to a different measure of responsibility (different injury recoverable, different time frame for emissions covered, etc.). Here, Nepal and Bhutan would not only be faced with the problem of multiple polluters but also with the problem of multiple grounds on which to base a claim. For example, the application of the no

328 ILA Report (1990), note 317, 293.
329 III RIIA 1911, at 1920.

harm rule might identify a different behaviour or set of behaviours as wrongful, and thus other States could be found responsible for shares of emissions over and above the ones legally relevant here ("excess" emissions after 1994). It is also possible that a primary norm will only cover certain types of injury (e.g. UNCLOS). In this case, a court would not be able to apply the joint and several liability rule because the parties would be liable for causing a distinct injury.

(3) *Jurisdictional issues*

As discussed above (III.8.b), a court might be barred from ruling altogether where its finding that one State is responsible for a harm affects the legal interests of States which are not party to the dispute.

It is important to note that an approach which results in the USA being responsible for the full measure of harm even though several States are in breach of the same primary norm would not affect the legal interests of those other States On the other hand, apportioning harm to the US on the basis of emissions shares very well could affect the interests of non-party States since their relative (causal) contributions would have to be determined as a precondition to an award for damages against the USA. Still, since the court most likely would only be using publicly available information on the emissions levels attributable to other States – as opposed to making determinations on the nature of third party acts – no jurisdictional problem would arise. In the words of the ICJ, the legal interests of those other States would not be "the very subject" of the dispute.

g) *Contribution of the injured State*

According to customary law and Article 39 DASR, the extent of reparation must be adjusted if the claimant State (or any individual or entity on whose behalf reparation is sought) has, through wilful or negligent behaviour, contributed to the injury. However, as mentioned above, the contributions of Bhutan and Nepal to anthropogenic greenhouse gas emissions are so miniscule – both historically and in the present day – that any adjustment would be negligible. Moreover, other negligent behaviour on the part of these two States cannot be established. Such behaviour would require proof that, for example, these countries should have foreseen and prevented the risk of GLOFs thereby reducing the costs or risks arising from glacial melting in the Himalayas. Finding the facts to support this argument would be very difficult indeed.

h) *Remedy and defence*

Bhutan and Nepal require financial assistance to undertake the measures necessary for lowering the water levels in the glacial lakes threatening their valleys. They also require assistance in monitoring other glaciers and lakes to prevent further damage and loss.

These items represent pre-damage costs, i.e. they are prevention costs. Therefore, the principle established in *Chorzow Factory* that says reparation must "wipe out" all consequences of the wrongful act is difficult to apply. However, as pointed out above, ecological damage is generally accepted as injury. Here, the wrongful act contributes to the raised water levels in the present lakes and therefore to the risk that other lakes will threaten to flood valleys. These consequences can only be "wiped out" and prevented by the measures demanded by Nepal and Bhutan. This corresponds to the ILC's understanding of compensation for damage, which shall include "costs incurred in responding to pollution damage"[330] – lowering the water levels of the lakes is clearly a response measure, even if it is not in itself a clean-up operation as in, for example, the *Trail Smelter* case.

Obviously, while the principle of full reparation/restitution applies, the amount will vary with the quantum of harm ascribable to the defendant State. As *Shelton* observes, this full reparation idea is closely linked to questions of causation and remoteness of damage, which have already been discussed. Depending on the view taken on the issue of concurrent causes and multiple polluters, the USA would thus be ordered to bear a proportionate share or the full cost of the measures taken. As restitution is still possible in that a GLOF has not yet occurred, the proportionality test prescribed by Article 35 DASR would not enable the USA to argue that compensation should be provided instead of restitution.

Should a GLOF occur during the course of litigation, compensation would have to be claimed, again based on the share of US responsibility. Here an equity test would play a role in determining compensation since the concern is "to reach an equitable and acceptable outcome".[331] Finally, the USA would be ordered to bring its emission behaviour in line with its treaty obligations, i.e. reverse trends of greenhouse gas emissions.

i) *Defences*

(1) *Adaptation finance*

Because the remedy is essentially paying for measures to adapt to the impacts of climate change, the USA could raise as a defence its compliance with obligations to finance adaptation measures through the FCCC framework. As discussed in Chapter III, Annex II States are obliged to bear the costs for "adequate" adaptation by contributing to the GEF, the financial mechanism of the FCCC. Still, as has also been

330 ILC Report 53rd session, note 6, at 250.

331 This principle is reflected in most international arbitrations and judgments involving compensation, see Gray, Judicial Remedies, 33 ff.; Graefenrath, note 98 at 101.

described, so far the GEF has only provided funding for vulnerability assessments and "enabling environments", and no funding for measures that actually reduce the vulnerability of human and natural systems to the impacts of climate change. Moreover, the contributions made by Annex II States do not currently correspond to the needs of developing country parties to adapt to the impacts of climate change. Certainly, the specific measures that must be taken by Nepal and Bhutan were not included in any calculation of the US contribution to the replenishment of the GEF. Therefore, the fact that the US has contributed to funding the GEF cannot be used as a legal defence against State responsibility claims.

(2) *Exclusive application of the FCCC framework*

Since the primary obligation forming the foundation of the State responsibility claim is a treaty obligation, it could be argued that the treaty regime itself would provide special procedures to tackle any questions of compliance and enforcement (see Article 55 DASR, *lex specialis*). Article 14.5 FCCC allows Parties that have submitted a notification of a dispute between them to submit a question regarding the interpretation and application of the FCCC to a conciliation commission. Yet, Parties are equally called upon to submit to the jurisdiction of the ICJ or arbitration in accordance with an annex on arbitration which has not yet been adopted. These special procedures do not bar any State Party to the convention request the application of the law on State responsibility.

j) *Provisional measures*

Nepal and Bhutan could be justified in requesting provisional measures, i.e. measures that are appropriate under the circumstances to preserve the respective rights of the Parties to the dispute or to prevent serious harm pending the final decision (see e.g. Article 41 ICJ Statute).

Since provisional measures are exceptional and discretionary in nature, international jurisprudence has developed two criteria that must be met in the specific case:[332] i) the court or tribunal must find that the rights of either one or other of the parties might be prejudiced without the prescription of such measures, i.e. that there is a credible possibility that such prejudice of rights might occur; and ii) that the prejudice of rights would be irreparable in the sense that it would not be possible to restore the injured party materially to the situation that would have prevailed without the infraction

332 See for an in-depth discussion of provisional measures and the legal criteria: ITLOS, The *Mox Plant* Case (Ireland v. United Kingdom, December 3, 2001, 41 ILM (2002) 405.

complained of, or that the infraction *"could not be made good simply by the payment of an indemnity or by compensation or restitution in some other material form."*[333]

Under the assumptions made in this case study it is indeed very likely that a GLOF might occur if technical measures are not taken. It is also virtually certain that the possibility of restoring Nepal and Bhutan to pre-GLOF conditions would be impossible, since both human and animal life as well as biological systems may be irreversibly destroyed. Therefore, Bhutan and Nepal would be advised to ask for provisional measures pending a final ruling.

k) *Conclusions*

This case study has shown that reparation is due to Bhutan and Nepal under the law of State responsibility on the basis that

i) the USA has breached its obligation of conduct as provided in Articles 2 and 4.2 FCCC;
ii) a causal chain can be established between the contribution of the USA to anthropogenic warming in the latter half of the 20th century and the increased melting of the Himalayan glaciers threatening valleys in Bhutan and Nepal with GLOFs;
iii) normative causation theories based on "proximate cause" or "adequate" contribution do not exclude the responsibility of the US;
iv) the scope of the rule theory can only restrict the USA's responsibility to the share of the injury caused by its wrongful emissions but not exclude it from responsibility completely;
v) Bhutan and Nepal can claim the costs of preventing GLOFs despite the fact that the damage (to infrastructure and human lives) has not occurred, since the environmental damage already occurred and these costs represent prevention costs comparable to clean-up operations in other pollution cases;
vi) the USA cannot defend itself by arguing that it has already funded adaptation activities within the framework of the FCCC since 1) to date the GEF has not funded "hard" measures to prevent damage and reduce vulnerability and 2) the specific costs for preventing GLOFs were not part of the calculation of US contributions to the GEF.

In addition, Bhutan and Nepal can request that the USA be ordered to bring its behaviour and climate change policies into compliance with the provisions of the FCCC.

333 Case concerning the Denunciation of the Treaty of 2 November 1865 between China and Belgium, P.C.I.J., Series A, No. 8, p. 7.

2. Sea Level Rise

As reflected in Chapter II, sea level rise[334] poses a major threat to many coastal areas of the world, but in particular to small island States. During the 20th century, global average sea level[335] rose between 10 and 20 cm, at a rate of 1 to 2 mm per year. The IPCC is confident (90-99%) that 20th century warming contributed significantly to the observed sea level rise, through thermal expansion of sea water and widespread loss of land ice,[336] and is similarly certain that sea levels will rise under all emission scenarios. Even if all greenhouse gas emissions were halted immediately, sea levels would continue to rise due to the slow response of oceans to surface temperature change.

a) *The case*

This case study presents the hypothetical claim of the Cook Islands, and scrutinises the possible action for injury due to expected sea level rise.

The Cook Islands comprises fifteen small islands scattered over the South (south-west) Pacific Ocean. The Exclusive Economic Zone (EEZ) of the Cook Islands is 1.8 million km^2 of the South Pacific Ocean. The low-lying islands have a height range above mean sea level of only five to nine meters. Rarotonga is both the largest (67.2 km^2) and highest island (652 m highest elevation above mean sea level), and is the most densely populated. The Cook Islands are engaged in international tourism activities, and receive 37% of their annual GDP from the tourism and service sector. Beach holidays, coral reef diving and nature attractions, such as sea turtle nesting sites are the basic attractions.[337] The Cook Islands have been a self-governing State since 1965. Under the 1964 Constitution, the Legislature has passed various land tenure bills and (unlike in other Pacific Islands) it is possible for nationals of the Cook Islands to obtain land from the public for building purposes (long-term lease).[338]

This case study assumes that a community on the island of Aitutaki, north of Rarotonga, wishes to lease on a long-term basis a coastal property to a company

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334 This category includes effects of temperature rise generally, such as changes in vegetation zones, increased risk of disease due to higher temperatures, increased precipitation, etc.

335 This figure refers to eustatic sea level rise only, i.e. resulting from changes to the density or total mass of water. Tectonic land movements are excluded. See TAR WG I, 643.

336 TAR WG I, 641. This Statement further clarifies the correlation: "The sum of terms not related to recent climate change is -1.1 to +0.9 mm/yr (i.e. excluding thermal expansion, glaciers and ice caps, and changes in the ice sheets due to 20th century climate change). This range is less than the observational lower bound of sea level rise. Hence it is very likely that these terms alone are an insufficient explanation, implying that 20th century climate change has made a contribution to 20th century sea level rise". (TAR WGI, 666)

337 See the national website with investment opportunities: http://www.ck/invest.htm.

338 See http://www.ck/govt.htm and Cook Islands National Communication under the UN FCCC, March 2000.

which develops and builds tourism sites, and which is already incorporated in the Cook Islands. Aitutaki, classified as an "almost atoll", is only 124 m maximum elevation above mean sea level. It already relies heavily on the tourism sector for income generation.[339] An evaluation of the offered site takes place and negotiations on price and infrastructure ensue. After extensive research, the developer informs the governing council of the community that it wishes to lower the previously suggested lease price by 30% to take account of the risk of sea level rise in the next decade.[340] It is argued that local sea level rise would both lead to high insurance premiums on the property (storm and tidal wave insurance) and lower the possibility of using the property long-term should the sea encroach on the beaches and the property become uninsurable. Moreover, should tidal waves hit the island with greater frequency, transport and supplies would not be guaranteed and "loss of business" insurance would be required. Also, should sea level rise occur locally, salt water intrusion would threaten the drinking water supply. The evaluation team, comprised of property evaluators, scientists and other experts, has specifically considered the risk of sea level rise due to climate change over the expected lifetime of the development and the official time of the lease of the property, i.e. 50-70 years (working on the basis of the IPCC estimates). For the sake of simplicity it is assumed that there is agreement about the fact that the market value of the site has decreased significantly due to the projected sea level rise for the region.

The Aitutaki community (via the Government of the Cook Islands) wants to take action against major greenhouse gas emitting countries because they feel they have incurred losses due to anthropogenic climate change. As a first step, the Cook Islands seeks redress from the Australian Government. As the case is concerned with *risk* of sea level rise, the no harm rule is chosen as the cause of action.

b) *Preliminary considerations*

The Pacific climate has changed significantly in the past 20 years. Most sea level monitoring sites in the South Pacific are now recording accelerated rises of up to 25 mm/year, more than ten times the trend this century. These findings have been validated by satellite data showing 20-30 mm rises from Papua New Guinea southeast to Fiji.[341] Land losses are already reported from Tuvalu, where the motu of Tepuka

339 See Cook Islands National Communication under the UNFCCC, 2000, 10.

340 This is not a purely hypothetical scenario, as investment experts do now warn of such risks to investments. See "Treasurers warn of risks to investments from climate change", GreenBiz.com, 16 April 2003, <http://www.enn.com/news/2003-04-16/s_3809.asp>. See also the 2003 report of the Carbon Disclosure Project about the financial risks climate change poses to investors <http://www.cdproject.net>.

341 TAR WG II, 857.

Savilivili has lost its sandbanks and coconut trees, and Kiribati, where the motu of Tebua Tarawa, which used to be a landmark for fishermen, is now under water. Relative sea level is also estimated to have risen by 2.2 mm per year on average for Raratonga.[342] Temperatures have risen by 0.6-0.7°C since the 1920s. These changes are seen to be consistent with the pattern of anthropogenic climate change.[343]

It is assumed that 50 years of tide gauge data would be necessary to be able to reliably detect trends of local sea level rise.[344] Specific sea level rise records do not exist for Aitutaki, and tide gauge records are insufficient also in the case of Rarotonga. Poor data availability is a problem for most Pacific Islands, even though the Marshall Islands actually possess more than 50 years' worth of data for one observation station. From the data, it is therefore not possible to clearly detect actual local sea level rise. Also, scientists are often unable to agree on whether regional and local sea level rise (where trends are detected) is primarily connected to the observed global mean sea level rise, or due to tectonic movement or natural variability. As with the Cook Islands, this is mostly due to inadequate data for comparing regional sea level rise (tide gauges with long records, satellite data. etc.) with tectonic movements. Archaeological efforts are currently underway to provide the necessary temporal and spatial data coverage.

Moreover, even on a global scale, the IPCC does not expressly attribute any observed sea level rise to anthropogenic climate change or human activities, as it has done for surface temperature rise in the latter half of the 20th century. At first glance, this seems illogical given the clear physical correlation between surface temperature rise (leading to thermal expansion of ocean water)[345] and sea level rise as a phenomenon. Also, the IPCC states that *"the sum of terms not related to recent climate change . . . i.e. excluding thermal expansions, glaciers and ice caps and changes in the ice sheets due to 20th century climate change . . . is less than the observational lower bound of sea level rise. Hence it is very likely that that these terms alone are an insufficient explanation, implying that 20th century climate change has made a contribution to 20th century sea level rise"*.[346] Yet, "20th century climate change" is not equivalent to what has been attributed to human activities, i.e. a part of the observed warming in the latter half of the 20th century.[347] The IPCC does estimate an anthropogenic contribution to 20th century sea level rise at minimum 0.3 mm/yr, but this is not a formal attribution statement. This current inability to attribute 20th century sea level rise clearly to anthropogenic climate change is partly due to data

342 Mitchell, W., The South Pacific Sea Level and Climate Monitoring Project.

343 TAR WG II, 848f.

344 TAR WG I, 664.

345 Thermal expansion is expected to be the largest component of sea level rise in the 21st century, TAR WG I, 643. Other contributions are the melting of glaciers, Greenland ice and Antarctic ice.

346 TAR WG I, at 666.

347 See the different use of the term climate change by the IPCC from the meaning attributed to the term in this thesis and by the FCCC, Chapter II.

constraints, but is also due to the time delay required for surface warming to translate into ocean warming (and expansion), which may take years, decades or centuries, depending on the ocean depth considered.

It should be noted though, that since the TAR, there have been many important developments in attempts to estimate the various contributions to sea level rise. For example, the physical association between sea level rise and surface temperature rise is shown for past changes in a 2001 study, which concludes that that the global average sea level rise between 1993-98, calculated from satellite data, is almost equal to the thermal expansion caused by temperatures increases of the upper 500 m of the ocean.[348] As most of the temperature rise in the latter half of the 20th century is attributable to human activities, this means that sea level rise in this time period could also be connected to human activities. In any event, leading scientists believe that it will be possible to attribute components of sea level rise to anthropogenic climate change in the next 5 to 20 years – this includes regional levels.[349] This is not surprising, given, again, the clear physical association between temperature and sea level rise. In fact, it is almost unthinkable that temperatures would rise without global sea levels responding to this change.

So, for the Aitutaki community's claim today, it must be concluded that no convincing causal relationship can currently be established between human activities and observed sea level rise (i.e. current changes) – even if such changes are well recorded. Instead, it must base its claim on the *increased risk* posed to the coastal site due to anthropogenic climate change, i.e. on projections of climate change in the future.

Global mean sea level is projected to rise – non-uniformly – by somewhere between 9 cm and 88 cm in the 21st century. Rates of sea-level rise are expected to increase to between 1 and 7 mm/yr, with a central estimate of 4 mm/yr.[350] These rates are much larger than the observed changes during the 20th century, and likely are without precedent over at least the last 10,000 years. Other impacts in the South Pacific area include increased storminess and precipitation.[351] While the current climate models are too coarse to predict sea level rise for distinct stretches of coastline, the IPCC projects that thermal expansion alone will raise sea levels in the southwest Pacific by 28-32 cm at the time of CO_2 doubling – which, as discussed in Chapter II, is a realistic prediction for the 21st century. Aitutaki is located within this area of the Pacific Ocean.

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348 Cabanes et al., Sea Level Rise During Past 40 Years Determined from Satellite and in Situ Observations, 294 Science (2001) 840. The upper 500 m of the ocean take up heat quickly, while the lower layers take much longer to absorb the heat from the upper layers and then store it for a long time.

349 Personal communication with two IPCC lead authors John Church (Australia) and Jonathan Gregory (UK).

350 See Hay et al., Climate Variability and Change and Sea-level Rise in the Pacific Islands Region, Chapter 2: Climate and Sea Level Variability and Change.

351 See Hay et al., ibid.

In line with these projections, it has been estimated that 12.5% of the total land area of Kiribati could be inundated with a 1 m sea level rise. The islands of Tokelau (Marshall Islands), and Tuvalu may also become wholly uninhabitable.[352] On these two islands, with a 0.3 to 1 meter sea-level rise, an area of 3.1 to 10.3 km^2 would be lost, affecting 2,700 to 9,000 people respectively.[353] All three islands are located in the vicinity of Aitutaki. As most of the infrastructure and human settlements are located along the coast of islands, the IPCC has projected that that the predicted loss of beaches and territory could devastate the economies of many small island States (67-95% confidence). It must be these predictions that lead the Tuvalu Prime Minister to declare that his country is seeking to sue the USA and/or Australia for damages.[354] However, as shown above, any such claim based on current changes is unlikely to proven scientifically at this moment in time (even though it may be possible in the near future).

For the purposes of this case study it will be assumed that similar estimates have been made for various models of the region of Aitutaki. Using projections and current sea level trends, simple estimates have been made that project loss of coastal land on Aitutaki, even under low warming scenarios, well in the 21st century.[355]

c) *Breach of treaty*

The Cook Islands can use the customary international law no harm rule as a cause of action. They can argue that Australia has contributed to the increase in risk of sea level rise, thereby unlawfully damaging their sovereign interests, which includes the economic value of their coastal lands. As both the Cook Islands and Australia are parties to the FCCC, provisions of this treaty can supplement the claim. While the Cook Islands have ratified the Kyoto Protocol, the Australian government has decided not to ratify the Kyoto Protocol *"unless and until it is demonstrated that it is in the national interest to do so".*[356]

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352 Nunn, P.; Mimura, N.: Vulnerability of south Pacific island nations to sea-level rise, Journal of Coastal Research, Special Issue 24, pp. 133-151. See also Johnson, Global Warming Threatens Pacific Islands, Reuter Libr. Rep., June 12, 1992 and McIlroy, Rising Tides From Global Warming Threaten Marshall Islands, Ottawa Citizen, May 3, 1992 who reports that the government of the Marshall Islands even considered accepting garbage from the State of California to build up its shoreline.

353 Mimura, N., Vulnerability of island countries in the South Pacific to sea-level rise and climate change, Climate Research 12 (2-3) pp. 137-143. This paper presents the results of an assessment of the vulnerability of the islands of Tonga, Fiji, Samoa and Tuvalu to sea-level rise and climate change.

354 World Environment News, 30 August 2002 "US faces legal battles as climate bogeyman", and "Tuvalu seeks help in US global warming lawsuit", available at <http://www.planetark.org>.

355 See for a description of such (possible) estimate of local sea level rise Hay et al., note 350, and further Gregory et al., Comparison of results from several AOGCMs for global and regional sea-level change 1900-2100., Climate Dynamics 18 (2001), 225.

356 See Australia's Third National Communication to the UN FCCC, 2002, at 1.

As established in Chapter IV, every State is under the obligation to prevent harm from another State's territory and to minimize the risk of such harm. Australia would be held responsible for damage if it has infringed its due diligence obligation to prevent damage or minimize the risk due to climate change damage of the Cook Islands. As outlined in Chapter IV, the specific duty entails the opportunity to act to prevent damage or minimize the risk thereof, foreseeability and the taking of proportionate measures.

(1) *Opportunity to act*

Australia has and had the opportunity to reduce the risk of sea level rise encroaching on the beaches of Aitutaki. Admittedly, compared to global emission levels, Australia is only a minor emitter, with a historical share of emissions of only 1.2% (1900-1999), but with high per capita emissions of about 5 tC/yr (world average 1.0t/yr).[357] Nevertheless, Australia is a net emitter with the ability to cut its emissions to reduce the risk that increased concentrations of greenhouse gases in the atmosphere will eventually lead to sea level rise greater than it would be without the Australian contribution.

(2) *Foreseeability*

Foreseeability is an objectified standard. Australia need not have envisaged specific damage to the Cook Islands, it need only have been able to foresee the consequences of its activities generally. Australia, as much as any other country with a scientific community, clearly had the ability to foresee that its emission of greenhouse gases would cause an increase in atmospheric concentrations and thereby increase the risk of sea level rise. In fact, sea level rise was the one impact that was most prominently discussed in the first IPCC Assessment Report in 1990. Moreover, in its 1994 submission to the FCCC Australia explicitly acknowledged potential damage: *"Australia recognises that while accurate scientific data on the potential regional impacts of climate change are not yet available, there are particular vulnerabilities that warrant action in line with the precautionary principle."*[358]

As discussed in Chapter IV, it could be argued that the Australian government could have anticipated damage even before publication of the first IPCC report. It could have anticipated damage as early as the 1950s when monitoring of atmospheric greenhouse gas concentration began, or even as early as climate change was first suggested as a possible consequence of human behaviour in the late 19th century. In fact, given its geographical location, Australian scientists were among the first to monitor and research global sea level rise. In sum, Australia could have foreseen damage for at least a decade and potentially much longer.

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357 World Resources Institute, Historical Emissions – Contributions to climate change, powerpoint-slide, <http://www.wri.org>.

358 Australia's First National Communication under the UN FCCC, 1994, 1.

(3) *Proportionate measures*

To establish a breach of due diligence, it must also be shown that Australia has failed to take appropriate measures to reduce or minimize the risk posed to the Cook Islands from sea level rise. Suitable measures are greenhouse gas mitigation measures, or measures to increase the capacity of or protect Australian terrestrial carbon sinks.

In the decade 1990-2000 when Australia knew or should have known that greenhouse gas emissions raise the risk of sea level rise, Australia increased its CO_2 emissions from fossil fuel use and cement production alone from 72.601 thousand tonnes of carbon in 1990 to 94.859 in 2000 representing a 30.65% increase.[359] In absolute terms, this is the highest decadal rise ever in Australia. Australian aggregate CO_2 emissions rose 24.9% from 1990 to 2000, and net emissions rose 6.3%.[360]

In 1997, Australia agreed to a "stabilisation" target of 108% above 1990 levels for the first commitment period of the Kyoto Protocol and is (politically) still working towards this aim, even though it has not ratified the Protocol. At current projections, Australia will actually raise its net emissions to 111% above 1990 levels by 2010/2012,[361] and probably substantially more, as the predictions made by the government have been called "wildly optimistic guesses" by scientists and officials.[362] According to the UNFCCC accounting arrangements, and with all sectors and greenhouse gas abatement measures suggested by the Australian government included, Australia's total emissions are projected to grow by 16% between 1990 and 2010.[363]

Emission rates from transport and electricity consumption have accelerated steadily in the past decades (between 1990-2000, emissions from stationary energy sources increased by 26.6% and emissions from transport by 24.2%).[364] Australia's emissions from electricity are expected to increase by 41% between 1990 and 2010.[365] Furthermore, the Australian government continues to strongly support the expansion of fossil fuels.[366] Measures to put an end to land clearing, a major source of GHG emissions in Australia, are insufficient.[367] Compared with other developed countries, Australia supports renewable

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359 Emissions from fossil fuel and cement, data from WRI 2003. In comparison, the Cook Islands emitted 8,000 tonnes of carbon in 2000. Other data taken from FCCC Secretariat, note 259.

360 Given these figures, Australia has also failed to meet the "soft" stabilisation target of Article 4.2 FCCC.

361 See "Australia lags behind Kyoto targets", Nine MSN, 11th April 2003, <http://news.ninemsn.com.au/Sci_Tech/story_47588.asp>

362 The Australia Institute, Missing the Target, 14 and Gwen Andrews, former head of the Australian Greenhouse office (Australian Financial Review: Lenore Taylor 'UK lashes Australia over Kyoto stance', 4, 23-24 November 2002).

363 Australia's Third National Communication to the UN FCCC, 73 and 86.

364 Australia's Third National Communication under the UN FCCC, 2002, 72.

365 Australian Bureau of Agriculture and Research Economics (ABARE), Getting Energy and Greenhouse Into Perspective, media release, April 15, 1999.

366 See for more references Greenpeace Australia Pacific/Australian Conservation Foundation/Friends of The Earth, Faking It, at 4.

367 The Australia Institute, note 362, 6.

energy with few financial means, and measures aimed at reducing greenhouse gas emissions in the long term (independently of the Kyoto Protocol's targets) are missing.[368]

Australia adopted a "National Greenhouse Response Strategy" in 1992, which – since 1998 – is coordinated by the Australian Greenhouse Office. The "Interim Planning Target" adopted by the Government serves as a yardstick for any climate mitigation activities. It aims to "*stabilise greenhouse gas emissions based on 1988 levels by the year 2000 and to reduce these emissions by 20 per cent by the year 2005 . . . subject to Australia not implementing response measures that would have net adverse impacts nationally or on Australia's trade competitiveness, in the absence of similar action by major greenhouse gas producing countries*".[369] This formulation emphasises that Australia's activities to reduce greenhouse gas emissions are not driven by the need to reduce and minimize risk of damage to the Cook Islands or other States, but by the needs of the Australian economy alone. Australia's greenhouse gas policies do not try to balance its economic interests against the likely damage due to climate change. The Australian approach does not recognise that Australia is under an obligation to protect the Cook Islands from damage resulting from activities within its territory. While this might be justifiable politically, it provides a strong indication that Australia has not taken and is not taking all the measures it could reasonably take to comply with its due diligence obligation to reduce the risk of climate change damage.

This approach explains why the Australian Government never actually proposed a plan to reverse emission trends, to decrease absolute emissions or to meet the FCCC's year-2000 target. In its first national communication to the FCCC, the government only proposed mitigation policies and measures leading to a 7% rise of emissions above 1990 levels.[370] According to the same submission, these measures were deemed "no-regret" measures, i.e. economically beneficial without considering potential climate change impacts. In its third national communication, Australia accepts an emissions scenario representing increases of 36% over 1990 levels for the energy sector, and overall emissions increases by 2010 and beyond.

As already stressed in Chapter IV, the magnitude of the risk posed by climate change (including to Australia itself) is enormous. Moreover, Australia is economically capable of making strong efforts to reduce its greenhouse gas emissions. It is the fourteenth largest world economy, with a GDP in 2000/2001 of US$361 billion. Overall, therefore, it does not appear that Australia has taken measures "proportionate" to the risk.

The concept of responsibility for risk must be re-emphasised here. The precise purpose of the no harm rule is to reduce and minimize the adverse effects of climate

368 The Australia Institute, Missing the Target An analysis of Australian Government Greenhouse Spending, Discussion Paper Number 51, January 2003, 26.

369 Australia's First National Communication to the UN FCCC, 45.

370 Australia's First National Communication to the UN FCCC, 69.

change or other environmental impacts in the face of uncertainty and before actual damage occurs. If States only had a prevention obligation once future impacts were positively known, the no harm rule would lose its purpose entirely. The risk from climate change has been demonstrated by the IPCC with a high degree of certainty. Australia has endorsed this science various times and accepts the precautionary principle as a yardstick (see above). The very purpose of this principle is to oblige States to take appropriate action to reduce risk. Given the scientifically demonstrated need to reduce net emissions substantially to prevent dangerous climate change, Australia's discretion in taking climate protection measures is limited by the objective need of all developed countries to reduce absolute emissions as quickly as possible. To actually plan and continue to *increase* emissions on the basis of the current projections provided by the IPCC cannot be an adequate response to the risks of climate change faced by other States such as the Cook Islands.

d) *Damage and causation*

The first question to be answered here is whether the situation experienced by the Aitutaki community actually amounts to damage in a legal sense. If no damage is present, the Cook Islands may only request cessation of the breach of the no harm rule by the Australian government, i.e. demand increased efforts to reduce greenhouse gas emissions. If damage is present, issues of causation remain to be discussed. As a first step, however, it should be emphasised that just because the case is directed at recovering pure economic loss does not signal its collapse.

In many national (tort) systems, this type of case might not succeed if it were construed as an attempt to recover pure economic loss. Pure economic loss is generally not a protected interest under national tort law. The reasons for this exclusion vary, but it could be argued that such protection would substantially affect social behaviour between citizens.[371] On the other hand, where a plaintiff seeks damages for violation of a contractual arrangement under national law, pure economic loss normally will be protected.

The Aitutaki community cannot prove physical damage to the coast (yet) and the incurred loss is due to the (un)willingness of a tourism developer to ignore risks posed to the property by climate change. It is a case seeking current economic loss, based on likely future damage, i.e. the likelihood of sea level rise impacting the coastal property.

371 See Ott/Paschke, note 120, 302 ff. See also the ILC project on (now) civil liability: Rao (Special Rapporteur), 1st Report on the legal regime for allocation of loss in case of transboundary harm arising out of hazardous activities, ILC Doc. A/CN.4/531, August 2003 (55th ILC Session), who states that loss of profits and tourism on account of environmental damage are not likely to be compensated (at 52).

In the international law on State responsibility, what matters is the breach of obligation, not the existence of a protected interest. In other words, it is the primary duty that determines the protected interest.[372] In this specific case, the no harm rule is the yardstick for determining whether the present claim is possible in general. This rule places a duty on States to prevent damage or minimize the risk thereof to other States. If a failure to perform this duty leads to a financially assessable loss to the other State, nothing inherent in the rule requires that a current physical damage or loss be associated with the breach. Rather, it is inherent in the concept of risk that behaviour prior to the actual physical damage is legally relevant and thus potentially reparable under the law of State responsibility. Accordingly, as pointed out in section III.5.b), Article 31 DASR defines injury in the broadest possible way and includes loss of profits expressly in the categories of damage.

With this caveat, the discussion now turns to the problem of future damage or rather, whether Australia is actually a cause of the loss.

(1) *The Problem of future damage*

Admittedly, this kind of claim certainly departs from the traditional cases of State responsibility, such as in the *Corfu Channel* case, where damage to the British warships had clearly been done. Here a loss is incurred because of anticipated (future) damage.

Analysing possible claims for radioactive pollution, *Okowa* has argued that as long as an activity has already taken place and increased the risk of damage to people and property, future damage is a sufficient basis upon which to seek compensation.[373] However, since at least a part of the emissions predicted to cause the risk of sea level rise have not yet occurred, this case cannot readily be compared to, for example, the testing of a nuclear bomb.

On another note, *Larson* has argued that the precautionary principle will prevent the argument that harm must have occurred already from barring a claim for sea level rise damage[374] Likewise, the ILC acknowledges that damage from emissions might be distant or uncertain, but states that this will not impede a case against the polluting State.[375] This argument was also raised by Hungary in the *Gabčikovo* case where it argued that possible future damage must play a role in the determination of reparation due from Slovakia for the unilateral damming of the Danube. While the ICJ did not directly rule on this issue, since it asked the parties to negotiate the legal consequences of the breaches of international law, it did not reject Hungary's argument that con-

372 See Report ILC 53rd session, note 6, at 73 and 225: "In some cases, what matters is the failure to take necessary precautions to prevent harm even if in the event no harm occurs".

373 Okowa, note 58 at 190 f.

374 Larson, note 238, at 513.

375 Report ILC 53rd session, note 6, at 226.

sideration of future damage was a *"logical application of the precautionary principle"*.[376] Hungary's situation was, however, also different from that of the Aitutaki community. Slovakia had already dammed the Danube. Only the precise ecological implications of this act were uncertain, which is why the precautionary principle was invoked for the purpose of determining reparation.

The Aitutaki situation is also different from domestic law cases where the exact implications of, say, a road accident are unclear and might only materialise over time in the victim. In such cases the courts usually only declare that damages are payable if any future illness can be associated with the accident. Such declaratory judgments may make sense in cases of cumulative and long-term environmental impacts, where damage is typically only be identifiable or provable scientifically long after the emitting activity. However, in the present case, the physical damage to the property has not occurred (or is at least not yet scientifically attributable to human emissions). The only thing that has occurred is contribution to overall climatic change, and a declaratory judgment is not what the Aitutaki community seeks.

The remedy sought is also not comparable to precautionary measures undertaken in anticipation of an environmental disaster such as an oil spill.[377] Instead, the community wishes to recover their loss consisting of reduced revenue from the long-term lease of the coastal property. In principle there is no reason why prospective damage should not be the basis for State responsibility. Whether this is possible in practice in this case depends on a different question.

(2) *The cause of the loss*

It would appear that the question of concern here is not whether future damages are recoverable in principle or in theory. Instead, it is whether the loss incurred (forgone revenue, 30% reduction of equity value) is attributable to Australia's unlawful activity, i.e. continuing to increase greenhouse gas emissions despite the knowledge that such course of conduct will increase the risk of sea level rise in the South Pacific. In other words, is Australia (partly) responsible for the loss, or is its behaviour not related to the devaluation of the property at all?

The devaluation of the coastal property on Aitutaki is based on projections of climate change and sea level rise, which in turn are based on *future* emissions of countries derived from models. These models rely on the accumulation of greenhouse gases in the atmosphere today. Naturally, the IPCC emission scenarios are not "completely hypothetical", but attempt to incorporate various states of a future world. With projected increased temperatures, it is relatively straightforward to also project sea level

376 *Gabčicovo-Nagymaros* case, Memorial of the Republic of Hungary, 5.12.1994, Vol. I, at 266.

377 Such precautionary measures are an accepted category of damage, even if they aim at preventing future damage. See Okowa, note 58, 191 ff.

rise. Even the scenario which assumes a high level of global mitigation actions projects significant sea level rise in the South Pacific. If only Australia's future emissions were incorporated in the projections, it might be difficult to hold Australia responsible for the Aitutaki community's loss. Naturally, a State cannot be held liable for damage caused by actions that it has not yet taken.

However, what must be kept in mind is that greenhouse gases emitted by Australia during the time period 1990 to 2003 and prior will continue to increase the risk of sea level rise for up to a century due to their long lifespan in the atmosphere and the slow response of oceans. While the projections are indeed the reason for the devaluation of coastal property, they are based on the current radiative forcing of the atmosphere. The legally relevant emissions in the past continue to increase the risk. Moreover, Australia has stated that it will continue to increase its greenhouse gas emissions in the future and therefore Australian emissions will play a part in any future emission developments – which in turn form the basis for climate models.

Since activities already undertaken by Australia are legally relevant, it is not necessary to discuss the extent to which the IPCC's projections could be regarded as authoritative statements for a court of law. Nevertheless, since much of the projected risk is due to future emissions and can only be shown in climate models which use various emission scenarios, some remarks are warranted. As discussed in Chapter II, the IPCC is the most authoritative scientific body imaginable. The confidence levels ascribed to future sea level rise by the IPCC have been agreed by scientists from all over the world. Naturally, since they are based on models as well as a range of scenarios of a future world, uncertainties remain. However, considering the range of emissions scenarios possible, they represent the best possible prediction of the world and climate system of the 21st century. The likelihood of changes are displayed with a high degree of confidence, and this is enough to effectively influence investment and financial markets, which has already happened. An argument by Australia stating that climate change may not necessarily happen in the way it is predicted is fair, but will not convince a court to place the burden of the uncertainty on the side of the Cook Islands.

What remains in question is whether Australia's conduct was causal for the devaluation of the coastal property given the size of its contribution to the projected climate change. It could be argued that in fact, the devaluation of the coastal property would have occurred regardless of whether Australia had complied with the no harm rule. Yet, as was argued above, this application of the *sine qua non* formula is of little use in the case of cumulative causes. It is possible to establish causation on the basis of a contribution only. Moreover, if the impact of Australia's wrongful emissions (past and projected) on overall temperature rise and the resulting sea level rise was calculated with the help of long term climate models, the contribution to the risk would likely not be *de minimis* and in any event much larger than those of many other countries and in particular the Cook Islands themselves.

The wrongful behaviour of Australia has thus contributed and continues to contribute to the risk of sea level rise and therefore to the devaluation of the coastal property.

e) *Remedy*

The Cook Islands would likely seek a financial reimbursement for the forgone revenue (30% of the market price of the property). As re-stated by the ICJ in the *Gabčikovo* case, an international tribunal that has jurisdiction over a claim of State responsibility would also have the power to award compensation for damages suffered.[378]

Yet, the primary obligation of a State that has committed a wrongful act is to provide restitution. It is under the obligation to restore the situation *ex ante*, if possible and if such measures would not be wholly disproportionate (Article 35 DASR). This rule has the character of customary international law and has been repeated by tribunals and scholars, most prominently in the *Chorzów Factory* case.[379] In the present case, it is difficult to imagine how Australia could provide restitution. The ongoing emissions of greenhouse gases have increased the risk of sea level rise and thus lowered the value of the coastal property. It is unrealistic to think that coastal protec-tion measures would (in the long term) protect the coastal site from encroachment of the sea.

The obligation to provide reparation covers all potential losses in human infrastructure, property and other clearly defined economic assets. Insofar as compensation is due, it also covers economic loss through loss of profits (Article 36.2 DASR).[380] As the property evaluation indicates, the property price must be reduced by 30% due to the risk of sea level rise resulting from climate change. This is a financially assessable damage, and it has also been established by the injured community (Article 36.2 DASR). In line with the general system of State responsibility, losses incurred by the community can be claimed by way of diplomatic protection of the Cook Islands government.[381] If the international tribunal is uncertain about the magnitude of devaluation, it is free to repeat the evaluation exercise by appointing an independent enquiry.[382]

The question of how to allocate this responsibility between the various greenhouse gas emitters has already been discussed in depth in sections III.6.g), III.8 as well as in the context of the glacial melting case study. The same principles (and problems outlined) apply here. It would be possible for a court to estimate Australia's contribution to the risk now and in the 21st century and award partial damages. Equally, the tribunal could find Australia liable for the full measure of damages (i.e. the full 30% loss of earnings) and only take into account any contribution by the Cook Islands

378 Note 18, ICJ Rep. 1997, 7 at 81. See for further references Report ILC 53rd session, note 6, at 244.
379 *Factory at Chórzow*, Merits, 1928 PCIJ Ser. A. No. 17, at 28.
380 Report ILC 53rd session, note 6, 248 and 250 ff.
381 See footnote 94.
382 This was done in the *Corfu Channel* Case, Assessment of Compensation, ICJ Rep. 1949, 244 ff.

(which is *de minimis*). Where several States are identified as having breached the no harm rule, Australia could also be held jointly and severally liable for the proportion of the injury attributable to all these States, and thus for a substantially higher percentage of the damage.

f) *Conclusion*

The case study Cook Islands v. Australia has demonstrated that it is possible to seek redress for damages based on the fact that current (and past) emissions contribute to the phenomenon of climate change and therefore to the risk of future sea level rise with its diverse consequences.

Critical for the evaluation to of this case is the fact that the no harm rule contains a duty to minimize risk. Despite the fact that global sea level rise has not (yet) been attributed to human activities and local sea level rise is not demonstrable due to lack of observational data, it is possible for a small island community to demand reparation for reduced equity value due to – with substantial certainty projected – risk of sea level rise in the 21st century. The breach of the no harm rule committed by Australia has contributed to this risk, and is therefore also a cause of this loss. It is likely that Australia's responsibility would only extend to a part of the loss, which corresponds to its wrongful share of emissions. An international tribunal would be able to estimate such share without impacting on other contributing States' sovereign interests.

3. Extreme precipitation events and floods

The following hypothetical case study will discuss whether China can demand support from industrialised countries to take out insurance for infrastructure damage due to heavy precipitation and flooding events. The legal analysis concludes that China will not be able to seek redress from other States due to the particularities of the case. However, it does allow interesting insights into questions of causation with regard to extreme weather events.

a) *Extreme events and science*

It is recognised that extreme changes in weather due to climate change may have severe impacts on society and the natural environment.[383] Extreme weather events include heat or cold waves, heavy precipitation events leading to flooding and soil erosion,

383 See most recently World Conference on Disaster Reduction, Kobe, Hyogo, Japan, 18-22 January 2005, Report of the Conference, A/CONF.206/6, The Hyogo Declaration, 2 ff.

cyclones, thunderstorms, etc. As recorded by (re)insurance companies, the insured losses from extreme events have increased dramatically from US$7 Billion in the 1960s to US$109 Billion in the 1990s. Observations and projections with respect to the effect of climate change on extreme events are described in detail in Chapter II.

The IPCC has concluded that at least part of this increase is due to changes in climatic conditions,[384] but other important causes include changes in land use and the increasing concentration of people and capital in vulnerable areas (e.g. coastal regions exposed to windstorms, fertile river basins exposed to floods, and urban areas exposed to earthquakes). These factors (climate and others) may be different for different perils (floods, storms), and across different regions.

The IPCC does not offer a formal attribution statement on whether climate change is responsible for changes in intensity or frequency of extreme events. One reason for this is the poor observational record (no uniform definition of weather extremes exists, which is why an evaluation of the observational records is difficult),[385] but is also do in part to the quality and design of current climate models, which mostly focus on the observations of temperature change, rather than on extreme events. However, the TAR does adopt a theory which shows that if the average climate is changed (i.e. rise in average surface temperatures, which is attributed to human activities), invariably, extreme events must change as well.[386] This theory is robust and based on the IPCC's combined expert judgment. It is most readily applied to temperature extremes, not to rainfall or storm events. However, with respect to heavy rainfall, the TAR is 66-90% certain that a 2 to 4% increase in mid-latitudes took place in the 20th century. The global reinsurer Munich Re goes even further. Its studies of extreme precipitation events in the context of non-climatic causes has found that great weather disasters, including floods due to heavy precipitation events have increased by a factor 16 since the 1950s and that this increase is only partially explicable by factors other than climate change. The remaining factor 2 of increasing losses, Munich Re is inclined to attribute to anthropogenic climate change.[387] Recently, a study concluded with 90% certainty that human activities (i.e. mainly greenhouse gas emissions) at least doubled the risk of the 2003 European heatwave.[388]

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384 TAR WG II, 423.

385 See Easterling et al., Climate Extremes: Observations, Modeling, and Impacts, Nature Vol. 289 (2000), 2068 at 2071. It is this work much of the IPCC TAR conclusions rely on.

386 TAR WG I, 155 ff.

387 Oral Statement by Gert Berz, Munich Re, Press Conference "Klimaausbadekampagne", Berlin 31.05.2002.

388 Stott/Stone/Allen, Human contribution to the European Heatwave of 2003, 432 Nature (2004), 610 ff.

b) *The case*

The IPCC has pointed out that extreme events have already increased in temperate and tropical Asia,[389] including floods, droughts, forest fires and tropical cyclones (67-95% confidence).[390] In summer and autumn 2002, regions in central China, usually regions with low rainfall, were hit by record rainfalls and the worst flooding in a century. The flooding killed 900 people and caused US$3.6 billion in damage, mostly to public infrastructure. The China Meteorological Administration announced that *"Global climate change . . . has caused these extreme events"*.[391] While no scientific proof was provided, such increased intensities in rainfall are consistent with the projections of climate models:

There is still uncertainty about the extent to which these types of extremes will increase in intensity and severity as a result of climate change, but some robust projections for the 21st century are contained in the TAR (see table II.2, Chapter II). It projects more intense precipitation events over many areas (90-99% confidence) resulting in increased damage from floods, landslides, avalanches and mudslides, increased soil erosion (67-95% confidence) and increases in tropical cyclone peak wind intensities and tropical cyclone mean and peak precipitation intensities over some areas (67-90% confidence). A combined model run indicates that precipitation in temperate Asia is expected to rise from 3.9% in the 2020's to 10.9% in the 2080's when compared to 1990.[392]

This case study will assume that China, as a response to the 2002 floods, seeks to engage private insurance to hedge the risks of destruction of public infrastructure in areas particularly exposed to extreme precipitation events and the resulting flooding, i.e. areas located near rivers or lakes. The government has negotiated a set premium with an international insurance pool to cover the risks to bridges and major roads posed by flooding, throughout China.[393]

It is assumed that China seeks to obtain financial support for the insurance premiums due. China argues that while some of the premiums should be borne by the Chinese State budget, the increase in risk due to anthropogenic climate change in areas of central/eastern China (temperate Asia) which in turn increases the premium (i.e. the cost of insurance) should be borne by Annex I countries to the FCCC as the primary (historical) polluters. For the sake of simplicity, it will be assumed that insur-

389 Temperate Asia is constituted mostly by the eastern part of China and the Japanese Islands, and tropical Asia extends from the southern tip of China to Indonesia and Papua New Guinea.

390 TAR WG II, 14, 49

391 Environment News Service: 14.6.2002, Associated Press, 16.8.2002.

392 TAR WG II, 546.

393 This assumption is made as it would be economically infeasible to only insure areas that are at high risk. This phenomenon is known as adverse selection. See Linneroth-Bayer/Mace/Verheyen, Insurance-Related Actions and Risk Assessment in the Context of the UN FCCC, Background Paper, May 2003.

ance premiums are calculated as trends from historic (or observed) losses in the region, but include climate and catastrophe modelling results for the region.[394]

As a first step, China seeks contributions from the European Community (EC),[395] the USA and the Russian Federation, which together account for 60% of total carbon emissions since 1900. China relies on the no harm rule and argues that these Annex I States are unlawfully increasing (through past and present activities) the risk of heavy precipitation events on its territory.

c) *Preliminary observations – injury*

China seeks contributions to its insurance premiums on the basis that activities in the Russian Federation, the EC and USA have and are continuing to increase the risk of extreme precipitation events. As discussed in the previous case study, a remedy based on risk is generally available under the law on State responsibility where the no harm rule serves as the primary rule.

The damage sought is the difference between a hypothetical insurance premium payable without the risks from anthropogenic climate change to insure a proportion of public infrastructure in central/eastern China and the premium calculated on the basis of catastrophe modelling incorporating climate change models, i.e. predictions of climate change impacts.

First of all it is necessary to find that China has actually incurred an injury. Can a (higher) insurance premium constitute such an injury? After all, China entered into the insurance contract which obliges the government to pay the respective premiums of its own free will. This course of action is not necessary in the sense that it would prevent damage (as was the case with the technical and monitoring work done to the glacial lakes in the Himalayas in the first case study). It is a decision taken by China to transfer the risks the country faces from extreme precipitation events onto the global insurance (and reinsurance) markets. It is also not comparable to the case of the Cook Islands, where Aitutaki actually incurred a loss due to reduction in the value of its coastal property today.

China could argue that it is agreed in international law that insurance might be one possible instrument for supporting developing countries to cope with the impacts of climate change. This is stated in Article 4.8 FCCC, which calls upon Parties to "consider" actions, including those related to insurance, to meet the specific needs and concerns of developing countries with respect to both the adverse impacts of climate

394 Catastrophe modelling is increasingly used by insurers to calculate premiums for weather insurance, rather than simple trends projections from past events (Linneroth-Bayer/Mace/Verheyen, note 393).

395 The European Community has legal personality (Article 281 EC Treaty) and has ratified the FCCC and the Kyoto Protocol. It has taken part in international legal proceedings as an entity, for example, as a party to the WTO. The European Union, on the other hand, does not yet have such legal authority.

change and the impact of the implementation of response measures. Article 3.14 of the Kyoto Protocol confirms this, calling for the implementation of Articles 4.8 and 4.9 of the FCCC in fulfilling obligations of the Kyoto Protocol, and explicitly for the consideration of the "establishment" of insurance. The term "insurance" is not defined in either of the treaties and could refer to private insurance for transferring risks from extreme weather events to public infrastructure.

Moreover, China could argue that since science may never allow the attribution of a particular weather event to human activities (see below), it would never be able to seek redress from a responsible State for damages resulting from a flood. Unless it is allowed to seek financial assistance in meeting its insurance premiums based on the increase in risk, it would be left to tackle the damage without recourse to the polluter.

The Russian Federation, the EC and the US on the other hand would argue that taking out private insurance for public infrastructure damage is not a sensible course of action. No country currently insures public infrastructure via private insurance markets. In fact, this course of action has been discouraged by commentators because of the high costs of risk transfer instruments. It might be more efficient to earmark a budget position for post disaster relief and reconstruction for public infrastructure or borrow money post disaster than to continually pay a (high) insurance premium.[396] Therefore, taking out insurance could not be viewed as a necessary step in response to the increased risk, but instead a deliberate way to "design" injury. Besides, no activity of the defendant States would qualify as a "proximate cause" for the injury claimed by China.

On this basis, normative causation theories would most likely be able to restrict causation in fact in this case.

It should be noted though, that this latter argument might not hold in a case where insurance instruments protect private property, for example farmland or homes in flood prone areas. For private individuals, insurance (where available) is often the only way to cope with risks as immense as those from extreme precipitation events and floods. China (or any other country) could assume diplomatic protection[397] for its citizens who are faced with higher insurance premiums and claim the difference in premium price from major emitting nations. Therefore, even though it is doubtful whether existing international law would support China's claim as constructed here, some remarks with regard to causation are in order and could apply to any other case pertaining to increased risk from extreme weather events.

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396 See Linneroth-Bayer/Mace/Verheyen, note 393, 16 ff., Auffrett, Catastrophe Insurance Market in the Caribbean Region – Market failures and Recommendation for Public Sector Interventions, 16 and Pollner, Managing Catastrophic Disaster Risks Using Alternative Risk Financing and Pooled Insurance Structures, 79 ff.

397 See note 94.

d) *Causation in fact*

(1) *Single events*

As emphasised, China does not demand compensation for damage due to a particular flooding event. It is unlikely that science will ever be able to attribute a specific extreme event to anthropogenic causes as opposed to natural variability. Rather, what science can show is that any *increase* in extremes is partially due to climate change.[398]

Causation in fact based on the *sine qua non* formula would therefore not be a workable approach for a single extreme weather event. As *Peñalver* has pointed out, the mechanistic view of causation by the legal system does not fit the complex relationships of the global climate system.[399] While he overlooks that it is indeed possible to establish causation for gradual changes (see the first case-study), his analysis fits well for extreme weather events such as storms and floods. Applying a probabilistic approach, damages could be sought for injury due to an extreme weather event according to a scientific probability analysis of the scale in which climate change has increased the severity of a particular event. For example, China could recover a part of its injury resulting from a particular flooding event relative to the probability of how much the severity of the flooding was increased by anthropogenic climate change, but not the entire injury, which normally would be recovered if proof of a causal relationship satisfied the "balance of probabilities" test.

Such legal approaches deviating from the *sine qua non* formula and calling for probabilistic rather than deterministic approaches to causation were discussed in case study no. 1. These range from attempts to reverse the burden of proof to some kind of causation moving away from a sine qua non test. Rightly, the *WBGU* has noted that *"[t]he transition is fluid between easements of proof and the introduction of probability liability, notwithstanding that the first is a procedural tool while the latter is a new type of liability based on a different standard of substantive causality"*.[400]

International law and indeed most national legal systems have not endorsed probabilistic approaches to causation and it is therefore doubtful whether a case relying on such theories would be successful without a specific legal instrument designed to overcome the hurdles of proof of causation. Nevertheless, in this specific case the question remains whether legal causation could be established on the basis of the increase in risk – similar to the setting in case study no. 2.

398 See Allen, Liability for climate change, Nature,Vol. 421 (2003), 891 at 892 and Stott, et al., note 388.
399 Note 140, at 582 ff.
400 WBGU, note 184, at 222.

(2) *Increased risk of events*

Given the fact that no formal attribution statement has been issued by the IPCC on the relationship between increases in extreme weather events and human activities (and that some States vigorously reject that this attribution can be made at all),[401] it would be difficult to imagine – at this point in time – a chain of causation linking the activities of the defendant States to any injury (should it be accepted as such). There is, however, a robust theory underpinning the belief of scientists that changes in mean climate (temperature) will also lead to changes in extremes. Moreover, it is likely that some kind of statistical relationship between anthropogenic climate change and the increase in extreme events will be demonstrable in the near future. For example, the German Environmental Protection Agency has commissioned a research study by the statistician *Schönwiese* to explore these statistical links.[402] The same research team was able to show statistically the human component of 20th century warming (see Chapter II). A statistical study like the one commissioned by the German government would begin by detecting trends in extreme events and then would compare them with climate trends such as temperature. Any statistically significant results could then be related back to what climate models have projected for the past and the future. If it is found that weather extremes have increased in a particular region (such as Central Europe in the case of the ongoing *Schönwiese* study) it would also be possible to determine the probability of the extent to which this increase was caused by anthropogenic activities. What has already been found for Central Europe, for example, is that – as models have predicted – winter precipitation has increased and in the past 100 years by a factor of 2.6 (159%), and in Germany by a factor 5.6 (463%).[403] If such work was conducted for temperate Asia, it is very likely that the results would allow for a statement of probability sufficient for a show of causation with respect to the increase in risk (or, that is, the probability that an event will occur).

China's case is not based on past and observed events and trends (even if scientific evidence on observed trends and attribution surely would help its case), but on estimates of the future climate in central/eastern China. These predictions are derived from climate modelling projections using both natural and anthropogenic forcings. They are based on the various emission scenarios used by the IPCC, and therefore also incorporate current and future anthropogenic emissions by the defendant countries. The TAR's projections of developments of extreme events are dependent on the human signal as the models have no basis for projecting natural climate variability.

401 This was stated repeatedly by the US delegation at COP10 in the framework of agenda item 8 (b) – input of the COP to the World Conference on Disaster Reduction.

402 Personal communication with Prof. Schönwiese, University of Frankfurt, 29th April 2003.

403 Schönwiese/Grieser/Trömel, Secular Change of Extreme Precipitation Months in Europe, "Theoretical and Applied Climatology" (2003), forthcoming.

Moreover, the model results, in particular with regard to precipitation events, correspond with the physical relationship between temperature and the hydrological cycle. An increase of greenhouse gas concentrations increases surface temperatures, produces more evaporation, increases the ability of the atmosphere to hold moisture, and thus increases the atmospheric moisture content resulting in increased precipitation rates.[404] And finally, the model results with human signal are compared with runs without the human signal and from this baseline it is clear that the increases in extremes are projected because of the respective assumed anthropogenic emissions. The range of risks projected by the models rely on the various future emissions scenarios and thus on the anthropogenic signal. This means that China could argue that the projections made by the IPCC on increases in precipitation events is at least partly due to past and future emissions by the defendant States.

As noted in the previous case study, it would be difficult to argue that States should be made responsible for future emissions, purely on the basis of model projections. The law on State responsibility requires a connection between the current or past activities of a State and a breach of international law (and an injury, if reparation is sought). It is conceivable that emissions could be cut substantially, leading first of all to compliance with the no harm rule, and second, rendering defective the assumptions made by the models and emission scenarios. Still – again similar to the previous case study – it is possible to argue that the current and past emissions behaviour of the defendant States can be associated with the increased risk of extreme events.

This is possible because one, models predict these changes incorporating human emissions since 1870, including those of the any defendant States. Two, relying on the theory about the relationship between means and extremes mentioned above[405] one can argue that a change in the mean must, in a statistical sense, result in a shift of the extremes (high and low). As past emissions have already altered the mean and now form the baseline for projecting changes in extremes, past and future emissions (together with natural variability) cause changes. An example used by the IPCC is that as a result of an increase in the average daily temperature the nighttime temperatures (extreme low) have also increased.

In sum therefore, it is generally possible to show a causal connection between past and current emissions of the defendant States and the risk of more and heavier heavy precipitation events in temperate Asia.

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404 Easterling et al., note 385, 2070.

405 See in particular Figure 4-1 from IPCC TAR, Synthesis Report: The schematic diagrams show the effects on extreme temperatures when (a) the mean increases, leading to more record hot weather, (b) the variance increases, and (c) when both the mean and variance increase, leading to much more record hot weather.

e) *Conclusion*

This case fails due to the fact that China cannot show that it has incurred an injury which was caused by the behaviour of the defendant States. Entering into the insurance contract was its own sovereign decision and not a result of any emissions or other behaviour by the defendant States. However, as the analysis of causation in fact has shown, if a breach of the no harm rule was found[406] and an injury to China was accepted, a causal chain between the activities of the defendant States and the increase in risk and the injury could be established.

This result is certainly interesting for cases where insurance contracts already exist (for example held by private individuals). It could also serve as advice to countries to take out insurance now and to be prepared to present an injury claim when premiums rise.

V. Conclusions

This chapter has discussed the possible application of the law on State responsibility to cases of climate change damage in general and has applied these rules to three specific case studies.

The law on State responsibility is of importance for States as a means of enforcing international law and as a tool for seeking reparation for damages done by other States. The basis of the law on State responsibility is an objective concept of the wrongful act, which is committed whenever international law is breached. The intent of the responsible State is not at issue. All a State must do to incur responsibility is to commit a wrongful act. On this basis, State responsibility law can and should be used to enforce the primary prevention duties identified in Chapters III and IV. It is also a tool for countries faced with the impacts of climate change to seek reparation for those injuries. The Draft Articles on State Responsibility for Internationally Wrongful Acts adopted by the International Law Commission in August 2001 are for the most part a good reflection of the status of international law on the various elements and preconditions for State responsibility.

Some findings and problems are summarised here:

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406 This is not further elaborated here, but it could be argued that such breach could also be established in the case of the EC, given that CO_2 emissions in the EC rose by 1.6% from 2000 to 2001 (see EU Annual Emissions Inventory, 2003 (<http://reports.eea.eu.int/technical_report_2003_95/en>). 10 of the 15 Member States are heading towards overshooting their agreed share of the EU GHG emissions target by a wide margin. Apart form the UK, Germany and Luxembourg, all EC States have actually increased their emissions since 1990.

Establishing causation in fact and the applicable standard of proof. Given the fact that the climate system is highly non-linear, observational data is limited and any scientific findings on how the climate system changes will rely on imperfect climate models or statistical methods, establishing causation will never be an easy task. However, this chapter has shown that the standard of proof at the international level is unlikely to be a full proof standard. Rather, an international tribunal would be allowed to find that a causal chain exists if the scientific evidence is able to satisfy the "balance of probabilities" or "51%" test.

Thus, an important result of the analysis is that even by applying a legal standard of proof, there is a clear causal chain between human activities and climate change. So far the IPCC has only been able to show a direct link between human activities and observed warming in the latter half of the 20th century. Nevertheless, it is possible to design scientifically sound studies which attribute thermal changes to phenomena such as glacial melting. The analysis in this chapter has shown that these attribution studies are capable of satisfying a court's standard of proof requirements. It will not be long before science is able to attribute (with a statistical likelihood) global and local sea level rise and in fact, studies are already relating increases in frequency and severity of extreme weather events to global warming (caused by human activities), showing that the risks of such events increase with climate change. States affected by the impacts of climate change should be able to seek redress for their injuries from States found to be in violation of international law. However, scientific uncertainties will always remain and render claims for reparation difficult.

Concurrent causes and multiple responsible States. Regardless of the specific case, the issue of how to apportion responsibility for damages resulting from climate change is inherently difficult. Climate change is not caused by one single emitter or share of emissions. Instead, it is a phenomenon that is based on the accumulation of emissions from multiple sources over time. This means that the general principle of tort law where one tortfeasor is responsible for all the damages, regardless of the situation ex-ante may not be applicable. After all, depending on the interpretation of the available primary norms, climate change damage will occur even without any wrongful behaviour on the part of States. This indicates that where a climate change damage case rests on the assumption that a State has emitted greenhouse gases over and above a certain legal threshold, responsibility most likely will be determined in proportion to the breach only. So, States affected by climate change impacts will have to bear a large proportion of the damage caused by climate change and historic industrialised country emissions on their own.

However, the longer victim States wait until bringing a claim for damages, the larger the recoverable proportion will become. This is due on the one hand to the relevant dates for foreseeability (in the context of the no harm rule) and entry into force of the FCCC, and on the other to the fact that the physical importance of any

emissions released after these dates increases over time in relation to historical emissions that do not constitute wrongful acts. It is possible for an international tribunal to employ the concept of joint and several liability to ensure that the victim State is able to recover a major part of its damage even if not all defendants can be joined to a particular suit.

The concept of risk. Two of the preceding case studies relied on an increase in risk to invoke State responsibility and claim reparation from States. As discussed in Chapter IV, the no harm rule includes a duty to minimize risk. Basing a State responsibility case on an increase in risk is difficult given that i) the defendant State's contribution of greenhouse gases will be small relative to the existing risk (high levels of atmospheric concentrations of greenhouse gases) and ii) an increase in risk is not equivalent to the occurrence of (causal) damage. Still, as the case study from the Cook Islands demonstrates it is possible to assess the impacts of increased risk financially (reduced value of coastal property). If it is accepted that States have an obligation to minimize risk, there will be a multitude of cases where legally relevant injury can be assessed in this way. In fact, this concept could have bearing on domestic cases as well, where private individuals start to feel the impacts of the increased risks of extreme events or sea level rise on equity prices or insurance premiums.

The role of international tribunals in a climate change case. A climate change related case will never be straightforward. It will always involve skill in applying and interpreting primary rules, evaluating scientific evidence, estimating damage and shares of responsibility as well as possibly making judgments on the basis of principles of justice and equity to fill gaps in the existing international law on State responsibility. This thesis has not discussed issues of jurisdiction – it has assumed that the substantive legal position of a claim matters whether or not a case can in fact be brought to a court, but it is clear that a climate change case will make high demands on a court. On the other hand, as climate science becomes even more robust and internationally accepted, evaluating the scientific evidence will not represent in itself a bar to bringing a case to an international tribunal. Given the basic principle that States are responsible for complying with international law and for not causing damage to other States, and the urgent need to strengthen efforts to protect the global climate, a climate change damage case could indeed present a tribunal with a unique case to strengthen the implementation of primary rules for climate protection and the prevention of climate change damage.

Chapter Six

THE CHALLENGE AHEAD: REGULATING CLIMATE CHANGE DAMAGE IN FUTURE

> *"The field of law has, in many ways, been the poor relation in the world-wide effort to deliver a cleaner, healthier and ultimately fairer world . . ."*[1]

I. A summary and the question

The preceding chapters have attempted a broad look on the issue of climate change damage. What kinds of problems do we have to expect and how does international law deal with them – around this question, the status quo of "Climate Change Damage and International Law – Prevention Duties and State Responsibility" was developed.

This Chapter will try to look beyond this status quo and discuss some possibilities of regulating climate change damage in future, and particularly the issue of redress for residual damage as this is entirely ignored by the existing climate regime to date. Yet, to set the scene, a brief summary of the status quo is in order.

Chapter II has shown on the factual level that some degree of climate change damage is unavoidable – already now mankind is committed to warming of more than 1°C; that damage curves climb with the amount of greenhouse gases in the atmosphere and that without substantial mitigation efforts ("business as usual"), damage could be uncontrollable. Most of this damage will occur in countries that are already poor and have contributed little to the anthropogenic greenhouse effect to date.[2]

As was discussed in the context of Article 2 FCCC, to avoid dangerous levels of damage, mitigation activities must be extended and sustained beyond the level currently

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1 Klaus Töpfer, Executive Director of the United Nations Environment Programme, on the adoption of the Judges' Johannesburg Principles on the Role of Law and Sustainable Development, August 2002.

2 As discussed in Chapter II, this is not only because of the geographical distribution of the impacts of climate change, but mostly due to the vulnerability of communities and individuals in developing countries. Thus, while a storm in North America might cause large physical and monetary damage, the economic system including the State and private insurance system will be able to cope with the damage. This "safety net" is non-existent in many developing countries.

negotiated as soon as possible,[3] in fact any temperature rise beyond 2°C must be avoided to not jeopardise the aim of the FCCC. In Chapter III it became clear that the current duties and operational obligations under the international climate regime are not sufficient to achieve this aim and effectively prevent climate change damage "on the ground". This is not only because States have been reluctant to take on ambitious reduction targets *per se*, but also because concrete damage prevention was never at the core of negotiations. Neither have these negotiations been led by already existing benchmarks such as those contained in nature protection treaties. The analysis in Chapter IV clarified that climate damage prevention is connected to many existing treaty regimes and in fact, climate change impacts are likely to frustrate the aims of some of these, such as the Ramsar and UNESCO Conventions as well as those treaties protecting endangered species. With these treaties, States have already agreed to preserve a distinct status of the environment, as habitats for rare species and as necessary sites for biodiversity generally. In as much as climate science is able to tell us today that the protection of these sites and species will be impossible beyond a 2°C warming, there need not be any further discussion on thresholds within Article 2 FCCC.

While the duty of industrialised countries discerned in Articles 4.2 and 2 FCCC to modify/reverse emissions trends in the medium and long term is an important primary norm (applicable to the law of State responsibility, as the case studies in Chapter V have shown), it will not be sufficient to prevent dangerous climate change in general or substantial damage to countries, and neither will the first commitment targets of the Kyoto Protocol. It is encouraging that the EU has decided that developed countries should *consider* necessary emissions pathways of -15 to -30% until 2020 compared to Kyoto baseline, and -60 to -80% for 2050.[4] But these Statements have yet to materialize into reliable policies and must be mirrored by mitigation activities of other major polluters. Thus, regulatory gaps remain.

Chapter IV has advanced our understanding of the role of climate change damage prevention in international law generally. The no harm rule provides any State with a right to have its interests protected and obliges every State to exercise due care in devising (or omitting) climate change policies. The duty to minimize harm and reduce risk applicable to all States therefore provides not only a powerful primary norm to demand specific changes in State behaviour but also provides an overarching principle for future climate change negotiations. Given the scientific findings and projections about the impacts of climate change, we have moved beyond "precautionary action". States must take proportionate measures to avoid and prevent

3 See the results of the most recent study by the WBGU, the German Advisory Council on Global Change which demands cuts in global energy-related CO_2 emissions by 45-60% from 1990 by 2050 (WBGU, Climate Protection Strategies for the 21st Century. Kyoto and Beyond, 2003).

4 EU Environment Council, 10 March 2005.

damage on other States' territories – agreeing to (e.g. 2nd commitment Kyoto) mitigation targets or policies is not a voluntary exercise.

Also, as we have seen in Chapters III and IV, States have various duties to prevent climate change damage directly by undertaking or financing adaptation measures. This area of law is still developing, and while this thesis could not expand on how adaptation obligations might emerge from domestic law, conceptually, international and national law obligations will have to be regarded together to build a complete picture of prevention obligations in this area. An important conclusion from Chapter III however is that while the FCCC provides developing countries with a right to claim financial support for the implementation of their convention commitments (including adaptation programmes, Article 4.1 FCCC) as well as for adapting to the impacts of climate change in general (Articles 4.3 and 4.4 FCCC), such financial support will i) never cover or repair residual damage and ii) possibly always be limited to "catalytic" investments, building on the concept of incremental costs and the fact that "adaptation needs" are difficult to quantify and are invariably linked to (economic) development in general.

Beyond this, the application of the rules on State responsibility has shown that in principle, States that incur damage resulting from climate change could claim reparation from States that have contributed to climate change as an anthropogenic phenomenon and thereby committed a wrongful act. Yet, many legal difficulties remain, for example, establishing a causal chain between certain impacts and injury and the contribution of a particular State to climate change (with the burden of proof resting *prima facie* on the claimant State); how to tackle the general uncertainties inherent in climate science in the application of legal theories; how to apportion damage between multiple polluters; how to deal with the fact that any wrongful act will probably only encapsulate a relatively small share of emissions compared to the overall volume of anthropogenic greenhouse gases effective in the atmosphere.

On this basis, it is worth thinking afresh about how the gaps and problems identified in Chapters III-V could be resolved. This Chapter suggests some principles and criteria for a sound legal approach to tackling climate change damage, focusing on how to tackle residual damage. While at the time of writing, the diplomatic discussions on a "Post 2012" regime[5] are alive, these discussions mostly focus on global mitigation policies and targets, including some debate about adaptation, but mostly disregard the specific damage prevention element of any future regime. While global (agreed) mitigation action is obviously a necessary condition for preventing climate

5 See Ott, It takes two to tango – Climate Policy at COP10 in Buenos Aires and beyond, 3 JEEPL 2005 (forthcoming) and Baumert/Müller, How Can the Transatlantic Partners Help in Addressing Developing Country Emissions?, in: Ochs/Venturelli: Towards a transatlantic consensus on Climate Change, Villa Vigoni, 2003.

change damage, this Chapter seeks to go further into the issue of (*inter alia* unavoidable) climate change damage "on the ground" and asks how a future regime would have to be designed to satisfy the interests of affected States as well as major polluters.

The following principles are used as guidelines throughout this Chapter:

- choose a negotiable approach rather than litigation to strengthen international law;
- ensure preventive effect of compensation duties/liability as trigger for mitigation activities both for States and private entities/individuals;
- set the right priorities: avoid "wait and see" attitude – adaptation activities as prerequisite for any restoration or compensation;
- require a just burden sharing between polluters for prevention and restoration costs;
- co-operate effectively with existing (disaster) relief instruments and aid;
- allow management of specific types of damage (gradual, extreme events) respectively;
- cover all types of categories of damage (including ecological);
- make necessary funding predictable and transparent;
- settle the issue of incremental costs/injury; and
- ensure distribution of adaptation and restoration to affected regions, communities and individuals.

Naturally, there may be many other issues to take into account when creating a sound legal framework for climate change damage and the list therefore may seem somewhat arbitrary. Nevertheless, it is a useful starting point. The discussion of the individual items will allow recourse to some of the findings of the preceding Chapters, as well as some reflections on proposals made by various actors in the context of solving the problem of preventing (and compensating for) climate change damage, or, broader, dangerous levels of greenhouse gas concentrations in the atmosphere (Article 2 FCCC).

In sum, the ensuing discussion will show that an active approach to the issue of climate change damage is necessary and possible, and that only a legislative approach will allow sufficient flexibility to tackle the many issues international law currently leaves open or opaque.

II. Negotiation approach

1. The reasoning

As stressed before, the preceding analysis has identified major gaps in the current network of primary rules aimed at preventing climate change damage as well as secondary rules providing victims with a possible route to obtaining restoration and reparation. There is therefore sufficient scope for diplomatic activity.

The international climate regime has made important steps towards preventing climate change as a phenomenon. It has not, however, dealt inclusively with the issue

of climate change damage. It is a regime aimed at preventing dangerous climate change for the benefit of mankind, not for the benefit of particular victims, affected regions or countries. It does not provide sufficient focus on adaptation and excludes any regulation of residual damage. The difficulties in applying the law on State responsibility to allow reparation of damage are apparent and while a claim is not impossible it seems unlikely that State-to-State claims are a practical way forward.

Thus, the law as it stands proves insufficient for the purposes of a victim State. Yet, it could also be fatefully insufficient for defendant States. If State responsibility claims were to mature and be adjudicated in international courts, major polluting States would be in danger of facing an enormous burden of costs and damages – even if only relative to their contribution to the problem. Such a claim for climate change damages would be largely unpredictable – especially if the claim were based on increased risk. Similarly, domestic lawsuits demanding compensation from private entities emitting greenhouse gases or producing fossil fuels could greatly influence national economies[6] and would increase general uncertainty amongst the private sector.[7]

One of the main reasons of course why it is not advisable for affected States to enforce their right to compensation and restoration before international courts is the fact that international law has a general enforcement problem, mostly because States still have the right not to submit to or to withdraw from international adjudication and the jurisdiction of an international tribunal.[8] Only few mandatory schemes of adjudication are operative, for example under the Law of the Sea Convention. The climate change regime itself only offers a mandatory route for conciliation (Article 14.5 FCCC), which cannot result in mandatory awards. Moreover, even if an international court awards monetary compensation to a State, enforcement of this award will depend on the willingness of the defendant State to pay. Enforcement systems such as under domestic and international private law do not exist against States.

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6 See the statement made by *Heinrich Garz* of West LB Panmure in July 2003: "This [climate change] litigation could be a catalyst or a trigger for markets to really look at climate change issues, not only with respect to the expected costs of litigation, but also in terms of a general economic assessment . . . Before September 11, nobody really thought about the risks or effects of terrorist attacks on equity market valuations, but afterwards, the threats of terrorism were more perceived and dominant, and this led the markets to price in the effect. Climate change litigation will similarly arouse the interest of the markets and raise the perception of the topic".

7 The private sector might prefer strict carbon constraints over a *laissez-faire* approach leaving them with the litigation risk, see for example John W. Rowe, chairman and CEO of the US based Exelon Corp. (EXC) (Business Week, Cover Story August 16, 2004) "We accept that the science on global warming is overwhelming . . . There should be mandatory carbon constraints". <http://www.businessweek.com/magazine/content/04_33/b3896001_mz001.htm>.

8 For evidence that international environmental law has thrived even without such enforcement systems see O'Connell, Enforcement and the Success of International Environmental Law, 3 Indiana Journal of Global Legal Studies (1995) 47.

While this does not alter the quality of international law as law (as *Merrills* points out, law without adjudication, i.e. enforcement of the rule of law through international courts is "the normal situation in international affairs"),[9] it shows that the mere existence of the primary and secondary norms discussed in Chapters III-V will not remedy the problem at hand. This is particularly true as the existing rules of international law are too opaque and complex to expect States to offer compensation to a State affected by climate change damage or react favourably to a claim made by, for example, a small island State for comprehensive adaptation measures on a voluntary basis.[10]

Against this background, there are at least four reasons for preferring negotiated solutions to tackle the issue of climate change damage over any litigation-based approach:

One, under the current rules, claimants (States or States on behalf of private victims) are unlikely to receive adequate reparation. Two, despite the fact that distinct obligations of States arise from both the international climate regime, and, for example, the no harm rule, climate change is a global issue that demands global answers – developing and developed countries alike must react.[11] Facing the issue of climate change damage involves seeking a comprehensive solution to a problem, rather than relying on a case-by-case or merely bilateral approach. Three, a negotiated framework on an international level could provide predictability for large private and State polluters that might otherwise face an uncertain future of tort claims in various domestic jurisdictions brought by affected individuals.[12] Four, there is ample scope for negotiation within or outside the context of the international climate change regime, which increases the chances of finding a successful solution. The analysis in Chapters III-V as well as the current and inherent limitations of science show that there is a very real regulatory gap with respect to climate change damage. During the early negotiations in the INC, States might not have accepted that the issue of climate change damage needed a comprehensive solution, but time has moved on and such a negotiated solution is neither unachievable nor technically impossible. In fact, the proposal submit-

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9 Merrils, International Dispute Settlement, 1998, 292.

10 Such payments could come under the definition of *ex gratia* payments, which are a common reality in inter-State relations, where one State does not want to accept its legal liability but is convinced enough of the damage done to another that it provides compensation on a voluntary basis. See for example Horbach, Liability versus responsibility under international law, 1996, 261 ff.

11 See for example Baumert et al., "If governments are going to address the problem of climate change, addressing developing country emissions, at least over the medium and long term, is a necessary condition for success" (How Can the Transatlantic Partners Help in Addressing Developing Country Emissions?, in: Ochs/Venturelli: Towards a transatlantic consensus on Climate Change, Villa Vigoni, 16th-18th October 2003, 2).

12 Such claims are indeed being researched and prepared, see only the activities of the Global Climate Justice Programme, <http://www.climatelaw.org>.

ted by AOSIS was a first attempt to arrive at a balanced solution for at least one type of damage (sea level rise) thoroughly based in international law (see Chapter III).

Such a solution could attempt to tackle both the ways and means of providing funds for adaptation activities as direct damage prevention, and a regulatory framework for providing compensation or other means of restoration for residual damage. Some possible approaches are discussed below, in particular approaches that involve both private and State actors. These focus on ways of providing compensation for damage done. The issue of how to also provide incentives for adaptation as direct damage prevention is discussed mainly below at (IV).

2. Possible approaches

Scholars of international environmental law have over time developed and discussed many ways of tackling the issue of compensation for or restoration of damage due to human activities.[13] The International Law Institute,[14] for example, has proposed a general scheme for international liability, comprised of i) strict operator liability and ii) residual/subsidiary State responsibility. The ILC appears to be heading in the same direction with its topic of "allocation of loss in case of transboundary harm"[15] which complements the agreed "Articles on prevention of transboundary harm" discussed in Chapter IV.

As to the basis for establishing such a scheme, scholars like *Lefeber* have argued that States have a legal duty to provide a negotiated solution where environmental damage is expected to occur. In his view, there is a rule in international law offering victims of significant transboundary harm prompt, adequate and effective compensation. This duty can be discharged either by establishing special civil liability regimes or by accepting strict (*sine delicto*) State responsibility in all cases regardless of whether the harm was the result of a wrongful act.[16] *Lefeber* is of the view that the best and most effective way to ensure victims are compensated for harm is by establishing har-

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13 See only Arsanjani/Reisman, The Quest for an international liability regime for the protection of the global commons, in: Wellens, K.C. (ed.), International law: Theory and practice; Essays in honour of Eric Suy, 1998, 469; Stone, Beyond Rio: "Insuring" against Global Warming, 86 AJIL (1992), 445; Gehring/Jachtenfuchs, Liability for transboundary environmental damage – towards a general liability regime?, 4 EJIL (1993) 92, and below note 77.

14 See Orrego Vicuña, Institut de Droit International – Resolution on Responsibility and Liability: Responsibility and Liability for Environmental Damage Under International Law: Issues and Trends, (1998) 10 Georgetown Int. Env. Law Rev. 279 at 287.

15 See 1st and 2nd Report of the Special Rapporteur of the ILC (Rao) on the legal regime for the allocation of loss in case of transboundary harm arising out of hazardous activities, A/CN.4/531 and A/CN.4/540.

16 Lefeber, Transboundary Environmental Interference and the Origin of State Liability, 230 ff.

monised and potentially all-encompassing special civil liability regimes, i.e. international treaties obliging private entities to provide compensation or damage prevention funds. These could then be complemented by residual State liability regimes or by compensatory arrangements (funds) etc., which would apply when and if the private operators cannot be held liable or compensation is not provided for other reasons. Interestingly, *Rao* (ILC Special Rapporteur) recently stated that *"States have a duty to ensure that some kind of arrangement exists to guarantee equitable allocation of loss"*[17] while leaving open the question of how this duty can be discharged.

To what extent this approach, as operationalised in the so-called Liability Conventions, can be transferred to the issue of climate change damage is discussed below at (a). Another possible aim of the negotiating process for resolving the problem of climate change damage would be to create a (public) fund to respond to certain claims by States (see (b) below), yet another (less suitable) route is ad-hoc negotiations (discussed below at (c)).

a) *Liability schemes*

Given that, as seen in Chapter V, the concept of liability or State responsibility does fit climate change damage in general, the various existing "Liability Conventions"[18] provide a good starting point for a possible climate change damage scheme as well as evidence that such a scheme, aimed at providing compensation to victim States or private entities can function as a dual system of private and State liability.[19]

The various liability treaties channel liability for damage resulting from a dangerous activity to the entity undertaking that activity. To ensure this effect, contracting States (parties to the respective treaty) are obliged to enact appropriate national legislation. Liability is strict – meaning that liability is tied to the fact that the dan-

17 1st Report, note 15, at 50.

18 See the 1969 International Convention on Civil Liability for Oil Pollution Damage and the 1971 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Fund Convention), which have now been supplanted by the 1992 Civil Liability Convention (CLC 92) and the 1992 Fund Convention; the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS Convention), the Nuclear Liability Conventions, 1960 Paris Convention, as amended by the 1963 Brussels Supplementary Convention, and the 1963 Vienna Convention, and the 1988 Joint Protocol. See for references Chapter IV, notes 135-139. See generally Sands, Principles of international environmental law, 652 ff.; Beyerlin, Umweltvölkerrecht, 278 ff.

19 Many of the ideas in the context of liability conventions stem from the paper produced by the current author with J. Linneroth-Bayer and M.J. Mace (Insurance-Related Actions and Risk Assessment in the Context of the UN FCCC, Background Paper, May 2003). In particular, I would like to credit the work of M.J. Mace on these issues, represented in Part V of the mentioned paper.

gerous activity giving rise to damage is being carried out, rather than to the fault of the operator, a private entity.[20]

As discussed in Chapter IV, a "dangerous activity" with regard to climate change damage could be any activity that causes greenhouse gas emissions or releases carbon stored in terrestrial sinks today and in the future. The difference between the traditional liability regimes and the occurrence of climate change damage is that damage covered by the various liability regimes is assumed to arise from accidents rather than from the conduct of normal activity. However, since it is unclear where and to what extent damage will be caused by the impacts of anthropogenic climate change, the concept of risk is generally adaptable and applicable (as discussed in Chapter IV).

As far as private entities liable for such damage are concerned, any company or institution could be chosen that sells or deals with goods with a certain carbon content, for example coal mining operations or companies that develop and exploit other fossil fuels. As mentioned before, for liability to arise, it is not necessary that the activity itself be prohibited. Instead, the liability regime functions as a safety net for instances where an allowed activity leads to damage elsewhere. This concept fits the scientific realities of climate change.

In the existing regimes, liability is generally limited to a fixed amount, based on the risk posed by an operator's specific activities. In exchange for the benefit of limited liability, operators are required to secure and maintain insurance, or other forms of financial guarantees, corresponding to their liability. This mechanism could also be adapted to the issue of climate change damage. If a private entity or a State can show that it has incurred damage due to climate change, the operator (and, eventually, the State of origin) would be held liable only to up to an agreed point, which could be fixed in accordance with, for example, the amount of carbon released annually by its business operations. This kind of international threshold could also have implications for domestic tort cases against polluters brought by victims of climate change damage – in essence acting as exculpation for any damage sustained beyond this limit.

Existing international liability regimes provide an especially useful example for climate change damage negotiations with respect to increased losses due to extreme weather events. These regimes are essentially a form of pre-disaster risk hedging instrument, purchased by participating State governments (and their taxpayers) by way of international negotiations.[21] The State's cost is the expense of negotiating and implementing

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20 Under the 1972 Convention on International Liability for Damage Caused by Space Objects, any State that launches a space object is strictly liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight. States self-insure against these losses. This treaty is an exception in that the State features as the operator and assumes strict liability directly.

21 *Risk transfer* spreads risks before a catastrophe occurs and requires the use of *hedging instruments*, which are pre-disaster arrangements in which the purchaser incurs a cost in return for the right to receive

at the domestic level a civil liability agreement with other States. Participation in these regimes reduces uncertainty (risk) for States, which might otherwise be cast in the role of unwilling insurers of their own and their citizens' losses, when adequate compensation cannot be obtained from responsible parties, either because operator liabilities have caused bankruptcy, causation cannot be determined, the responsible party cannot be located, or domestic laws are inadequate to guarantee recovery. These regimes also reduce uncertainty for potential victims, by ensuring the availability of a certain minimum level of compensation, and elaborating procedures for the presentation of a defined category of claims.

This regulatory system also guarantees the insurability of the defined risks (in the existing regimes for example coastal damage due to an oil spill), and some even oblige nation States to apply mandatory private insurance schemes to the operators addressed under the pertinent regime. The involvement of the private insurance sector, especially for risks due to extreme weather events is indeed an issue that could be explored in more depth (see also below, section VII).[22]

Critics may argue that the liability schemes do not, in fact, provide a usable example for the issue of climate change damage because private entities could never cover the actual risks posed by climate change to individuals, private entities and States worldwide. This is a problem common to other cases of environmental damage as well. Therefore, to share risks and avoid overburdening of private entities, some existing liability regimes divide liability between States and private operators, and tiered compensation systems have evolved to provide supplemental coverage for those situations in which claims exceed the limits of the operator's limited liability and therefore the private operator's insurance coverage.[23] The tiered systems have served to spread the risks of damage beyond operators, to operator industries as a whole, to public funds and to international solidarity funds, much in the way that reinsurance is used to backstop insurance. This evolution is most readily seen in the oil spill regime, which presently uses a two-tiered system of compensation (private operator – State), and the nuclear damage regime, which uses a three-tiered compensation system (private operator – public fund – State).

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a much larger amount of money after a disaster occurs. The important distinction between risk transfer and *collective loss sharing* (as for example a compensation fund) is that the former is purchased by the persons or community at risk, whereas the latter is provided by the State and thus (usually) funded by current and future taxpayers. Risk-transfer instruments, however, can also serve as important redistributive instruments if the premiums for insurance or the interest for capital market securities are cross subsidized by persons within the victim community or subsidized by persons outside.

22 The international climate regime currently explores possible roles of insurance in tackling climate change impacts in the context of Article 4.8 FCCC. A workshop on this issue was held in June 2003, see Report of the Workshop, FCCC/SBI/2003/11.

23 Examples are the oil spill and nuclear liability regimes. See in detail: Linneroth-Bayer/Mace/Verheyen, note 19, Part V.

Critics might argue further that the regulatory system adopted by liability regimes does not fit climate change since damage resulting from anthropogenic climate change will not be the result of a particular operator's conduct, as it is, for example, in the case of an accidental oil spill or nuclear explosion. Any residual damage experienced by a State or private entity is the result of an accumulation of greenhouse gases in the atmosphere, as well as the implementation or non-implementation of direct damage prevention measures. While this is certainly correct, it does not render the creation of a liability regime technically impossible. A logical consequence of the realities of climate change would be the need to pool or otherwise join contributions to enable a victim of climate change damage to request compensation from all covered operators. A practical example of this approach is the oil pollution liability regime, where all covered operators must contribute to a joint fund administered by the international treaty regime.

Critique could also be targeted at the definition of damage. Were climate change damage to be regulated in the form of a liability regime, what would qualify as compensable damage? In an accident scenario, answering this question is not a major problem. However, in light of the discussions of causation and concurrent causes in Chapter V, for climate change, arriving at an answer is more problematic, but technically solvable. As the AOSIS insurance proposal shows, it is possible to define thresholds of damage resulting from anthropogenic climate change. While such thresholds might not constitute exact scientific statements, they could serve to delineate the boundary between injuries that are covered by the regime, and injuries that are not. For the case of sea level rise, the AOSIS proposal chose a negotiating approach both for the determination of areas covered as well as for the absolute and relative level of sea level rise as physical trigger. Such an approach could also be adopted for other types of impacts, such as extreme weather events or the melting of permafrost resulting in infrastructure damage. One could even chose a regional temperature rise trigger, which is thought to capture the most threatening injury to natural and human systems.

Generally, therefore, the regulatory approach of liability regimes could be applied to the issue of climate change damage, assuming of course that States can agree on a system to specify the damage, a threshold of damage, and importantly, the addressees and level of contributions of such system. This latter issue will be considered in more depth in the section below on "just burden sharing between polluters".

b) *Funds*

Funds have been discussed extensively as instruments for covering gaps in tort or liability laws, especially in cases where difficulties in proving causation hamper claims for compensation or the clean-up of environmental damage. A popular example in Germany is the "Solidarfonds Abfallrückführung" a fund installed to cover the costs

of waste that has been exported illegally.[24] Other domestic examples of mandatory schemes financed by private entities are the fund for health damages due to toxic emissions in Japan, the Dutch fund for damages due to sudden air pollution,[25] as well as the US CERCLA Superfund for the clean-up of toxic waste deposits (however, CERCLA can recover its expenses from the responsible parties and is therefore not a pure solidarity fund).[26]

For cases of climate change damage, a fund could be set up to pool contributions by private entities. Leaving aside private entities as "liable parties", public compensation funds could also be set up for various types of climate change damage.[27] This is the approach chosen by the AOSIS proposal, which provided for a system of State-to-State compensation for the impacts of sea level rise.

For one type of impact of climate change, extreme weather events such as floods and storms, States have already started to design public, national level funds, such as the Mexican catastrophe reserve fund, FONDEM, which was set up to smooth the volatility of economic activity after natural disasters.[28] Costa Rica, Nicaragua and Honduras also have or intend to create national funds to cover the costs of large disasters such as Hurricane Mitch in 1998.[29] Still, national funds do not actually solve the legal issues underlying climate change damage, i.e. that the high-volume emitters are not the ones most affected by the impacts of climate change.

Various proposals for international funds to recover damages that are not otherwise recoverable have been made,[30] including a European fund for transboundary air pollution.[31] Naturally, this type of fund could also be set up by the Parties to the FCCC to meet the costs of residual climate change damage.

However, as *Ott/Paschke* points out, these funding schemes do not automatically solve issues of distribution and extent of restoration.[32] Therefore, some scholars prefer the acceptance of environmental liability based on theories of proportional and

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24 See Dieckmann/Reese, Kreislaufwirtschafts- und Abfalrecht, in Koch (ed.) Umweltrecht, 2002, 287. This fund was recently declared unlawful by the European Court of Justice, see C-389/00, Judgment of 27 February 2003, available at <http://www.curia.eu.int>.

25 Ott/Paschke, Ausgleichswürdige Summations- und Distanzschäden am Beispiel der neuartigen Waldschäden, 1997, 503 ff.

26 See Comprehensive Environmental Response, Compensation and Liability Act, 11.12.1980, with amendments. For the current version: <http://www.epa.gov/epahome/laws.htm>.

27 See generally on the advantages and disadvantages Faure/Hartlief, Compensation Funds versus Liability and Insurance for Remedying Environmental Damage, 5 RECIEL (1996) 321

28 See World Bank, Managing the Financial Impacts of Natural Disaster Losses in Mexico, 2000 and Linneroth-Bayer/Mace/Verheyen, note 19, Part IV.

29 See Charveriat, Natural Disasters in Latin America and the Caribbean: An Overview of Risk, 2000.

30 Ott/Paschke, note 25, 492 ff. See also Winter, Fondslösungen im Umweltrecht, 1993.

31 Rest, Luftverschzmutzung und Haftung in Europa: Anspruchsmöglichkeiten auf nationaler, europäischer und internationaler Ebene, 108 ff.

32 Ott/Paschke, note 25, 508 ff.

statistical causation (see Chapter V).[33] Moreover, where a public fund is created, the issue of differentiation between other budgetary contributions and commitments (development aid, catastrophe aid, contributions to the GEF) would arise.

It is clear that a fund-based scheme would have to solve some of the same problems highlighted above, such as the definition of covered areas and injuries, thresholds of damage, contributions, etc. If it were a State-based-system, it would carry the disadvantage of having to make contributions from public budgets to a fund "up front" and the ensuing institutional problem of administering (and investing) the monies in the fund. Nevertheless, despite the fact that many details of such a scheme would have to be agreed, and then possibly separately for the various likely impacts of climate change, does not preclude the usefulness of such an approach *per se*.

c) *Ad-hoc negotiation*

Yet another approach could be a case-to-case negotiation between States when and if damage has occurred. In fact, *Quentin Baxter*, one of the ILC's Special Rapporteurs proposed that the negotiation of a situation-specific agreement would be the way to enable States to deal co-operatively with harm occurring.[34] However, this method seems rather unrealistic and burdensome and while it might be suitable for individual industrial accidents, this approach would again leave the affected countries with the burden of proving damage due to climate change in each individual case, much as within the framework of international litigation.

Regardless of the approach chosen, the most important pre-condition is that States be willing to negotiate a scheme. Because this thesis is not the place to discuss the political realities surrounding the climate change debate, this issue will only be revisited briefly below. However, one of the important triggers of political will surely is that a climate change damage scheme actually supports mitigation activities, i.e. that it serves the function of liability in general: serving both a preventive and a compensatory role.[35] This issue is touched on in the next section.

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33 Ott/Schäfer, Unternehmenspublizität, Umweltschadensbilanz und Haftung für Umweltschäden, in: Ott/Schäfer, Ökonomische Analyse des Unternehmensrechts, 1993, 217 ff.

34 See Pinto, Reflections on International Liability for Injurious Consequences Arising out of Acts not prohibited by International Law, 16 NYIL (1985) 17 at 43.

35 In the context of environmental pollution, liability regimes serve various functions, including the two stated. Liability rules are said to strengthen enforcement of international obligations, they provide compensation for damage incurred by individuals and/or States in order to establish the pre-damage situation (if possible, they solve the problem of free-riders in the context of Treaty regimes), they help enforce non-treaty rules that represent international obligations, and they protect the (global) environment directly by preventing the repetition of environmentally damaging activities. See Birnie/Boyle, International Law and the Environment, 1992, 136 ff.; Fitzmaurice, International Environmental Law as Special Field, NYIL (1994) 181, at 202 ff.

III. Compensation duties as triggers for mitigation action

Given the scientific realities, it is essential that any scheme aimed at regulating residual climate change damage also serves as an incentive for States as well as private entities and individuals to increase mitigation efforts in order to prevent dangerous climate change in the sense of Article 2 FCCC. Any State advocating the negotiation of a liability scheme would have to argue that it fulfil the prevention duties that already exist in international law (see Chapters III and IV).

Politically, there are good reasons for assuming that negotiating on climate change damage and impact issues is a way of supporting a strong mitigation regime. In fact, an analysis undertaken by *Müller* clarifies that the search for transparent and just solutions for the issue of climate change damage would not only support preventive action, but could ensure the development of the international climate regime as a whole. *Müller* has argued convincingly that unless industrialised States agree to tackle the issue of damage, developing States will be unwilling to agree to commit to further action to limit and reduce their greenhouse gas emissions.[36] In his 2002 report "The Great Divide", *Müller* identified the damage issue as the main equity concern developing countries hold against the international climate regime, whereas industrialised countries understand equity in climate change as arriving at a fair allocation of proportions of the atmosphere for the future (emission rights).[37] Therefore, the industrialised States' demand for mitigation commitments by developing countries such as China, India and Brazil is at cross purposes with the aspiration of the group of developing countries to find a solution for the issue of climate change damage – both in terms of providing funds for adaptation to the impacts of climate change and the restoration of any residual damage. *Müller* claims that as a result the development of the international climate regime is essentially blocked.

Given that it is absolutely necessary to involve developing countries in mitigation efforts to reach a goal of stabilisation of atmospheric greenhouse gas concentrations at 450-550 ppm, a negotiated solution tackling the issue of climate change damage indeed could be in the interest of industrialised countries (historical emitters) as well as mankind as a whole.

It should be noted that the political unwillingness of most developing countries to commit to greenhouse gas reductions does not mirror the international legal or the factual situation. At the factual level, developing countries already are reducing emissions of greenhouse gases even though they are not subject to binding "targets". According to recent estimates, efforts in China, Brazil, India, Mexico, South Africa,

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36 Müller, The Framing of Future Emission Limitation Commitments, 2003, Chapter V "The twin taboos of climate change".

37 Müller, The Great Divide, 39 ff.

and Turkey alone have reduced emissions over the past three decades by nearly 300 million tons a year. Without these efforts, emissions of these six countries likely would be about 18% higher than current levels.[38] Any negotiated solution could build on these efforts and must not necessarily consist of "hard" reduction targets such as the Kyoto targets. Many other options have been proposed, for example technology transfer, commitments to renewable energy support, etc.[39]

Legally, ongoing efforts to reduce greenhouse gases are a wise course of conduct since, as shown in Chapter IV, the no harm rule obliges any State to take due care to prevent damage or minimize the risk thereof. This duty to exercise due care in shaping climate change mitigation policies also extends to developing countries. Although, as discussed in Chapter V, it is unlikely that developing countries could be held responsible for any damage due to climate change at this point in time, given the volume of their emissions proportionate to population levels and their limited capabilities to enact mitigating measures. However, the assessment of due diligence (as the standard of care of the no harm rule) is a dynamic one, and developing States are not cleared from responsibility for eternity, if, for example, a small island (being a zero- or small emitter itself) claims compensation for loss of its territory. Moreover, the duty to consult and negotiate (as part of the no harm rule) as well as the specific co-operation duties of the FCCC oblige all States to negotiate in good faith to prevent damage or minimize the risk thereof.

Apart from the political relationship between tackling the issue of climate change damage and mitigation commitments, compensation claims under the law of State responsibility necessarily take into account the efforts made by a particular country in mitigating climate change. As shown in Chapter V, especially where the no harm rule represents the cause of action, mitigation activities will form the benchmark for determining whether a wrongful act has occurred or not. Similarly, a negotiated solution could explicitly link mitigation commitments with responsibility for climate change (residual) damage. For example, States could agree to refrain from raising damage claims if a particular private operator or State complies with mitigation duties such as greenhouse gas emission reduction targets. This not only provides an incentive for agreeing to mitigation commitments, it would also provide certainty for States and private operators with respect to their financial risks/liability and obligations.

Moreover, from an economic point of view, any scheme enabling victims of climate change damage to claim compensation for residual damage would support mitigation activities by both States and private operators. For example, a scheme adopting

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38 Chandler et al., Climate Change Mitigation in Developing Countries, 2002, p. iii.

39 See Baumert et al., How Can the Transatlantic Partners Help in Addressing Developing Country Emissions?, in: Ochs/Venturelli: Towards a transatlantic consensus on climate change, Villa Vigoni, 16th-18th October 2003, 4 ff.

the general approach of the liability conventions would lead fossil fuel operators to set aside funds or purchase insurance to cover their liabilities. The costs of such risk-hedging activities would be incorporated into the price of products and therefore would lead to a general increase in prices for coal, oil and gas. This pricing mechanism could be compared to that of an ecological tax, however, it would be used to benefit the victims of climate change damage – and not the general State budget.

If a fund approach were chosen, contributions to the fund similarly could be based on net-emission shares in order to encourage States to invest in mitigation activities to lower their contributions to the fund. In sum, therefore, a scheme regulating liability for climate change damage would indeed fulfil the dual purpose of liability rules generally in environmental law: prevention and compensation.

IV. Adaptation activities as a prerequisite for restoration or compensation

Another important element of a negotiated scheme for tackling climate change damage is the incentive for countries and potential victims of climate change damage to prioritise adaptation over compensation.

Even from a lay person's point of view it is clear that potential victims of climate change damage have a duty to prevent damage as much as possible. This duty is also enshrined in international law through Article 4.1(b) FCCC and the precautionary principle (Article 3.1 FCCC). In addition, there is a duty to mitigate damage in the law on State responsibility. While these legal rules do not prescribe the exact behaviour required of States in fulfilling this prevention duty, many domestic legal systems impose a duty of protection on public authorities – where foreseeable damage to people and property must be prevented rather than simply compensated (see Chapter IV). Some domestic legal systems also include a rule obliging citizens to protect themselves against, for example, unlawful expropriation before they are allowed the right to seek compensation.[40] The notion of sustainable development also points in this direction, as adaptation measures could possibly secure ecosystems or infrastructure that are valuable for future generations. Moreover, without supporting adaptation as a means of direct damage prevention, any international scheme would run counter to the established rules and principles of the FCCC (as explored in Chapter III).

An example of how an international scheme could incorporate a duty to undertake adaptation measures before any compensation for residual damage can be claimed is, again, the AOSIS proposal of 1991. One, according to this proposal, measures of

40 This is, for example, the prevailing legal doctrine for applying Article 14 of the German Constitution, which stipulates that the State is free to regulate property rights in general, but also that expropriations must be compensated.

protection (such as coastal defences) were not to be covered by the new fund to be established for damage, but by the general financial mechanism of the FCCC (GEF). Two, in assessing claims the administering authority was to determine whether and to what extent the loss or damage could have been avoided by "measures which might reasonably have been taken at an earlier stage" and reduce the claim accordingly. Such a mechanism is also conceivable for extreme weather events such as storms. The negotiated scheme could prescribe the safety measures to be taken locally or regionally, and to be enforced by the pertinent State. Where such safety measures are not taken, claims could not be made against the selected group of operators, States or international fund.

An international duty framed this way would still leave a large margin of discretion to States and individuals with regard to which adaptation measures they chose to undertake, but would make adaptation a much more robust priority to claiming compensation than within the current legal framework.

This criterion also raises the important question of how adaptation costs should be dealt with in future. As discussed in Chapter V, adaptation costs can indeed be captured under the general rationale of liability for damage if measures can be identified that aim at preventing a precise type of damage (see the case study of Bhutan and Nepal, where technical measures were possible to prevent glacial outburst floods). As Chapter III points out, the international climate regime does not provide a comprehensive framework for strategically organising adaptation activities where necessary and does not inclusively regulate who will bear the ensuing costs and how funds are to be dispersed. However, with increasing claims by developing countries for adaptation projects, it can be expected that some of the issues surrounding the implementation of, *inter alia*, Articles 4.3 and 4.4 FCCC will be solved through operational decisions of the COP. Indeed, with the new Special Climate Change and Least Developed Country funds as well as the GEF "Adaptation Approach", these discussions are well underway.

The main issue in this context is the unwillingness of industrialised States to provide large sums of money to projects, when their development aid departments have attempted to move away from project-based aid (see also below VI), as well as the concept of incremental costs (see below X). Naturally, as industrialised States continue to reject the notion of the polluter pays principle in the context of climate change, there are also strong political restraints on funding for adaptation for developing countries.

As discussed above, a negotiated scheme for tackling climate change damage could cover both adaptation and compensation claims, and thus substitute the financial obligations of the FCCC today. However, a twin-track approach is also possible, where the notion of liability or simply necessity to provide adequate resources for adaptation especially in developing countries would be taken up in the traditional FCCC context, and the issue of compensation regulated separately. It is, however, question-

able whether the division of tasks between the GEF and the COP and Parties obliged to provide funds for adaptation purposes (Articles 4.3 and 4.4 FCCC) can be upheld, especially since the GEF will continue to remain an institution aimed at the improvement of the global environment, while adaptation measures do not automatically qualify as a means to enhance the quality of the global environment. The fact that the GEF is now able to fund pilot projects aimed at reducing vulnerability and providing a learning example does not remedy this general problem for the future.

V. Just burden sharing

Whichever approach for a negotiated scheme is chosen, the issue of who makes contributions to it or to what extent a private operator or a State is in fact responsible for climate change damage will be crucial and heavily contentious. The problem of multiple polluters has already been discussed in depth within the framework of State responsibility claims in Chapter V, and the brief discussion of contributions to the problem of anthropogenic climate change in Chapter II also provides some background to this section. As mentioned above, a litigation-based approach will be unable to solve this issue in an adequate manner, simply because it is unlikely that all relevant polluters could be joined before a court adjudicating a case of climate change damage.

There are several overlapping issues to resolve in this context: the criteria for determining responsibility, contribution level to a fund, or shares of liability of private entities, the sharing of responsibility between private entities and States, given the transnational nature of many of the potential addressees of liability, the ability of the negotiated scheme consider polluters after it has gone into operation, the determination of the share of responsibility on the basis of methods other than actual greenhouse gas emissions.

The following sections present some options, without claiming to treat this difficult issue inclusively.

1. States

At first glance, it would appear that coupling historic net emissions with actual emissions would provide a sufficient measure for allocating responsibility for climate change damage, at least for States. However, a second glance at the issue reveals that measuring responsibility can be complex, as many elements could be taken into account when negotiating a just burden sharing between States.

Some proposals with respect to the right modus for determining responsibility for States have been made, mostly with the aim of determining future mitigation commitments or emission rights of countries. The question of who should bear the costs

of damage is obviously different, but also comparable to the allocation of commitments/emission rights. While it is not practical here to refer to the entire body of literature on future commitments,[41] some proposals are relevant to the allocation of responsibility for climate change damage.

Based on a scientific analysis of damage to be expected and historical and actual emission levels (including emissions from land-use change and forestry), *Panayotu et al.* have proposed a system of compensatory transfers from *"those who contribute to climate change more than they suffer from it to those countries whose damages outweigh their responsibility for the problem"*.[42] This balance of damage versus contribution leads them to the conclusion that temperate-zone economies will impose *"severe net costs on the tropical regions"* and therefore that net transfers would be due from the temperate zones (including China, which is a major contributor to the problem, but is expected to bear only a small proportion of the costs). This method is certainly interesting since it weighs the contributions to the problem against the possible impacts. However, it is difficult to see how this method could underpin international negotiations since they will be concerned with only certain types of damage, will probably set a limit to liability, and might not enable the incorporation of a complex aggregate economic impacts model to determine contributions.

Another, simpler suggestion is the "Marshall Plan" by *Parikh et al.* These developing country authors suggest a compensatory scheme as liability payments for damage and excess past emissions to developing countries.[43] Their proposal is based on an assessment of historical emissions only. Intrinsically, this proposal contains a "carbon debt" theory. Because industrialised countries have emitted more in the past, and thus over-used their share of the atmosphere, they must pay off their debt to developing countries. Yet, as highlighted in Chapters IV and V, international law does not recognise State responsibility for all historical emissions, unless a strict standard of liability or the polluter pays principle as such is accepted for climate change. Therefore, any approach based on historical emissions alone might face resistance from industrialised States arguing for legal *status quo*.

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41 See for a reference of the literature Müller, note 36, 8 and, *inter alia*, Centre for Clean Air Policy, Designing Future International Actions of climate change, material at <http://www.ccap.org>; Höhne et al., Evolution of commitments under the UNFCCC: Involving newly industrialized economies and developing countries, 2003; Evans, Fresh Air? Options for the Future Architecture of International Climate Change Policy, 2002; and much more on http://www.fiacc.net/.

42 Panayotu et al., Compensation for Meaningful Participation in Climate Change Control: A Modest Proposal and Empirical Analysis, 43 Journal of Environmental Economics and Management (2002) 437, 439.

43 Parikh et al., Climate Change, North-South-cooperation and collective decision making post Rio, 9 Journal of Internat. Development (1997) 403, see also Schelling, T. The cost of combating global warming – facing the trade-offs, 76 Foreign Affairs (1997) 8.

The *World Resource Institute* has proposed a much more complex set of indicators, based on the principle of common but differentiated responsibility as the yardstick for the development of the international climate regime.[44] The WRI "Analysis Tool" and its indicators was developed to support decision making for future mitigation commitments rather than to apportion climate change damages. Still, some of the underlying ideas are certainly transferable. The WRI indicators include for a measure of "Responsibility" annual emissions, cumulative emissions, contributions to current concentrations as well as contributions to temperature increase, as already presented in Chapter II. As the *WRI* notes, the measure of temperature increase is nearer to the actual climate impact than annual emissions or cumulative emissions. However, the closer an indicator is to the actual impact, the more uncertain it becomes scientifically, as opposed to, for example, the relatively easy assessment of annual or cumulative emissions.[45]

Against the legal background displayed in Chapters III-V, applying a pure emission-based indicator is generally problematic as it does not allow inclusion of the notion of "wrongdoing" into the equation, i.e. a differentiation between emissions as such and "excess" emissions. To calculate responsibility purely on the basis of emissions does not correspond with the legal theory of State responsibility, and accordingly, *Durner*, for example, States that an adequate solution for responsibility for climate change damage can only be the proportionate liability of polluters according to their excess emissions.[46] Therefore, to calculate who should bear both a mitigation and compensation burden, the *WRI* also takes into account indicators of "Capability" such as wealth/income, education, health and governance, even though "capability" of a State has physically nothing to do with the chain of causation leading to the actual climate change damage. This two-pronged approach indeed mirrors the principle of common but differentiated responsibility which is applicable as a legal principle in the context of climate change through Article 3 FCCC. Using a "per capita" or "emissions above world average" approach could also help determine "unlawful" or excess emissions independently of negotiated mitigation targets: only emissions above a certain per capita share could be counted for the purposes of determining contributions to a fund or other instrument for compensating climate change damage.

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44 See WRI, Climate Convention Indicators: Indicator Framework Paper, 2003 and for the analysis tool <http://www.wri.org>.

45 Ibid. See also Höhne/Harnisch, who propose to differentiate between indicators to take account of the time gap between emissions, atmospheric concentrations and impacts (for example by using an indicator that takes into account historical emissions (backward looking), one that weights more recent emissions more heavily than early emissions (Backward-discounting) and one that takes into account the effect of the emissions in the atmosphere after the point of emissions (Forward-looking). In: Comparing Indicators for Contributions to Climate Change, Contribution to Phase I of the UNFCCC's "Assessment of contributions to climate change", 2002.

46 Durner, Common Goods, at 55, note 82.

Another, similar approach is the "luxury emissions" or reasonable emissions concept. The idea behind this is that each country should be allowed a certain level of reasonable emissions, i.e. those necessary for survival,[47] such as methane from cattle/industry for meat and "natural" keep of animals providing environmental service. Naturally, there are severe practical problems in defining "luxury emissions" or a threshold of "reasonable emissions".

The additional "National Circumstances" indicator introduced by WRI (which includes population size, size of economy, total energy use, the GHG Intensity of Economy, a heating-cooling index as well as a vulnerability index) is a way of balancing equity concerns and mirrors the proportionality test applied in the context of the no harm rule. Its application could lead to the negotiation of shares of responsibility for damage that do not mirror the actual contributions to the problem but respond to national circumstances. This indicator could also support a "phasing in" of responsibility or contributions to a fund for developing countries.

Together, the *WRI* contends, these indicators could lead to an equitable determination of responsibility both for damage and mitigation burden in the future. Indeed, a mix of indicators seems to best suit the legal situation with regard to responsibility for climate change damage. This is disregarded by authors such as *Jaitly/Khanna* who have pointed to the difficulty of finding a suitable "equitable" measure for liability for climate change damage. In their opinion, climate change damage should be treated rather more as a "pure" liability than as an equity issue.[48] This opinion essentially points to a pure emission-based approach for determining shares of liability – which, as shown above, would not really fit the legal requirements for invoking State responsibility.

Admittedly, the wealth of possible indicators and yardsticks for achieving a "just burden sharing" between States will render negotiations complex. However, it should be remembered that climate change diplomats already have some experience in negotiating complicated indicators. For example, during negotiations leading to the adoption of the Kyoto Protocol, Japan proposed differentiated mitigation targets according to emissions per capita, emissions per GDP and population growth.[49] While this approach had to give way to "grandfathering" as embodied in the current first commitment period targets and the base-year 1990, accompanied by the system of negotiation targets for subsequent commitment periods, the example shows that States could indeed envisage a complex solution.

In sum, however, historic or current emission levels surely provide the easiest indicator for responsibility, while possibly not the most "equitable" or closest to what an international court would have to take into account when awarding damages on the

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47 Agarwal/Narain, Global Warming in an unequal world: A case of environmental colonialism, 1991, see also various material at <http://www.cse.in>.

48 Jaitly/Khanna, Liability for climate change: Who pays, how much and why, 1 RECIEL (1992) 453.

49 FCCC/AGBM/1997/MISC.1/Add.6, see also Oberthür/Ott, The Kyoto Protocol, 116 ff.

basis of the law on State responsibility. A semi-official methodology for assigning responsibility based on emissions levels flowing from the work around the Brazilian Proposal (discussed in Chapter III in the context of the CDM) will be presented by the so-called MATCH Group in 2005 – tried and tested at various scientific meetings in the FCCC framework, which will lend much credibility. Building on this work and the various approached discussed above should be possible.

2. Private entities

First of all, any negotiated scheme would have to be based on the notion of joint and several liability since the cause of any climate change damage will be the accumulation of greenhouse gas emissions in the atmosphere, leading to an enhanced greenhouse effect. This was discussed in depth in Chapter V and touched on in section II.2 above. Chapter V also showed that in fact, many domestic legal systems already recognise joint and several liability as an allocation principle.

A good recent example is the EC environmental liability scheme. The directive[50] is based on a public law approach and focuses on contaminated sites. It establishes strict liability for damage to land, water and biodiversity from specified activities and fault-based liability for damage to biodiversity from other "occupational" activities. The proposal foresees that, when a damage is caused by the actions or omissions of several operators, they are jointly and severally liable. If an operator can establish that he has only caused part of the damage, this operator is to bear the cost related to that part of the damage only (Article 11). Another example is the US CERCLA Superfund legislation, which imposes joint and several liability irrespective of when the original releases occurred.[51]

This allocation principle is generally applicable to climate change damage.[52] As mentioned above, a "joint and several liability" clause might not even be needed if a pool solution is chosen to overcome problems of multiple claims.

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50 Directive 2004/35/EC of the European Parliament and of the Council on environmental liability with regard to the prevention and remedying of environmental damage of 21 April 2004, OJ Nr. L 143/56, see for its history COM (2002) 17.

51 See Clarke, Update Comparative Legal Study, 2000, at 15.

52 Generally, the proposal is not aimed at issues such as climate change. Article 3.6 stipulates that the directive is not applicable to "environmental damage or to an imminent threat of such damage caused by pollution of a widespread, diffuse character, where it is impossible to establish a causal link between the damage and the activities of certain individual operators". Moreover, the directive will not apply to "emissions or activities which were not considered harmful according to the State of scientific and technical knowledge at the time when the emission was released or the activity took place." (Article 9.1 (d)). This could be argued for emissions of greenhouse gas prior to the first IPCC Report (1990).

Methods to determine the share of liability of operators of activities leading to environmental damage can, again, be borrowed from the various liability conventions in place. For example, in the framework of the International Oil Pollution Compensation Fund (IOPC Fund) established through the 1992 Convention,[53] contributions are calculated according to the actual amount of crude oil received by private entities, i.e. generally oil companies. The specific amount of the levy is decided each year by the Fund Assembly (comprised of all Contracting States to the 1992 Convention), based on anticipated payments of compensation and administrative expenses. In a similar way, oil or coal producing companies could become liable parties for climate change damage. Another possibility would be the calculate the emissions of private entities, such as power companies and base the share of liability/contribution on these. In fact, distributing responsibility among private entities as opposed to States would possibly ease negotiations of an international scheme since equity issues would not feature in the same manner (while naturally controversies about who should be responsible would remain) and it would be much easier to rely on a pure emissions-based approach.

VI. Effective cooperation with existing disaster relief instruments and aid

Naturally, any scheme tackling climate change damage could cover damage both in industrialised and developing countries. Given the realities of climate change impacts, the historic contributions to the problem, and the abilities of industrialised countries to transfer and manage risk without outside help, it is likely that such a scheme would focus on poorer regions, especially with regard to damage due to increased intensity and severity of extreme weather events and climate variability. These regions are also the focus of existing disaster reduction and relief efforts. As discussed elsewhere, even adaptation to current climate variability is not financed in a coherent manner, despite the effort of the United Nations through the International Strategy for Disaster Reduction.[54] To achieve maximum efficiency a negotiated scheme would need to make use of existing institutions and instruments as much as possible. Looking at climate change impacts more generally, existing official development aid programmes must be taken into account when designing an effective international instrument to tackle the issue of climate change damage – it is often aid budgets that shoulder damage today that could be defined as climate change damage tomorrow.

The link between disaster relief/prevention and climate change impacts was recognised at the recent Kobe Conference on World Conference on Disaster Reduction.[55]

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53 See note 18.

54 See Müller, The Great Divide, 75 ff., International Federation of Red Cross and Red Crescent Societies, World Disaster Report, 2001, 9 ff. The for the work of the UN also <http://www.unisdr.org>.

55 Held in Kobe, Hyogo, Japan, 18-22 January 2005, Report of the Conference, A/CONF.206/6.

With respect to integrating climate change impacts and existing disaster reduction and aid efforts, some ideas have been voiced.

Müller has suggested redirecting already existing monies into a "FCCC Impact Response Instrument". He observes that the international disaster community has recognised the importance of disaster reduction, i.e. measures designed to avoid or limit the adverse impacts of natural hazards, and that this is prominent in recent FCCC decisions (see also Chapter III). In his view, this offers a unique possibility to transform the already existing UN mechanisms for disaster aid into a FCCC disaster relief fund with binding and up-front contributions from the industrialised State parties to the FCCC, based on the models of the OCHA (UN Office for the Coordination of Humanitarian Aid) Trust Fund for Disaster Relief and the Disaster Relief Emergency Fund of the International Federation of Red Cross/Red Crescent Societies.[56] By integrating climate change impact aspects into existing disaster relief and reduction efforts, the work of international agencies (such as the OCHA) would be rendered more predictable in terms of funding, more oriented at long-term prevention of disasters, and more efficient as all climate related disasters would be tackled through the climate regime. Much like the current financial mechanism entrusted to the GEF, OCHA could administer the fund under the political guidance of the COP.

Nevertheless, *Müller* does not address the distinction between anthropogenic change and natural climate variability in his suggestions because in the context of development policy, the distinction is not helpful nor must be made (as in the context of an instrument in the context of the FCCC). His is a policy suggestion aimed at simplifying already existing work to reduce disasters and offer disaster relief. The fund proposed is not about allocating new monies for compensating for climate change induced damage, but about making existing expenditure more effective. Still, the proposal has its merits as it would not necessitate the creation of new institutions and generation of new funds, a fact that could substantially ease the negotiations.

In a similar vein, *Sprinz, Jäger and Hasselmann* have suggested the extension of the newly established European Catastrophe Fund[57] to a climate change fund which would be able to cover not only damage from extreme weather events in Europe but worldwide. It would not pay victims directly but rather act as a reinsurance mechanism for private insurers who would then be able to cover infrastructure and other losses in extreme weather events without risking insolvency. This focus on Europe is suggested because of the political unwillingness of the USA and other partners to engage

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56 Müller, An FCCC Impact Response Instrument as part of a Balanced Global Climate Change Regime, 2002, and more detailed in: Equity in Climate Change – The Great Divide, 2002, 89 ff. See also IIED, Up in Smoke, Report 2004, at 23.

57 The European Union Solidarity Fund for Natural Disasters. The fund was set up after the floods in August/September 2002, see Council Regulation (EC) No. 2012/2002 of 11 November 2002 establishing the European Union Solidarity Fund, OJ Nr. L 311 of 14.11.2002.

in substantial climate change efforts and because such an initiative would strengthen Europe's leadership role in the climate change domain. They further suggest that a levy on the European Emission Trading activities or a levy on each litre of gasoline could finance such a fund.[58]

Such proposals show that a negotiated approach as sketched out above is conceivable, at least technically, while highlighting that much thinking is needed to achieve integration of existing disaster relief and reduction efforts in a climate change damage scheme.

With respect to integrating a negotiated climate change damage scheme into existing general development aid, some work has been done to analyse the role of development agencies in helping partner countries in the developing world to adapt to the impacts of climate change.[59] Yet, no detailed analysis has taken place with respect to a potential financial mechanism that would not only help cover adaptation costs but also provide compensation to victims of residual climate change damage. Engaging in this type of analysis goes beyond the boundaries of the current thesis, but it is certainly an important consideration to be taken into account. Some brief remarks about this issue are warranted.

As discussed in Chapter III, the quality of financial transfers under the climate regime (and possibly also under a new climate change damage scheme) differs fundamentally from the provision of official development aid (ODA).[60] Even though the "Right to Development"[61] is still being discussed by developing nations as a basis for mandatory development aid, and this understanding is enshrined in the FCCC financial obligations by stressing the "additionality" of financial support under the FCCC, many international declarations and treaties emphasize the need for financial co-operation to achieve sustainable development,[62] and one of the current development goals of the United Nations is the promotion of "environmentally sustainable development",[63] no

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58 Sprinz/Jäger/Hasselmann, in: Die Zeit, 13.02.2003 available at: <http://www.zeit.de/2003/08/klimasch_8aden_neuneu>.

59 See in particular World Bank, Poverty and Climate Change – Reducing the Vulnerability of the Poor through Adaptation, June 2003, with contributions of the current author.

60 See also on this issue: Verheyen, Adaptation Funding – Legal and Institutional Issues, in: Huq/Klein/Smith: Climate Change, Adaptive Capacity and Development, 2003, 191.

61 See UN General Assembly Resolution A/RES/41/128, 4 December 1986. The Declaration defines the right to development as (Article 1) "an inalienable human right by virtue of which every human person and all peoples are entitled to participate in, contribute to, and enjoy economic, social, cultural and political development . . . " Article 3 of this declaration was interpreted to give developing nations a right to official development aid, if not to a particular amount. The legally binding nature of this part of the declaration was rejected by industrial States and thus, not accepted as a principle of international law.

62 See the so-called "Monterrey Consensus", adopted at the International Conference on Financing for Development, 22 March 2002, <http://www.un.org/esa/ffd> as well as the World Summit for Sustainable Development – Plan of Implementation <http://www.un.org>.

63 UN et al., A better world for all – Towards the development goals, Geneva, 2000. The seven goals, also contained in the UN Millennium Declaration are: halving the proportion of people living on less

binding international law rule exists on this issue. All funds provided by developed nations for activities that could qualify as supporting adaptation to climate change or help restore human or ecosystems that have been affected by climate change impacts are voluntary. This applies also to the official UN target of 0.7% of GDP annually for ODA.[64]

In this respect, the climate regime represents a significant change both in legal and political terms, since it establishes binding financial obligations, which, while aimed at implementing the obligations of the FCCC, actually extend into the domain of traditional development aid. A new scheme regulating the issue of climate change damage inclusively would broaden the binding obligations of industrialised States or create new obligations for private operators to provide financial support to developing countries. It appears questionable whether the additionality of such a scheme with current aid flows can in fact be ensured beyond a political declaration of will. This is both because the lack of binding commitments and lack of transparency in the flow of funds – whether or not a climate change damage scheme would in fact replace part of the fund administered through development budgets – would make it very difficult to trace. Admittedly, the OECD currently registers flows of official development aid, but the OECD Development Assistance Committee (DAC) can only register the aid, it cannot enforce the manner in which the development aid is used.[65]

However, it should be noted that this particular difficulty of the ensuring efficiency of fund flows could be avoided if private operators (polluters) were captured in a climate change damage scheme, and States only assumed residual State responsibility.

VII. Allow differentiated management of specific types of impacts and damage

Chapters II and V present the various likely impacts of climate change and the differences when applying legal rules and principles to those. There are at least two reasons for differentiating between the types of impacts and damage when designing a scheme to tackle climate change damage.

One, is the issue of causation. With respect to extreme events as opposed to gradual changes, it was noted that it might never be possible to establish that a particular event is the result of climate change and not natural climate variability. What can

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than US$1 a day; enrolling all children in primary school; empowering women by eliminating gender disparities in education; reducing infant and child mortality rates; reducing maternal mortality ratios; promoting access to reproductive health services; and promoting environmentally sustainable development.

64 See, e.g., UN Millennium Declaration, UN General Assembly Resolution 55/2.

65 For the DAC and OECD practices in this area, see <http://www.oecd.org>. It receives annual reports on ODA from all donors and therefore has an overview of country activities.

be argued in these cases is only that the risk of such events increases proportional to global or regional climate change. On the other hand, the linkage between glacial melting as a gradual change impact and the associated damage to human systems or water resources is much easier to show and concurrent causes are much easier to isolate. Two, extreme events such as storms and floods require a different type of regulation than damage due to gradual changes. In particular, an insurance-based mechanism is conceivable for weather extremes, but not for gradual changes. Given that extreme events are likely to cause more havoc and endanger more human livesthan gradual changes (at least in the short term), some remarks about the use of insurance as an instrument within an international climate change damage scheme are warranted.

Two types of insurance can generally be distinguished: liability insurance and "weather" insurance.[66] "Weather" insurance is taken out by individuals or entities that wish to insure against certain risks that could destroy or reduce the value of their property. Liability insurance on the other hand is purchased by the person creating the risk or causing the damage – in this case the emitters of greenhouse gases (States or private operators). The liability regimes described above are concerned only with liability insurance, and the original utilitarian approach of insurance regards liability insurance primarily as a means to increase the utility of a risk averse injurer and not so much as a means of protecting victims.[67] Still, it can also be used in an environmental context. An example of recent legislation which incorporates mandatory insurance or financial assurance for environmental damage is the EC environmental liability scheme (see above). Article 16 of the Directive[68] stipulates that Member States should encourage the use by operators of any appropriate insurance or other forms of financial security in order to provide effective cover for financial obligations.[69]

In addition to this, in the case of climate change, and for extreme weather events in particular, an agreement about mandatory "weather" insurance coverage is conceivable, where individuals or regional authorities would insure against certain types of extreme weather events on the private market, while the premiums would be paid by polluters/operators/States, as envisaged in the third case study presented in Chapter V.[70]

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66 Naturally, there are many other types of insurance. One which could also be interesting in this context is the debt-insurance provided by, for example the "Small States Insurance Scheme" which provides relief from debt servicing obligations in the case of a natural disaster in order to free up capital for recovery efforts; see <http://www.commonwealthdma.com/CDMA_Brochure.PDE> and Linnerooth-Bayer/Mace/Verheyen, note 19, 23.

67 Koch, Versicherungswirtschaft, 1998, 12.

68 Note 50.

69 See further Faure/Grimeaud, Financial Assurance Issues of Environmental Liability, 2000, Executive Summary, § 2 A.

70 It is this kind of insurance Bals/Butzengeiger grapple with in their paper "Insuring the Uninsurable – Preliminary thoughts regarding the basic structure of an insurance related mechanism" (unpublished, on file with author) which was partly presented at a side event at COP10. They also suggest a fund-based solution.

While it is questionable whether States should be advised to insure themselves on the private market as this could raise costs rather than reduce them,[71] an insurance regime could help to cover private risks.[72] It is worth noting that anything is insurable in general, as long as the damaging incident is possible, even if only the exact point in time at which it will occur is uncertain (as for example in the case of life insurance).[73] However, given the possibly dramatic impacts and potential pay-outs the insurance industry would have to handle, it is likely that the involvement of the private insurance sector is only possible if governments act as the reinsurer of "last resort" to cover damage over and above a certain threshold. This is a tested method[74] and could well be applied to instances of climate change damage.

Gradual changes such as gradual coastal inundation due to sea level rise might be better regulated through a scheme based on a joint fund, such as the one proposed by AOSIS. For impacts that do not occur on a country's territory but on the global commons such as Antarctica, it might be best to tackle climate change damage through existing regimes, such as the one for Antarctica (see Chapter IV).

A negotiated approach would enable States to take account of the specific characteristics of the potential impacts of climate change – including setting priorities for most urgently needed regulatory action. This differentiated approach would also allow for a system of incentives to ensure that adaptive and damage prevention action is taken in a timely manner. For example, a weather insurance system could oblige the insured to undertake certain measures *ex ante* to be able to cover his or her damages afterwards. Such differentiation would not be possible if incidents of climate change damage would be tackled through a litigation-based approach – be it on a national or international level.

VIII. Cover all categories of damage – including ecological damage

As discussed in Chapter II, climate change impacts not only affect human systems, property and health, but threaten unique ecosystems worldwide. As shown in Chapter V, State responsibility generally also covers ecological damage, at least as long as this

71 See for an in-depth analysis Linneroth-Bayer/Mace/Verheyen, note 19, 16 ff.

72 See Whitmore, Compulsory environmental liability insurance as a means of dealing with climate change risk, 28 Energy Policy (2000) 739.

73 Some criteria for insurability from an economic perspective are i) the scope of liability can be determined with enough certainty to make the risk predictable and thus insurable, ii) it is possible to control moral hazard effectively, iii) it is possible to reduce adverse selection.

74 One example is the Worldbank-sponsored Turkish earthquake insurance system, see further Gurenko The Role of World Bank in Supporting the Turkish Catastrophe Insurance Pool, 2000 and Linneroth-Bayer/Mace/Verheyen, note 19, 26 ff.

is financially assessable. Therefore, there is no justification for restricting a negotiated scheme for climate change damage to certain categories of damage such as property or health. In fact, recent State practice shows that ecological damage should be recoverable.[75] The recent EC liability scheme for example establishes strict liability for damage to land, water and biodiversity. In fact, this proposal is aimed at filling the gap left open by domestic tort and liability systems which sometimes do not allow for recovery of damage to ecosystems.

A negotiated scheme would allow for specification with regard to which types of damage would be covered, including possible measures for helping natural systems to adapt to temperature changes, where and if possible. It would also allow States to establish a system for the determination of covered (protected) areas, possibly building on the existing schemes for nature protection under, *inter alia*, the UNESCO and Ramsar Conventions. Such a determination was also foreseen by the 1991 AOSIS proposal for the case of sea level rise and would – while ensuring that damage to ecosystems is incorporated in the scheme and thus also steers the preventive effect of the scheme – ensure that the likely damage and costs are predictable for States or private entities alike (see below).

IX. Make necessary funding predictable and transparent

One major disadvantage of a national or international litigation-based approach is that liabilities or generally funds and costs for both adaptation and compensation are not predictable, neither for the potential victims, nor for potential defendants. The lack of information about the real adaptation needs is also a reason for the inadequate implementation of the financial obligations of the FCCC – and stands in the way of any assumption of responsibility by States for residual damage.

A negotiated scheme would help determine covered losses and areas, would allow for a limitation of liability for private parties (if those were covered by a liability scheme) as well as States, and – if operated through a fund or pool – would allow for some degree of certainty.

Naturally, this also implies a "vision" of certainty, as neither States nor scientists will know exactly what kind and extent of damage will occur until it actually occurs. However, a legal instrument must aim at facilitating "just" solutions that enable the addressees and parties to achieve common aims. It is rarely a method for eliminating uncertainty that prevails in the natural world. Moreover, with any international

75 See for a comprehensive analysis Kokott et al., Ökologische Schäden und ihre Bewertung in inte nationalen, europäischen und nationalen Haftungssystemen – eine juristische und ökonomische Analyse, 2003.

or domestic liability regime, a certain tension between the objective of paying full compensation to victims and certainty on behalf of private individuals (or States) regarding the financial burden that could be imposed on them will remain and must be accepted.

X. Settle the issue of incremental cost and injury or: Ease the burden of proving causation

As mentioned above the issue of incremental costs or the differentiation between damage brought about by anthropogenic climate change and natural variability is one of the core problems in regulating both adaptation to the impacts of climate change and compensation for any residual damage. As a GEF expert group stressed,[76] this issue will never be fully resolved, or at least, large margins of uncertainty will remain when trying to divide up impacts on the ground between "man-made" and natural causes. This dilemma is mirrored in the new GEF Approach to Adaptation presented in Chapter III.

While the financial obligations of the FCCC legally only apply to adaptation measures undertaken to face anthropogenic climate change, the international community has in fact undertaken first steps to deal practically with the lack of certainty and the ability to divide injury in the way envisaged by the FCCC. As seen in Chapter III, the GEF has been given a mandate to fund – as part of the implementation of the FCCC – measures of disaster prevention and reduction as well as capacity building in the form of NAPAs without differentiating between natural and anthropogenic risks and adaptation needs. This was a practical step given current and inherent scientific limitations, and this approach could also be taken for a new climate change damage scheme. States could agree on a proportion of risk to be assumed by every affected State. They could fix a certain level of sea level rise or extreme weather events as the *status quo* and thus anything above this threshold would be non-recoverable from any international scheme. Similarly, they could agree on a maximum amount payable by the responsible parties towards a compensation fund – this would, in essence, also solve the issue of causation as affected States would then have to agree on a formula for apportioning the reparation.

Again, such solutions would not aim at establishing causation between a particular share of greenhouse gas emissions and a particular damage as attempted in Chapter V for invoking State responsibility. Rather, they would serve to overcome a legal problem in the face of scientific uncertainty and in so doing design an acceptable and

76 GEF/C.19/Inf.12, Report of the STAP Expert Group Workshop on Adaptation and Vulnerability, May 2002, 6.

just solution for affected and causing parties alike. This pacifying role is exactly what should be expected of a negotiated scheme as opposed to a litigation-based approach to climate change damage, even if naturally, the one does not necessarily preclude the other.

XI. Ensure just distribution of reparation and adaptation funds

A litigation based approach would result in some (few) affected parties (States or private entities) recovering their damage or being provided monies for adaptation purposes. However, the general principle enshrined in the no harm rule is clear: any State negatively affected by another State's behaviour should recover compensation for its injuries. As described in Chapter IV, some scholars have concluded therefore that the no harm rule together with the general duty to cooperate obliges States to ensure that an equitable solution is found. In the case of climate change damage, this means that people and countries injured by the impacts of climate change should be able to claim adaptation costs or compensation for residual damage regardless of their diplomatic or political capacity. Such scheme covering all potential victims of climate change can only be negotiated.

Any liability regime or fund solution would have to provide methods for the distribution of funds and the administration of claims. Examples of such rules can, again, be found in the liability regimes described above. Depending on whether States or individuals are potential claimants, various methods are imaginable, such as an inter-State settlement of compensation claims, an agreement between States that provides for clear possibilities for private individuals to seek compensation for injury incurred through private law remedies or a system that tackles claims through a separate institution.[77] If a compensation fund approach were chosen, the existing bodies of the FCCC could provide an example for the institutional set-up, e.g. the CDM Executive Board (see Chapter III). In any event, the current practice of GEF funding (first come, first serve) could not be upheld in the context of a comprehensive climate change damage scheme. These issues are, however, certainly solvable technically – if sufficient political will supports the establishment of the new scheme.

Nevertheless – and this should not be disguised – even the best international scheme will face a problem which is inherent in international law: while justice might be done on a State-to-State level (if an equitable solution can be found in the political arena), there is no assurance that the internal distribution will also follow objec-

77 Caron, D., Liability for transnational pollution arising from offshore oil development: a methodological approach, 10 Ecology Law Quarterly (1983) 641; Berwick, Responsibility and Liability for Environmental Damage: A Roadmap for International Environmental Regimes, (1998) 10 Georgetown Int'l Envtl. L. Rev. 257.

tive and equitable rules. This kind of distributional problem cannot be solved on the international level – even though it can be assumed that a scheme involving private parties and their claims from the start might be less politicised and therefore less prone to internal political bargaining.

XII. In sum . . .

This Chapter has discussed ways of approaching the issue of climate change damage in a comprehensive manner, building on the analysis performed and the gaps and difficulties identified in the preceding Chapters.

One of the most important statements that can be made at the end of the day is that international law remains the main driver for action on climate change and it should assume this position also with regard to climate change *damage*. The fact that international law provides various damage prevention obligations as well as rules to enable States to seek redress for climate change damage serves to clarify the role of international law in this area. Acting consciously to protect the global climate as well as individual States and people from damage, States should take these obligations and rights to heart, especially when entering the first phase of the "post-2012". The Kyoto Protocol has entered into force and its obligations set a framework for mitigation action until 2012, but negotiations on how to proceed after this point must start now, not only because the Kyoto Protocol obliges its Parties to demonstrate progress by 2005 and begin negotiations (Articles 3.2 and 3.9 Kyoto Protocol) but also because the first commitment targets are clearly inadequate to protect mankind against climate change damage.

When entering negotiations in good faith, Parties could consider the remarks made on these last pages, primarily that it is advisable to negotiate a scheme covering both the costs of adaptation to the impacts of climate change and any claims for residual damage occurring as a result of climate change.

The analysis in Chapter V on State responsibility argues that the approach to liability for environmental damage fits the climate change phenomenon generally, and therefore, existing liability regimes can serve as examples for designing a climate change damage liability scheme. The underlying assumption is that it is preferable for the international community to tackle the issue of climate change damage by way of negotiation soon – rather than to wait for the reactions of people and countries at some point in the future when the impacts of climate change become more and more apparent (litigation-based approach). The exercise of beginning to think about such a scheme would also help reinforce mitigation efforts, as it could prove a precursor for the involvement of developing country governments in strong mitigation regimes following the first commitment period of the Kyoto Protocol. The second assumption was made primarily for this reason: negotiating a climate change damage

scheme is not entirely unrealistic from a political point of view in the medium and longer term.

A negotiated scheme would face many technical difficulties – such as determining the responsible parties (States or private entities?), allocating responsibility among them (according to emission shares?), determining and delineating the injuries to be covered (ecological damage covered?), designing adequate responses to the different types of impacts of climate change (insurance solutions for extreme weather events – fund solutions for gradual changes?), overcoming the problem of proving causation or determining which part of a particular injury is due to anthropogenic climate change rather than natural changes, etc.

Still, while admitting that these issues merit much more thought and are certainly very complex, the overriding conclusion of the discussion in this final Chapter is that a negotiated, just and comprehensive solution to the issue of climate change damage is technically possible and would go far toward filling the gaps identified in both the primary and secondary rules of existing international law. Given the projected impacts of climate change, particularly on poor countries and their peoples, which will occur – with a high degree of certainty – within the lifetime of this author, this is certainly a hopeful thought.

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