GLOBALIZATION, AGRICULTURE AND FOOD IN THE CARIBBEAN

CLIMATE CHANGE, GENDER AND GEOGRAPHY

EDITED BY
CLINTON L. BECKFORD
AND **KEVON RHINEY**

Globalization, Agriculture and Food in the Caribbean

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Climate Change, Gender and Geography

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We would like to pause here to recognize the contribution to geography education, research, and scholarship in the Caribbean of outstanding geographer Professor David Barker. Professor Barker has put in nearly 40 years of dedicated service to the development of geography in the Caribbean through his teaching, research and scholarship, and, perhaps most importantly, guidance and mentorship of numerous graduate students. Professor Barker has influenced all of the contributors to this volume in some way with most of them benefitting from his mentorship in their graduate studies. As an agricultural geographer, Professor Barker has influenced the careers of hundreds of students at the undergraduate and graduate levels and today his students are making significant contributions around the world in the field of geography and beyond. Through his involvement with the Jamaica Geographical Society, the journal Caribbean Geography*, which he edits, and the British Caribbean Seminar Series, Professor Barker has been at the forefront of the dissemination of Caribbean geographical research. His work in the field of agricultural geography is well known. This volume showcases the work of some of Professor Barker's many graduate students and pays homage to him as a master teacher, mentor, researcher, and scholar on the eve of his retirement from the University of the West Indies.*

Foreword

It was my great pleasure to accept the invitation to write the Foreword for this important collection of contributions on Globalization, Agriculture, and Food in the Caribbean. Dr Clinton L. Beckford was my first doctoral student at the University of the West Indies (UWI), and together we have published extensively on Caribbean small-scale farming, indigenous knowledge, and the yam stick problem in Jamaica, the third being the theme of his doctoral dissertation and a postdoctoral fellowship. Dr Kevon Rhiney, another of my doctoral students, was the first of an impressive line of human geography PhDs who, over the last decade, have honed their skills at the Department of Geography and Geology, UWI, Mona Campus, Kingston, Jamaica. The research of this group of young scholars, on Caribbean food security and small-scale farming and global change, has been well received at high-profile international conferences and in the published literature. This latest volume includes some of the research output of this group of talented researchers.

The timely relevance of the volume is worthy of a brief commentary. Since the onset of economic globalization in the 1980s, the Caribbean region of Small Island Developing States (SIDS) has entered a new era of economic and environmental vulnerability quite different in scope from that of the colonial period. It has impacted all territories, large and small, all sectors of the economy—industry, tourism, and agriculture—and both urban and rural areas. Though the impacts can have positive

outcomes, most are negative and probably no sector has felt these effects more severely than the agricultural sector.

Trade liberalization has posed the most significant of the challenges of economic globalization to the agricultural sector. Its impacts have complex implications for food security and rural livelihoods. For most Caribbean countries, agricultural exports are a major source of foreign exchange and employment-based income-earning opportunities. Moreover, for any given territory, they often comprise only one or two commodities, such as sugar, bananas, or coffee. Such dependency on a single commodity deepens economic vulnerability. The negative impacts of trade liberalization are exemplified by the 'banana wars' of the 1990s, and the subsequent retreat from export bananas which affected the Windward Islands and Jamaica in particular. Caribbean sugar also fared badly through increased competition on the world market, with Trinidad and Tobago and St Kitts closing their sugar industries since the turn of the century, the latter after a turbulent 350-year history. There are a number of contributions in the volume, which focus on the ramifications of economic globalization on traditional export crops.

The general decrease in agricultural tariffs as a result of trade liberalization not only affected traditional exports like bananas and sugar, but also opened up domestic markets to a flood of food imports. Historically, Caribbean territories were always dependent on imported food, and food imports are necessary and critical to nutritional and food supply stability. But trade liberalization ushered in a regime of imports that included fresh produce from North America such as potatoes, carrots, red peas, and onions which hitherto were produced in the islands by small-scale producers. These imports were often cheaper than local produce and not surprisingly had disastrous consequences for local farmers and their families with limited income-earning opportunities outside their rural communities.

The vicissitudes of economic globalization have been stalked by the looming spectre of climate change, and the region's vulnerable open economies have found themselves on the front line of this battlefront too. The region has experienced increasingly unpredictable weather patterns and extreme meteorological hazards; the series of severe hurricanes of the first decade of the new century were often preceded by an extensive

drought, and occasionally followed by another prolonged drought. Seasonal precipitation patterns appear to be shifting in the western half of the Caribbean Basin, affecting the timing and duration of the short early rainy season, a critical period in the farming cycle for many small-scale producers. The present drought affecting the Caribbean Basin and attributed to El Niño is one of the worst on record.

Robin Leichenko and Karen O'Brien have characterized economic globalization and climate change as a process of *double exposure* in its impacts on people and places. They argue it triggers a range of external economic and environmental factors which interact in complex ways and have differential impacts on locations at different scales, and on particular groups, institutions, and individuals. When considered together rather than separately, the impacts of globalization and climate change have the potential to amplify benefits and losses to the *winners* and *losers* respectively. It is noteworthy that these two scholars are geographers; at geography's epistemological core is an interdisciplinary approach which synthesizes ideas from the social sciences and environmental sciences. Teasing out the reciprocal consequences of economic globalization and climate change on food security and the agricultural sector is a good example of how to engage a creative synthesis of concepts and research methods that cut across the natural sciences and the social sciences.

The Caribbean region of SIDS has felt the full force of double exposure over the last 25 years, and so is an ideal arena for empirical research on the impacts of global change. It is equally noteworthy that much of the Caribbean-based research which uses the lens of double exposure was pioneered by geographers based at the Department of Geography and Geology at the UWI, Mona Campus. Several contributions in this volume are representative of this new wave of geographical research and its focus on sustainable livelihoods, livelihood coping strategies, adaptive capacity, and livelihood resilience, among other things. They are based on rigorous ethnographic research methodologies that generated rich primary data and involved long hours of painstaking field work and residence in a local community. Mixed-methods approaches allow for the triangulation of results from quantitative and qualitative data. All the above are the hallmark of some excellent doctoral research included in the volume and which I have had the pleasure and privilege of supervising.

An important feature of most of the contributions is that they focus on the local, community-level of analysis. At this scale, it is possible to zero in on people who arguably live in some of the most vulnerable locations and communities impacted by economic globalization and climate change; certainly they are the least likely to benefit from external intervention and assistance. At the community level, research highlights the plight of the people and places affected, and captures the more successful coping strategies (or their absence) and the more promising approaches to strengthening adaptive capacity, as a possible route to more sustainable livelihoods. In the Caribbean region such vulnerable livelihoods include small farming and artisanal fishing—both are represented in the volume.

The wide range and scope of the applied research included here is commendable because the impacts and vulnerabilities generated by economic globalization and climate change are not scale-neutral. Island conditions are not uniform across their geographical spaces. The need to focus on local areas is critical because spatial vulnerabilities vary significantly even within a single island, depending on local topography, soils, microclimates, and local social, economic, and cultural traditions. Jamaica, for example, is a complex mosaic of agro-ecological zones each associated with a different suite of vulnerabilities. Even within local communities, social groups can be impacted in different ways, some much more so than others, and have different capacities to cope or adapt to external change. Differential impacts can be gender-based, age-based, or generated by other variables like family size, household size, income or access to land, and such a focus helps define those groups most seriously impacted by globalization and climate change. Particularly vulnerable groups like women, the elderly, or the poor warrant special attention, and again the volume is representative of such research.

I commend the volume to you. Enjoy and learn.

David Barker
Kingston, Jamaica

Preface

This book highlights geographical perspectives on the impacts of changes in the global political economy and climate on food and agriculture in the Caribbean Community, or CARICOM, using research from different countries in the region. Using the lens of human, economic, social, and cultural geographies, the volume showcases recent research by Caribbean researchers who were all educated at the region's premier postsecondary institution, the UWI.

Even though we use the word 'Caribbean' our focus in this book is mostly on the English-speaking countries that make up the CARICOM. The CARICOM is perhaps the most significant political and economic manifestation of regional integration. The organization comprises the countries of Antigua and Barbuda, the Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines, Suriname, and Trinidad and Tobago. The countries of Anguilla, Bermuda, British Virgin Islands, the Cayman Islands, and Turk and Caicos Islands are associate members of CARICOM. The organization started as an effort to deepen integration among former British slave colonies of the West Indies. Today the non-English-speaking countries of Haiti and Belize are full members.

According to Potter et al. (2004, p. xvix) the Caribbean is a 'diverse, vibrant, and complex world region'. Many people outside of the region think of the Caribbean as a conglomeration of small island states.

However, while most of the countries are indeed island states, the South American mainland countries of Guyana and Suriname and the Central American mainland country of Belize are also included as countries of the Caribbean. Beckford and Campbell (2013, p. ix) write that,

> The Caribbean countries reflect a rich colonial past, with ties to England, Spain, France, and the Netherlands. Through the imperialistic goals of the colonists, ties were developed with both Africa and Asia, which supplied the region with labour in the form of slaves and after slavery ended in 1838, with indentured servants mainly from what was then known as the East Indies.

For many people worldwide, the Caribbean region is alluring, exotic, enchanting, and intriguing (Beckford and Campbell 2013; Sheller 2003). Its geographies are a major reason for this. Many of its landscapes are considered to be some of the most beautiful in the world. The region has a rich history of global involvement and its climate and weather make it attractive to outsiders. The Caribbean's historical participation and integration in the global market and international affairs, and its heavy dependence on weather and climate, have been fundamental in shaping the economy of the region.

> Since the first instances of conquest and colonization in the Caribbean, the region has been a major player in international politics and economics. In the slave era and the longer colonial period, the economies of the region were tied to metropolitan centers in Europe. The countries were used to produce primary products for the European countries while they had to import everything they needed, including food. The legacy of this mercantilist era is evident in the region today, with great implications for regional food security. (Beckford and Campbell 2013, p. x)

External forces still play a major role in the Caribbean. For example, changes in the global trade rules have been devastating to the sugar and banana industries in the region with severe consequences for many national economies and rural livelihoods.

The economies of the region are also bounded in its weather and climate, which exert considerable influence over economic livelihood

activities. Outside of the oil and natural gas industry in Trinidad and Tobago, the driver of most of the CARICOM Caribbean economies today is tourism which is based on the vaunted sea, sun, and sand of the region but also the underestimated warmth of its people. Climate affects the region in profound ways evidenced by the overwhelming influence of meteorological events on Caribbean life and livelihoods, including agriculture. While this has always been the case, the last decade and a half has seen a number of devastating events, especially hurricanes and droughts, that have wreaked havoc on agricultural sectors in a number of Caribbean countries. The role of agriculture in Caribbean economies is still critical especially in regard to sustaining rural livelihoods and households despite the fact that today this contributes a declining share of GDPs region wide. Therefore, any scenario in which agriculture is at risk is of grave concern.

In the Caribbean, geography is an important academic discipline. At the primary school level it is not done as a discrete subject but forms part of the social studies curriculum. At the secondary school level it is treated as one of the core subjects—one that many schools insist that students must take after they reach the level where they select the subjects they want to pursue in preparation for postsecondary studies. At the postsecondary level also geography is an important subject. At the UWI it is a mainstay of pure and applied sciences as well as liberal arts programmes. In teacher education too geography is emphasized and is one of the subjects that prospective teachers can specialize in at the high school level.

The centre for academic study and research in geography in the Caribbean is the Department of Geography and Geology at the UWI, Mona Campus. Many of the top geographers across the region and professionals and technical experts working in agriculture, disaster management, and the environment are geographers who received their undergraduate and graduate education at UWI. Many more are employed in and out of academia outside of the region in places such as the USA, Canada, and the UK. A very large number of the region's geography teachers also did their postsecondary studies in geography at UWI. Throughout the region, the vast majority of Caribbean folk with degrees in geography would have read for them at UWI's Geography Department. The same would be true of master and doctoral degrees in

geography, perhaps to a slightly lesser extent. The University, therefore, and its Geography department, more specifically, have been at the forefront of geography education and research in the Caribbean for over 50 years. This is not surprising because the Caribbean's geographies form the very identity of the region. From its economic, physical, social, political, cultural, and environmental characteristics, geography is at the heart of Caribbean vibrancy and dynamism.

The point is thus made that the themes of this book—globalization, agriculture, food, climate change, gender, and geography—are fundamental aspects of Caribbean identity and healthy existence. Research and scholarship in these areas are essential to our evolving knowledge and understanding of how peoples and communities are impacted throughout the region. The presentation of geographical perspectives on climate change, globalization, and food and agriculture in the region in one dedicated volume is important. Even more important is the fact that the book showcases the research and scholarship of young Caribbean nationals who received some or all of their geography education at the UWI, which is by far the most successful and enduring regional institution with a sterling international reputation. This home-grown talent is making tremendous contributions to regional development in respective countries across the region in the areas of geography education, policy, and planning for globalization and climate change. For example, Kevon Rhiney teaches in the Department of Geography and Geology at UWI; Anthony Norman is a teacher educator at Church Teachers College, Mandeville; Dorlan Burrell is a director at the Ministry of Water, Land, Environment and Climate Change, Jamaica; Joyelle Clarke is director, Department of Constituency Empowerment Ministry of Agriculture, Marine Resources, Cooperatives; Chanelle Fingal-Robinson is a Fairtrade Consultant with Jamaica Cocoa Farmers' Association; Ayesha Constable is a doctoral candidate at the Department of Geography and Geology, UWI; and Rose-Ann Smith is Map Curator at the Department of Geography and Geology at UWI. Others are contributing to geography education in the international arena. April Baptiste, Mario Mighty, and Clinton L. Beckford are university professors in the USA and Canada.

These authors have logged huge numbers of hours conducting research on Caribbean geographies. Their perspectives are thus evidence-based and

the product of years of empirical research. A growing number of scholars who are foreign nationals are now engaged in Caribbean research. This is very welcome and timely because it could be argued that, compared to other parts of the developing world such as Asia, Africa, and Latin America, the Caribbean is not greatly represented in the geography literature. But in recent times there have also been a growing number of Caribbean scholars writing about Caribbean geographies and issues of concern including the themes of this volume. This book adds to this and provides a space for the voices of Caribbean researchers to be heard on critical Caribbean issues.

As a region of mainly SIDS the CARICOM Caribbean faces certain ubiquitous challenges. These have quite rightly taken centre stage in regional discussions and been the focus of academic discourse in geography and other academic disciplines. According to the United Nations.

> We reaffirm that small island developing States remain a special case for sustainable development in view of their unique and particular vulnerabilities and that they remain constrained in meeting their goals in all three dimensions of sustainable development. We recognize the ownership and leadership of small island developing States in overcoming some of these challenges, but stress that in the absence of international cooperation, success will remain difficult. (http://www.sids2014.org/samoapathway)

Caribbean SIDS are grappling with existing and emerging challenges as an inevitable part of life. Many of these are related to structural issues like small size (landmass and population), small resources base, and sameness. These factors stymie diversification and make it difficult to develop any significant scale economies (Gomes 2014). In addition to these structural challenges, there are problems related to dependence on relatively few markets, dependence on a relative narrow range of commodities mainly primary resources, vulnerability to a range of natural disasters mainly meteorological, and susceptibility to external shocks such as global economic stresses. Include the emerging climate change implications, which are still largely unknown in terms of the severity of their effects, and we have a scenario rife with risks and uncertainties. These challenges are interrelated and closely linked to geography, climate, and globalization,

and have implications for environmental and economic vulnerabilities. These are unique challenges, hence the UN's description of SIDS as a distinct and special category of developing states.

Caribbean SIDS have the following characteristics, which combine to render them vulnerable environmentally and economically: they have low-lying coastal areas with large population concentrations and clustering of economic infrastructure; they are small in size and population and lack economies of scale; they have small but growing populations; they have a narrow resource base; they have fragile ecosystems; they are susceptible to natural hazards including extreme meteorological events; they have open economies; and they are overdependent on external trade partly because of their small domestic markets (Barker 2012; Briguglio 1995; Pelling and Uitto 2001).

Food security is a growing challenge in Caribbean SIDS. There are problems related to quantity and quality of available food. Another problem is the increasing average age of farmers in the region as youth seek more lucrative employment and the perception of farming as a viable and dignified occupation declines. Farming has become an occupation for the uneducated and undereducated in the society. Very few university- or college-educated professionals are involved in agriculture, and the transfer of arable land to housing, commercial purposes, and other forms of land use indicates a devaluation of the importance of farming by decision-makers (Gomes 2014). These and other factors have contributed to the present situation where domestic food production in CARICOM countries is at an all time low and the countries of the region have serious external trade imbalances and whopping import food bills due to the dependence on food imports to boost food and nutrition security. With the exception of Belize and Guyana, all the CARICOM countries are now net importers of food—a situation that has been recognized as untenable (Beckford and Campbell 2013; Deep Ford and Rawlins 2007).

A discussion of the geographies of climate change, globalization, and food and agriculture in the Caribbean would be incomplete and distorted without some gendered analysis. The issues treated within this book have differential impacts on men and women. There is a general and considered view that in climate change and globalization scenarios while there are often no real winners, women tend to be the biggest losers. We join

the growing number of scholars who now advocate that for successful adaptation to climate change and globalization, and for sustainable food and agriculture futures in the Caribbean, women's issues must be given special consideration and greater participation of women in all areas including decision-making must be facilitated.

The critical themes and issues raised make this volume quite timely. It examines issues that are fundamental and existentially important to, and in, the Caribbean. It provides insights that will stimulate academic discourse, bridge knowledge gaps, and guide future research. It should be of value to Caribbean scholars and students in several disciplines as well as to non-Caribbean academics in the social sciences who are interested in Caribbean studies and tropical geographies more generally.

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Contributors

April Karen Baptiste is Associate Professor of Environmental Studies at Colgate University, Hamilton, New York. Her research interests are interdisciplinary and involve a fusion of environmental psychology, environmental justice, and natural resource management. Her current projects are focused on climate change perceptions and behaviours among fishers in the Caribbean region and on food access and affordability for low-income persons in Madison County, New York.

Clinton L. Beckford is a geographer and Associate Professor of Geography Education at the University of Windsor. He completed his doctoral studies at the University of the West Indies (UWI), Mona Campus, Kingston, Jamaica, in the area of agricultural geography. His research is focused generally on food and agriculture and rural livelihoods and, more specifically, on sustainable agriculture and food and nutrition security in tropical small-scale farming systems with emphasis on Jamaica and the wider Caribbean. Over the last decade he has published extensively on food and agriculture in international journals. This book follows his 2013 co-authored volume *Domestic Food Production and Food Security in the Caribbean: Building Capacity in and Strengthening Local Food Production Systems*, published by Palgrave Macmillan.

Dorlan Burrell is a director within the Environment and Risk Management Division of the Minister of Water, Land, Environment and Climate Change. He recently worked with the University of North Carolina and East Carolina University on a research project relating to the ability of small-scale farmers to cope with climate variability. His research and consultancy activities span areas relating

to food production and market availability, crop suitability modelling, disaster risk reduction, and climate services. Other areas of interest include sustainable development, rural livelihoods, community development, climate change modelling and adaptation, disaster management, environmental management, and vulnerability/hazard assessment. His postgraduate thesis analysed the impacts of hydrometeorological hazards on crop production among small-scale farmers in Jamaica.

Joyelle Clarke is a graduate of the UWI with a PhD in Geography. Her doctoral research focused on application of the sustainable livelihood framework and asset analysis to the livelihoods of former sugar workers in St Kitts. Her research interests focus on rural livelihoods within the context of land use change, national economic transition from sugar to tourism, and global economic changes, in particular globalization and trade liberalization. Current research has evolved into a self-funded project on 'Transforming Lives through Livelihoods', an investigation into how Kittitians have improved living conditions and the sustainability of their livelihood profile through agriculture and tourism-based activities. An evolving aspect of her research is the feminization of marginalization in agriculture and gendered identities and experiences from a livelihood perspective. She is Director, Department of Constituency Empowerment, Ministry of Agriculture, Marine Resources, Cooperatives in Basseterre, St Kitts.

Ayesha Constable is a graduate student in the Department of Geography and Geology at the UWI, Mona Campus. Her doctoral research centres on climate change and agriculture, with a focus on determinants of adaptation among small farmers in Trelawny, Jamaica. She has also participated in several climate change meetings including the Global Power Shift in Turkey, COP20 in Lima, Peru, and the Commonwealth Climate Change Youth Expert General Meeting in London in 2015. Among her areas of academic research are rural development, climate change and theology, and youth and climate change. She has conducted research and written on other topics including forestry, fisheries, and youth development. She is a member of the Commonwealth Youth Climate Change Network and Caribbean Representative for the UN's Sustainable Development Solutions Youth Network.

Mario Mighty is a Jamaican geographer with a strong interest in agriculture, geographic information systems (GIS), economic development, and the impacts of globalization on small island developing states. Dr Mighty is an assistant professor at the University of North Alabama. Throughout his academic career he has explored how various export crops, notably citrus, bananas, and coffee, compete on the global agricultural markets. An active member of the southeastern

and national divisions of the Association of American Geographers, his primary research foci are GIS applications in agriculture and economic development in small islands. Other interests include competition in international agribusiness and the role of geopolitics on the operations of developing nations.

Anthony Norman is a teacher educator who currently lectures at Church Teachers College, Mandeville, Jamaica. He teaches and does curriculum development in the areas of geography and social studies. His research interests are related to environment, resource use, and sustainability. His current research focuses on protected agriculture as an adaptive response to declining production and productivity in domestic agriculture, and the restoration of mined bauxite lands to sustainable production of crops and other economic activities.

Kevon Rhiney is a lecturer in the Department of Geography and Geology at the UWI, Mona Campus. He is also the current President of the Jamaican Geographical Society (JGS), and a former Commonwealth Fellow and Visiting Academic at the Kellogg College, University of Oxford. His research interests span the rural–urban nexus and include issues surrounding agricultural change and rural development, market liberalization and food security, climate change adaptation and mitigation, human security, and sustainable development. Dr Rhiney is a well-published author and scholar with publications in international journals and other sources.

Chanelle Fingal Robinson is the Fairtrade Consultant at the Jamaica Cocoa Farmers' Association. She holds a PhD in Geography from the UWI, Mona Campus. Her research interests include alternative trading systems, the impacts of Fairtrade on producers and consumers, social capital, brand loyalty, and commodity fetishism. She has undertaken research in the Caribbean and the UK and has published a number of articles on the effects of globalization, and, more specifically, trade liberalization on the banana industry in the Windward Islands.

Rose-Ann Smith obtained her PhD in Human Geography from the UWI, Mona Campus, in 2015. Her dissertation focused on rural livelihoods and vulnerability to global change among three remote communities in Northeastern St Vincent. It assessed the vulnerability of Carib (an indigenous people) communities to global changes, particularly climate change/climatic variability and economic globalization, their coping and adaptation strategies, and the opportunities for resilience building. Dr Smith is passionate about community development with strong focus on resilience building, disaster risk reduction, climate change adaptation, and sustainable livelihood. Other areas of interest are cultural and ecotourism, and environmental management.

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Part I

Framing the Discussion

1

Geographies of Globalization, Climate Change and Food and Agriculture in the Caribbean

Clinton L. Beckford and Kevon Rhiney

Overview

In this chapter we present an introduction to the book. The chapter serves to contextualize the discussion that occurs in each section and chapter and to provide background analysis that synthesizes the importance of the various issues to the Caribbean. We begin by introducing the Caribbean as a region before discussing briefly the main themes of the book and introducing the chapters in each section by providing a summary of the contents of each.

Historical Antecedents of Globalization in the Caribbean

The Caribbean is a region characterized by rapid internal change and influenced by profound global shifts. Changes in economy, demography,

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and the sociocultural, political, and environmental arenas combine to paint a picture of dynamic and rapidly evolving geographies. Globalization is not new to the Caribbean. The histories of the region are laced with transnational interactions and integrations and what it is today has been largely shaped by a multitude of external forces and influences. Some of these influences have been decidedly negative and political leaders and peoples across the region have been trying to limit and reverse them since the nation building and independence era of the late 1950s that blossomed in the 1960s. Potter et al. (2004, p. 387) suggested that, 'Historically, the Caribbean is perhaps the most globalised world region.' Referencing the earliest days of European colonization, the authors show how the plantation era was responsible for the domination of the Caribbean by external influences from Europe, Africa, and Asia in particular. 'For the Caribbean, therefore, current "globalizing" trends represent yet another round of powerful external influences for a region historically shaped by exogenous decisions and events' (Potter et al. 2004, p. 388). Klak (1998) is of the view that not much has changed in the Caribbean in terms of globalization. He argues that there are more similarities than differences with the economic domination of the past. He writes:

> The Caribbean's historical global integration, modernization, and industrialization underlie the region's abject dependency, which continues to the present. The Caribbean region is now largely independent from Europe politically but is still reeling under the historical legacies of dependency on outside authorities, suppliers, markets, and geopolitical agendas. Now that the entire world has entered the present era of (US dominated) globalization, the Caribbean offers a chronicle of the impact produced by exposure to many rounds of transformations of global capitalism. (p. 6)

Through its deep colonial ties to England, Spain, France, and the Netherlands and close, complex relations with the USA, the Caribbean region has a rich legacy of integration in international affairs and the global political economy.

> Through the imperialistic goals of the colonists, ties were developed with both Africa and Asia which supplied the region with labour in the form of slaves from Africa, and after slavery ended in 1838, with indentured servants mainly from the East Indies. (Beckford and Campbell 2013, p. ix)

There can be no doubt then that global forces have profoundly impacted all facets of Caribbean existence. One of the areas where this manifests itself most acutely is in food and agriculture and more generally economy. Sugar, bananas, and coffee are three of the biggest foreign exchange earners and absorbers of the labour force. All three have been severely impacted by the global political economy with serious consequences for rural livelihoods and rural development.

Globalization has also had significant impacts on sociocultural and demographic aspects of the Caribbean. The region has a rich and diverse culture that is directly tied to global influences. Demographically, the region is largely made up of people of African, Asian, and European descent. Contact with Europeans in the early days of colonization led to the demise of the indigenous population through genocide and today there are only remnants of the first peoples in Caribbean populations.

Through the process of globalization, deep international ties have been established between the Caribbean and numerous parts of the world. A huge global Caribbean diaspora now exists because of opportunities for Caribbean peoples to emigrate. This started in the nineteenth century and gathered momentum in the mid-twentieth century and is still occurring at a rapid pace today. The overall impact of this phenomenon is still generally unknown. The significant contribution of financial remittances to the economies of so many Caribbean countries is clearly a positive development. However, especially in the context of the profile of recent migrants (young, technologically savvy, and highly educated), the region is losing some of its brightest minds and people with huge economic potential. This could be seen as a significant brain drain that is not offset by financial remittances. Furthermore, it could be reasonably argued that the remittance situation represents another form of dependency on external forces and conditions over which we have no control. Economic downturns and recessions in North America and Europe can have negative repercussions on remittance levels with households that are largely dependent on this source of income being severely affected. At the same time, the surplus labour that is absorbed by emigration provides substantial relief for overstretched social services in the region. Many migrants would be unable to find jobs in their native countries or would be underemployed. Of course many are still underemployed in their new lands. This discussion demonstrates the difficulty in analysing the impacts of globalization and explains why the issue is so thorny and contentious.

Global Change and Food and Agriculture in the Contemporary Caribbean

The term globalization means different things to different people. The interpretation of its effects and influences is also contested. In the development discourse, the conventional approach was to view globalization as an oppressive and unjust system imposed on developing countries by rich countries, which served to further their growth and development at the expense of the poorer countries. Having come to terms with the fact that the process now known as globalization would progressively manifest itself on the livelihood of peoples of the developing world, there is today more emphasis on looking for the opportunities that are often present because of the process.

Globalization as a process is nothing new. The world has been 'globalizing' since the earliest days of migration and international trade. Communication, access to information, and transportation have caused physical boundaries to fade and made interactions easier. In strictly physical terms, the world is as close to being a *global village* as it has ever been (Murray 2006). Globalization may be succinctly defined as a deepening social and economic integration of nations across the world. It is the change in the nature of globalization today that draws legitimate criticisms from many observers. Research from East and Central Africa has concluded that globalization hurts the poor, hurts workers, is undemocratic, lacks control, and supports agricultural trade for the rich countries at the expense of the poor (Robbins and Ferris 2003). Advocates of globalization suggest that free trade brings benefits and that openness in an economy is good business (Jolly et al. 2008). Anti-globalization scholars say that it disfavours the poor, accentuates poverty, and increases inequities and trade dependency (Bhagwati and Srinivasan 2002; Stiglitz 2002). According to Schneider (as cited in Jolly et al. 2008, p. 36) there is a historical simplistic and inaccurate and misleading 'view of globalization as a steady, progressive, beneficent integration of the global economy'. The suggestion is that this view is inaccurate because

> it ignores the contradictory way in which globalization has been visited upon various regions of the world, and it is dangerous in that it ignores the real effects of greater openness on real people. (Schneider as cited in Jolly et al. 2008, p. 36)

In the Caribbean, globalization in terms of economy is characterized by a reduction in trade barriers in the context of so-called free trade and an opening up of regional economies, which ironically, while promoting generally unfettered competition from external economies, have not promoted intra-regional economic integration to the same extent. This increased liberalization has often had devastating effects on local agriculture, as it does not always occur on a level playing field. However, a balanced assessment of the effect of globalization on Caribbean economies will show some positives. Even in the agricultural sector we will find some differential effects. Bananas and sugar have taken massive blows in most countries, but rice in Trinidad and Tobago and Guyana and sugar in Guyana have not suffered as much. In the Windward Islands, for example, the devastating effects on the banana industry are well documented now (Ahmed 2001; Fingal 2008; Grossman 1998a; Isaac et al. 2012; Rose 2010; Wiltshire 2004). Sugar, which was once 'king' in the Caribbean, has virtually disappeared from St Kitts and Nevis (see Clarke, Chap. 3 in this volume) and is tottering in Jamaica (see Burrell, Chap. 5 in this volume). The impact on domestic food production has not been studied enough but there is emerging evidence that importation of food such as a variety of fruits, and vegetables such as peas, carrots, onions, and Irish potatoes, which were all major cash crops in local food production systems, is having profound impacts on domestic food production (Ahmed 2001; Deep Ford and Rawlins 2007; Beckford and Campbell 2013).

According to Ahmed (2001, www.caricom.org/jsp/community/donor_conference_agriculture/preferences.pdf) 'The process of globalization has touched every aspect of Caribbean life including the agricultural sector'. While all agriculture in the Caribbean is impacted by globalization, sugar, bananas, and coffee bear special mention because they are the subjects of study in several chapters in this book with perspectives from at least three different countries. Ahmed (2001, http://www.scsonline.freeserve.co.uk/olvol2.html) explains that 'sugar and bananas are two most important foreign exchange earners and sources of employment in several Caribbean countries. These commodities share a common history and a common future. They also face similar challenges due to similar reasons'.

In Parts 1 and 2 of this volume we showcase research that examines issues of Caribbean food and agriculture in the context of globalization. In Chap. 2, Kevon Rhiney provides a historical account of a shift in economic imperatives as the Caribbean responds to pressures exerted by global

political-economic forces. This chapter assesses the transition from agriculture- to service-based industries in the Caribbean, paying keen attention to the growth of the tourism industry. The chapter provides an overview of the historical development of agriculture in the Caribbean. It provides a synopsis of regional post-war development policies and their concomitant impact on the development of agriculture up to the 1970s. Rhiney then chronicles the ways free trade policies, commencing from the 1980s, have effectively opened up regional economies to food imports of unprecedented proportions on the one hand while reducing regional producers' access to overseas markets on the other. A brief history of the growth of tourism in the Caribbean is presented, and a theoretical framework is proposed for analysing this regional shift towards the export of services. The author discusses the implications that this may have for better understanding the evolution of agriculture–tourism linkages in the Caribbean and concludes by exploring some new and emerging avenues for resuscitating the regional agriculture sector, amidst recent developments in the global economy.

In Chap. 3, Joyelle Clarke tackles the issue of rural resilience and the future of female former sugar workers in post-sugar St Kitts and Nevis. The author examines the closure of the country's sugar manufacturing industry in 2005 and the challenges experienced by female former workers in the context of employment and diversification of a 357-year-old sugar-led agricultural sector. Clarke highlights the comparative vulnerability of rural female sugar workers who failed to secure alternative livelihoods as they were generally characterized by limited education and skills, although the government-implemented post-sugar employment initiatives in agriculture and tourism offered short-lived success. The emerging agricultural sector failed to attract the mass of former workers mostly due to their unwillingness to be self-employed. This chapter evaluates the role of land assets and the value of farming as a livelihood strategy for poor rural women in the immediate post-sugar period. Agriculture's contribution to a reduction of socio-economic vulnerability is examined to understand feminization of vulnerability and poverty in sugar production in St Kitts. Clarke also examines the relationship between land, gender, and rural livelihoods, demonstrating the need for a revised national farming policy and for rural economic transformation and sustainable livelihood transition by gender-sensitive resource distribution, use of the household as a productive asset, and the transformation and repurposing of existing assets.

In Chap. 4, Chanelle Fingal-Robinson's research on the banana industry in St Lucia focuses on the subject of Fairtrade and liberalization and presents a balanced view of the impacts of globalization on St Lucia's banana farmers. This chapter examines the impact that Fairtrade has had on banana producers in rural St Lucia. It traces the removal of preferential treatment for Windward Islands' bananas enjoyed under the Lome Convention and the threat trade liberalization posed to the livelihood of thousands of St Lucian banana growers. It will show that these farmers have received some benefits related to Fairtrade including increased community development and higher prices for bananas. However, some more intangible benefits such as gender equality are not yet fully actualized.

Chapter 5 features Dorlan Burrell's research into the effects of globalization on small-scale sugar cane farmers in central Jamaica. He assesses the socio-economic problems affecting small-scale sugar cane farmers in three communities in the context of trade liberalization. Farmers' coping and adaptive responses to the effects of trade liberalization are a feature of Burrell's research and are treated in detail. The chapter provides insights into the role of small-scale sugar cane farmers in Jamaica's sugar industry and their experiences with trade liberalization and declining economic fortunes.

In Chap. 6, Mario Mighty discusses the impacts of globalization on the coffee industry in Jamaica. This chapter presents the results of a qualitative study of the major challenges coffee producers, processors, and exporters face within Jamaica. This in-depth exploration also highlights the ways in which stakeholders are responding to these challenges. Based on the findings of his study, the author makes recommendations on how to best secure the future of the local coffee industry. Although numerous studies have shown that those involved in the specialty coffee sector receive greater returns, especially coffee growers and others at the production end of the value chain, relatively little has been published on how participants maintain these gains once established. The author shows how the viability of coffee has declined, affecting the livelihoods of the many thousands of people involved in the industry. Determining factors include rising production costs, a slow economy, and the increased regularity of hurricanes, droughts, and disease over the past ten years that have combined to push the industry towards what some stakeholders regard as a crisis. The impact of the global recession in 2008 accelerated the decline in export earnings from US$22.3 million in 2010 to US$17.9 million in 2012. As uncertainty arose among

producers, production steadily declined. The chapter demonstrates how coffee farmers and exporters can benefit from globalization given the reputation of Jamaican coffee and some of the comparative advantages enjoyed in the international marketplace. This is important now with supplies and consumption of these specialty coffees approaching saturation point.

Climate Change and Food and Agriculture in the Caribbean

Part 3 of this volume presents research exploring the effects of climate change on agriculture and food in the Caribbean. Rhiney (2015, p. 14) writes that 'climate change presents enormous and unprecedented challenges for the Caribbean region'. Climate change has permeated the regional consciousness unlike any other phenomenon in history. Guyana, Suriname, and Belize are mainland states of the Caribbean but the region is otherwise a conglomerate of Small Island Developing States (SIDS). Climate change research and crop modelling indicate that climate change could have negative effects on food, agriculture, and nutrition in the Caribbean (Campbell 2011; Gamble 2009; Gamble et al. 2010; Nurse et al. 2014; Rhiney 2015). Already unpredictable atmospheric phenomena have caused intensified unseasonal droughts, heavy rains, and massive storms. These have led to billions of dollars of losses in the agricultural sector resulting in food shortages and increasing food prices (Campbell 2011). The prognosis is for more frequent and severe hurricanes, longer dry seasons and shorter wet seasons, rising temperatures, rise in sea level, which will impact fisheries and marine environments, and intense rains and flooding. These will all have adverse impacts on crops, livestock and poultry, and aquaculture. The changing climate and weather will also impact agricultural diseases and pests with implications for local food supply and nutrition.

Hutchinson et al. (2013) suggest that the potential impacts of climate change on agriculture may be positive or negative. A more tempered and nuanced outlook that highlights that some areas and regions will suffer more greatly than others has replaced the early climate models, which invariably predicted dire impacts on agriculture. The outlook for the tropics is very negative in places susceptible to sea-level rise and areas that depend on rain-fed agriculture (Hutchinson et al. 2013). In the

Caribbean, commercial export crops like bananas, sugar cane, and coffee benefit from modern irrigation systems but small-scale food farmers who grow domestic food crops that are so critical to food self-sufficiency and subsistence, import substitution, and overall food security and nutrition operate almost entirely under rain-fed conditions, while thousands of low-lying coastal communities are susceptible to sea-level rise. A lot of agriculture in the Caribbean occurs in coastal lowland areas, alluvial plains, and river valleys and flood plains, all areas that are susceptible to the potential and unpredictable impacts of climate change.

The Intergovernmental Panel on Climate Change (IPCC) has continuously noted that the characteristics of SIDS like those in the Caribbean make them especially vulnerable to the effects of climate change (IPCC 2007, 2012, 2013). The Caribbean is expected to be amongst the earliest and most severely impacted by climate change over the course of this century (Mimura et al. 2007; Nurse et al. 2014). The vulnerability of the region to a variable and changing climate is now well documented in the academic literature, especially within the context of Caribbean SIDS and their relatively high sensitivity and exposure to both present-day and future projected climate change impacts (see, for example, Hall et al. 2013; Gamble et al. 2010; Cambers 2009; McGregor et al. 2009; Mimura et al. 2007; Sahay 2005; Nurse et al. 2001).

The Caribbean's recent exposure to extreme climatic events including major hurricanes, drought, and floods has been attributed partly to climate change. Studies have shown that farmers are experiencing an increasing unpredictability of rainfall and unseasonal drought conditions (Campbell 2011; Gamble 2009; Gamble et al. 2010; McGregor et al. 2009; Selvaraju 2013). Farmers have observed that rainfall is occurring with less frequency but greater intensity, the latter often leading to damages to crops (Campbell et al. 2010; Gamble 2009). Agriculture in the Caribbean faces many constraints and climate change is expected to exacerbate these. The frequency of extreme weather in the form of tropical cyclones, droughts, and flood and the proliferation of agricultural diseases and pests are some of the factors that will likely reduce crop productivity, increase crop failure and agricultural losses, and pose major risks to regional food security and rural development.

Some countries in the region are seen to be more vulnerable than others to the effects of climate change (Nurse et al. 2014) due in part to the

varied geophysics of the region (Rhiney 2015). Jamaica, for example, has been numbered among the world's top 40 climate hotspots (Wilson Edmonds 2013). This suggests that Jamaica is likely to be one of the countries most affected by climate change partly because of its dependence on agriculture and tourism and its coastal infrastructure.

It is not just crop production that is expected to be affected by climate change in the Caribbean. Fisheries might be even more affected (see Baptiste's research in Chap. 10) and livestock will not be spared the direct and indirect effects. According to Norman Gibson from the Caribbean Agricultural Research and Development Institute, increased temperatures will cause stress to animals and adversely influence their ability to reproduce as well as produce milk and convert feed into meat. There is also the fact that pastures and forages will be affected and further decrease the quality of food available.

Food and agriculture is an important issue in the Caribbean. This topic permeates all aspects of life including economic livelihoods, food security, health, sociocultural life, and academia. Agriculture is an important industry and despite its declining contribution to GDP its significance in the Caribbean is well established in the academic literature and will be examined in some depth in this volume (Beckford and Campbell 2013; McGregor et al. 2009; Nicholson and Thomas 2014; Potter et al. 2004). Vergara et al. (2014) assert that agriculture plays a key role in economies of Latin America and the Caribbean. This is one of the aspects of Caribbean life that is most greatly impacted by globalization and climate change. The influence of globalization is already profound and widespread (Ahmed 2001; Chesney and Francis 2004; Jolly et al. 2008; Klak 1998; Robbins and Ferris 2003; Wilkinson 2004). The impact of climate change is still evolving but the projections are significant and ominous (Bueno et al. 2008; Hutchinson Jafar 2011; Hutchinson et al. 2013; JIS 2005; Maletta and Maletta 2011; Selvaraju 2013; Tandon 2012; Rivero Vega 2008; Vergara et al. 2014).

Rose-Ann Smith leads the discussion in Chap. 7 towards analysing the double impact of climate change and economic globalization on rural livelihoods as a valuable framework for understanding the vulnerability of rural households in northeastern St Vincent. The study provides a holistic understanding of the vulnerability of rural households, with recognition that livelihood vulnerability is a key driver of poverty within the communities. It assesses the vulnerability of rural livelihood to the double impact of environmental change and globalization, while recognizing the other

stresses faced by these households, which result in constant negotiations, choices, and decision-making. This multiple exposure creates a form of powerlessness amongst households, keeping them in a vicious cycle of vulnerability. At the core of this vulnerability is the *double exposure* (O'Brien and Leichenko 2000) from global economic and climatic stresses and shocks, which produces *winners and losers* (O'Brien and Leichenko 2003).

The results revealed that economic factors such as access to markets and price fluctuations in goods are key determinants of households' vulnerability. They prevent households from acquiring the necessary assets whether physical, technological, or human, which are necessary to improve and expand their livelihoods, and force them to make decisions that are geared towards survival rather than attaining a sustainable livelihood. Rural livelihoods are also highly sensitive to climate change and climatic variability. The discussion highlights how perceptions of climatic hazard might increase household vulnerability and how these rural communities, as a consequence of their remoteness and resource constraints, also show little elements of institutional support from the government or private institutions.

In Chap. 8, Clinton Beckford and Anthony Norman examine the issue of the availability of quality planting material to small-scale food farmers in the context of climate and weather. This chapter explores the impact of climate change on diseases and pests and the implications for the availability of high-quality planting materials for domestic food crops in the Caribbean, focusing on certain root and tuber crops. Based on qualitative research, the chapter examines the use of in vitro plant production and protected agriculture to make clean, disease-free planting material available to Caribbean small-scale food farmers. The chapter looks specifically at the potential of tissue-culture technology in the Caribbean for clean planting material, and at protected agriculture through greenhouse technologies, to enhance climate resilience and increase productivity. It has been argued that tissue culture combined with protected greenhouse farming holds the key to the adequate and reliable supply of high-quality potato seeds year round for farmers (Christiana Potato Growers Cooperative Association 2013). This has led to the growth of greenhouse farming in highland areas of some Caribbean islands, most notably Jamaica, and the establishment of in vitro plant production facilities in several countries in the region.

In Chap. 9, Ayesha Constable analyses farmers' perceptions of climate change in a rural farming community. This chapter explores the impact of

climate change on the livelihoods of farmers in the rural farming community of Sherwood Content, Trelawny, Jamaica. Using a mixed-methods approach to data collection, Constable examines awareness, perceptions, and adaptation to climate change. The aim is to secure an increased understanding of the situation of farmers in the climate change debate and how that influences decision-making. The findings show that even where farmers were aware of climate change, they had a very fatalistic outlook and generally demonstrated little or no concern regarding the impacts. Despite the limited concern about long-term impacts of climate change, farmers make efforts to adapt their practices to deal with the localized variations in conditions by applying local knowledge and diversifying their practices. The chapter reflects the experience of many rural communities in the Jamaica and possibly the wider Caribbean through the example of Sherwood Content. It is important that the value of rural farmer's experiences and indigenous knowledge be recognized as we move towards developing a comprehensive assessment of climate change vulnerability by first examining localized perceptions as determinants of adaptation.

This research contributes to the existing/burgeoning global research on climate change and smallholder farmers as well as the discourse on indigenous knowledge and climate change. In the local context, it is important as it looks at resource-poor farmers who are critical to domestic and export crop production and their efforts at using traditional knowledge to enhance their capacity to adapt to changing and variable climate.

In Chap. 10, April Karen Baptiste looks at knowledge and awareness of climate change among fisher folk in a coastal community. The chapter seeks to increase understanding of the levels of knowledge regarding climate change, perceptions related to the impacts of climate change on livelihoods, and current strategies that are being used to adjust to climate change among fishers. The case study of Old Harbour Bay, Jamaica, is used to articulate patterns within the broader Caribbean context. The study showed that for fishers there is a clear perceived relationship between climate change and threats to livelihoods (Baptiste 2013a). Specifically, fishers believe that climate change effects reduce fish stock and species diversity, increase the unpredictability in weather and tidal patterns which in turn threatens lives, and increase the probability of damage and loss of equipment related to increased storm events (Baptiste 2013b). The chapter explores the type of strategies that are being used to

adjust to the threats to livelihoods, how these strategies are being implemented, and whether these strategies improve the overall resilience of the community. The chapter provides understanding of how coastal communities or subsections thereof adjust to the impacts of climate change on their daily activities, especially in cases where livelihoods are threatened by these impacts. Baptiste shows how the exposure to climate-related hazards together with socio-economic factors and the adaptive capacity of the community all affect the overall vulnerability of Caribbean coastal communities (Taylor et al. 2012). This chapter adds to the growing body of literature that examines the disproportional impacts of climate change on SIDS (see, for example, Fry 2005; Gomes 2014; Mertz et al. 2009).

Part 4 offers a synthesis of the discussion throughout the book. It identifies key findings and their implications for the Caribbean. Chapter 11 in this part suggests some issues for future research that emerged from the discussions in the volume.

Gender, Agriculture and Food, Globalization, and Climate Change in the Caribbean

One of the key cross-cutting themes in this book is the role of gendered analysis in the Caribbean around the geographies of food and agriculture, globalization, and climate change.

> In many developing countries women are the backbone of the economy. In some places they even comprise the majority of smallholder farmers. There is a strong argument for focusing on investing in the women in agriculture-as farmers, fishers or workers in agro-processing and marketing. Yet women farmers do not have access to resources and this significantly limits their potential in enhancing productivity. They are often at a severe disadvantage when it comes to securing land tenure rights or owning land outright, owning livestock, accessing financial services, receiving the kind of extension services and resources that will grow her output. (Veveer 2011)
>
> Sustainable food security in the Caribbean requires the effective participation of women in food production. This is significant in the context of the dimensions of availability, access and nutritious foods and the implications for overall household food security. There are many commercial female farmers in the Caribbean but women are mainly involved in the marketing

> and distribution of food as they make up a disproportional amount of sellers in local produce markets across the region. The strategic participation of women in food production could be an effective strategy for addressing food security and nutrition at the household level. (Beckford and Campbell 2013, p. 79)

Yet it would have to be said that the potential of women to contribute to food and agriculture, rural development, and the climate change debate in the Caribbean has not been maximized. According to Tandon (2012, p. 1) research indicates that 'smallholder farmers in general and women farmers in particular are generally left out of emerging discussions and decisions about farming, food security and climate change'. Tandon identified several roles women played in local food systems in the Caribbean farm-level production, household consumption/allocation level, and societal/environmental level. To this we would add food marketing and distribution, which might be the area of their greatest contribution. Beckford and Campbell (2013) have highlighted the critical role of women in the local food trade and the vital importance of this role to food security and rural livelihood and development. We would argue too that research on agriculture and food, globalization, and climate change in the region has not included enough rigorous gender analysis. Tandon (2012) has described some efforts to assess the role of women in the context of food security and climate change in three Caribbean Community (CARICOM) countries, Antigua and Barbuda, Dominica, and Haiti. The author describes women's role in food production, agro-processing, and fisheries, and documents some of the persistent and emerging challenges they face. Tandon makes the point that despite their huge contribution to food and agriculture security, women farmers still face exclusion from participating in the food production endeavour on a level playing field with men.

The efforts in this volume to deal with this issue are therefore noteworthy. Clarke in Chap. 3 provides a refreshing gender-based analysis of the effects of globalization on female former sugar workers in St Kitts due to the closure of the three-and-a-half-century-old sugar industry. This study shows the differential effects of this immovable force on

women and men. Fingal-Robinson in Chap. 4 explores the fortunes of women banana farmers in the context of Fairtrade, and Beckford and Norman in Chap. 8 also include some gender analysis in assessing the potential of tissue culture and protected agriculture to increase the participation of women in food production. Beckford and Rhiney in Chap. 11 discuss the marginalization of women in discussions about globalization and climate change and the potential they have to significantly enhance food and nutrition security in the Caribbean.

Conclusion

The chapters in this book reflect the plurality and richness of research approaches and methodologies employed by Caribbean researchers. Some of the chapters are based on qualitative research. Qualitative perspectives employed include historical research, case studies, ethnographic research, and phenomenological research. Others are based on mixed-methodology research. The book also reflects the growing utilization of mixed-methods research among Caribbean geographers as a more holistic view that goes beyond numbers, becoming more favoured by researchers. A plethora of data collection procedures were employed, including surveys, questionnaires, interviews, focus groups, document analysis, and observations. It captures the essence of Caribbean geographical research and discourse and is a manifestation of the standard of geographical education and training available to scholars and researchers.

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2

From Plantations to Services: A Historical and Theoretical Assessment of the Transition from Agrarian to Service-Based Industries in the Caribbean

Kevon Rhiney

Overview

Despite many attempts by Caribbean governments to resuscitate the industry, agriculture has declined in economic importance over the years (Potter et al. 2004). The 1970s and 1980s saw the region-wide promotion of manufacturing industries epitomized by the preponderance of free trade zones and apparel export industries (Potter et al. 2004). In recent decades, service-based industries, particularly tourism, have dominated regional economies (Mullings 2004; Nurse 2007)—and as some would argue—at the expense of traditional industries such as agriculture (Pattullo 2005). The tourism industry has been criticized for its high import content and limited integration in local economies. This is ironic since, from the onset, the promotion of tourism development throughout the Caribbean was largely premised for its potential to stimulate other local industries (particularly agriculture) through its anticipated multiplier effects and market linkages.

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This chapter assesses this transition from agriculture to service-based industries in the Caribbean—paying keen attention to the growth of the tourism industry—and the implications for the viability of the regional agriculture sector over the medium to long term. It begins with a synopsis of regional post-War development policies and their concomitant impact on the performance of the agriculture sector up to the 1970s and then chronicles the ways free trade policies, commencing since the 1980s, effectively opened up regional economies to food imports of unprecedented proportions on the one hand, while eroding regional producers' preferential access to long-held overseas markets on the other. I then move on to illustrate how this wholesale adoption of trade liberalization policies by regional states occurred alongside a general shift away from agriculture towards the export of services across the Caribbean. The chapter argues that the promotion of mass tourism in particular, while not directly responsible for the decline in regional agriculture, has generally done little to stimulate growth in the sector. The chapter concludes by exploring some new and emerging avenues for resuscitating the regional agriculture sector, amidst recent trends in the global tourism industry.

Caribbean Post-War Development Strategies and Agriculture

Caribbean economies were founded on agriculture (Belisle 1983; Best 1968; Levitt 1991; Momsen 1998) and have been an integral part of the global food network from as early as the sixteenth century (Klak 1998). For centuries, Caribbean economies have been geared towards supplying primary agricultural commodities such as sugar and bananas to metropolitan markets in Europe.

After the Second World War, agriculture's status (the sugar industry in particular) in the Caribbean started to wane as regional governments sought to diversify their economies amidst changes in the international economy (Levitt 1991). During the interwar years and immediately after the War, it became increasingly evident that agriculture alone could not satisfy the region's need for achieving economic growth, employment generation, and overall improvement in living standards for its growing

population (Farrell 1980; Deere and Antrobus 1990; Potter et al. 2004). This saw the flourishing of a Caribbean scholarship led by the works of scholars such as Arthur Lewis, Lloyd Best, and George Beckford, focused on understanding and addressing the unique development challenges facing the region at the time. A major point of discussion was the future role of agriculture in regional development (Beckford 1972; Best 1968; cf. Lewis 1950).

The Lewis Model

W. Arthur Lewis (1950, 1954) proposed a dual-sector development model that became known as the 'industrialisation-by-invitation' model. The model recommended economic policies to stimulate industrialization through the facilitation of direct foreign investment, which was based on the rationale that agricultural production could not sustain Caribbean development (Blomstrom 1984; Lewis 1950, 1954, 1955). Lewis rejected the import substitution strategy arguing that the region's domestic markets were too small to support such an approach (Lewis 1950, 1954). Furthermore, the lack of local capital and knowledge presupposed the outsourcing of investment and expertise (Figueroa 1996; Lewis 1950; Rose 2002).

This thinking dominated post-War development policy up to the 1960s (Girvan 2005). There was an increasing shift away from agricultural exports towards non-agricultural activities such as bauxite mining, light manufacturing, and tourism (Bernal 1982; Girvan 1971b; Girvan and Jefferson 1976; Jefferson 1972; Levitt 1991). Development was to be achieved by shifting the surplus labour from the underperforming agricultural sectors to more competitive manufacturing industrial activities (Lewis 1950).

Lewis did not recommend abandoning agriculture (cf. Figueroa 1993, 1996; Rose 2002), but was critical of its economic competitiveness. Traditional agriculture in particular was too subsisting, with low productivity, low income generation, and considerable underemployment (Lewis 1950). Aside from it being a supplier of surplus labour to the more modern industrialized sector, Lewis (1950, 1954) theorized that growth in other industries would over time create increased demand for agricultural products, thus providing an impetus for furthering agricultural development in the islands.

The Lewis-inspired policies of the 1950s and 1960s did not transform the Caribbean economy. Factors such as the region's small size and limited resources played a part in this. So did regional governments' failure to precisely follow their prescribed strategies (Conway 1998; Farrell 1980; Figueroa 1993). In reality, there was little attention to the promotion of manufactured exports and the forging of linkages between different industries. This was exacerbated by the general neglect of agriculture (particularly domestic agriculture) in development policies across the region (Rose 2002; Timms 2008).

Instead of fostering a competitive regional manufacturing sector, two decades of policies based on the 'industrialisation-by-invitation' model produced mostly US-owned and operated production plants that were capital intensive, were highly reliant on the import of raw material and machinery, and offered few linkages to the domestic economy (Potter et al. 2004; Girvan 2005). Most of these firms had simply relocated their production facilities within the Caribbean to serve regional customers (Deere and Antrobus 1990).

The Plantation School

By the late 1960s, Lewis' industrialization model was being challenged by an emerging group of Caribbean scholars known collectively as the Plantation School due to their analysis of the plantation economy (Girvan 2005; Potter et al. 2004; Timms 2008). The theory of plantation economy consisted of a historical and structural analysis of the evolution of the plantation system in the Caribbean dating back to the early 1600s (Rose 2002). Caribbean economies were perceived as being 'plantation economies'—characterized by a colonial legacy of underdevelopment and being heavily reliant on and subservient to foreign capitalist interests (Best and Levitt 1975). Lewis was criticized for not accounting for the structural obstacles imposed on the Caribbean and their role in thwarting economic growth (Best and Levitt 1975; Levitt 1991). The Lewis-influenced post-War industrialization strategies that had dominated the Caribbean throughout most of the 1950s and 1960s were therefore blamed for the continued foreign dependence of the region (Girvan 1973).

Though influenced by Marxian and dependency theories, emphasis was placed on Caribbean-specific problems (Marshall 2002b). Obstacles such as the uneven distribution of land and wealth, the continued dominance of the plantations over the peasantry, the perpetual reliance on food and other commodity imports, and the continuously rigid racial and class divisions that were emblematic of many Caribbean societies were brought into sharper focus (cf. Beckford 1972; Demas 1978; Smith 1989).

The Plantation School highlighted the Caribbean's dependency on the rest of the world for things such as markets and supplies, transfers of income and capital, banking and financing services, and even technical skills and knowledge (Rose 2002; Girvan 2005). Even though the region had experienced some level of development in the mining and light manufacturing sectors throughout the 1950s and 1960s, it was still perceived as operating largely in a framework similar to that of the colonial era (Brewster 1973; Demas 1978). Proponents of the Plantation School pointed to regional states' heavy reliance on foreign capital, the high degree of foreign ownership of local industries, and the region's continued dependence on a single or limited number of export products. The region's political independence had not translated into any sort of economic sovereignty (McIntyre 1971). Regional economies were seen as still operating within the confines of the plantation economy. In short, the Caribbean's lack of development was a function of the region's historical and structural interconnectedness with Europe and other imperialist states (Marshall 2002b).

Lloyd Best (1968) and George Beckford (1972) formulated a structuralist explanation of the Caribbean dependency and underdevelopment. Both rejected natural variable explanations such as country size and resource endowment and focused instead on the historical role played by external institutions and agents in undermining regional economic development. Beckford (1972) emphasized the disconnect between the prevailing post-War industrial strategies and the local economies, the continued 'monocrop' nature of regional economies and the associated marginalization of domestic food production. Beckford and other proponents of the Plantation School promoted more self-sufficient development strategies for the Caribbean. In terms of agricultural, this meant improved productivity and greater consumption of locally grown food (Timms 2008).

Unlike Lewis, Beckford saw agriculture (particularly domestic small-scale agriculture) playing the lead role in regional development. According to Beckford (1972, p. 48), the continued focus on export agriculture and industry came at the expense of domestic agricultural production. Added to this was the prevalence of foreign ownership in industries like bauxite and oil manufacture and inequity in regional economies (Girvan 1971a, b; Persaud 1980; Wilson 1998). As for agriculture, the majority of arable lands were distributed unequally in favour of traditional exports, especially sugar (cf. Mintz 1985; Barker 1993), and efforts in agricultural research and development continued to ignore the viability of the domestic food crops sector. The latter, Beckford (1972, p. 216) explained, 'prevent[ed] a rational pattern of agricultural development'. To address these problems, Beckford recommended several policy measures including the nationalization of the manufacturing industries, increased state regulation, and extensive land reform (Thomas 1988; Potter et al. 2004).

Beckford proposed that in order for plantation economies to achieve sustained economic development, ways had to be found to induce development internally. The high economic openness characteristic of many developing countries was seen as a major obstacle to development and made some degree of protectionism necessary (Beckford 1972). In policy terms, this meant the promotion of import substitution strategies across the region (Timms 2008). Policies were also geared at extending research and extension services to domestic agriculture and increasing the availability of capital for agricultural diversification alongside increased government subsidies and tariff protection for domestic food producers. Linkages between the various economic sectors and industries were to be actively pursued by regional governments and maintained through a protective regulatory framework (Momsen 1998).

Neoliberalism and the 'Deprioritization' of Caribbean Agriculture

While strengthening regional productive capacity, adopting market protectionism, and achieving self-sufficiency were emphasized during the 1970s, the 1980s represented a period of intense market liberalization,

increased privatization, and state retrenchment in the Caribbean. Caribbean economies were confronted with severe economic pressures arising from inflated oil and food prices, stagnant or declining economic growth rates, and widening national debt burdens (Timms 2008). As a result, more and more Caribbean states entered into negotiations with the International Monetary Fund (IMF) and World Bank in an attempt to secure loans to help resuscitate their ailing economies. These loans came with rigid conditions that prescribed the application of neoliberal economic policies. This saw a reduction in state expenditures, removal of subsidies, and the progressive liberalization of domestic markets (Deere and Antrobus 1990; Klak 1998; Weis 2004).

The impact of structural adjustment on agriculture in the Caribbean (domestic agriculture in particular) was substantial as the decline in government spending and trade tariffs meant reduced support for local small farmers and increased competition from food imports (Timms 2008; Weis 2004). Research across the region demonstrates the extent to which the imposition of neoliberal development policies has impacted the productive capacity of regional states (Ahmed 2004; Barker and Beckford 2008; Clegg 2004; Handa and King 2003; Mullings 2004; Timms 2006; Weis 2004; Wiley 1998). Alongside this is a focus on the challenges confronting regional states' ability to diversify their economies and remain competitive within the context of economic globalization and neoliberalism (Mullings 2004; Pattullo 2005).

In most cases, attempts at achieving economic diversification have meant a shift towards the export of services, in particular, tourism (cf. Mullings 2004; Pattullo 2005; Wiley 1998)—often to the detriment of traditional industries such as agriculture (Pattullo 2005). For instance, Weis (2004) has shown how the liberalization of the Jamaican economy in the 1990s has threatened the viability of the island's agriculture sector and resulted in a flooding of cheap food imports in local markets. According to Weis (2004, p. 461), agriculture in Jamaica 'is on the brink of irrelevance, with serious social and economic consequences in the balance'. In sum, Weis (2004) highlights not only how neoliberal measures have favoured the expansion of the services sector at the expense of the agricultural industry but also the long-standing disconnect that exists between the two sectors (see, e.g., Belisle 1983; Momsen 1998).

Progressive market liberalization and free trade policies have had a twofold impact on Caribbean agriculture. Commencing since the late 1970s, regional governments have come under increasing pressure to liberalize their domestic markets to food imports. The removal of state support to local farmers and the liberalization of the food import regime have led to massive food importation (Ahmed 2004; Weis 2004). Later, progressive neoliberalism under the disguise of free trade policies handed down by the World Trade Organization (WTO) led to the removal of the region's preferential market access to Europe and a general lowering of world commodity prices. These have severely affected regional agricultural exports, particularly banana and sugar (Ahmed 2004; Blythman 2005; Clegg 2004; Momsen 2008; Potter et al. 2004).

Structural Reform and Rising Food Imports

Caribbean economies have experienced an influx of cheap food imports in recent years as the globalization process increasingly integrates consumer markets across the world (Weis 2004; Timms 2008). Agricultural development in many regional states is being thwarted by neoliberal economic policies that support trade liberalization at the expense of local economies. This process took place in two stages: First, the removal of state subsidies for local farmers resulted in an increase in both the cost of production and the market prices for local produce; and second, the liberalization of the local economy led to a drastic increase in the proportion of imported goods (Ahmed 2004). The result is that local small farmers are increasingly being squeezed out of their own domestic markets as they compete with more economically and technologically advanced countries and large transnational companies that are able to provide similar products at considerably lower prices (Weis 2004).

The present global market environment has seen a general shift from inter-product to intra-product trade (Hoogvelt 1997). Hence, there is now intense competition in commodity exports between producers from distant parts of the world in the same product lines. As Hoogvelt (1997, p. 123) pointed out more than ten years ago, 'even goods and services that are produced and exchanged within the national domestic sphere

have to meet standards of quality and costs of production that are set globally'.

As such, the global market principle—which is primarily the global standardization of price, quality, and efficiency—is increasingly imposing itself on the domestic supply of consumer goods, capital, and even labour. Implicit is the notion that global competition has intensified as consumer markets become increasingly integrated into global commodity chains, thus producing uneven geographies between resource-poor producers in the Global South and their competitors in the developed North (Bonanno et al. 1994; Wiley 1998; Hughes 2000; Hale and Shaw 2001).

The Caribbean, in general, provides a good example of how the growing integration of global commodity chains has helped displaced local industries in small developing economies. This is particularly evident with food imports. This was clearly manifested in the recent global food crisis where the international food price index increased by approximately 82 percent between March 2006 and March 2008 (World Bank 2008, as cited in Timms 2008, p. 110). This raises questions about the fate of the Caribbean in the face of dependence on volatile food imports (Jessop 2009; Timms 2008).

The Decline in Traditional Agricultural Exports

Apart from the significant influx of food imports, Caribbean economies have had to contend with contracting world commodity markets and declining terms of trade for their few traditional exports. Caribbean vulnerability to globalization in general and to changes in the global trading environment was exposed to the WTO rulings on the European Union's banana regime and its associated impact on the small economies of the Windward Islands. This has led to the phasing out of preferential European market access for Commonwealth Caribbean banana producers in response to the WTO-imposed sanction in 2002 emerging from the dispute largely between the EU and several Latin American countries, who were supported by the USA acting on behalf of its banana companies (Ahmed 2004; Clegg 2004; Lewis 2000). This resulted in banana

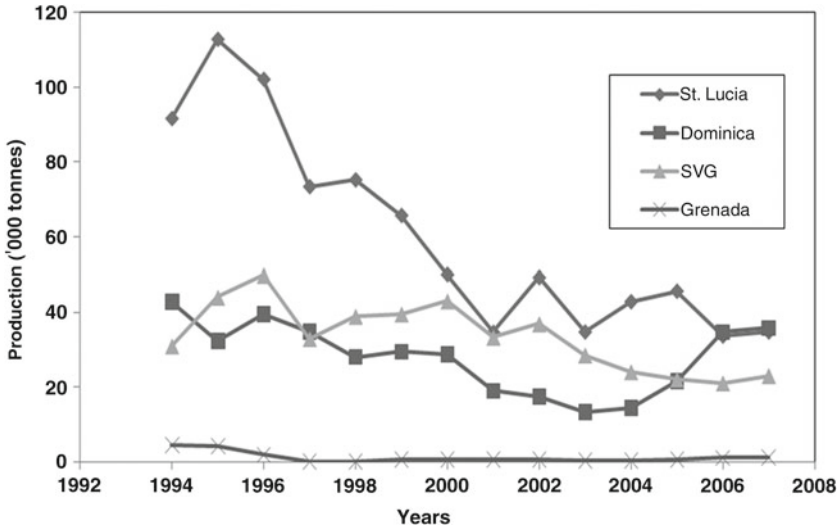

Fig. 2.1 Banana productions for the Windward Islands, 1994–2007 (Source: FAO database)

production declining from rates as high as 92 percent of total exports in Dominica and 87 percent in St Lucia in 1991 to 24 percent and 48 percent, respectively, in 1999 (Ahmed 2004; Bernal 2000).

An assessment of the overall performance of the regional banana industry will show a general decline in both volume traded (Fig. 2.1) and export earnings since the mid-1990s. St Lucia, for example, has seen a precipitous decline in the volume of bananas traded from 103,700 tonnes with export earnings valued at some US$56 million in 1995 to 65,200 tonnes and US$32.2 million in 1999—within less than five years, the volume of bananas traded declined by some 37 percent and export earnings declined by approximately 43 percent (Ahmed 2004).

A number of scholars have pointed to the severe social, economical, and political implications that may arise from the complete abandonment of the EU Banana Protocol, particularly in the highly banana-dependent economies of the Windward Islands (Ahmed 2004; Clegg 2004; Lewis 2000). Despite the downturn in market prices witnessed since the mid-1990s, the banana industry still remains an integral part of the small economies of the Windward Islands (Fingal 2008). As recently as 2004,

banana production accounted for approximately one-half of all exports, one-third of total employment, and more than 10 percent of GDP in the Windward Islands (Potter et al. 2004, p. 120). In St Lucia, banana production alone accounted for 44 percent of total domestic exports and as much as 95 percent of total agricultural exports in 2004 (Annual Agricultural Digest, St Lucia 2004, online). This triggered social unrest and economic mayhem manifested in St Lucia during the mid-1990s where declining banana prices triggered a series of riots by banana farmers, resulting in two farmers being shot dead by members of the security forces (Ellis 2005).

Similarly, sugar production in the Caribbean has seen a drastic decline in output and foreign exchange earnings (Richardson-Ngwenya 2010). In 1961, Caribbean sugar cane accounted for 20 percent of world production but has since declined to less than 4 percent (Potter et al. 2004, p. 115). In addition to a region-wide decline in land cultivation—with the exception of Belize—a number of Caribbean islands have either stopped exporting sugar or shifted attention to other forms of commodities (Potter et al. 2004). St Lucia, for instance, stopped exporting sugar as early as the 1960s (ECLAC database; Potter et al. 2004) while Antigua and Barbuda followed suit since the 1990s (Table 2.1). In 2005, the 357-year-old sugar industry in St Kitts and Nevis was also dismantled.

Table 2.1 Sugar production ('000 tons) for select Caribbean states, 1981–2007

	1981	1991	2001	2003	2005	2006	2007
Antigua and Barbuda	2.8	…	…	…	…	…	…
Barbados	966.0	587.0	520.0	364.6	350.0	410.0	410.0
Belize	985.7	1131.9	1150.0	1093.0	927.0	1180.0	1250
Jamaica	2492.4	2732.0	2400.0	1775.7	1470.0	1950.0	2000.0
Cuba	66,679	79,700	35,000	22,100	11600	11,060	11,100
Trinidad and Tobago	1290.0	1301.0	1500.0	873.9	420.0	420.0	475.0
St Kitts and Nevis	337.5	200.0	188.4	193.0	100.0	…	…
Grenada	9.3	6.5	6.8	6.8	6.8	7.2	7.2

Sources: Compiled from data from ECLAC Statistical Yearbook (2009) and Richardson-Ngwenya (2010)

The majority of islands, however, have continued to struggle to keep the industry afloat (Table 2.1). Jamaica in particular has strived for years to revive the sugar industry, with the most famous efforts perhaps being the introduction of the failed sugar cooperatives during the 1970s (Potter et al. 2004; Feuer 1984). Successive governments have shown a reluctance to abandon this industry (Davies 2000).

Presently, Caribbean banana and sugar exports are being kept afloat by a small and complex set of multilateral trading arrangements known as Fairtrade. Fairtrade marketing arrangements are especially noted for sustaining the Windward Islands' banana industry since its introduction in the late 1990s (Momsen 2008; Myers 2004; Shreck 2002; Torgerson 2009). In Chap. 4, Fingal-Robinson provides a discussion of how Fairtrade has helped to build resilience in the St Lucian banana industry. There are now 12 Fairtrade groups in St Lucia comprising more than 1300 small banana growers, representing over 90 percent of the banana farmers on the island (Fingal 2008, p. 120). By the end of 2006, all Windward Islands' bananas were traded under the Fairtrade label (Momsen 2008).

For now, the future seems bleak for Caribbean agriculture. Progressive market liberalization of regional economies, increasing competition from food imports, and the rapid erosion of the region's preferential access to traditional export markets have all made it extremely difficult for Caribbean producers to survive let alone thrive. One clear option that is seemingly available for Caribbean states is to diversify their economies; moving away from agriculture and promoting other forms of industries, particularly services. At present, services account for over one-half of total exports from Caribbean Community (CARICOM)—the largest part of this is contributed by the travel and tourism industry (CARICOM Secretariat website 2013).

The Caribbean's Transition Towards a Service-Based Economy

Structural adjustment and trade liberalization policies have not only transformed Caribbean states into consumption-based economies (Momsen 1998), but also led to their increasing reliance upon services

than any other productive sector (Mullings 2004). Most of these service activities (for instance offshore calling centres, offshore data processing, and offshore financing) are export oriented and geared primarily towards generating well-needed foreign exchange earnings. The problem is that this shift towards service-based exports in the Caribbean has occurred alongside a progressive decline in traditional industries—the regional agricultural sector in particular. The promotion of services, while not directly responsible for this decline, is seen more as a replacement rather than a complement to these fading industries.

It is tourism, however, that has been prioritized the most by regional governments. Services now account for a significant share of regional exports—the majority of which is contributed by the tourism industry (Mullings 2004; Tsikata et al. 2009). The concomitant decline of the agricultural sector and the rise of tourism in the Caribbean have been noted by several scholars (Momsen 1998; Conway 2004; Timms 2006; Pattullo 2005; Dodman and Rhiney 2008; Rhiney 2008, 2009). According to Wood (2004, p. 152):

> The imperatives of neoliberal globalization are at once dismantling the remaining props of the islands' agricultural export industries and at the same time increasing their reliance on that most global of industries, tourism.

Many Caribbean states have now turned to tourism as a cornerstone for economic growth (Caribbean Tourism Organization 2008; Pattullo 2005). The magnitude of this dependence on tourism by regional states is noted to be amongst the highest in the world (Mather and Todd 1993; Duval 2004; Duval and Wilkinson 2004; Karagiannis and Salvaris 2005). As Mather and Todd (1993, p. 11) duly noted:

> There is probably no other region in the world in which tourism as a source of income, employment, hard currency earnings and economic growth has greater importance than in the Caribbean.

Tourism only became a viable development strategy in the Caribbean as recently as the 1960s when most island states had either gained independence or were about to (Pulsipher and Holderfield 2006). This shift in

focus was fuelled by the need to move away from the 'extractive plantation economy' that had characterized the region for so long, as well as to find viable alternatives that were conducive with the available post-War development opportunities and the new world order (Duval and Wilkinson 2004).

Tourism was also promoted as a viable way to earn hard foreign currency, to create much needed employment opportunities, and to diversify the region's monocrop economies (Pulsipher and Holderfield 2006). Consequently, many of the region's governments started to provide 'generous financial incentives' for tourism expansion in their respective countries (Duval and Wilkinson 2004; Momsen 1998). This led to a large inflow of foreign investment in setting up tourism facilities, catering mostly for the mass tourism market (Taylor 1993).

The improvements in transport technology during the aftermath of the Second World War aided in the expansion of the region's tourism industry (Momsen 1998). Prior to this, tourism growth was relatively moderate and confined mostly to Cuba and the Bahamas, owing of course to their close proximity to the USA. Visitor arrivals to the Caribbean increased from 45,100 in 1919 to 131,400 in 1929. By 1959, visitor arrivals to the region had reached 1.5 million (Momsen 1998, p. 123).

The region witnessed a steady increase in visitor arrivals and expenditures up to the early 1970s where the industry 'stalled' due to a worldwide recession triggered by the 1973 oil crisis and the nationalist movements that had spread throughout the region during the same time, which had negative repercussions in the generating markets (Bell 1993, p. 222). In 1973 visitor numbers totalled 5.4 million. By the latter part of the 1970s, the industry was revitalized due to an improved North American economy, better marketing and promotion strategies, and the opening of new markets in Europe (Bell 1993; Duval and Wilkinson 2004). Between 1980 and 1990, the number of tourists visiting the Caribbean increased by approximately 86 percent (Table 2.2).

Tourism has come to dominate the Caribbean economy over a relatively short time span (Duval and Wilkinson 2004; Phillips and Graham 2007; Mullings 2004). Between 1970 and 2000, visitor arrivals to the Caribbean increased almost fivefold, from approximately 4 million to 20 million tourists (Caribbean Tourism Organization 2000, p. 21). On a similar note, visitor expenditure increased from approximately US$3.5

Table 2.2 Caribbean tourist arrivals, 1970–2014

Year	Tourist arrivals (millions)	Year	Tourist arrivals (millions)	Years	Tourist arrivals (millions)
1970	4.2	1992	14.0	2004	21.8
1972	5.1	1993	15.0	2005	22.2
1974	5.7	1994	15.7	2006	22.2
1976	5.8	1995	16.2	2007	22.7
1978	6.6	1996	16.7	2008	22.9
1980	6.9	1997	17.9	2009	22.1
1982	6.9	1998	18.3	2010	22.8
1984	7.6	1999	19.1	2011	23.4
1986	9.6	2000	20.3	2012	24.6
1988	11.3	2001	19.5	2013	25.0
1990	12.8	2002	19.0	2014	26.3
1991	13.0	2003	20.4		

Source: Caribbean Tourism Organization, *Caribbean Tourism Statistical Report* (various issues) and database
Notes: Figures include data from Cancun and Cozumel

billion in 1980 to US$20 million in 2000—an increase of approximately 470 percent (Caribbean Tourism Organization 2000). Duval (2004, p. 3) duly points out that the 'significance of tourism in the Caribbean effectively mirrors, and even trumps, the importance and scope of tourism worldwide'.

Indeed, while international visitor arrivals increased by an average of 4.3 percent between 1990 and 2000, average annual growth in arrivals to the Caribbean increased by 4.7 percent (Caribbean Tourism Organization 2002, cited in Duval 2004, p. 4). Total visitor expenditure for the Caribbean more than doubled between 1990 and 2004 from a total of US$9.8 billion to US$21.6 billion (Caribbean Tourism Organization 2005). In 2014, the Caribbean hosted approximately 50.3 million visitors (Caribbean Tourism Organization 2014).

But what does all this mean for Caribbean economic development? What role does the new service economy play? And what are the implications for the agricultural sector? These questions are explored next in the context of agritourism. Although agritourism is largely understood as constituting a form of niche tourism that involves touring agricultural areas to see farms and participate in farm activities, the term is being

broadened here to also include the production, marketing, and sale of farm-based products for tourist consumption. Amidst the phenomenal growth seen in Caribbean tourism in recent decades, agritourism is perhaps one of the most promising avenues for diversifying and expanding the region's agriculture sector.

Potential Opportunities for Agritourism Under a New Service Economy

Despite the phenomenal growth of tourism in the Caribbean, the extent and scope of its net contribution to regional economies has been the subject of intense scrutiny for some time now (see, e.g., Marshall 2002a; Mullings 2004; Rhiney 2009; Webb 1997). Studies have pointed to the fact that the remarkable growth recorded for the regional tourism industry over the past two decades, for instance, has occurred alongside high rates of foreign exchange leakages and limited inter-sectoral linkages—estimates of foreign exchange leakages from the sector are as high as 70 percent in some cases (Pattullo 2005; Phillips and Graham 2007).

Ironically, the idea of linking tourists' demand for food with domestic food production is nothing new to the Caribbean. From the onset, tourism development was expected to stimulate a particular response from farmers—resulting in the expansion and diversification of local crop production to meet tourists' demand for 'exotic' tropical fruits and vegetables (cf. Zinder and Associates 1969). However, up to the early 1990s, studies revealed that these expectations had not materialized and that linkages between tourism and agriculture were only weakly developed (see, e.g., Belisle 1983; Cazes 1972; Charles and Marshall 1991; Gooding 1971; Momsen 1972, 1973). It is therefore evident that linking these two productive sectors will require deliberate and strategic support to create sustainable economic opportunities that can benefit local communities in a meaningful way. There are essentially two broad ways to achieve this goal. The first entails finding innovative and sustainable ways of shifting tourist establishments' food sourcing to local farmers. The second involves capitalizing on the region's unique range of natural and cultural assets to enhance the tourist experience through activities such as farm-based

tours and the development of alternative forms of tourism, for example, food festivals and ecotourism.

The challenges of shifting hotel food sourcing to local producers are considerable, yet if it can be done in a way that meets the tourism industry's demand for volume, quality, consistency, and safety, then this could bring immense benefits to regional economies. However, the likelihood of forging viable links between these two productive sectors will depend heavily on the size, scope, and competence of the local farming industry as well as the type of tourism development in question (e.g., mass tourism, high-end niche tourism, community tourism, ecotourism, and health tourism). Enhancements in local crop production systems through, such things as the transfer of appropriate technologies and improved extension and marketing support, can play a critical role in improving the competitiveness of regional agriculture. Studies have also shown, for example, that the mass tourism model is often associated with high foreign exchange leakage rates due to the strong emphasis placed on minimizing operational costs (Pattullo 2005; Torres 2002). In the case of the Caribbean, mass tourism destinations like the Bahamas and Jamaica usually have a high food import content. One of the main reasons for this relates to mass tourism establishments' need to source large volumes of produce at the lowest possible costs (Rhiney 2011; Torres 2002). The promotion of other forms of tourism such as community tourism or ecotourism might provide better opportunities for stimulating the local farming sector due to the greater interface with local communities and the smaller emphasis on minimizing operational costs. The small rural community of Treasure Beach situated along Jamaica's southwestern coast provides a good example of how low-density tourism development can benefit local farming communities in a substantial way (Rhiney 2011). This is in stark contrast to the larger scale mass resort enclaves typical of the island's famed northern coast (Rhiney 2011).

There are also numerous niche market opportunities that regional farmers could tap into based on current market trends in the global tourism industry. Shifts in global consumer tastes, preferences, and attitudes towards food, leisure, and travel are said to be generating a desire for regionally distinctive experiences, including a growing demand for regional cuisines based on locally produced foods (Torres and Momsen

2011). The provision of specialty food items targeted at niche market consumers seeking high-quality, healthy, environmentally responsible, and equitably produced foods has been shown to have positive spinoffs for local agritourism development in several regions around the world (Cox et al. 2011; Rilla 2011). For the Caribbean, greater promotion of farm- and food-based attractions could provide significant economic benefits to local farming communities. Farm stay bed and breakfasts, farm tours, food festivals, and even the staging of farmers markets in resort towns can provide immense opportunities for local farmers and rural households to augment their income. A good example of this is the weekend Oistins Fish Fry, which has become one of the most popular events among tourists visiting Barbados (Richardson-Ngwenya and Momsen 2011). These niche markets also present clear opportunities for empowering rural women, especially through the development of cottage industries targeted at providing specialty items to the sector. Elsewhere, Hashimoto and Telfer (2011) have shown how the provision of homemade food products and crafts to farmers' markets has generated new streams of income for female farmers in rural Japan. This is not surprising as many agritourism initiatives around the world rely heavily on female labour inputs and entrepreneurship (Torres and Momsen 2011).

Branding, certification, and labelling of local food items also present a significant opportunity for local agribusiness operators to add value to their products. For instance, organic labelling and certification offer tremendous opportunities to add value to existing products, expand reach in existing markets, or maintain market share in competitive environments through product differentiation. A recent study into Dominica's potential as an 'Organic Island' revealed that local consumers were generally willing to pay more for organic and locally grown produce (Boys et al. 2014). Unfortunately, other Caribbean governments have not promoted organic agriculture with the same degree of enthusiasm as Dominica, despite mounting private sector and civil society interests in the area. Initiatives like these are suited for the Caribbean as they are driven more by product quality and uniqueness rather than economies of scale. Tied to this is the growing requirement from regional and international consumers for increased transparency and information about the food they consume. This certainly has implications for the region's tourism sector

since the industry is also subject to increasing regulatory demands for food safety information and effective trace-back systems. This will certainly have serious implications for where and how the region's hotels source their food going forward. As the tourism sector develops, it is more than likely that farmers and local agribusiness operators wishing to supply this market will have to comply with increasingly strict hygiene, food safety, and quality standards.

At the institutional level, there have been few deliberate and sustained attempts by regional governments to formulate policies or programmes aimed at promoting greater synergies between tourism and agriculture in the Caribbean. As such, there is a clear need to develop new policies that provide incentives for buyers in the tourism industry to purchase more local foods. A common challenge to increasing inter-sectoral trade linkages between the two sectors is usually the mismatch between supply and demand and the lack of intermediary support structures that enable buyers and suppliers to come together. The establishment of the Tourism Linkages Hub in Jamaica, an initiative of the Ministry of Tourism and Entertainment, provides one of the few examples in the region where government is playing an active role in aligning the two sectors. The initiative is aimed at positioning and assisting the tourism sector to increase its demand for and consumption of goods and services that can be competitively sourced in Jamaica, while strengthening the linkages between the industry and other sectors, such as manufacturing, agriculture, and the creative industries. One of the highlights of the Tourism Linkages Hub initiative is the monthly staging of the 'Agro-Tourism Farmers' Market' in the resort town of Negril. The Agro-Tourism Farmers' Market provides a great opportunity to expose tourists to a range of fresh and processed local agricultural produce that could potentially serve as a major economic boost for local farmers and manufacturers.

Concluding Remarks

This chapter has shown how increasingly important the export of services has become for regional economic development. This shift towards the trading of services in the Caribbean has occurred alongside a progressive

decline in traditional production-based industries, particularly agriculture. This has raised questions among Caribbean scholars and policymakers alike concerning the future of agriculture in the region and more specifically, the particular avenues available to resuscitate the sector, including identifying potential niche markets such as agritourism (Conway 2004; Jessop 2009; Rhiney 2008, 2009, 2011; Timms 2006). For the services sector, the questions relate to finding ways of improving the region's competitiveness and net returns (Mullings 2004). The tourism industry in particular has been criticized for its high import content and limited integration in local economies (cf. Dodman and Rhiney 2008; Hayle 2005; Pattullo 2005).

Of particular importance is the multi-scalarity of the current challenges facing the region. Mullings (2004), for instance, has pointed out how the limits to regional development can be found at various scales. While many of these limitations result from locally based and historically contingent factors, they also result from a number of new and emerging processes that are increasingly played out at scales above the nation state (Agnew and Corbridge 1995; Giddens 2000; Thomas 2000; Mullings 2004). Even global climate change will play an increasingly crucial role in determining regional development outcomes in the near future (as discussed in several chapters in this volume). This also has clear implications for agritourism since both sectors (tourism and agriculture) are highly dependent on weather and climate.

For agriculture-tourism studies this implies a rethinking of the traditional methods of enquiry to incorporate extra-local factors and processes in our analysis. Thus, in an increasingly global trading environment that promotes the free flow of goods and services, the ability of local farmers to forge viable and sustained links with the tourism industry is increasingly conditioned by exogenously determined rules of trade the majority of which are dictated by powerful transnational financial institutions like the WTO and the IMF. Likewise, increased exposure to extreme climate events such as hurricanes and droughts will likely have severe negative consequences for both the tourism and agriculture industries. At the same time, these challenges are also presenting promising opportunities for both sectors through changes in global food consumption patterns and attitudes towards the environment.

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Part II

Global Change and Food and Agriculture

3

Securing the Female Future and Reframing Livelihoods in Post-Sugar St Kitts

Joyelle Clarke

Overview

Promoting rural non-farm income opportunities for women is a major challenge facing Caribbean Small Island Developing States. For the island of St Kitts, the closure of its Sugar Manufacturing Cooperation in 2005 presented a major challenge for employment and diversification of a 357-year-old sugar-led economy. It also highlighted the comparative vulnerability of rural female former sugar workers who failed to secure alternative livelihoods in part because of their limited education and skills. The new emerging agricultural sector failed to attract the mass of former sugar workers mostly due to their unwillingness to be self-employed.

This chapter evaluates the role of land assets and the value of farming as a livelihood strategy for poor rural women in the immediate post-sugar period through a series of surveys, focus group discussions with former sugar workers, and expert interviews. Agriculture's contribution

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to a reduction of socio-economic vulnerability is examined to understand feminization of vulnerability and poverty in sugar production in St Kitts. The chapter also provides a discussion on the main findings relating to land, gender, and rural livelihoods, demonstrating the need for a revised national farming policy and the need for rural economic transformation and sustainable livelihood transition by gender-sensitive resource distribution, use of household as a productive asset, and the transformation and repurposing of existing assets.

Introduction

The closure of the state-owned St Kitts Sugar Manufacturing Cooperation (SSMC) in 2005 was a strategic choice by the Government of St Kitts and Nevis in response to losses in production, increasing indebtedness to the local banking system, and global changes in preferential market access (MTES 2003). This effectively signalled the collapse of the centuries-old sugar industry in one of the first sugar colonies in the Caribbean. The collapse of the sugar industry resulted in major economic shifts nationally for the country, and locally for individual livelihoods. At the national scale, the island rapidly transitioned to a service-based economy dominated by tourism and agricultural diversification with income generation as a major objective. Locally, the end of sugar production had major livelihood-based reverberations for the sugar workers who were made redundant by the closure of SSMC. While all former workers were affected by the closure, females were disproportionately impacted. Government attempts to rehabilitate the workers and implement livelihood transition did not solve the challenges faced by female former sugar workers (FFSW).

The FFSW, in particular those of the sugar belt region (rural parishes producing the greatest percentage of sugar cane per acre and per rural livelihood) in St Kitts (see Fig. 3.1), still bear the scars of sugar livelihoods lost in 2005. Manifestations of this include failed coping strategies, a protracted period of dependence on government assistance, as well as poor alternative employment transition rates. Limited successes in government-sponsored re-training programmes for women further heightened the severity of vulnerability for FFSW versus that of male former sugar workers.

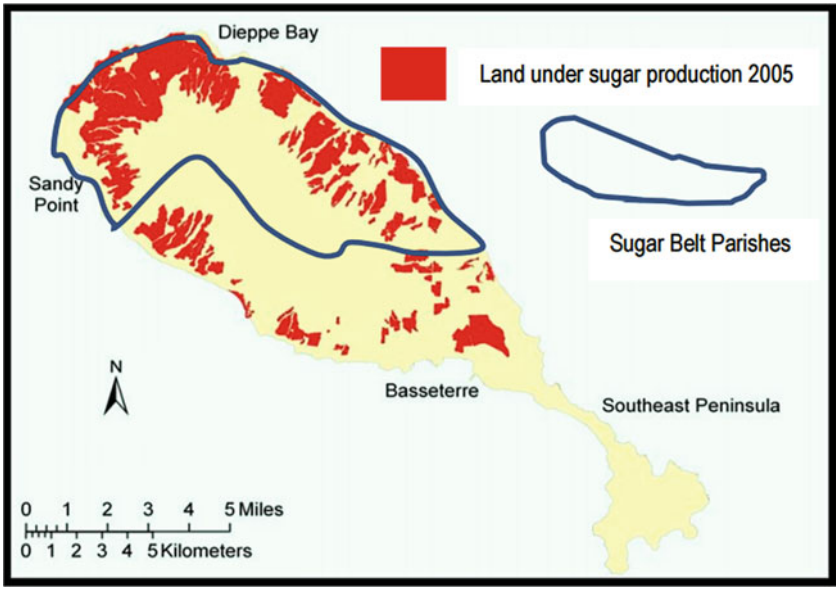

Fig. 3.1 Sugar belt region of St Kitts

These distinct challenges are further heightened by the socio-economic realities of female-headed households and their dependents. Moreover, the historic patterns of female vulnerability in the sugar industry and the feminization of poverty are derivatives of enslaved sugar production, which today are manifested in the distinct hardships faced by the FFSW in charting sustainable courses for alternative non-sugar livelihoods and income generation.

From the first days of European colonization, sugar defined the landscape, the economy, and the culture of St Kitts and impacted the livelihoods of almost every Kittitian. Its discontinuation affected the economy and people's lives and livelihoods. This chapter provides a trajectory of sugar in St Kitts and Nevis, tying the economy and female lives together. It revisits historic sugar production and the subaltern status of female workers of the 1800s, highlights the difficulties of earning a living from the pittance of sugar wages, and shows how modern approaches to sustainable female livelihood research require unique configurations that take into account their history and their current realities.

The chapter advocates the reframing of the idea of resilience and livelihoods by tackling its conceptual appreciation for poverty alleviation, the economic approaches to female resilience, and government-based policy and planning objectives in an attempt to secure the female future in post-sugar St Kitts. It discusses the problem of female vulnerability and poverty in the sugar industry within the framework of feminization of poverty in sugar. An argument is made for a new approach to poverty reduction, which moves beyond social protection sustainability initiatives and considerations of resilience. It is further argued that resilience itself would need a major restructured approach to its applicability in the Kittitian context.

Sugar, Debt, and the Economy

Mimura et al. (2007) explain that globalization may be nothing new to St Kitts given its colonial history. However, rapid change from the growth in internationalization is forcing small islands to deal with new forms of extraterritorial economic networks. The impacts have been overwhelming for St Kitts (Consultants 2001). The impacts of trade liberalization were first felt in St Kitts from the early 1980s, but the sugar industry in the Caribbean had been struggling to compete on the international stage for most of the second half of the twentieth century (OECS 2005).

The 2005 closure of the sugar industry in St Kitts and Nevis was a result of the competitive mismatch between internationally competitive, large sugar producers and the ailing sugar industry in a small island state. As Pattullo (1996) explains, Caribbean agriculture has long been characterized by one-crop dependency based on the monoculture production of sugar or bananas destined for Europe. This strong colonial legacy left many Caribbean small-island economies heavily reliant on preferential access to markets (IMF 2000). Further Klak et al. (2011) demonstrated how Caribbean small-island economies, highly dependent on a single export crop for foreign exchange and for people's livelihoods, are continuously exposed by the impacts of trade liberalization. Preferential market arrangements with Europe were significant in keeping the St Kitts sugar industry competitive as world sugar prices declined (MTES 2003; Adaptation Strategy Report 2006). However, by the dawn of the

twenty-first century, new European Union (EU)/African, Caribbean, and Pacific (ACP) trade rulings saw the gradual loss of preferential market access for Caribbean producers (Ahmed 2004), opening them up to competition from other, much larger international sugar producers whose economies of scale and financial backing dwarfed the capacity of regional sugar industries (ECLAC 2000). The reform of the EU sugar regime would have inevitably resulted in rising losses for the SSMC (GSKN 2005) at a time when sugar contributed an estimated 4 percent to St Kitts' gross domestic product.

Methodology for Female Livelihoods: Past and Present

It has been argued that women in general, or specific groups of marginalized and intersectionally oppressed women, can be considered as bearers of a privileged access to potentially transformative insight into the existing hegemonic gender orders (Lykke 2010). The feminist approach to data collection is predicated on the use of observance of codes, reflections and reflexivity as well as participation, and constructing knowledge with women from their lived experience. This approach stems from the feminist theory of 'privileged knowing'. McDowell (1997, p. 382) submits that

> doing feminist geography means looking at the actions and meaning of gendered people, at their histories, personalities and biographies, at the meaning of places to them at the different ways in which spaces are gendered and how this affects people's understandings of themselves as women or men.

Wolfe (1996, p. 4) goes further in suggesting that 'feminist scholars oriented toward qualitative field work in particular, often have encouraged relationships between the researcher and the researched that defy the tenets of positivism and objectivity'. The data collection here attempted as far as possible to remain true to some version of a 'feminist way' of collecting information, with inclusion of females in the entire process, drawing heavily on their

livelihood experiences and stories as the 'wealth of knowledge'. The strategies that adopted a gendered approach include the focus group discussions, participant observation activities, and livelihood trajectories. Following this argument the nature and presentation of the research has been constructed by the relationship between the researcher and the female participants. Some aspects of feminist theory advance the indistinguishable nature of the researched and researcher with a lack of hierarchy (Hammersley 1992). However, our relationship needed to interchange easily along a continuum from blurred to distinct demarcations of roles. The women were more often than not responsible for setting up the meetings, inviting peers, and leading the discussions. They made suggestions on what were the important aspects of their livelihood trajectories that should be noted.

Complementing the participatory data collection were expert interviews. The interviews were done on a referral system with the female sugar workers providing the first level of referrals. An island-wide survey was conducted with a confidence level of 95 percent covering over 285 households, including female-headed households and those headed by the FFSW. Survey data collected was used mostly for creating livelihood asset and vulnerability scores. The survey also provided data for creating socio-economic profiles on sugar workers and on the general population.

Feminization of Poverty in Historic Sugar Production

The vulnerabilities faced by the FFSW could be related to the roles of women during and after slavery, and the increased numbers of women working as field slaves during slavery and the colonial era and consequently as field labourers in the twenty-first century. Customarily, skilled male workers did manufacturing; most clerical work was done by skilled, educated female workers; and the bulk of the cane field work was done by the unskilled, uneducated women. A profile of cane field workers suggests that up to 1995, 33.5 percent of the field workers were women with an average age of 39 years (SABAS 1999). 'Patriarchal' descriptions created during colonial sugar production have placed women at the bottom of most things relating to social, economic, and gender matters compared to men. Shepherd

(1999, p. 90) explains that the 'social divisions of society (based on race and colour, class and gender, and access to education and training) assigned black women to the low end of the socioeconomic ladder'. The Economic Commission for Latin America and the Caribbean (ECLAC) (2002) adds that in 2005, 270 women and 213 men were employed in field operations, with four in every five women in the industry employed in field operations.

At the average age of 39 for those women who left the sugar industry (SABAS 1999), and having spent on average 13 years in the industry, transitioning to other occupations was daunting. The women's gravitation to menial replacement jobs, such as cleaning drains, was misunderstood by persons who did not fully appreciate the burden, both psychologically and socially, that the end of the sugar era placed on these women. They were conforming to the definitions attributed to them based on subordinate gender stereotypes. Ellis (2000) explains that this subjective construction of themselves relates directly to lowered expectations of them by everyone else.

The constants of female life and status were produced during slavery, defined during post-emancipation period, and perfected by colonial capitalist requirements. These elements created the gendered legacies of colonialism. This unfortunate status quo is manifested through their unwillingness and/or inability to transition to new livelihoods outside of sugar. Their lives necessitate discussion of the importance of a historical feminist livelihood research to demonstrate the overwhelming influence of sugar on poverty and vulnerability. The following section provides a synopsis of the statistical data, which leads to the general argument that sustainable livelihoods for females, despite their colonial past, is not impossible given the wide array of assets they currently possess. The challenge lies in transforming the assets into productive aspects of their unique livelihood profile.

Understanding the Role of Asset Transformation in Building Sustainability

Land is of particular importance to Kittitians on a whole who generally agree that the loss of farmland is detrimental to the country's agricultural base (Daniel 2005) . Kittitians were generally a landless lot during much of the periods following emancipation into pre-independence. Changes

in government policy saw the transfer of crown lands into a national trust for all Kittitians to have fair and equal access (Clarke 2013). As such, agricultural land has always been a sensitive issue for the country. Over 80 percent of respondents agree that the loss of farmland impacts the country's quality of life, and another 67.5 percent are very concerned that farmlands in their respective communities were being converted into non-farm activity. Larger tracts of land and a higher percentage of the land being designated as sugar lands characterized the sugar belt region. The geographic distribution of land assets can be depicted through the use of asset maps. Figure 3.2 shows the range of total asset score for each parish in St Kitts. Northern parishes, which comprise the sugar belt region, have the highest asset possession totals.

The island of St Kitts can be divided along the central mountain range into asset-rich and asset-poor regions. The asset-rich region also corresponds with the sugar belt parishes. Statistics show an observed tendency for sugar belt parishes to have higher incidences of poverty compared to

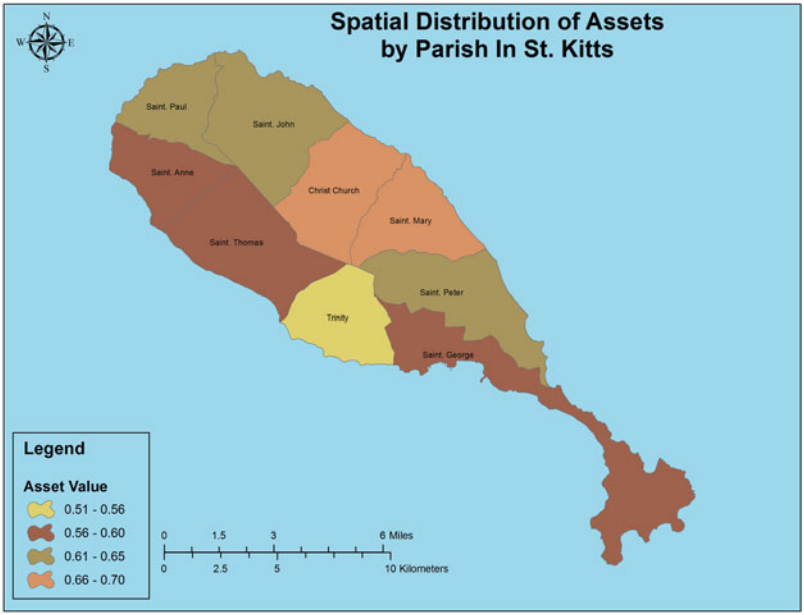

Fig. 3.2 Spatial distribution of assets by Parish

other areas (Clarke 2013). Although sugar workers live all over the island, sugar belt parishes (St Paul, St John, Christ Church, and St Mary) are identified by the total number of workers employed in the sugar industry and the amount of land that was under sugar cultivation. Kairi (2009) designates the parish of St John as the poorest parish, the most remote community in the context of St Kitts and would have been affected the most by the closure of the sugar industry. Additionally, the statistics warn that females in this region are more likely to slip below the poverty line than males. Sixty-eight percent of the respondents in St John have high level of vulnerability compared to only 4 percent with low vulnerability. It is recognized that the sugar belt region has higher poverty, higher than average unemployment rates, and standard secondary education completion is considerably lower.

The cross-tabulation between sugar workers and asset index reveals that 33 percent of sugar workers actually have a high asset index. This is very interesting when compared to the only 22 percent of non-sugar workers in the high asset index category. In the same light, the percentage of sugar workers in the low asset index category is 4 percent less than non-sugar workers. This underscores that access to assets in the land-based livelihoods category is exceptionally high. It further suggests that the higher rates of access are related to increased adaptive capacity, hence resilience. Unfortunately this is not entirely true, as secondary data in the form of their socio-economic profiles show that FFSW display greater socio-economic and social vulnerability than female non-sugar workers. The gender, spatial, and economic manifestations of this vulnerability can be arrested if attention is paid to the transformative use of assets in reducing vulnerability and increasing sustainability in former sugar communities.

Taking the view of Bebbington (1999), this section focuses on the various ways in which former sugar workers combine and transform assets in the building of their livelihoods. Here, female asset access in the sugar industry and their vulnerability with reference to the poor use of the asset portfolio are the focus of discussion.

Thirteen percent of male former sugar workers were involved in farming, compared to 19 percent of FFSW. There is a basis for the recommendation that sustainable income generation through farming should be streamlined for FFSW. This speaks to the ease of creating livelihoods

in farming for FFSW. Farming livelihoods, however, are a matter of willingness to engage in the activity.

The FFSW do spend time bemoaning the end of the sugar industry and complaining about the difficulties they now face. However, the focus group discussions highlighted the importance they themselves place on assets and in speaking about what they have. They explained that access to land for farming or a house, access to help from relatives, and having a broad social network help in reducing their exposure. However, the wealth of information they have provided through focus group discussions begs further statistical support. Examining the access profile of the women more closely reinforces the weak nature of financial and human assets. A profile reveals the areas females rely on most and the areas requiring the most assistance and padding to buffer against further shock.

Female asset accumulation has been continuously affected by the fortunes of sugar. During sugar production, assets were mainly social in nature with the sugar group (colloquially referred to as a gang) as the main source of income. The post-sugar era has brought with it 500 new homes and backyard farming space to aid the transition from sugar. Women, whether or not they are conscious of it, are being forced to rely on assets outside of agriculture; a clear indication that the asset base is widening as we move further away from 2005.

A comparatively higher percentage of FFSW did not engage in alternative income-earning opportunities. Data shows that having only one income source during sugar caused the increasing vulnerability of women. Cross-tabulating women with no alternative income sources with income-level grouping with average monthly income levels reveals that 40 percent of these workers are found in the lowest income category of less than US$360 per month. Only 10 percent of the specific grouping is found in higher income categories. This suggests that alternative income strategies can increase income and strengthen the asset base.

In particular, male former sugar workers had other sources of income in the form of part-time jobs outside of agriculture. It was customary for men to work as farm hands or work in construction during the dull season. Women, on the other hand, were reduced to relying on men, migration, and remittances (SABAS 1999). Further, 91 percent of women

agree that they had depended entirely on sugar for a livelihood income. In general, the women received a weekly stipend from government sponsorship during the transition period. This stipend was not intended as an income source but with lack of suitable alternative the women used it as a form of income substitution for waged labour. On the other hand, access to a wider range of assets, particularly land-based assets, provided the cushion needed to ride the wave of change in the sugar industry in St Kitts. For this reason, there is need to understand more thoroughly the importance of assets in cushioning blows and manoeuvring through change, especially for women whom Barrientos (2005) claim to have been more affected by the end of sugar industry than men.

The socio-economic profile hints too that although asset possession is high among the sugar workers, the socio-economic profile remains poor. Asset access improves neither living standards nor social and economic strength, a task that must be performed to secure sustainable livelihoods. That is why 24 percent of non-sugar workers have a high socio-economic profile compared to only 2 percent of former sugar workers. Similarly, 81 percent of former sugar workers have low socio-economic profiles compared to only 45 percent of non-sugar workers. Therefore, for high asset access to translate into sustainable livelihoods, there must be some amount of transformation of assets and a reframing of the approach to sustainability and resilience.

Securing the Female Future and Reframing Sustainability Through Land?

Land redistribution could be the key to securing the future of female livelihoods in St Kitts. Distribution, however, must be pro-poor, and must match the livelihood choices, payment options, and land maintenance capabilities of FFSW.

Agriculture was used as the main livelihood option for the transition programme out of sugar. However, its success was short-lived because of the option to use group farming as a supportive livelihood option for rural women. A deeply engrained culture of individualism and mistrust saw the inevitable failure of partnerships in farming. The women were

Table 3.1 Land for farming

Issue/interview	Land for farming
FFSW	'I do not want my own land I can't control it, I sure of my pay when I go work someone else land.'
	'They giving us land without no plan oh just take this and that sheep farmer next to peanut farmer me no want none me no want no ground nowhere else.'
Trainers	'Give them an acre of field for planting peanut.'
	'I had to watch she back and when I pull a bag of nuts she only.'
Experts	'1500 acres of former sugar land now assigned for agriculture.'
	'The intention is to distribute the land to farmers.'
	'They wanted land.'

Source: Author's field work

sceptical about the viability of group farming. This suggests some amount of mistrust and a very weak social asset functioning with regard to productive assets.

There is some disagreement at all levels about the importance of land for farming and the likelihood the women would succeed at this endeavour. The comparative insert in Table 3.1 outlines some of the diverging views of women, experts, and trainers on the issues of land for farming.

It would be remiss not to discuss the inherent problems of a gender-blind land distribution policy. 'Land for all' is quite possibly the most welcomed mantra for most small islands with an agricultural base; however, St Kitts offers an interesting diversion from this rule. Land was seen as a burdensome challenge and expense that the women were incapable of bearing. It was considered an integral component of sustainable livelihood portfolios. Women saw its declining role as a successful coping strategy, considering the increasing percentage of other assets, including financial and social, that land possession would necessitate for successful use of the resource.

Stemming from the Ministry of Agriculture's 2009 survey of the women, there were two main recommendations for addressing high levels of unemployment:

1. Community-based enterprises, and
2. Promotion of backyard farming

These are by no means tectonic shifts in approaches to rural livelihood policy but their simplicity may effect more successful transitions. There is merit in the idea of backyard farming and community-based enterprises. It represents a productive alternative to women who prefer to remain close to the household, or in the village, while earning an income. An essential approach that must be incorporated in this new approach to community and household productivity through small-scale agro-processing or cottage industries is a gender-sensitive policy. FAO (2013a) explains that policies, which are geared towards increasing women's access to and control over assets, have positive effects on human development outcomes, including women's well-being and status. Gender equality in land distribution is thus a mediating process between agricultural policy and female household productivity (FAO 2012, 2013b) . FAO Director General (2013 c) suggests that FAO policy on gender equality aims for sustainability in food production and rural development for the elimination of hunger and poverty.

Mohammed et al. (2004) argues that the purpose of gender-sensitive policy is to bring about improvement in the social, legal, civic, political, economic, and cultural conditions in the lives of women and men in the Caribbean. Charlton (1984) asserts that women are politically dependent at the local, national, and international levels, and thus they have little say in development policy-making. International development thinking advocates the importance of integrating gender analyses into poverty reduction planning. For example, FAO, IFAD and WFP (2013) suggest that tackling food security requires interventions in agriculture and education particularly targeting women.

Another important factor in transitioning to productive livelihoods is that the women view their current physical asset—the household—as a productive unit. The household is the base for women's daily activities and can be repurposed to provide a home-based income. This supports ideas for backyard gardening integrated with cottage industry-style agro-processing. Okeyo (1997) calls for a better understanding of household dynamics. Recognizing the different roles that women and men play in the agriculture sector is key to identifying the diverse challenges they face and tailoring projects and programmes on their specific needs (The World Bank, FAO, IFAD 2009).

Further, Mohammed et al. (2004) argue that Caribbean women's control over their lives is a function of their degree of economic autonomy. Control over economic activity is tied to control over the economics of the household. They already control their homes, so being the economic manager of their productive households should be seen as a natural progression. Mohammed et al. (2004) show that historically, the majority of Caribbean women perform the dual role of economically supporting families and doing daily household chores. For many who are unable to obtain steady jobs one option has been to rely on men. SABAS (1999, p. 16) states quite conclusively that 'for many low stratum women, improved economic fortunes depend upon the availability of three resources over which they have no direct control: men, overseas relatives, and migration opportunities'. Now, however, repurposing the home as the base for economic activity allows the women to focus on their economic activity without leaving the home unit and hopefully reduce dependence on 'visiting men' for livelihoods.

Making the household a productive unit also eliminates arguments for not wanting to work in tourism, particularly commuting to work and dealing with entitled tourists. The most obvious scenario is backyard farming with the sale of value-added processed produce such as drinks and food, supplementing the kitchen garden income (Clarke and Barker 2012). French (1997) critiques recent and past agricultural discourse for its treatment of women farmers as having the same problems as men claiming women's role in agricultural production is undervalued although women do large amounts of field work. She suggests that women may be a dying breed in agriculture. But, women's contribution in agriculture can be revived through home-based farming. Female-headed households can become major innovators in agriculture if they receive necessary support (Okeyo 1997), but Barrow (1998) argues that we need to understand the ways in which women's agriculture is structured.

Options are available for transforming the culture of farming to benefit the FFSW, but these require policy and development programmes. Measures to increase the incomes of rural women are justified not to improve gender equality but rather to increase women's role in contributing to poverty reduction (Ellis 2000). Gender-specific attempts can ultimately increase opportunities for women (FAO 2013d). Ellis

(2000, p. 156) states that 'in a rural and agricultural context, land is a fundamental asset'. Although the women's fear and reluctance to own land may be perplexing, land ownership is still the way forward for successful transition from sugar. Women's ownership of land can reduce their dependence on men for support, if they are able to make productive use of the land. When women own land they have the opportunity to establish the productive units required for household-based income generation. Bolles (2003) also supports the importance of Caribbean women controlling their own property. The women's perspective of land as a burden is based on a perception that managing large holdings requires resources that they do not have. Land allocations should be small but economically viable home-based holdings that provide just enough work for one hand.

Ensuring a successful livelihood transition into agriculture requires changing women's perception of land ownership. According to SABAS (1999, p. 27) 'the workers do not see agriculture as a viable livelihood supporting alternative, only the rich are involved in farming'. Secondly, agriculture for women must be small scale and community oriented with small holdings close to home with ready markets. This does not necessarily negate the idea of large-scale female farming. Group initiative and cooperative farming may also provide viable opportunities for these women. Unlike large group farming the women can create smaller group-based farming which consists of either family members or neighbours in close proximity to the household. This provides the opportunity for farm monitoring, sharing, and trading. The small group also allows the women to hopefully experience less risk and feel less responsibility in monitoring who does what and when.

Policy for Reframing Female Resilience

Bebbington (1999) argues for frameworks that can approach rural poverty and rural livelihoods without automatically linking their analysis to agriculture or nature. A rural resilience framework for the island of St Kitts with a clear focus on the FFSW is being proposed here. The framework is based on five main platforms: rethinking sustainability, reframing the

approach to resilience, improving mediation and communication, and gender mainstreaming and resource distribution.

Rethinking Sustainability

In St Kitts, sustainable development is the new development mantra. With sustainability as the new 'it' word or panacea for every development woe the country faces, a problem has been created. The use of the term automatically connotes 'good' or efficacy to policy decisions with seemingly limited consideration for effecting livelihood diversity and resilience, or in mitigating stresses and threats to rural female livelihoods.

Although resilience should be considered to be inherent in the definition of sustainability, the latter has been treated differently from resilience and from sustainable livelihoods. It is suggested here that focusing on resilience and livelihoods may force Kittitian policymakers to adopt more locally minded, rural-people-first approaches (Chambers 1983) to the development and description of policy. Resilience moves 'sustainability' policy decision to the micro livelihood-oriented debate. Essentially, policies will move from being macro-centric prescriptions focused more on the economy to being micro-oriented (when necessary) and people-oriented with the use of *resilience genre* development.

Reframing the Approach to Resilience Measurement

Livelihoods researchers have argued for more qualitative approaches to understanding resilience in rural areas (see Ungar 2003). The rationale is that localized and contextually specific variables can be derived from qualitative approaches, allowing one to discern intelligibility, patterns of behaviour, and choices from these variables. Arguing that there is no need for meeting the generalized resilience measures through random non-specific variables, Ungar (2003) suggests that qualitative approaches should be recognized and celebrated for their ability to create a clear, contextualized picture of resilient livelihoods and the solutions at-risk local populations implement and rural people's decision-making processes.

It is believed that there is some reflexivity and dialogical reciprocity in qualitative approaches, allowing for multiple truth claims through the co-construction of meaning (Ungar 2003). A deconstruction of roles allows experts (policy-makers) to be the audience of the lived experiences of rural peoples, which provides authenticity since it reflects the voices of participants. This gives voice to the silenced marginalized rural dweller and 're-presents' rather than represent and interpret what people have said. Ultimately, we give power to the marginalized voice and present exactly what people feel and think, and how they perceive vulnerability. This is more closely related to communicating the voice of the marginalized.

Improving Mediation and Communication

A major concern of the Sugar Transition Programme was a need for bridging the communication divide between women and government departments to explore possible strategies to accelerate the recovery of the affected rural communities. Pimbert (2012) in arguing for democratizing research states that there is a strong need to democratize the governance of food and agricultural research—to take a fair and inclusive approach that creates safe spaces for farmers and other citizens to participate in setting research plans and policies. The inability to effectively communicate ideas, wants, feelings, and expectations left little room for success.

The most classic example of poor communication leading to failure is in fact highlighted in interview comments for the agricultural programme. While the experts regarded land as the panacea for the problems of sustainable livelihood creation, the women saw land access and ownership as a sort of hindrance and challenge. Effective communication requires more intimate community-based discussions. Engaging in such should effectively communicate rural people's interests and what they are willing to change and engage in to create livelihoods.

Enabling Asset Transformation

Perhaps the most significant consideration in the resilience framework is the treatment of livelihood assets. Assets are continuously praised for their crucial role in resilience building by authors such as Bebbington

(2001). They are the basis on which rural people construct their livelihoods. Arguably, asset access is germane to attaining some semblance of a resilient livelihood. Unfortunately, the literature has painted a picture of asset-based resilience, which seemingly follows a very simple and yet unattainable measure of resilience for the Kittitian female agricultural worker.

Grounding the argument on the belief that localized and contextually relevant examples of resilience are key to understanding the Kittitian experience, the simplistic equation of 'assets = resilience' holds little validity where asset access is highest amongst the most vulnerable, including FFSW. The tenuous nature of the relationship between these planks of sustainable livelihoods (asset access and vulnerability levels) suggests that there is some barrier to the creation of resilient livelihoods. Increasingly high measures of asset access and use should lead to lower vulnerability scores. That is not the case here. Asset transformation is an important barrier to resilience based on assets. Transformation here speaks to redefining the worth and use of assets already possessed by the rural poor. This argument continues with the need to question women's willingness to diversify and alter existing livelihoods. This takes us into the viability of farm-based livelihoods to transform the existing assets portfolios of FFSW. Although farming is advocated as the likeliest income strategy for improving transition success, women argued for both agricultural and non-agricultural livelihoods alternatives. Added to this is the bureaucracy governing distribution of land to the tiller and the priorities of giving skill to the unskilled who refuse to be soil bound.

These are the issues for consideration in reframing resilience in the Kittitian context. Important questions can be asked here. Can farming then be the national policy solution for poverty reduction and resilience building for unwilling FFSW? How do you distribute land to the unwilling tiller? Although women are willing to work in agriculture, there is an unwillingness to engage in the current national emphasis on small-scale farming. Many Kittitians are still hopeful that a large-scale government farm programme would be the answer to their employment struggles. Current government policies and the attitudes of women towards land ownership and small-scale agriculture render the rural female livelihood tenuous at best. Redefining agriculture, to facilitate the special needs of

women, may reduce future livelihood challenges. This includes improving access to smaller-sized plots closer to home, year-round training and support, backyard farming and community group farming, and female preference in access to funding in small farming. With female cooperation, the expected results are resilience building and capacity strengthening, consequently securing the 'female future' and reframing rural resilience in St Kitts.

Ellis (2000) provides an example of successful post-reform livelihoods in the wake of trade liberalization in Tanzania and Ghana. Liberalization had brought benefits to the poor and the rich by increasing the availability of consumer goods, which acted as a stimulus to income generation. Women and young people in the villages considered household-level diversification positively. The reform process had a beneficial impact on rural livelihoods (Ellis 2000).

The general lacklustre approach to creation of new livelihoods adopted by the women in this study suggests that the safety nets approach as a means of providing temporary income, job experience, and pathways to diversification may not be a successful strategy. Should women take the blame for their unwillingness to view changes in the economy in a positive light? Leo-Rhynie (1996) argues that women select work areas that are traditional for their sex and for which they are prepared. Barriteau (2001) purports conversely that this epistemological frame of perceiving women activities through patriarchal lens is bad. Momsen (2002) affirms that the Caribbean gender relations are a double paradox of patriarchy within a matrifocal system. Barriteau (2001) supports this stance in arguing that a particular gendered construct of Caribbean women exists, based on exclusion. Essentially, she argues that women, but more so men, view women in such a way that their value as economic actors is often distorted or unrecognized. They continually reduce female entrepreneurs to traditional female roles of working in salons, services, and childcare. This explains why the female sugar workers may have felt that failure as farmers was inevitable. Powell (1996) explains that many women, especially the unskilled and uneducated, are employed in domestic work. Indeed many of the women did opt for household help jobs. But, according to the trainers, not even the hospitality sector worked for these women. So, if they failed even at the jobs that they were expected to do well in, the overall

failure may not be blamed only on their unwillingness to do work or transition smoothly, but perhaps on far more serious implications of ability.

Ellis (2000) argued that the reasons that individuals and households pursue diversification are often divided into considerations of necessity and choice, obeying a continuum of causes, motivations, and constraints. Choice, it is suggested, may even be socially circumscribed in the case of women who are faced with culturally defined situations in the livelihood context. It is important to note that the women made livelihood choices not to pursue long-term livelihood activities in farming because of the short-term need to provide (financially) for their households through the government stipend. Gwimbi (2009) maintains that when livelihood decisions have both short- and long-term options, resilience is often fraught with failure. People do not always rationalize choices and make decisions to secure long-term sustainability. The need to protect families through immediate income opportunities influenced women to choose to work on farm programmes paying a weekly wage rather than working to obtain land for their individual farms—a long-term goal.

Livelihoods researchers have been arguing for resilience policies over safety nets for quite some time. Moser (1998, p. 1) in discussing the importance of assets, livelihoods, and social policy explains that 'in the past two decades poverty focused policy shifted from residual welfare poverty-alleviation strategies commonly associated with "safety nets", to social protection poverty-reduction policies'. The problem she noted is that 'despite such advances social protection still tends to focus on income/consumption protection of the poor through the provision of cash transfers and other safety net provisions'. The fundamental problem with the safety nets approach for sustainable rural development is simple. We presume to know what will affect livelihoods and we pad or buffer these livelihoods with as many resources as possible.

Gender Mainstreaming and Resource Distribution

Gender, land, and livelihoods then provide framework for understanding how market liberalization processes affect poor rural women in small islands and effect changes in land and other resources. 'Gender is

an integral and inseparable part of rural livelihoods' argues Ellis (2000, p. 234). He outlines the differences in asset profiles of men and women, linking these to land ownership, educational achievement, and discriminatory access to decision-making processes. Ellis cautioned that the gendered realities add up to diversification of rural livelihoods being more of an opportunity for rural men than for rural women. This underscores an important principle being advocated here—gender should not be an optional frill to development agendas in St Kitts and Nevis. Therefore, as a critical component of the resilience framework, gender mainstreaming and resource distribution should act to reduce gender inequalities, improve decision-making regarding resource distribution, and most importantly, remove blanket approaches to rural re-development which more often than not ignore the unique circumstances and needs of female-headed households.

The recommendation, therefore, is to apply a three-pronged approach to gender and rural livelihoods. In the first instance, the rebranding of the sugar belt as a feminized space speaks to the recognition that the challenges of livelihoods in that area are felt more acutely by females, and female-headed homes. Second, the distribution of land under a gender umbrella will be the prototype for distribution of any other resource and building of the asset profile to increase resilience. Third, community-based resilience will focus on the important role of women in small Kittitian villages. Projects will emphasize the role and importance of women beyond their domesticated duties and will account for their control over non-financial resources and decision-making. Together these platform arguments should ensure that sustainability, resilience, and asset transformation for successful female livelihoods in rural St Kitts is attainable.

Conclusion

The end of sugar industry in St Kitts unleashed changes, stresses, and challenges for both male and female sugar workers. The resilience of the male workers is not only evident in the successful transition of men as a group to other livelihoods, but was amplified by the failure of the female sugar

workers in transitioning. The chapter argued that attitudes, conformity to socially constructed roles of women, and policies driven by macro-level expectations rendered the new livelihood strategies ineffective in coping with the end of sugar era. With consistent failure in the 10 years since the collapse of sugar industry, perhaps the best course now would be to develop new livelihood options based on the idea that women are bent on remaining close to home and to the land. Thus, developing a household-based agricultural programme for FFSW may provide a pathway to more resilient livelihoods for women.

This chapter advocates that resilience measures, and sustainable livelihoods in the rural areas in particular, be given more attention in the Kittitian development agenda. Continuing research in this area may ensure that livelihoods, assets, and resilience do not fade into the minutiae of the sustainable development agenda in St Kitts.

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4

Globalisation and Fairtrade Bananas in St Lucia: A Solution to Building Resilience?

Chanelle Fingal-Robinson

Overview

Historically, bananas are significant because they played an integral role in the establishment of the global fresh produce market in the 1800s (Raynolds and Murray 1998). Today, bananas are one of the most widely traded agricultural commodities in the world (Food and Agriculture Organization of the United Nations [FAO] 2003; Murray and Raynolds 2000) with approximately 16.8 million tonnes being traded annually (Morazán 2010). Additionally, globally, they are the most heavily traded tropical fresh fruit by volume, having surpassed apples and citrus (Wiley 1998; Nurse 2005). Persons around the world spend more than US$15.19 billion annually on the fruit. Moreover, worldwide, millions of people depend on banana production to earn a living (NERA 2003).

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In St Lucia, bananas replaced sugar as the major export crop in the 1920s (Momsen 2008). Here, bananas are grown by small-scale producers on tiny plots (less than 2 ha.) of mainly marginal land (Mandle 1999; Momsen 2008). In spite of this, traditionally, banana production was very significant to the island. It was able to generate vast amounts of foreign income for St Lucia and the rest of the Windward Islands (Klak et al. 2011). During its 'green gold' peak in the 1980s, the industry was the single largest contributor to St Lucia's earnings, making up about 34 percent of the country's gross domestic product (GDP) (Potter et al. 2004). In addition to foreign exchange earnings, banana production employed a large proportion of the country's work force, both directly as growers and indirectly as employees of the various companies related to banana farming (International Labour Organization [ILO] 1999).

Unfortunately, since the mid-1990s commercial banana production on the island has experienced a marked decline. Today, banana exports account for less than 1 percent of the GDP. The number of banana producers has also decreased more than tenfold from approximately 10,000 active growers in 1992 to only 950 active growers in 2012 (Ministry of Agriculture, Food Production, Fisheries and Rural Development 2013). The initial decline was because of global economic change; however, the more recent exodus of farmers is as a result of the outbreak of the black Sigatoka disease in the Eastern Caribbean. This disease has had and will continue to have long-lasting, negative effects on the banana industry in St Lucia and the wider Windward Islands.

Methodology

This chapter examines the extent to which Fairtrade was able to build farmers' resilience to the negative impacts of globalisation before the black Sigatoka outbreak by analysing data collected using a mixed-methods approach. Three field visits were made to St Lucia between 2006 and 2008. Data were collected via a formal questionnaire survey with 90 farmers from three Fairtrade groups on the island. A convenience sampling method was utilised to select farmer respondents whereby the

researcher was stationed at the groups' Fairtrade office and interviewed farmers as they came to collect their bi-weekly production quota. To supplement the questionnaire data, the researcher also conducted a number of elite interviews as well as field observation exercises.

Global Economic Change and Banana Production in St Lucia

Modern-day globalisation, and more specifically trade liberalisation, has had a negative and in many respects debilitating impact on banana farming in St Lucia. Prior to the mid-1990s, bananas from the Windward Islands had a protected market in the UK, which was guaranteed through the Lomé Convention. This guarantee also included the provision for banana producers to receive a price, which was higher than the world market price (Ahmed 2001) in order to cover their relatively high production expenses. The establishment of the World Trade Organization (WTO) in 1995, and its subsequent ruling against the EU's protectionist regime for products from its former colonies, dealt a major blow to the industry. Producers in St Lucia were unable to compete on the global free market because their prevailing local conditions made their production costs up to two times higher than their main competitors, Latin American producers (Bananalink 2004; Moberg 2008). Being paid the global market price for their goods meant that most could not earn a decent living and opted to exit commercial banana farming. This in turn had several negative socio-economic implications such as unemployment and mass emigration for St Lucia, particularly for the rural areas where the crop is cultivated (Montrose 2004).

Fairtrade aims to fight poverty through trade. It is a market-based approach which supports and facilitates rural development, while empowering producers in the developing world who are disadvantaged because of unequal trading conditions (Fairtrade International [FLO] 2014). Fairtrade began in St Lucia at the onset of the twenty-first century in an attempt to renew interest in the banana industry and also to protect farmers against the negative impact of trade liberalisation. Initially, both farmers and other banana industry stakeholders were resistant to the conversion to Fairtrade. Farmers were hesitant to switch to Fairtrade because they were unsure

about the effects it would have. One banana company believed that rather than entering into Fairtrade, the banana industry should have tried to find a new niche market by developing 'brand Windward Islands'. The Ministry of Agriculture, on the other hand, favoured a move towards diversification. In spite of these apprehensions, the switch to Fairtrade was made because it was held that its benefits would be realised in the shortest time frame.

The Fairtrade regime's higher price increased farmers' per unit earnings and allowed them to achieve a decent standard of living. In addition, Fairtrade facilitated rural community-level development through the projects it was able to finance. Further, social capital was activated within farming communities because of Fairtrade. However, although it was successful in these areas, there are still some aspects of resilience building that have not fully materialised.

Fairtrade: A Solution to Building Resilience

The Fairtrade Minimum Price

Fairtrade was able to build producers' financial resilience by guaranteeing that they would be paid a fair minimum price (Ronchi 2002; Utting-Chamorro 2005). The minimum price 'sets the bottom limit for negotiations between producer and trader' (FLO 2009, p. 5). It represents the lowest possible price that a Fairtrade buyer can pay the producer for his/her product. In some cases, it is the lowest starting point for price negotiations between producer and purchaser. It is guaranteed regardless of the fluctuations in the world market price for bananas (Paul 2005; Utting-Chamorro 2005). The minimum price ensures that farmers receive a payment that covers the cost of sustainable production. At the time of data collection, the price producers received for a 40-pound (18.14 kg) box of bananas increased from EC$15.00–18.00 (US$5.55–6.66) to EC$23.00–27.00 (US$8.52–10.00). This represented a 50 percent increase in price and was in keeping with Fairtrade International's minimum suggested price at the time. The higher price provided farmers with some degree of financial security, which is something that global free trade threatened to remove (Fingal 2008).

The Fairtrade Premium

The second way in which Fairtrade strengthened farmers' resilience was through the payment of the Fairtrade social premium. Simply covering the cost of production, in most cases, does not give farmers the financial freedom to invest in proper health care and education or improving their environment, amongst other things. Therefore, they have to rely on either the government or family or community members to access such things. Often these external agencies or persons are unable to assist, hence the Fairtrade premium provides farmers with the little extra they may require in this regard (Fairtrade Anz 2013). Furthermore, while the minimum price directly benefited individual farmers and their families thereby indirectly benefiting communities, the Fairtrade premium is aimed at directly benefitting producer communities (Moore 2004; Torgerson 2010).

The Fairtrade premium is the money given back to the farmers from each box of bananas sold to the UK market. It represents an indirect form of income to producers as it helps improve their working and living conditions. The premium is paid to the St Lucia National Fairtrade Organisation (SLNFO), which then distributes it to the various farmer groups in proportion to their production. The SLNFO keeps a portion of the premium to offset the cost of running its operations. The social premium is used to fund community-based development projects and represents 'significant and consistent economic returns' for the areas that receive it (Schreck 2002, p. 15). The social premium is paid regardless of the quality of the fruit when it arrives in the UK. In other words, if 2000 boxes are shipped and 25 boxes are spoilt by the time they reach the UK, the social premium is still paid for 2000 boxes rather than 1975 (Marketing Manager, WIBDECO interview 2006).

Community Development Through Social Projects

Going hand in hand with the Fairtrade premium are the projects that it funds. These projects have increased resilience by increasing community development in rural areas of St Lucia, which are traditionally the last to

receive any sort of government assistance. Social projects funded by the premium are arguably some of the greatest benefits of Fairtrade.

Annual scholarships have been awarded for performance in the Caribbean Common Entrance examination. Six scholarships are awarded to the top performing children of Fairtrade farmers. The scholarships are each valued at EC$5000 (US$1852) and are paid at the beginning of each academic year for a period of 5 years at a value of EC$1000 (US$370) per year. The money is given to help with the purchasing of uniforms and books for secondary school. Occasionally, grants are also given for exchange programmes whereby students from primary schools in St Lucia are able to go overseas. One example of this is the Micoud School in South East St Lucia, which has an exchange programme with a primary school in London, the UK.

Some of the money from the social premium has been used to fund community, sporting events. Football competitions are organised and funded by the Fairtrade groups in coordination with members of the community. The groups provide the uniforms and also sponsor the prizes that are awarded for performance. These competitions are intended to promote community spirit and unity and allow Fairtrade to be seen as an important force in building and maintaining strong community bonds.

The most neglected schools are usually located in rural areas (Ronchi 2002). Therefore, rural community-based schools in the Fairtrade banana-growing areas have received equipment from the social premium money to facilitate the delivery of a high-quality educational programme. An example of this is the Richfond Infant School, which received a new computer lab and water tanks from the Fairtrade organisation. Additionally, a nursery school in Bexon was given EC$1000 (US$370) to purchase books.

The Fairtrade organisation is committed to assisting the elderly persons within each farming community. For one of the farmers' groups this help comes in the form of 30 food hampers, valued at EC$100 (US$37) each to needy elderly persons within the district. These hampers are distributed in December to coincide with Christmas celebrations.

Farmers are better able to access proper health care through a medical assistance programme that is paid directly by the SLNFO. Each Fairtrade farmer and one member of his/her family is entitled to EC$1000 (US$370) in assistance annually. This money is reimbursed after paid visits to the

doctor as well as after the purchase of medication. This is a great help to producers, particularly those with relatives with ongoing health problems.

In addition, if a farmer or a family member is involved in a serious accident or has a serious illness, there is no upper limit on the medical assistance. An example occurred in mid-2006 when a female farmer was involved in a traffic accident. She lost some mobility, thus Fairtrade premiums were used to finance the construction of an indoor bathroom to replace her outdoor latrine. This project cost approximately EC$4000 (US$1481). The SLNFO has also been able to provide medical equipment to rural hospitals. For example, the Dennery Hospital in eastern St Lucia has received an autoclave from the proceeds of the premium.

Another advantage that is afforded to farmers with respect to health care is a death benefit. If a member of a farmer's family dies, he/she is given EC$500 (US$185) to help with any expenses which may or may not be related to the death. Similarly, if the farmer himself passes away his/her relatives still receive the money. In that case, the money is used to help family members deal with the economic shortfalls that may occur following the death of their primary breadwinner.

One of the most significant development projects has been the improvement of farm roads. Prior to the development of Fairtrade in St Lucia, farm roads would often remain overgrown and unkempt, making it difficult for the banana growers to transport their crop from the farms to their pack sheds and then from the sheds—if they are not located at the side of the main road—to their point of sale at the Inland Reception and Distribution Centres. Initially, money from the Fairtrade premium was used to pay persons to keep the roads clear of brush. However, as more funds became available a number of farm roads have been paved with gravel and pitch and in some cases concrete if the slope was too steep (Fig. 4.1).

Environmental Sustainability

Often, in an attempt to remain globally competitive, production is increased at the detriment of the environment. Fairtrade, however, ensured that this was not the case and that banana production generally subscribes to some

Fig. 4.1 Upgrades made to farm roads using Fairtrade premium funds (Source: Author)

modicum of environmental sustainability. This builds farmers resistance to environmental degradation, which can be a side effect of greater production. These more environmentally sound practices are also better for the overall health and well-being of the growers involved (Fingal 2014).

The creation of buffer zones is one of the environmental criteria which producers must fulfil under the Fairtrade system (FAO 2003). Farmers who cultivate along rivers and other watercourses were required to create buffer zones around their plots. These are areas in which they are not allowed to plant any bananas but in which they may have other tree crops growing in order to reduce or prevent soil erosion and rapid run-off, which is caused through monoculture. Proceeds from the Fairtrade premium were utilised to complete a nationwide project to create buffer zones along rivers that flow though banana farms.

The use of synthetic chemicals has been a prominent feature of the agricultural landscape of St Lucia and the wider Caribbean (Collymore 1984; Grossman 1992; Semple et al. 2005). Over the years, there has also been an increase in the imports, manufacture, and use of these agrochemicals throughout the region (MRAG 2004; Simpson 2004). In St Lucia, the expansion of the banana industry was the primary reason for the growth in the use of synthetic chemicals (Grossman 1992) because of the pesticide-intensive nature of banana-based monoculture. Bananas have a low genetic diversity and are quite vulnerable to fungal diseases (Henriques et al. 1997). Admittedly, St Lucia does not have a tradition of utilising the most worri-

some of pesticides; however, the Mocap, Gramoxone, and Furadan, which are used, have the potential to be very dangerous if ingested (Grossman 1992). This coupled with the inadequate use of protective gear by farmers can have serious negative consequences (Semple et al. 2005).

Since the implementation of Fairtrade, producers have been given strict guidelines as to the application of agrochemicals. In fact, they are only allowed to utilise those that are approved by the Fairtrade International. Fairtrade rules dictate that farmers wear proper safety gear and employ correct application methods for their approved chemicals via a mandatory pesticide application, training programme. Additional training was given in proper food-handling methods. Further, farmers are not allowed to use chemicals to combat weeds. All weeding must be done by hand or using mechanical weed eaters.

Waste from the farms must also be disposed of in an appropriate manner (Nicholls 2005). During cutting time, farmers would have traditionally placed their used blue plastic bags on the ground between the banana trees on their farms and leave them there. Alternatively, if a river happened to border or run through a farmer's plot, he or she would often throw the old plastic bags into the water. Both of these practices are forms of pollution that had the potential to severely damage the environment, which is already fragile due to the continuous exploitation of the land. The problem of disposal of these plastic bags was further exacerbated by the fact that the bags contained the pesticide residues (FAO 2003) which when improperly disposed of have the potential to get into both the ground and surface water supply.

Because of Fairtrade, there is now a more reliable waste collection system, which has significantly reduced the level of environmental degradation. This waste collection has been facilitated by the improvements made to the farm roads. Farmers now place their used plastic bags at the side of the roads and these bags are collected once a month by a truck. The truck is paid for using Fairtrade premium funds. This increases environmental sustainability, which is a major principle upon which Fairtrade was developed.

Increased Organisational Capacity Through the Creation of Social Capital

In St Lucia, there has traditionally been a paucity of community organisations, which has led small farmers to become powerless in various ways, exerting little or no influence over even their agricultural sector (Cole 1994). In an attempt to change this reality, Fairtrade has mandated that small growers be organised into groups or cooperatives (Fairtrade 2009). Cooperatives have a long history of contesting the perception that individuals and/or households are the only route to development by making certain amenities available to their members (Hirschman 1993; Mutersbaugh 2002).

The principles of Fairtrade are close to those of cooperatives (Litvinoff and Madeley 2007), hence the formation of farmer groups is significant to producers. In St Lucia, Fairtrade has been credited with creating greater collective action amongst farmers. This teamwork is a result of the creation of social capital. Social capital is able to improve human welfare and it is beneficial at both the individual and the community levels (Mohan and Mohan 2002). The benefits of social capital are realised because when it is combined with other forms of capital (e.g., human, financial), it increases productive activity (Bebbington and Perreault 1999). In this way, it stimulates development, which in turn provides access to resources that would not have been available in its absence (Coleman 1988; Mohan and Mohan 2002).

Social capital due to Fairtrade is visible in a variety of ways in rural St Lucia. The groups have a set of rules to which farmers adhere. There is also a fully developed democratic process for the selection of members to serve both on the executive committees and social projects to be implemented. Another way in which social capital can be seen is through the high levels of involvement of growers in the decision-making of their groups with almost 90 percent of interviewed producers stating that they were very involved in the process. Additionally, there is a high level of collaboration between individual farmer groups and the National Fairtrade Organisation. Furthermore, there are great levels of trust between individual growers and members of their group executive. This was evident

through the fact that producers would go to the executive members with even their non-farming issues. Moreover, farmers agreed to participate in this research based solely on the suggestion of the then National Fairtrade Coordinator as well as members of their leadership committee.

The social capital allowed farmers' groups to provide additional services to their members, which resulted in improved efficiency. This was achieved by reducing the growers' transaction cost, therefore, increasing their competitiveness. The producer organisations here provided farmers with farm input. These inputs were at cheaper prices than at their traditional suppliers. For example, approved fertilisers were sold for EC$105.00 (US$38.88) per bag by the banana companies but for only EC$85.00 (US$31.48) by the farmer groups. Farmers groups also started to supply producers with banana pack boxes, cutting knives, and gloves, which originally could have only been sourced in the country's capital, Castries. According to the president of one of the Fairtrade groups, this has reduced transportation costs, thereby lowering the cost of production and ultimately increasing producers' profits.

Fairtrade: A Solution to Building Resilience?

The discussion so far has illustrated ways in which Fairtrade has indeed improved farmers' resilience to global change. The following sections will focus on two aspects of the regime that still require improvements in order to build greater resilience.

Global Trade Integration

One of the major aims of Fairtrade is to make farmers and their produce better integrated into the global trading system than they would be under the free trade regime, and in doing so, make them more equal trading partners (Nicholls 2005). One of the first ways in which this can be achieved is by bringing producers and consumers closer together through the shortening of the supply chain. This is achieved by decreasing the

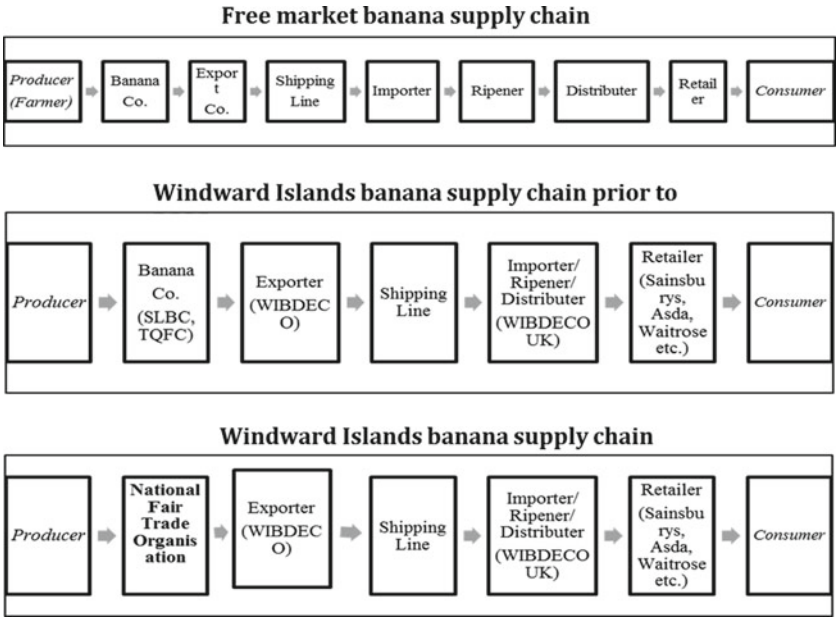

Fig. 4.2 Changes in the banana supply chain (Source: Author's fieldwork)

number of entities over which the profits have to be distributed, thereby ensuring more of these same profits are transferred to the producers.

A comparison of the two types of banana supply chain illustrates this point further. In a free market banana supply chain, when the fruit leaves the farmer, it is sold to a banana company, which passes it on to an export company who then exports it through a shipping line. When the fruit arrives in its destination country, it is received by an importer who transfers it to a ripener (as bananas are shipped green and have to be ripened when they reach their market destination—assuming that they are exported to be eaten ripened). From the ripener, the fruit is passed on to a distributer who sells them to the retailer who sells to the final consumer (Fig. 4.2). At each step in this supply chain, the company or entity responsible has to be paid for its services. A nine-step process from farm to consumer translates to a significant eroding of profits for the farmer, particularly since supermarkets usually get the bulk of the profits made from the sale of bananas.

Now, it must be appreciated that the banana supply chain of St Lucia has always been shorter than other banana suppliers worldwide because once the fruit arrives in the UK, the same company, WIBDECO UK, is responsible for the importing, ripening, and distribution of the fruit (Fig. 4 2). But the low world market price for the fruit and the high production costs have always resulted in very low profits for farmers. Since the introduction of Fairtrade, however, the supply chain for bananas from St Lucia has become even shorter, not in the sense of elimination of intermediary players but by virtue of the fact that one player in the chain has been replaced.

In 2008, because of pressure from the National Fairtrade Organisation, it was ruled that the banana companies did not have the right to be included in the sale of Fairtrade bananas because they were not certified. As a result, they were removed from that position and the SLNFO took their place at that point on the supply chain (Fig. 4.2).

While the aforementioned does not constitute a literal shortening of the supply chain, the replacement of the banana companies by the National Fairtrade Organisation does in fact bring producers and consumers closer together as farmers now receive a larger proportion of the money that the consumers spend on bananas. While the banana companies would deduct EC$1.30 (US .48c) from each box of bananas per farmer to cover their running costs and expenses, the SLNFO only deducts EC .30c (US .11c) from each box resulting in the farmer receiving an entire EC$1.00 (US .37c) more than he/she did before.

Another way to assess the extent to which farmers are better integrated is appraising their knowledge of their trading system and the market. In St Lucia, all of the farmers who were interviewed stated that they believed that their access to international markets had increased since the introduction of Fairtrade. However, when the farmers were asked to describe what they knew about the persons who bought their fruit, only 44 percent were able to provide an answer. The rest stated that they knew nothing about the British consumers. Moreover, over 75 percent of those that gave a response were only able to say that the foreign buyers wanted more of their produce. This can be compared to the other side of the coin where the majority of consumers interviewed in the UK had only very general knowledge about the places of origin of the Fairtrade products they purchased. The limited knowledge at both ends of the chain illustrates that,

in this respect, there is still a knowledge gap between the two, and that the divide could be blamed on a lack of information within the system which ultimately may be the fault of the Fairtrade umbrella organisations. For producers, more information about their consumers would make them more equal trading partners, while for consumers it would help to reduce the incidence of commodity fetishism for Fairtrade products. Both instances will bring consumers and producers 'closer' together.

Additionally, a little less than one third of the interviewed producers could actually define Fairtrade while 38 percent did not know about the Fairtrade premium. Of the 62 percent that had heard of the premium, over three quarters could only give examples of the projects that it had funded rather than discuss its meaning or why it was important in the Fairtrade system. The farmers also blamed the then government for the drastic price decline that occurred prior to Fairtrade's introduction. By way of contrast, all of the UK respondents had knowledge about Fairtrade and were able to give a working definition. Even those who did not believe in its ideals were able to link it to a 'better' trading deal for producers. Clearly, here is another divide between consumers and producers which Fairtrade still has not really closed.

One possible explanation for this divide may be the way in which Fairtrade was introduced to producers. The banana growers have had some form of formal training on the ideals and benefits of Fairtrade through the National Fairtrade Organisation. The producers' lack of knowledge about what exactly is Fairtrade could also reflect a failing at the implementation phase of the Fairtrade regime in St Lucia where banana farmers were not adequately educated about its core values. All aspects of the regime were probably presented to the farmers; however, because of their initial resistance to Fairtrade bananas, there may have been a deeper focus on the financial and other physical gains rather than the more intangible longer-term benefits. In fact, the then managing director of one of the banana companies in St Lucia said that the farmers on the island only agreed to switch to the Fairtrade model after they were shown how it would positively affect their bottom line. He stated,

They [farmers] *didn't take to this Fairtrade business until they were assured by WINFA…and the rest that they would make more money* (Managing Director, TQFC interview 2007).

While this would have been a good primary strategy to get farmers to come on board with Fairtrade, in the long run it has resulted in them still being at a disadvantage in terms of their integration into the global banana trade. The latter may be the more plausible explanation because the persons within the National Fairtrade Organisation, Extension Officers, and people working in the Fairtrade offices during interviews were all able to give detailed definitions about the concept of Fairtrade.

It can be concluded that the St Lucian banana growers under Fairtrade rules are now better integrated than prior to Fairtrade but still not fully incorporated into their trading system. The 'shortening' of their food supply chain has brought a larger proportion of profits to the producer. However, their inability to define the term Fairtrade suggests that, for the most part, they are unaware of the extensive international food network of which they are a part. In addition to not knowing much about their food network, they may also be ignorant of the important role they play in the supply chain (Renard 1999). The fact that they do not know about the social premium in general terms and in some cases the specific benefits it has provided also suggests that they do not know much about their trading network. This is in stark contrast with the consumers who are aware and have knowledge about the trading network and their role in it.

Finally, the farmers' willingness to blame their country's government for the dramatic cut in price which occurred prior to Fairtrade's introduction reflects an overall lack of awareness of broader global processes, particularly with respect to the removal of preferential access to European markets by the WTO. Instead of trying to find out the real reason for the price decrease, it seemed logical to them to simply blame their leaders. Therefore, it may be argued that the farmers' produce are more physically integrated into global trade, as they do have an assured UK market, than the farmers themselves. They are still unequal trading partners because consumers appear to generally have a relatively greater knowledge about Fairtrade, its variety of products, and its farmers (Linton et al. 2004). A

failure to have the aforementioned be rectified could result in the producers being more highly paid but still marginalised.

Gender Equality

Gender equality focuses on the differences in power between men and women (World Bank 2011). It refers to a situation in which males and females have identical access to and enjoyment of the opportunities, resources, and benefits in society (Rice 2009). In society, women are usually the ones who are at a disadvantage and do not have same rights as men. This is especially true of female farmers in the developing world, who are faced with lower wages, job instability, sexual harassment in the workplace, and the burden of both work and household responsibilities amongst other things (Oxfam International 2004). Hence, gender equality is closely associated with the empowerment of women (Ganem-Cuenca 2011). Female empowerment increases their participation in society.

It has been argued that the chosen path to development has an effect on gender equality (King and Mason 2001). Since Fairtrade has often been conceptualised as a development project (cf. Raynolds 2002; Paul 2005; Utting-Chamorro 2005), its introduction into any rural society has great implications for gender. Fairtrade has consistently claimed that the empowerment of disadvantaged producers across the globe is one of its primary foci. This includes the empowerment of arguably the most disadvantaged group of rural producers—women. Ironically, however, although the Fairtrade standards include an explicit statement of protection against gendered labour discrimination, the dimension of female empowerment is not a specific requirement for Fairtrade certification (Nicholls and Opal 2005). Thus, even though the regime has gone a long way in closing certain aspects of the gender gap through female empowerment in rural areas, some gender inequalities still persist.

One of the ways in which the empowerment of women is evident is through their level of participation in the farmer groups' decision-making process. From the sample, 89 percent of the women farmers stated that they were very involved in their groups' decision-making

process. This figure exceeds that of their male counterparts who had 86 percent involvement.

The high level of reported female producer involvement was verified by observations at the farmers' cooperative meetings. Although there were fewer females than males at these meetings (farmer groups were predominantly male), the women that were present played a very active role in these meetings. Although the researcher was unable to fully understand the words that were uttered because of the mixture of English and French patois, the dynamics of a particular interaction was noted and recorded:

> A female farmer raised her hand to make a comment. When she was called upon to speak, she openly expressed her obvious disdain for the matter, which was being debated. All were silent while listening to her and when she was finished she received some applause from both male and female meeting attendees.

The aforementioned incident was typical (save the applause) of the Fairtrade meetings, which were observed by the researcher. Unlike Lyon (2008), who in her study found that women were discriminated against and made to feel rejected by men during cooperative gatherings, here the opposite is true. Female farmers are openly welcomed and encouraged to share their opinions on matters, which may arise during group discussions. Their opinions are also valued by both male and female group members alike, as was evident by the applause the producer received in the above example. It is also interesting to note that the silence that women often enjoy while expressing themselves in the group was not a courtesy always extended to the men. Hence, this further points to the importance that has been placed on the viewpoints of women in this particular Fairtrade setting. In this respect, Fairtrade has somewhat empowered women and thus addressed gender equality.

Another aspect of female empowerment is women's involvement in higher group responsibility (Ganem-Cuenca 2011). Generally, at the time, for the studied cooperatives, women's access to roles of greater responsibility within the groups was almost non-existent. In truth, two of the three groups that were studied reported having one female each as part of their executive at some point. The president of one of the groups

stated that the group had a female treasurer for 1 year at some point in the past. Even this alludes to limited access to higher-level responsibility since the position of treasurer is usually considered to be of a lower status than that of president, vice-president, or secretary—all positions that males hold (Ganem-Cuenca 2011). The other organisation, on the other hand, did report having a female vice-president. However, she only served for 1 year, which is very different to the many male executive members who have held their positions for many years. The inability to elect a woman to a high-level executive position or re-elect the female vice-president may be used as a proxy to illustrate the perpetuation of women's more disadvantaged position in spite of Fairtrade.

The participation of females at the 'subordinate' end of the group executive may be as a result of the traditional patriarchal relations (Lyon 2008) that make men (and women) reluctant to elect or appoint women to the highest levels of authority. Some also argue that their lesser educational achievement as compared to men also limits their chances (Ganem-Cuenca 2011). The result is that women are not either confident or comfortable enough to run for a high position or do run but are not voted in by their fellow group members. Whichever way, it leaves a situation in which women are confined to only being part of 'lower' end of group participation and leadership.

Further, in terms of defining the regime, only 11 percent of the women who were surveyed could actually provide a definition of Fairtrade. By contrast, 38 percent of the men were able to define Fairtrade. This general lower understanding of the women of their trading network appears to negate the premise that Fairtrade improves gender equality. It shows that in some critical aspects the women in the banana trade are still lagging behind their male counterparts even after Fairtrade.

Improvements in gender equality can be thought of as being a function of both the community-based development projects and the group organisation. The effective involvement of females during group meetings and in general group decision-making points to the success of the organisational capacity of the groups as this participation has been facilitated through the development of the farmer cooperatives (Lyon 2008).

The overall paucity of higher-level female participation points to a failing of the community-based development projects. Women are socialised differently compared to men and may require programmes that are more customised for them. However, at the time, there were no development projects which were aimed specifically towards women and, in particular, their education or advancement. There were also no plans to implement any female-specific programmes. Additionally, the groups having more male than female members means that these members may not be sensitive to the 'lower position' of women and therefore not appreciate the necessity to implement projects which could help in this respect (Ronchi 2002). Moving forward, part of the prerequisites for becoming Fairtrade certified should be the inclusion of at least one yearly, mandatory female empowerment-related programme.

Conclusion

Fairtrade was introduced into St Lucia at the beginning of the twenty-first century as a response to the potential fallout that could have occurred due to the removal of preferential trade arrangements in Europe (Fingal 2014). Farmers and other key stakeholders did not readily accept it, as they were unsure as to whether it would provide the promised benefits. However, since its inception, Fairtrade has been able to build producers' resilience to global economic change in a variety of ways. It provided a stable, higher than world market price as well as additional income in the form of the Fairtrade premium. Premium funds have been used to implement social projects such as farm road upgrades and donations of equipment, which have aided in rural community development.

As a result of its environmental requirements, producers became much more environmentally sustainable under the Fairtrade regime. Additionally, the Fairtrade regime improved farmer groups' organisational capacity and facilitated the creation of both structural and cognitive social capital. The presence of social capital has increased the capacity of these farmer cooperatives and allowed them to provide additional services to their members such as lower-cost farm inputs.

In spite of the above milestones, there were still areas in which the Fairtrade regime failed to fully provide benefits to farmers. In terms of global trade integration, the non-literal shortening of the supply chain provided farmers with a greater proportion of profits; however, producers and consumers were both ignorant about certain aspects of each other. Further, some strides have been made with respect to gender equality in that females participate more than males in their farmer group activities; however, they still do not normally hold positions on their groups' executive committees.

The aforementioned discussion highlights the fact that Fairtrade has provided a great deal of tangible benefits for producers in the sample. However, some of the more intangible benefits are yet to be fully received. Hence, it has made some progress towards ameliorating some of the inequalities in global trade while increasing farmers' resilience to global change. In moving forward, it is necessary for the regime to look towards ways in which St Lucian producers can receive its full benefits. Unfortunately, based on the current state of the industry, it is uncertain as to whether Fairtrade can help farmers overcome the new challenges they now face.

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5

The Decline of Preferential Markets and the Sugar Industry: A Case Study of Trade Liberalization in Central Jamaica

Dorlan Burrell

Overview

The sugar industry in Jamaica has been declining since the 1990s with very little hope of survival without urgent and significant diversification. Small-scale farmers involved in the sugar industry are experiencing the effects of trade liberalization through the 'domino' effect. In response, a number of small farmers have lost interest in the industry, which can be seen in the decreasing production levels of small sugar cane farmers from the mid-1990s. Small farmers are vital to the sugar industry and as such their fortunes impact the industry as a whole.

There have been several research projects on small farmers in Jamaica and the wider the Caribbean (Barker and Beckford 2005; Beckford and Barker 2007, 2011; Campbell et al. 2010; Campbell 2011; Clarke and Barker 2012; Gamble et al. 2010; Spence 1999) and trade liberalization

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(e.g., Ahmed 2001; Ahmed 2004; Deep Ford and Handsdeep (2007); Anderson 2013; Maur 2006; Clarke and Barker 2012; Deep Ford and Rawlins 2007; Witter and Brown 2004; Wyss and White 2004); however, oftentimes the link is not made between the two. This chapter assesses the socio-economic challenges affecting small-scale sugar cane farmers in Central Jamaica in the context of trade liberalization. The chapter highlights alternatives taken by small-scale sugar cane farmers as a response to trade liberalization.

Research Design

The research relied on a mixed-methods approach that included administering questionnaires, conducting interviews and focus group discussions,'recording participants' observations' in order to have a parallel construction and assessing secondary sources. A convenience sample was used to administer the questionnaires based on the sample population and its distribution over the sample area.

Study Area

Crofts Hill, Kellits, and Top Hill are farming communities located in Central Jamaica. Crofts Hill and Kellits are both located in north-eastern Clarendon while Top Hill is located in north-western St Catherine. Together, all three communities represent an extensive area of sugar cane cultivation predominantly grown by small-scale farmers (see Fig. 5.1).

The communities are located within a six-mile radius from the parish border of Clarendon, St Catherine, and St Ann. The Worthy Park Sugar Factory is located several miles from all three communities and is the main buyer of sugar cane from these farmers (see Fig. 5.1). The general study area was divided into two sites to examine the effect of distance from the Worthy Park Sugar Factory:

Site One—from Top Hill to Crofts Hill (including St John)
Site Two—from Crofts Hill to Kellits

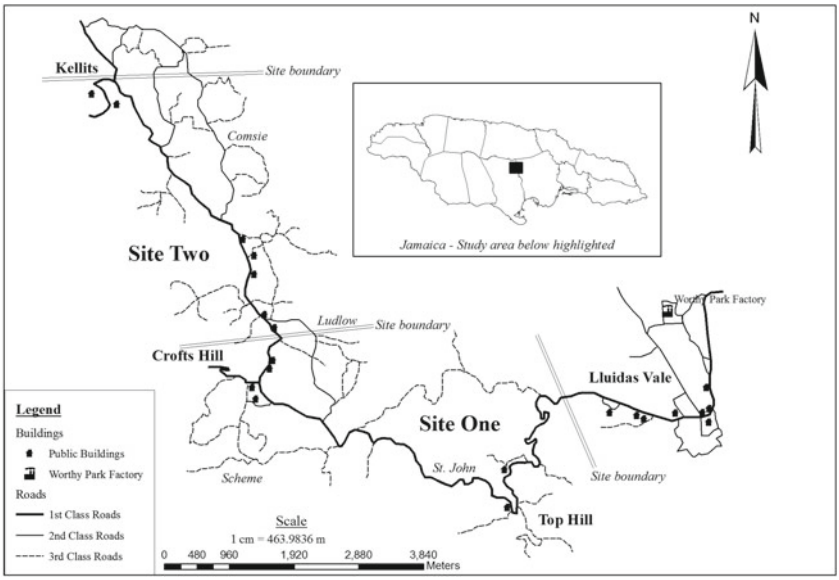

Fig. 5.1 Study area: North East Clarendon and North West St Catherine

Methodology

The study used a mixed-methods approach to collect data from the sample in order to better understand the farming dynamics of each community and to represent the view of the entire population of the study area (Flowerdew and Martin 2005). A convenience sample was thought to be the ideal sampling method for this research. This resulted from the extensive nature of the study area, time period for conducting the study, and limited knowledge of households with sugar cane farmers.

The main data collection strategy was the administration of a questionnaire. The questionnaire consisted of both open- and closed-ended questions, which gave the respondents a chance to express their opinions and to answer direct questions. Informal interviews were also conducted with

ten small sugar cane farmers who have found other alternatives in farming. Five farmers were selected from both sites for the informal interview on a convenient basis to reduce bias. Focus group discussions and participant observation provided vital information to examine a number of issues that were raised in the administration of the questionnaires and interviews.

The Conceptual Framework

Regional Context

Trade liberalization has significantly affected agriculture in the Caribbean region (Ahmed 2001; Anderson 2013; Clarke and Barker 2012; Deep Ford and Rawlins 2007; Harrison 2001; Jessop 2009; Lapper 2005; Lechner 2009; Witter and Brown 2004). Globalization is a process where international trade and investment knit together a larger world economy (Lechner 2009) while trade liberalization focuses on the removal of trade barriers, import licenses, and preferential prices (Ahmed 2001, 2004; Anderson 2013; Witter and Brown 2004). Trade liberalization has had varying impact on different countries. For developed countries and some developing countries with economies of large-scale growth, the impacts of trade liberalization have led to increased exports and foreign income (Maur 2006). On the other hand, developing countries, such as those in the Caribbean, have experienced increased imports bills and reduced prices and markets, along with significant decreases in the traditional and non-traditional crop exports (Ahmed 2001, 2004; Anderson 2013; Clarke and Barker 2012; Deep Ford and Handsdeep 2007; Deep Ford and Rawlins 2007; ECLAC 2005; The Jamaica Gleaner (TJG) 2009; Witter and Brown 2004).

Between the 1950s and early 2000s, import licenses, preference prices, and stamp duties, along with restriction of quantities, protected traditional agricultural exports from the Commonwealth Caribbean at large from competition on the world market. Trade protection, in the form of guaranteed preferential prices and a market for sugar and bananas, was offered by the UK after the Second World War (Ahmed 2004; Lapper 2005; Witter and Brown 2004). However, according to Simcoe-Read et al. (2006, p. 1), 'liberalization eroded the protection from rates such as

20 percent to a maximum of 40 percent for agricultural products'. Sugar prices offered by the European Union (EU) have also experienced a 39 percent decrease (Lapper 2005; TJG 2009). This decline brought preferential rates closer to world market prices, which eroded trade benefits (ECLAC 2005; Grant 2013, 2014). In addition to this economic disaster, Jamaica became a member of the World Trade Organization, which meant that it would be required to adhere to the rules and regulations that were associated with the organization (Ahmed 2001; Ahmed 2004; Anderson 2013; Wyss and White 2004).

National Context: Development of the Sugar Industry

In 2010, six sugar factories were located across Jamaica in which both raw and, to a lesser extent, refined sugar were being produced. Two factories were privately owned and were also considered to be more efficient than their government-owned counterparts. One of these is the Peter Mc Connell family-owned Worthy Park Sugar Factory considered to be the most efficient sugar factory in Jamaica, but it has also been affected by trade liberalization and the EU price reduction (Harrison 2001; Lapper 2005).

After recording an all-time high of 514,825 tonnes in 1965, Jamaica's sugar production declined to 186,133 tonnes in 1998 and 204,188 tonnes in 1999 (Sugar Industry Authority (SIA) 2000). This trend has continued, and sugar factories across the island continue to produce way below their full capacity (see Table 5.1). Since 2001, sugar production has not exceeded 200,000 tonnes (see Table 5.1). However, it should be noted that Hurricane Ivan in 2004 accounted for much of the losses that were recorded in 2005 when many cane fields were devastated (Thame 2006).

The fluctuating sugar production rates are stifling the ability of the industry to compete effectively with countries such as Brazil (Ahmed 2001; Ahmed 2004; Anderson 2013; ECLAC 2005; Lapper 2005; Witter and Brown 2004). In spite of losing guaranteed markets, Jamaica, like several other Caribbean countries, was given specified quotas to fulfil until the full erosion of the preferential arrangement. If Jamaican sugar factories were efficient, the industry would have been able to produce the required quota to satisfy its three principal markets. However, Jamaica continuously experienced challenges in meeting its quota

Table 5.1 Production of sugar in Jamaica: 2000–2009

Factory°	Capacity (Tonnes)	Production (Tonnes 96)									
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Frome	90,000	59,108	64,078	56,534	53,117	56,978	42,515	46,524	53,729	49,828	37,847
Monymusk	65,000	42,247	32,559	22,666	19,028	27,091	9,322	18,400	16,957	15,421	19,342
Bernard Lodge	50,000	29,325	28,193	19,673	16,798	21,869	14,053	15,124	16,114	15,017	–
Appleton	50,000	23,291	30,706	26,707	20,882	29,267	21,404	26,196	31,332	22,310	31,625
Long Pond	30,000	15,600	8,967	9,873	10,475	10,410	4,654	8,761	9,884	6,399	3,833
St Thomas Sugar	25,000	13,389	10,615	10,968	9,685	13,492	10,426	10,928	14,151	12,886	11,486
Worthy Park	26,000	25,188	22,339	23,066	22,552	24,566	21,833	20,949	22,220	19,011	21,685
Total	**336,000**	**216,387**	**204,478**	**174,640**	**152,536**	**183,672**	**124,206**	**146,882**	**164,387**	**140,872**	**125,818**

Source: SIA (2010)

or supplying all its markets adequately from 2000 to 2014 (ECLAC 2005; Grant 2013, 2014; Myers 2007) (see Table 5.1). The end of the Cotonou Agreement in 2008 allowed the sugar industry to supply the domestic market and to seek new markets. In October of 2009, the EU reduced the price of raw sugar imports from Jamaica by 36 percent. The removal of the Sugar Protocol, which ensured preferential prices led to the African, Caribbean, and Pacific Economic Partnership Agreement to cushion the social and economic impacts based on changes in the sugar industry. This agreement provided financial assistance to affected countries, but Jamaica continued to experience production challenges. As a result of the termination of the Sugar Protocol, Jamaica entered into a 2-year agreement with a Swiss company, Eridana, to provide 79,000 tonnes of sugar (Luton 2009). This new agreement helped to fill the gap that was left after the erosion of the EU market in the short term. After Eridana, another agreement was signed with Tate & Lyle to supply a minimum of 100,000 tonnes of raw sugar. The deadline to end sugar production quotas will take effect on 30 September 2017, which will be the start of a new era for the sugar industry in Jamaica.

High production cost for sugar has resulted in the high cost of raw and refined Jamaican sugar on the world market. World leader Brazil can afford to sell its sugar at a lower price than Jamaica because they have a lower cost of production (Ahmed 2001; ECLAC 2005; Lapper 2005). The use of technology within the sugar industry has also separated countries with economies of scale from those without. In Jamaica, the sugar industry still remains labour intensive, especially among small farmers (SIA 2000). Brazil and Australia can produce raw sugar for less than 7 US cents per pound, and Guyana can produce sugar at about 18 cents per pound, while in some Jamaican state-owned factories, the cost is as high as 40 cents/lb (Lapper 2005).

In order to avoid the total demise of the sugar industry, like CARICOM partners Trinidad and Tobago and St Kitts, and the possible socio-economic effects that would be associated with such collapse, there have been several attempts to revitalize the industry by the Government of Jamaica (Lapper 2005). In 1998, the government regained control of the four factories that were divested in 1994, and at that time was the major shareholder of six of the country's eight factories (SIA 2000).

After failure of its sugar industry divestment efforts in the early 1980s and mid to late 1990s, the Government of Jamaica in 2009 again considered diversifying the industry in another revitalization effort. The diversification process was expected to involve moving away from raw sugar production to by-products such as ethanol, rum, and refined sugar, as well as bagasse (Lapper 2005). These efforts required more investment in the form of economic input to purchase badly needed technology to increase the efficiency of the government-owned factories. The Worthy Park Sugar Factory at this time was already diversified as the factory was largely powered on bagasse during harvesting along with the operation of a rum distillery, which was opened in early 2005 (ECLAC 2005; Henry 2006; Lapper 2005; TJG 2009). Other factories also diversified by processing other products apart from sugar. For example, Appleton Estate in St Elizabeth has focused on the production of spirits including its flagship internationally recognized red rum that bears its name, and Monymusk in Clarendon has also expanded its production of rums and other spirits.

Local Context

Traditional export crops such as sugar cane are mainly produced by large-scale farmers and estates, but at the beginning of the millennium, approximately 30 percent of sugar cane was being produced by small farmers (Simcoe-Read et al. 2006). However, the export potential of major traditional agricultural exports—like sugar, bananas, and coffee—is in constant danger because of the inability to produce at internationally competitive prices. More recently, the challenges associated with loss of preferential markets have presented themselves to local sugar stakeholders.

In the Caribbean, entire communities may not depend solely on the sugar industry (Clarke and Barker 2012; Harrison 2001; Lapper 2005). According to the Sugar Industry Authority (SIA) (2000), the sugar industry in Jamaica employed some 36,000 persons directly, of which about 15,000 were self-employed cane farmers and 2,200 were factory workers along with another 100,000 indirect affiliates (Robertson 2007). Peter Mc Connell (cited in Lapper 2005) claims that the majority of the persons located in a 15-mile radius of the Worthy Park Sugar Factory depended entirely on the sugar industry for a living. In the study areas

of Crofts Hill, Kellits, and Top Hill, the majority of the sample were totally dependent or relied heavily on the sugar cane industry and small-scale food farming for their livelihood. Closure of the sugar industry in Jamaica would impact thousands of persons.

Small farmers are currently facing low prices for sugar cane and high production costs. The latter stem from several factors including high cost of fertilizer, high cost of labour and other inputs, insecure land tenure, farm size, and land fragmentation along with the distance of plots from the main road and factory, which attracts high transportation costs. These factors have resulted in changes in land use patterns as several farmers have decided to grow 'cash crops' (short growing crops, e.g., cabbage and pepper), rear livestock, sell the land, or leave the land idle. Mr. Mc Connell, the owner of Worthy Park Sugar Factory (cited in The Jamaican Gleaner 2009), suggests that in the event of a closure of the factory, the result would be a deepening of rural economic and social crises.

Medicine for an Ailing Industry

In order to move the sugar industry forward, a number of policies have been developed and implemented by the Government of Jamaica to assist small sugar cane farmers. For example, a medium-term agricultural plan was developed between 2002 and 2004, aimed at improving the agricultural sector. According to Singh (2005), one of the key areas of the plan was the rationalization and strengthening of the extension services for the small independent sugar cane farmers on the island.

Similarly, the 'Country Strategy for the Adaptation of the Sugar Industry: 2006–2020' was drafted by the Government of Jamaica in 2005 and revised in 2009 to assist with the transitioning of the industry until 2015 and 2020, respectively. The Country Strategy highlights three main products of focus, namely raw sugar, molasses, and ethanol. It supports the concept of a private sector-led industry with improved efficiency in production, diversifying revenue sources and strengthening the human resources available in the industry. This resulted in the sale of government-owned sugar entities Long Pond, Hampden, and St Thomas Sugar Estates in 2009 and Frome, Monymusk, and Bernard Lodge Estates between 2010 and 2011.

The sugar industry is still important to Jamaica's economy and that there are several opportunities that can be exploited. The Sugar Industry Research Institute, the SIA, and All Island Sugar Cane Farmers Association are all working to improve the viability of the sugar industry. More recently, the Sugar Transformation Unit was established to implement the Country Strategy by providing financing through the Cane Expansion Fund to support the expansion of cane production and provide capital input such as drip-irrigation equipment to improve efficiencies within the industry.

Small-Scale Sugar Cane Farming in the Central Jamaica

The Worthy Park Sugar Factory has been in operation since 1672 (Henry 2006) and is located 12 miles from Crofts Hill, 17 miles from Kellits, and 8 miles from Top Hill. It purchases most of the sugar cane from the farmers within the general study area. The study area is located within the hilly interior of Jamaica and both sites are approximately 850–950 m above sea level. The relief of the area influences frequent rainfall within the two predominant rainy seasons as well as irregular showers during the dry seasons. This creates a favourable farming environment. Farmers in the area have studied and used the rainfall patterns, climatic regimes, and soil to their advantage for generations.

Patterns of Land Use

Monitoring 339 farm plots across the study area revealed significant information about the changes in land use patterns that have taken place over a 7-year period from 1999 to 2006. 'The sugar industry has vanished (not literally) from northern Clarendon and is in a state of stagnation in the south' (Robotham 2008). The decline of sugar cane production in Crofts Hill, Kellits, and Top Hill has been drastic. Ninety percent of the respondents in the general study area reported decreases in their production of sugar cane with only 10 percent of the respondents reporting a slight increase. Out of a total of 339 sugar cane plots in 1999, only 193 were still producing sugar cane in 2006, which represents a 43 percent decline

over the period. Idle lands (24.8 percent), other crops (16.5 percent), and buildings (1.7 percent) were responsible for the drastic land use changes.

This decrease also corresponds with downturn in sugar prices as small farmers reduced sugar cane cultivation on selected plots to plant other crops that they deemed to be more lucrative (see Table 5.2). This is manifested in significant decreases in the production of sugar cane in the two sites between 2004 and 2009.

Age, Gender, and Period of Involvement

Jamaica's agricultural sector is characterized by an ageing population with most farmers being between the ages of 50 and 60 years over the last half a century (Campbell 2011). The average age for farmers in Jamaica is 58 years, according to Mr. Allan Rickards, speaking at the Cane Leaders Meeting held at Crofts Hill (January 2010). More recently, the Minister of Agriculture suggested that the average age of farmers in Jamaica was 65 years in March 2015. Across the two sites, a similar trend was identified. Site One had 71.5 percent of the respondents who were over the age of 55 while in Site Two, 71.4 percent of the respondents were over that age.

Older farmers tend to lack the production capabilities that can normally be found among those of a younger age (Brierley 1987). However, one should not rule out the contribution of older farmers in the production of sugar cane as they dominate the small sugar farmers' subsector.

Farmers from both sites have been involved in sugar cane production for a long time. The majority of the farmers were involved in sugar cane cultivation for at least 21 years. In both sites, 74.3 percent of the respondents were involved in sugar cane production for at least 21 years. During

Table 5.2 Mean production and highest recorded tonnage of sugar cane in 2004 and 2009

Location	Mean production in 2004	Mean production in 2009	Highest recorded tonnage in 2004	Highest recorded tonnage in 2009
Site 1	69.11	40.04	350	360
Site 2	56.40	30.34	85	150

Source: Author's fieldwork

the focus group discussions some farmers expressed the view that the cultivation of sugar cane has been and still is a vital aspect of their livelihoods. Although the economic return may not be significant, the compensation received is still able to provide a means of subsistence for some households. Sugar cane cultivation is somewhat of a tradition, which has been passed down according to 80 percent of respondents in Site One and 60 percent in Site Two.

Educational Attainment of Farmers

It has been argued that education is important to agricultural production in a rapidly changing technological or economic environment, but agriculture is often hampered by low educational attainment (Campbell 2011; Padhy and Jena 2015). The agricultural sector in Jamaica is normally stigmatized by the perception that farmers are generally uneducated. Although there are some farmers with sound education, the vast majority are indeed undereducated when measured in terms of completion of post primary education. In Site One, only 11.4 percent of the respondents had secondary level education whereas in Site Two, 5.7 percent of respondents had secondary school education.

Low educational attainment can affect a farmer's ability to effectively manage his/her farming operations based on capacity constraints (Campbell 2011). Without effectively managing one's farm, the ability to maximize farm returns could be greatly diminished. Welch (1970) coined the phrase 'worker effect of schooling', which attributes increase in farm output directly to education, all other things being equal. Padhy and Jena (2015) supported this concept after assessing several studies, which suggest that education increases agricultural productivity. Educated and/or trained farmers are exposed to information and new practices, thereby changing their attitude in a positive manner. However, Kalirajan and Shand (1985) argued that farmers' formal education was not as significant as non-formal education relating to farming practices and technology, which was independent of formal education.

Use of Indigenous Technical Knowledge

According to Beckford and Barker (2007), Campbell (2011), and Richards (1985), small farmers constantly experiment, adapt to changes, and innovate in their own ways in trying to solve their problems. This process is considered to be indigenous experimenting, also known as indigenous technical knowledge (ITK) (Brierley 1987; Barker and Beckford 2005; Beckford and Barker 2007). Barker and Beckford (2005) refer to ITK as the unique and traditional knowledge of local communities. This knowledge is passed down to each succeeding generation who then modify it to suit changing dynamics.

In the cultivation of sugar cane, the ratooning technique (growing crops from the stubbles/roots of the previous crop) is widely used by small-scale farmers, large-scale farmers, and estates alike over a period of time. This is done to ensure that the crop matures earlier and to reduce costs associated with replanting. However, the use of the technique may cause fields to become exhausted and may lead to reduced yields. Farmers are therefore encouraged to replant their fields with new cane seeds every 6 years as cane roots become depleted and yield low-quality sugar. Evaluation of new cane varieties can be made to obtain high yielding varieties that are suitable for particular climatic and soil conditions within given areas (Alam and Khan 2001). In Site One, 51.4 percent of small farmers replanted sugar cane after 6 years while 28.6 percent replanted after 6 years in Site Two. Small farmers who failed to observe this agronomic practice reported significant reduction in yields.

Although replanting fields every 6 years is recommended, some farmers have found an alternative to this. Rickards argues that the subpar performance of the 2004 crop was due to problems with farmers and the estates not replanting fields (Thame 2006). Instead of having to go through the process of clearing the land, ploughing the land, and replanting sugar cane, small-scale farmers tend to 'supply' their fields with cane heads/tops. 'Supplying' is the process in which gaps in sugar cane fields are planted with material (cane heads) from the previous crop. This includes routine checks for areas within the field(s) containing gaps. Leaving unplanted spaces in cane fields reduces output and hence income and exacerbates low sugar content from over ratooned planting stock. At Site One, 14.3 percent of the respondents 'supplied' their farm plot(s)

whereas in Site Two, 22.9 percent of the respondents 'supplied' their farm plot(s). Unlike the sugar estate and large-scale farmers where sugar cane is planted in rows, some small farmers tend to plant their produce in an ad hoc manner, which supports the practice of supplying.

Poor Farm Management

A key informant in the study, Mr. Kiffin of the Worthy Park Sugar Factory, stated that farmers are encouraged to maintain and increase the productive capabilities of their farm plots and to treat it as a business. By doing this, both farmers and the factory would benefit (Harrison 2001). Up to 1998, external contribution from small- and large-scale farmers accounted for more than 50 percent of the sugar cane that was sold to the Worthy Park Sugar Factory. However, in 2009, the Worthy Park Sugar Factory produced more than 50 percent of the sugar cane it processed. The contribution made by small-scale farmers to the Worthy Park Sugar Factory has experienced a gradual decline since 1998.

Sugar cane tends to grow best where the roots are properly aerated. Most of the farm plots observed were not properly aerated, especially those fields that had been neglected. The majority of the small farmers relied primarily on the second payment for the procurement of inputs to maintain fields. Payments are usually done in tranches in which the first disbursement accounts for 70 percent of actual sale (based on projected market price), second disbursement accounts for 27.5 percent of actual sale (based on revised market projections), and third disbursement accounts for 2.5 percent of actual sale (based on actual market price). The second payment is of significance to the farmers for the purchasing of farm inputs and is disbursed in early to mid-August of each year. At Site One, 100 percent of the respondents used fertilizers and chemicals while at Site Two, 97.1 percent used fertilizers and chemicals and 2.9 percent used only fertilizers. However, waiting on such inputs hinders the early development of the cane. This impacts growth and directly affects the sugar content, yield per acreage, and eventually the income earned from the crop as explained by Mr. Kiffin.

Economic Issues

Price of Sugar Cane

The price per tonne of sugar cane has increased over the years. Between 2003 and 2014 small-scale farmers across the island were paid between $1700 and $5700 per tonne (see Table 5.3). The sugar cane farmers who sell their produce to Worthy Park Sugar Factory are usually paid more for their produce than those who sell their produce to other factories with the 2013/2014 year being an exception (see Table 5.3). The same can be said when compared to the industry average. However, given the high costs of production, harvesting and transportation, and low prices for their produce, small-scale sugar cane farmers in the study area struggle to eke out a meagre existence.

Labour Cost Impacting Production Costs

Labour costs are often high as sugar cane cultivation remains labour intensive (Ahmed 2001). Farmers' expenses typically include paying workers to cut the cane at $1000.00 per day or $800.00 per tonne, $800 per day to transport cane from the field, between $600.00 and $1000.00 for transportation to the factory, and $300.00 per head for providing lunch. These expenses often total more than the first payment and as such farmers incur a loss. Interestingly, transportation costs increase more dramatically with distance from the main road rather than with distance from the factory. Several small farmers in both sites, along with Mr. Kiffin, explained that the first payment is not for the farmers but for the workers. In general, small farmers producing less than 30 tonnes of sugar cane would normally have to withdraw money from their personal savings, sacrifice livestock, or borrow money to cover their harvesting expenses.

The second payment received by small farmers is not much better than the first. Small farmers were upset that the cost of fertilizers received before August would be deducted from the second payment. According to Cruz (2008) fertilizer contributes approximately 30 percent of the total input in the production of sugar. Out of the remaining sum received, up to 40 percent would go towards the purchasing of chemicals.

Table 5.3 Average price received by small-scale farmers for tonne cane between 2003 and 2014

Production year	Appleton	Bernard Lodge	Everglades	Golden grove	Monymusk	Frome	Worthy Park	Industry average
2003/2004	1,803.07	2,006.12	1,848.92	1,743.22	2,195.22	1,962.16	2,671.51	2,032.89
2004/2005	1,996.90	1,788.59	1,942.10	1,965.02	1,863.38	2,061.11	2,639.32	2,063.95
2005/2006	2,222.52	2,076.47	2,050.74	2,290.31	2,343.93	1,988.80	2,555.29	2,148.37
2006/2007	2,204.32	2,131.01	2,178.22	1,992.12	2,414.46	2,109.73	2,444.24	2,181.48
2007/2008	2,751.65	2,425.70	3,022.96	2,490.34	2,826.60	2,448.86	3,058.58	2,624.80
2008/2009	3,363.22	n/a	3,316.53	3,444.39	3,453.44	3,593.96	3,720.09	3,524.04
2009/2010	2,750.78	n/a	3,177.08	2,362.24	2,603.70	2,487.35	3,215.88	2,635.68
2010/2011	3,331.55	n/a	n/a	3,000.64	3,282.45	3,268.59	3,568.72	3,287.12
2011/2012	4,479.43	n/a	4,904.55	4,157.97	5,375.10	4,470.12	5,545.53	4,711.40
2012/2013	5,294.10	n/a	4,559.05	4,197.37	5,175.65	4,850.11	6,042.08	4,998.14
2013/2014	4,748.41	n/a	4,893.81	3,822.35	5,631.45	4,141.28	5,565.13	4,643.87

Source: SIA (2015)

The rest would be used to offset any debt that they might have incurred for the period. However, due to the age of most farmers, they are unable to provide labour to spray their fields (Brierley 1987). This accounts for the labour cost, which is usually between $1000.00 and $1500.00/drum of spray depending on the location and the size of the farm plot(s). The regular increases in farm inputs affect the viability of sugar production and output from small-scale farmers (Alam and Khan 2001; Cruz 2008).

The third payment is usually paid in the first week of December, which is approximately a month before the start of the harvesting season. However, earnings from the second and third payments normally contribute to domestic expenses and the schooling of family members. With farmers having fairly large households, these commitments can be financially taxing. In Site One, 48.5 percent of the respondents indicated that the household size was over five persons, while 40 percent of the respondents' households in Site Two had over five persons.

Use of Less Fertilizers and Chemicals

Although small-scale sugar farmers are urged to increase their yield per unit area of land, it has proved difficult for most to achieve this. Faced with increasing prices for both local and imported fertilizers (Ahmed 2001), farmers have opted to use less fertilizer, thereby reducing the nutrient content of the soil. Both sites had decreasing numbers for fertilizer use in 2009 compared to 2004. High-priced fertilizers translate to a higher cost of production (Alam and Khan 2001; Cruz 2008).

Ranked as the number one problem in both sites, farmers have adapted to their fertilizer challenges. Using less fertilizer per unit of land contributes to excessive nutrient loss (Cruz 2008) and reduced productivity. This can partly account for the drastic decline, which has been plaguing the sugar industry in terms of the contribution from small-scale farmers.

Lack of access to chemicals has forced several farmers back to basics. Farmers in both sites have been seen manually weeding the rows of their cane fields, which, although being labour intensive, is quite effective. This is time consuming but eliminates the dependence on expensive chemicals and, very importantly, is environmentally sound.

Land Tenure and Land Fragmentation

Land tenure and land fragmentation of farm plots are interrelated and can affect a farm's economic viability. Land fragmentation is the cultivation of more than one plot of land in which spatial dispersion of the plots may be limited to a community or over a wide area (Beckford and Campbell 2013; Campbell 2011; King and Burton 1982). In the Caribbean, land fragmentation is often associated with small-scale farmers (Brierley 1987; Campbell 2011). In such instances, a farmer's agricultural land may consist of multiple plots dispersed over a wide area in relation to distance from the farmer's house (see Table 5.4). The issues of land tenure and land fragmentation play a vital role in agricultural production within the study area.

Land that is bought, rented, or leased may not necessarily be located near the homestead (Brierley 1987) and as such may result in plots being dispersed. This creates the problem of timely access to farm plot(s), b ut in some cases, this problem may be mitigated with the use of donkeys and vehicles. Farmers without reliable transportation (averaging 37.15 percent in the general study area) indicated their tendency to neglect distant plots, which are usually F3–F6 (see Table 5.4). According to and Brierley (1987), the intensity of land use declines with increase in distance from the farmer's house. This contributes to distant plots being underused and underproducing. This significantly affects the productivity of small-scale sugar cane farmers.

Over 50 percent of the farm plots in both sites were fairly small (59.7 percent had 0–2 acres in Site One and 78.3 percent in Site Two) and do not allow for large-scale production. Small plots also make it more uneconomical for the use of advance technology and mechanization. However, in other cases, land tenure may affect farmers' interest to incorporate such advancements as land may not be directly owned by them but is operated under insecure tenure such as rent, lease, or family land to a lesser extent. Economic viability is more likely when farmers are able to make decisions that will not be affected by land tenure (Brierley 1987) and the size of farm plots where farmers can take full advantage of the land that they are cultivating. If these issues continue to plague the industry, there will be further decreases in sugar cane production and productivity.

Table 5.4 Basic characteristics of 77 farm plots in Site One and 83 farm plots in Site Two

	Site One							Site Two					
Size of plots	F1 (%)	F2 (%)	F3 (%)	F4 (%)	F5 (%)	F6 (%)	Total (*n*)	F1 (%)	F2 (%)	F3 (%)	F4 (%)	F (%)5	Total (*n*)
0–2 acres	39.1	37	15.2	4.3	2.2	2.2	46	50.7	26.2	10.8	10.8	1.5	65
2.1–4 acres	60	26.6	6.7	6.7	–	–	15	–	46.2	38.5	–	15.3	13
4.1–6 acres	60	20	20	–	–	–	5	50	25	–	–	25	4
More than 6 acres	45.5	36.4	18.1	–	–	–	11	–	100	–	–	–	1
Ownership of land													
Family land	46.9	34.4	15.6	3.1	–	–	32	51.9	29.6	11.1	3.7	3.7	27
Owned/Land title	50	27.7	13.9	5.6	2.8	–	36	50	27.8	8.3	8.3	5.6	36
Rented	–	–	–	–	–	–	–	–	28.6	42.8	28.6	–	7
Leased	22.2	55.6	11.1	–	–	11.1	9	23.1	38.4	23.1	7.7	7.7	13
Relief of land													
Flat	41.7	33.3	25	–	–	–	12	40	30	13.3	16.7	–	30
Gentle	48.6	28.5	11.4	5.7	2.9	2.9	35	52	32	16	–	–	25
Flat and sloping	42.9	42.9	14.2	–	–	–	7	44.5	22.2	22.2	–	11.1	9
Fairly steep	37.5	37.5	25	–	–	–	8	37.5	37.5	12.5	–	12.5	16
Very steep	46.6	40	6.7	6.7	–	–	15	–	–	–	66.7	33.3	3
Distance from house													
0–400 m	66	27.7	6.3	–	–	–	47	63	21.7	8.7	4.4	2.2	46
401–800 m	16.7	66.7	8.3	8.3	–	–	12	8.3	33.3	25	25	8.3	12
801–1200 m	–	–	100	–	–	–	1	–	66.7	33.3	–	–	3
1201–1600 m	–	20	80	–	–	–	5	12.5	50	25	–	12.5	8

(*continued*)

Table 5.4 (continued)

	Site One							Site Two					
Size of plots	F1 (%)	F2 (%)	F3 (%)	F4 (%)	F5 (%)	F6 (%)	Total (*n*)	F1 (%)	F2 (%)	F3 (%)	F4 (%)	F (%)5	Total (*n*)
More than 1600 m	16.7	33.3	16.7	16.7	8.3	8.3	12	28.6	35.7	14.3	14.3	7.1	14
Distance from main road													
0–400 m	57.8	28.9	11.1	–	–	12.2	45	56.7	26.7	10	3.3	3.3	30
401–800 m	28.6	28.6	14.3	21.4	7.1	–	14	33.3	50	8.3	8.3	–	12
801–1200 m	–	66.7	33.3	–	–	–	3	22.2	22.2	33.3	22.2	–	9
1201–1600 m	45.5	45.5	9	–	–	–	11	45.4	18.2	18.2	9.1	9.1	11
More than 1600 m	–	50	50	–	–	–	4	33.3	33.3	14.4	9.5	9.5	21
Type of farming													
Sugar cane	31.1	44.5	15.6	4.4	2.2	2.2	45	20	40	20	14.3	5.7	35
Inter-cropping	54.5	9.1	27.3	9.1	–	–	11	45.4	18.2	27.3	9.1	–	11
Sugar cane & other crops	37.5	50	12.5	–	–	–	8	25	50	12.5	6.25	6.25	16
Mix farming	100	–	–	–	–	–	12	100	–	–	–	–	18
Nothing	–	100	–	–	–	–	1	33.3	33.3	–	–	33.3	3

Source: Author's fieldwork (Adapted from Brierley 1987)

n = number of respondents

Accessing Financial Capital

Farmers who operate family, leased, and rented land(s) are at a disadvantage in accessing loans or even getting grants (see Table 5.4). Not having legal document(s) to establish user rights is problematic. For example, family land is usually handed down through verbal agreements, and as such, there is often no written document(s) to show proof of ownership (Brierley 1987). Of course, being considered high risks also stymies small sugar cane farmers' access to loans. High cost of sugar cane production has and continues to frustrate the hopes of individuals who were once a part of a very vibrant industry (Rose 2007). Yet, it is difficult for one to turn his/her back on something they love and that has become integral to their livelihood.

Poor Agricultural Practices

Improper Preparation of Farm Plots

The then Sugar Company of Jamaica argued that the 12,300 tonnes of sugar produced in 2005 was attributed to shortfall in sugar cane production due to illicit fires and industrial unrest (Thame 2006). In addition, another 17,700 tonnes in losses was attributed to the poor quality of sugar cane reaped due to heavy rainfall early in the season and drought in the latter part of the season. The fires affected the economic stability of the small-scale sugar cane farmers within the industry as they are paid less for burnt cane. Based on tradition, some small farmers tend to have the same or similar method(s) of preparing land for cultivation. All of the respondents in both sites tend to burn land when clearing it for cultivation. This practice affects the nutrient level of the soil and consequently affects yield. The burning of farm plots also adversely affects sucrose content of cane. Wildfires were not a major problem in the study areas.

Early/Late Planting Versus Early/Late Reaping

The growing period for sugar cane is ten to twelve months. In Site One, 48.6 percent of the respondents planted sugar cane in May and June while 54.3 percent in Site Two planted sugar cane over the same period. Planting sugar

cane in the predominant rainy season of May to June creates the opportunity for sugar cane plants to develop efficiently in the early stages of growth (Alam and Khan 2001). Planting sugar cane outside of the rainy seasons can result in getting caught up in adverse drought conditions, which may affect the growth of the plant. However, the risk associated with the early/late reaping of the plant can be as detrimental as early/late planting. When the plant is reaped early, the juice quality is affected and will affect a farmer's income. In Site One, 48.6 percent of the respondents harvested their crop between May and June while 51.6 percent of the respondents in Site Two harvested their crop between February and March. To obtain satisfactory benefits, farmers must know the ideal planting and reaping times.

Conclusion

Liberalization creates conditions that make trade more open and competitive. However, with no protection or support available to local small sugar cane farmers, trade liberalization has exacerbated the challenges small sugar cane farmers face and is contributing significantly to their productivity decline of the sugar industry in Jamaica. Small farmers are a vital part of the sugar industry although their contribution to the industry has been declining. Many report that they are losing the battle of coping with the multiple challenges that they face. A low resource base and difficulty in accessing capital financing are two fundamental factors that are currently restricting small farmers from achieving increased production.

Small farmers across the study area face issues on many fronts with economic and social factors taking centre stage. The social issues surrounding small farmers and their viability include their age, period of involvement, gender, level of educational attainment, farm management, and the use of ITK. The economic factors include high production costs, low prices paid for sugar cane, insecure land tenure systems, land fragmentation, inability to access loans, high cost of transportation, and poor agricultural practices. The underperformance of small-scale sugar cane farmers has deleterious effects on the local sugar industry as a whole as they still represent an important source of raw material.

Government efforts to boost the fortunes of small-scale sugar cane farmers have not produced the desired results. The alternative for most small farmers is to exit the sugar industry. Some farmers have adapted to the economic constraints they face by diversifying operations and creatively cutting production costs through reduction in the use of fertilizers and chemicals. However, this leads to other problems including reduced yields.

The future of the sugar industry is at stake; the Government of Jamaica needs to pay more attention to all areas within the industry and make the necessary adjustments to ensure a safe and secure future for individuals involved in the sugar industry. Large-scale farmers and estates normally find economic viability within the industry, but the same cannot be said about the small farmers. While all sugar cane interests have felt the impact of globalization there can be little doubt "but for small cane farmers survival is a struggle". In order to save the sugar industry and the thousands of jobs within the industry, a holistic approach is needed to boost production and enhance profitability of small-scale sugar cane farmers.

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6

The Jamaican Coffee Industry: Challenges and Responses to Increased Global Competition

Mario Mighty

Overview

This chapter highlights the various challenges being faced by coffee stakeholders in the island of Jamaica in the context of a changing global environment, and the ways in which they have been responding to them. For decades, coffee was considered a 'sure' crop, one that you could bank on to provide for you and your family whether you grew, picked, roasted, or exported coffee. Jamaica's Blue Mountain coffee was among the first coffees considered to be a 'specialty' coffee—coffees grown in special geographic microclimates that produce beans with unique flavour profiles (Rhinehart 2009). However, with the changing dynamics in the specialty coffee markets, stakeholders are seeing declining demand for their coffee and when the demand is strong, the prices being commanded are lower than ever.

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Introduction

The decline in coffee price on the international market has come about as a result of a combination of several factors. The traditional customer base in Japan—the 'baby boomers'—who were in the prime of their careers in the 1970s and 1980s are now either retired (meaning that they now have smaller incomes) or have passed away. Since over 80 percent of Jamaica's coffee is sold to Japan, this has meant that purchasing companies in Japan have gained leverage in negotiating prices due to falling demand. In other markets, especially the USA and Western European markets, Jamaican coffee is known as an exotic coffee but does not gain much market share due to competition from dozens of other specialty coffee brands. Another factor is the typical consumer's changing appetite for coffee. Though more people have been drawn to specialty/higher-end coffee since the 1980s (Roseberry 1996; Daviron and Ponte 2005), the recent marketing trend has been towards coffee blends sold by international coffee-roasting companies and retailers located in the major coffee-consuming countries. Thus, coffees marketed as originating from a single farm, estate, or niche region of a country (single-origin coffee) have lost some prominence in the specialty market.

From the farmer level up to the dealer level, the members of the coffee industry have had to find creative ways of adapting to the challenges that they are experiencing. This study brings to light many of these adaptations. As the experiences of these stakeholders are explored, we see reinforcement of the reality of global competition and the need for those engaged in agriculture to actively seek niche areas and vigorously market them. This is especially important if they are based in a Small Island Developing State (SIDS) such as Jamaica.

The focus of Jamaican agriculture on the international market has a long, historic tradition. Beginning with the establishment of the sugar plantations in the sixteenth century at the behest of its colonial masters, and continuing with banana and coffee estates, the Jamaican agricultural sector has been oriented towards dependence on external demand. This has led to a number of vulnerabilities such as depressed prices when there are increased global supplies of the particular good, obsolescence as substitute products are created, and restricted access to

capital as profitability declines. The Jamaican coffee industry (JCI) has been an exception to the rule for many decades. Though produced on a small island, Jamaican coffee has established an enviable reputation on the specialty coffee market as being one of the best coffees in the world. However, the increased role of trade liberalization policies in the coffee trade has seen a decline in exports due to increased production costs, increased global competition, and economic recessions in key markets.

Although numerous studies have shown that those involved in the specialty coffee sector receive greater returns, especially coffee growers and others at the production end of the value chain (Raynolds 2002; Teuber 2007; Weber 2011), relatively little has been published on how participants seek to maintain these gains once they have been established. This chapter is part of a larger body of work that examines how the JCI can regain some of the competitive advantage (CA) it has lost over the last few years. The findings provide insights on how members of the JCI seek to secure their livelihoods in the face of global economic change.

Much of the published literature on CA has focused on firms outside of agriculture. Even within this sector, the emphasis has been on the consumer end of the value chain. This research will continue to build upon the literature on the impacts of globalization on small-scale agriculture by examining the influence of the global coffee market at the local scale. By identifying the challenges that drive decision-making among coffee stakeholders, both academic and non-academic stakeholders can generate more effective policies to support the coffee industry and promote diversification where applicable.

This research centred on the hypothesis that rising production and maintenance costs are the major challenges to improving CA faced by all stakeholders within the JCI. In order to test this hypothesis, this chapter presents a qualitative analysis of interviews with various coffee stakeholders examining this issue. The chapter continues by giving some context to the research including an overview of the JCI, the theoretical framework of the research, and a survey of broader issues in specialty agriculture. This is followed by a description of the research methodology, and the presentation and discussion of the various challenges faced and responses fashioned by stakeholders in the JCI, particularly in relation to securing the future of the local industry.

A Historical Overview of the Jamaican Coffee Industry

Coffee was introduced into Jamaica in 1728 from Haiti or Martinique (Wrigley 1988). The crop spread rapidly with the use of slave labour, mainly in the mountainous areas of the parish of St Andrew, and in 1737 Jamaica became a coffee-exporting country when 83,400 lb (valued at £6300) were exported to Great Britain (Gordon 2009). Production gradually increased and a very large portion of exports was derived from coffee planted in the Blue Mountains region of eastern Jamaica. The abolition of slavery in 1838 greatly reduced the labour force for coffee plantation and production quality and quantity gradually declined over the next 100 years (Gordon 2009).

By the 1940s, the deterioration of agricultural lands, the poor quality of coffee produced, and lack of quality standards influenced Canada, the main market at the time, to stop buying Jamaican coffee. This led to the suspension of all coffee exports from the island. In 1946, a comprehensive investigation of the industry and its practices highlighted the need to rehabilitate the JCI and amalgamate the various grower and processing works (in the early days of the industry, the washing, drying, and roasting of the coffee cherries were carried out in centralized facilities known as processing works) involved in the manufacture of Jamaican coffee. This led to the creation of the Coffee Industry Board of Jamaica (CIB) and the All Island Coffee Growers Association.

The island resumed smaller scale production in 1950, and over the next 10 years, the JCI gradually reoriented production towards international markets in keeping with the country's diversification of its economic base after the Second World War (Witter 2005). They exported primarily to their colonial masters, Great Britain, where Jamaican coffee had a reputation of excellent quality. Towards the end of the 1960s, it was discovered that much of the coffee sold to Britain was being resold to Japan for significant profits as the Japanese took a strong liking to the island's coffee, especially the higher-quality Jamaica Blue Mountain (JBM) coffee. Jamaica established direct market relations with Japan and sold most of its coffee there from 1970 onwards. Japan continues to be the primary market for Jamaican coffee to this day but was especially

dominant up until the mid-1980s, often purchasing the entire volume of coffee produced. This led to a scarce supply of JBM coffee for coffee connoisseurs all over the world and combined with its unique flavour profile, the JBM coffee established a reputation as one of the finest in the world. As market demand rose for JBM coffee, coffee production began falling in the non-Blue Mountains (NBM) regions of the island in the 1990s and today these areas contribute less than 25 percent of national coffee production (see Fig. 6.1).

The emphasis on this high-value agricultural good enabled the JCI to better negotiate many of the issues faced by the conventional global coffee market. These include changing governance structures, a concentration of power by transnational corporations, oversupply, interchangeable commodity grade beans, and low farm gate prices (Bacon 2005, p. 497). The trade liberalization and free trade eras brought increased opportunities as well as increased competition. Structural adjustment policies put in place for Jamaica by the International Monetary Fund (IMF) in the late 1980s made specializing in industries generating foreign exchange attractive to the government and they placed special emphasis on supporting the JCI, especially the JBM sector.

In the 1990s addressing the production and marketing challenges became the major focus of the JCI. Several incidences of drought and recurring disease outbreaks, industry deregulation, and devaluation of the Jamaican dollar significantly increased the costs of growing coffee across the island. At the same time, the prevailing World Bank-IMF-driven political economic consensus (Weis 2000, p. 304) opened several markets for the JBM coffee brand as well as for several other countries which moved into the premium and specialty coffee niche market. By the early 2000s, local coffee farmers began to see a general stagnation in prices due to even more competition from other premium and specialty coffees such as Fairtrade and organic products.

Falling demand was exacerbated by other adverse events. Chief among them were a spate of hurricanes between 2004 and 2008 that destroyed thousands of coffee trees across the island and outbreaks of coffee leaf rust and a resurgence of the coffee berry borer, which further complicated production, leading hundreds of farmers to exit the industry. Hundreds more found it difficult to make a living from growing just coffee and diversified their economic base to include other crops. The global economic recession

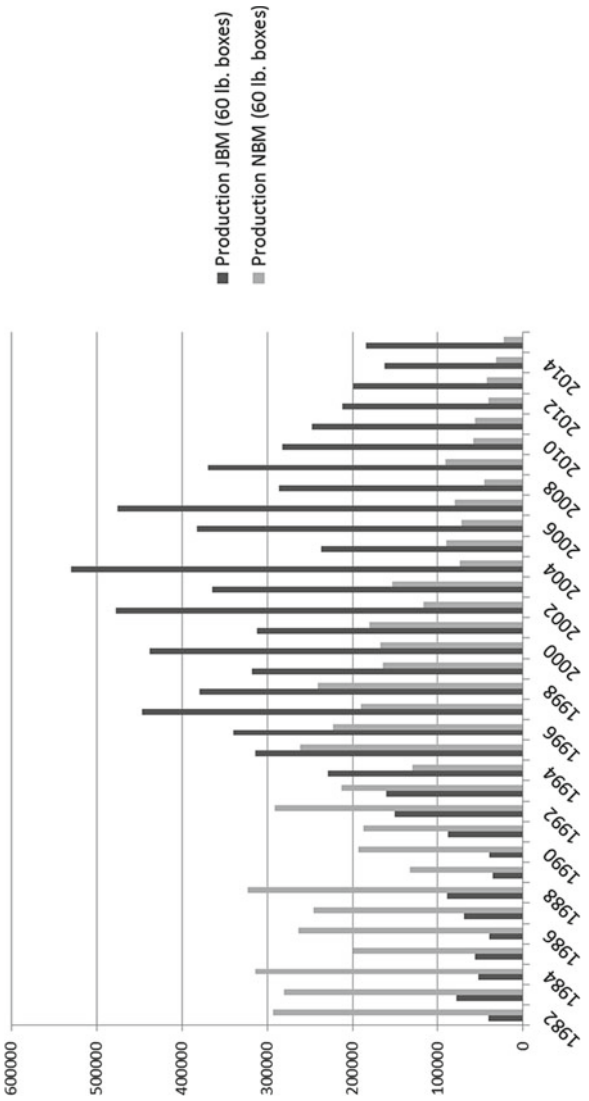

Fig. 6.1 Coffee production 1982–2015 (60 lb. boxes)

in 2008 further softened demand for JBM coffee as consumers reduced purchases. Although the CIB has continued their exploration into other markets while aiming to maintain market share in Japan, farmers uncertain about the future have continued to exit this seemingly prestigious industry. Thus, the JCI has had to seek ways to reinvent itself to maintain its presence in the ever-competitive international specialty coffee market.

Theoretical Framework

The theoretical lens for this work lies in the economic principle of CA as posited by Michael Porter. He states that CA focuses on the ability of a firm to obtain sustained profits that are greater than average for the industry. This advantage is based on being able to produce the good or service at a lower cost than competitors, or being able to charge higher prices than the competition through product differentiation (Porter 1985). In general, the competitive advantage framework relies on the 'bottom-up' approach to CA of a nation as compared to the 'top-down' approach in the models of comparative advantage (Gupta 2009). Some advantages of using CA in this research are its utility at various scales, its focus on industry structure, and the fact that it incorporates product differentiation as a key component of its approach.

The JCI is one of many industries in the Jamaican agricultural sector and includes entities at various scales—from individual, companies (public and private) to entire regions within the island. The flagship product of the industry—Jamaica Blue Mountain (JBM) coffee—is a study in successful product differentiation, and in order to maintain its success, stakeholders have to address the local and international structure of the global coffee industry.

Challenges in Specialty Agriculture

Suppliers of agricultural products face the challenge of receiving the lowest profit margin in the coffee value chain (Daviron and Ponte 2005). The possibility of obtaining higher profits through specialization has

therefore attracted members of most agricultural sectors to promote specialty chocolate, sugar, coffee, tea, and a number of other products.

Recall that CA is either based on a cost advantage (production at a lower cost than rivals) or by differentiation (creation of a product that is perceived as being unique on an industry-wide basis) or both (Huggins and Izushi 2011). In other words, when firms (such as those in the JCI) sustain profits that are greater than average for the industry then they have a CA over their rivals (such as other premium coffee producers). Porter (1985) states that maintaining these advantages requires the cumulative impact of many discrete activities ranging from production of the raw materials to the delivery of the end product to the consumer, that is, the value chain. However, there are several challenges to maintaining these advantages.

Globally, most coffee producers live in poverty and manage agro-ecosystems in some of the world's most culturally and biologically diverse regions (Bacon 2005). The International Coffee Organization (ICO) has reported frequently declining prices for coffee and slow growth in consumption for years (ICO 2013), though the 2013–2014 coffee year saw increased prices due to lower coffee supplies (ICO 2015). Bacon (2005) notes two tendencies that are eliminating the previous CAs held by countries producing Arabica coffee varieties. The first is the leading world producer, Brazil, increasing its global dominance of producing Arabica coffees. The second is the ability of many roasting companies to switch between Robusta and Arabica beans in their various blends, thus decreasing the price differential between the two types of coffee. Furthermore producers face the challenge of increasing incidences of pests such as the coffee berry borer (Jaramillo et al. 2011) and restrictions in production areas due to climate change (Haggar and Schepp 2012; International Center for Tropical Agriculture 2012).

Another development in the global coffee industry was the increased flexibility and more direct market access attained by producers and exporters with the collapse of the International Coffee Agreement (ICA). Large-scale transnational trading and roasting companies were quick to enter the spaces that opened up and rapidly gained majority control of the value-added segment of the coffee market (Bacon 2005). This has resulted in declines in the share of revenue to producers and producing countries and a corresponding enrichment of those involved in value-added enterprises in or for consuming countries (Talbot 2002; Daviron

and Pointe 2005; Diaz 2009). The increased homogenization of various coffees and a large number of producers over the last 20 years have meant that opportunities to succeed in the specialty coffee market have become very limited.

However, increasing consumer awareness regarding issues of quality, taste, health, and environment has increased the demand for specialty and eco-labelled coffees. These offer price premiums but still comprise a relatively small portion of the global coffee market. The largest market for specialty coffees is the USA where the specialty or gourmet market segment represents 17 percent of US coffee imports by volume and 40 percent of the retail market by value (Giovannucci 2001). Two of the major specialty movements, Fairtrade and organic coffee, have grown steadily over the last 20 years. Pierrot et al. (2010) estimated that 8 percent of the global trade in green coffee was certified as sustainable in 2009. But, as Bacon (2005) and Daviron and Ponte (2005) point out, the promise of re-embedding trade into a social value system is matched by the challenges and contradictions involved in attempts to infuse twenty-first-century capitalism with social and ecological justice, and the risk of saturating this relatively small market.

Along with the challenges described above, small islands possess even more limited coping resources, not the least of which include land and other natural resources. These are the people, landscapes, and contexts in which this research is situated.

Methodology

The primary data collection mechanism for this research was the semi-structured interview. This was supplemented by archival data collected from the CIB, the Statistical Institute of Jamaica (STATIN), and a variety of online sources.

Research Instrument

A semi-structured interview proved very useful for collecting this detailed and higher-quality information and had advantages over other methods

such as observation (challenges of misinterpretation), focus groups (relatively high difficulty to get farmers together and also less useful to get varied, in-depth perspectives), or using a questionnaire (less detailed information). The semi-structured interview is flexible, but it is also controlled (Burgess 1982) for a relatively smooth progression; yet it also leaves room for unexpected topics or new ideas to be taken into account and explored. Mighty (2010) highlighted that a semi-structured interview is the most effective means of gleaning information from a wide cross section of stakeholders with varying interests. Using this data collection method, farmers, manufacturers, regulators, government officials, and persons were not only given the opportunity to share information within a fairly structured framework but also given adequate space to expound on topics of interest as well as introduce ideas, issues, or concepts not covered by the interviewer. Each question led to a discussion of the challenges that were experienced or observed in the JCI and were arranged in such a way that new topics could readily be introduced.

Data Collection

Interview data was collected over two field seasons: between June and August 2012 and June and August 2013. The coffee year in Jamaica starts in August and ends in July. Thus, the timing of the interviews allowed participants to reflect on the various events of the concluding production year and assess them with greater clarity than if the interviews were being conducted in the midst of the production period. Data collection was designed to obtain a representative sample of farmers, processors, dealers, and regulators that would accurately represent the range of stakeholders' challenges and responses. Ultimately, all but 2 of the 14 main dealers, all 4 of the major coffee processors, and a diverse group of coffee producers were interviewed.

Data Analysis

Qualitative analysis techniques were used to identify the common themes across the interviews and thus identify the major challenges and responses by stakeholders within the JCI. The process of data analysis followed was

similar to that laid out by Bryman (2001), Patton (2002), Northcutt and McCoy (2004), Thomas (2006), and Swisher (2011). Every few interviews and also at the end of the data collection process, four kinds of analysis were conducted (though not necessarily in the order listed):

- Finding similarities among respondents through identifying common themes to enable the creation of categories,
- Identifying linkages between these categories and eventually creating some sort of typology related to the categories identified,
- Understanding and explaining the relationships that had been identified whether through seeking synthesis or understanding differences in the context of the research question,
- Conducting examination of outliers to see if they pointed to themes or questions that the researcher failed to consider in the research design.

This hierarchy synthesized dozens of pages of interview transcripts into a format that revealed the various challenges and responses. The remainder of the chapter will present the results of the analysis as well as discuss their implications for the JCI at the intranational and international levels.

Challenges and Responses in the Jamaican Coffee Industry

A total of 57 interviews were completed—39 in 2012 and 18 in 2013. The decrease in the number of interviews in 2013 was a result of reaching a saturation point (the point in the data collection process where no new information is being acquired) among farmers and the limited number of processors, roasters, dealers, and regulatory bodies available to be interviewed.

Although generally identified as farmers, processors, dealers, and regulators, it is important to note that these categories are not mutually exclusive in Jamaica. Strictly speaking, a coffee farmer is primarily engaged in the production and sale of his or her coffee cherries. A coffee processor is focused on the chain of activities that change the coffee cherries to dried green coffee beans; a coffee roaster then takes those beans and roasts them

for the consumer market; and a coffee dealer in Jamaica has the license to sell green bean and roasted coffee to local and international markets. In reality, there is often some overlap as most of the large coffee farmers have vertically integrated and are involved in some combination of processing, roasting, and exporting coffee. All coffee processors in Jamaica are also dealers in green beans and roasted coffee. The CIB's mandate as the regulatory agency is to work with stakeholders at all levels to maintain particular quality standards. Ultimately, the only stakeholders not involved in multiple levels of the value chain are the small-scale coffee farmers (the implications of this will be discussed later in the chapter).

As with most agricultural commodities, there are significantly fewer players involved as one moves up the value chain. Although over 80 percent of the interviewees were farmers, it is important to keep in mind the overlap in each segment amongst several of the interviewees.

Data was categorized and themes and topics from each category identified. These will be explored as each stakeholder group is discussed.

Farmers' Challenges and Responses

Fifty of the 57 interviewees were involved in growing coffee. According to the CIB and local farmers themselves, most of the island's 6000 farmers cultivate less than 4 ha (10 acres). Thus for the purpose of this analysis, small farmers were defined as those cultivating less than 4 ha of coffee, medium farmers as those cultivating between 4 and 20 ha, and large farmers as those cultivating over 20 ha. There was a similar distribution of farm sizes in and out of the JBM coffee region. In fact, over half of the small farmers interviewed cultivated less than 1 ha (2.5 acres). Though there are fewer medium and large farmers, they are concentrated in the JBM coffee region and produce much of the island's coffee according to production information obtained from the CIB.

The most prominent challenges identified by farmers were related to the economics of coffee production—production costs, coffee price, payment structure, payments delays—and how these have resulted in many farmers leaving coffee production (see Fig. 6.2).

A secondary set of challenges faced by farmers revolved around the pests and diseases that impact coffee, foremost among them being the

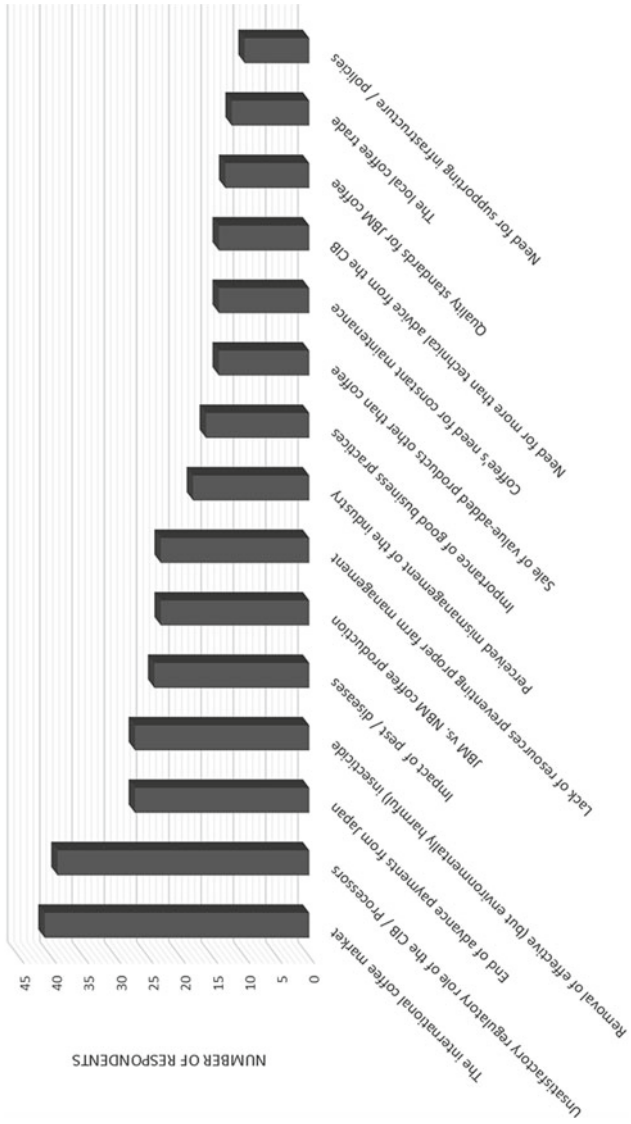

Fig. 6.2 The top 15 challenges faced by stakeholders in the Jamaican coffee industry

coffee berry borer (*Hypothenemus hampei*) as well as the impact of climatic hazards especially hurricanes and droughts. The coffee berry borer inflicts damage directly to the young coffee beans and can significantly reduce the number of marketable cherries while the coffee leaf rust disease reduces the ability of the coffee plant to photosynthesize, leading to lower yields. Hurricanes, high winds, and rain inflict significant damage to the coffee trees, particularly to the flowers and young berries. Droughts, on the other hand, restrict the proper development of the coffee cherries resulting in lower yields and lower-quality beans when processed.

For the farmers that remained in the JCI, the overwhelming response was to diversify their farming operations and to spread their risks whether by growing other crops, raising livestock, or engaging in other economic activities. Despite this diversification, the general consensus, especially among smaller farmers, was that it was still a struggle for survival, especially in the light of the diminished capacity of the CIB to provide material assistance and technical advice due to funding constraints.

Farmers have borne the brunt of the downturn in the industry. They have also been among the last to receive the benefits of any rise in demand for Jamaican coffee. This is especially true for the small farmer. The most significant challenge reported by farmers is the increasing gap between production costs and the income received from coffee. The global economic recession in 2008 led to lower prices and frequent payment delays from processors and dealers. One farmer summed up the plight of coffee farmers:

> They can't budget like other people that are getting a pay check because they get their money piece piece.

Although prices have rallied to some degree, the price per 60 lb box of coffee has not kept pace with the already high costs of the various inputs for producing coffee. For example, one JBM farmer stated

> the price per box right now is J$3200/box and the cheapest fertilizer is J$3000 and you don't use that one unless you're planting the coffee. For the mature trees, the fertilizer is J$5000 or more per bag.

The gradual depreciation of the Jamaican dollar has made these imported fertilizers, herbicides, and other chemical inputs increasingly costly; and the steep hillsides where most coffee is grown limit the application of labour-saving technologies. For many farmers (including all the small farmers interviewed), it is no longer a case of a small profit margin—growing coffee essentially means losing money. This is especially true in the NBM regions where farmers may receive as little as 40 percent of the price JBM farmers receive (see Fig. 6.3) while having similar production costs. A frequent statement by farmers was that '*nobody is planting trees so the industry going down*'. Many farmers have ceased maintaining their coffee plants and focus on reaping what they can from the trees. This lack of maintenance has aided the resurgence of the coffee berry borer and other pests and diseases. Combined with the damage caused by extreme weather, producing coffee has become a much more expensive and risky venture.

The consequent lack of generational replacement and concern about the future of coffee in many traditional coffee-growing areas of Jamaica is therefore not surprising. The bleak perception of the crop has discouraged young people from entering the industry (and farming in general) as they seek more lucrative employment elsewhere. In every region where interviews took place, it was said that only the farmers that are '*in it till they give it up*' remain in coffee production. Crop diversification among the farmers that do remain in coffee production was a constant theme in the interviews. Farmers grew everything from tree crops (like bananas and coconuts) to cash crops (such as tomatoes and peppers), while a few undertook animal husbandry, all with the aim of spreading their risks and ensuring a steady income from their farms. The larger 'farmer-dealers' have been able to vertically integrate their operations. By being able to expand into exporting coffee, they can use their farms as loss leaders for value-added production. This allows them to obtain much better returns as they are able to take advantage of relative economies of scale in production.

Whether a small, medium, or large farmer, a critical factor highlighted in the interviews was the role of efficiency (productivity) in reaping benefits from coffee. This is a big issue—farmers in Jamaica do

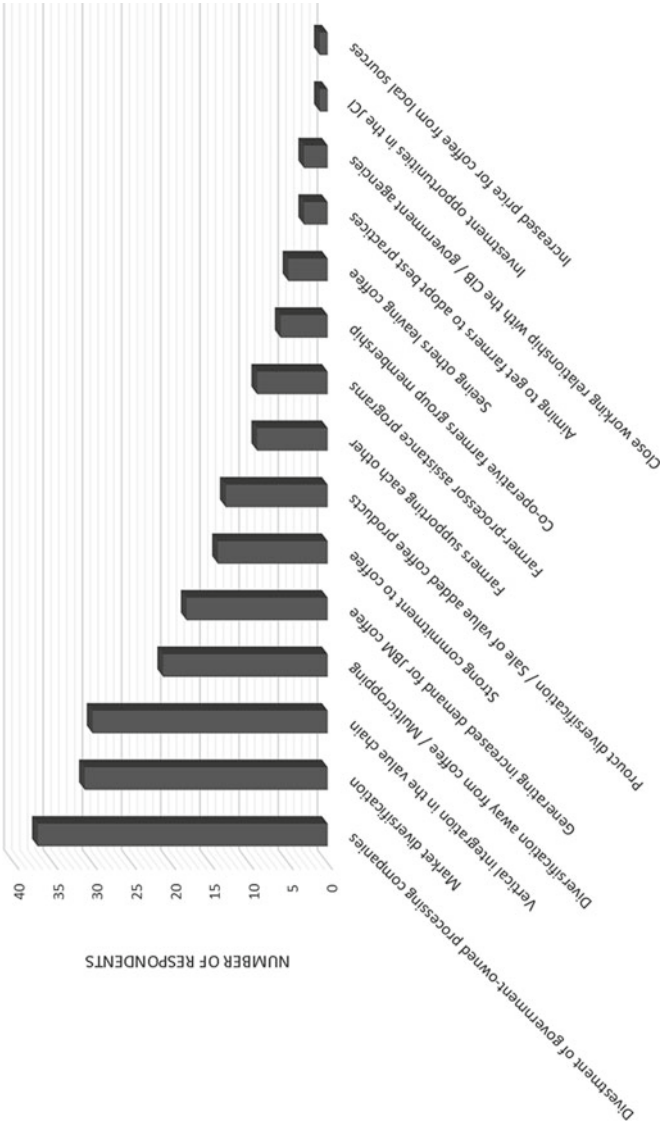

Fig. 6.3 The top 15 responses to challenges by stakeholders in the Jamaican coffee industry

not have the land area or ability to mechanize to the extent that many 'small' or 'medium' farmers in Central or South America can—thus they cannot obtain close to the number of boxes per hectare generated by their larger rivals. Combined with the diminished capacity of the CIB to provide technical and material support, farmers have to take a hard look at their place in the industry and either do what they can to increase their knowledge about increasing coffee productivity to improve their ability to be more profitable or exit production. One larger farmer noted '*once a farmer gets to a certain level then he'll see a greater profit margin*', however '[production] *efficiency is the core issue that the JCI needs to deal with and this is the elephant in the room that many do not want to deal with*'. That being said, larger farmers are better able to improve their efficiency than small farmers due to their ability to access the financial resources (personal funds or loans) needed to attain the higher outputs per hectare on their farms. Smaller farmers tend to have less collateral and make less attractive candidates for such financing. Additionally, very small farmers (less than a hectare) cannot realistically be expected to get the same results as the farmers with hundreds of hectares.

Processors' Challenges Responses

Four respondents were involved in the processing of coffee in the JCI. Unlike the farmers' focus on production issues, the processors focused on the value-added components of the industry. The divestment of the two largest government-owned processing plants in the island—Wallenford Coffee Company (WCC) and Mavis Bank Coffee Factory (MBCF)—between 2008 and 2013 resulted in some measure of uncertainty and conflicting opinions among coffee producers and dealers. One dealer noted that

> with the growing demand for coffee and MBCF only buying JBM coffee, WCC and (others) …will be competing for the coffee in the NBM areas.

Another dealer was more optimistic, stating that

> the divestment of MBCF and the pending divestment of WCC have made the industry stronger. They bring increased market knowledge and are willing to invest capital in marketing their coffee and support services as well as supporting the local farmers.

The recession and the consequent impacts on the major market of Japan and increased competition from other premium coffees were seen as the most crucial external challenges. Thus the need for effective marketing strategies (market diversification), product diversification, and increasing production efficiency through vertical integration emerged as primary responses to those challenges. Pests and diseases were also identified as challenges as they affected the quality of coffee to be processed.

The intermediaries between the farmer and the dealer—the coffee processor—turn the coffee cherry to the dried bean ready for export and/or roasting. The decreased demand for JBM coffee led to cash flow problems that led to payment delays and lower prices offered to farmers. As market conditions improved, prices increased but between 2008 and the times of the interviews, hundreds of farmers had ceased production. The divestment of WCC and MBCF also gave farmers pause, all of which led to record low production levels by the 2012–2013 coffee year. Therefore, processors had to pay more per box of coffee and pay farmers more promptly. Some processors observed that there was a decline in quality of the coffee cherries due to farmers being less able to properly care for their coffee (as discussed above). Thus, farmer assistance programmes (which provided growers with favourable prices for inputs in exchange for a guarantee on the crop) were revitalized and one processor even went as far as providing a variety of extension services to the farmers they worked with. The coffee processors interviewed were often involved with other value-added endeavours such as creating flavoured coffee and different grades of coffee from a blend of JBM and NBM beans to the highest quality JBM beans. Attaining international quality marks was also pursued as a coping strategy. One processor highlighted their drive to Hazard Analysis and Critical Control Points (HACCP) certification and Rainforest Alliance certification as means of achieving greater differentiation and thus be more competitive internationally.

Dealers' Challenges and Responses

Twelve of the 14 active coffee dealers in Jamaica were interviewed in this study. Since some coffee dealers are farmers and processors, several of the important categories in the previous sections are also seen in this section (see Fig. 6.3).

Seven of the dealers highlighted the impact of the 2008 recession as the biggest challenge to their operations, especially the decline in demand for JBM coffee and the prices charged in order to maintain what market share they had. Other significant issues for dealers were the changes in regulations regarding coffee sales (especially the more stringent colour-grading scheme for beans to be exported) implemented by the CIB and the decline in coffee quality across the island, which in turn affected the price and volume of JBM and NBM coffee on the international market. The uncertainty caused by the divestment of WCC and MBCF led many of the dealers to explore expansions to fill any voids left by these processors. In fact, market diversification was seen as the most appropriate response in the face of the challenges. Product diversification, whether by investing in specialty certification or delving into coffee-related value-added products, was often a related response. Dealers have sought to expand into the USA, Europe, and a few Asian markets (notably China) in an effort to both increase sales and decrease their dependence on the Japanese market. Efficiency was again a key theme among dealers several of whom indicated vertical integration into processing or farming as a means to maximize profitability as well as ensure consistent quality of beans sold internationally.

The local coffee market has also suffered. Because there is no significant coffee-drinking culture in Jamaica, most (roasted) coffee sales target hotels, gift shops, and other sales outlets involved in the tourism sector—three processors stated that they were heavily involved in the hospitality and tourism sector. However, the recession was noted to have severely impacted the purchasing power of visitors, resulting in a flat market for dealers. This too has forced dealers to diversify their product offerings and sales locations.

The declines in production and recent increased demand for primarily JBM beans led to a relative scarcity of coffee. Dealers that process coffee have had to offer better prices to the farmers who have coffee for

sale (especially those who have JBM coffee) and be prompt with their payments in order to secure needed inventory. For dealers that purchase processed beans, the increased price paid by processors is passed onto them, thus decreasing their profit margin.

Regulators' Challenges and Responses

The four interviewees from the CIB highlighted challenges and responses that were related to the three groups that make up Jamaica's coffee value chain. All four representatives recognized the challenges imposed by the high cost of material inputs and all but one also discussed the high cost of labour and the resulting impact on the viability of coffee production. One interviewee conceded that

> the economics for coffee just doesn't work out—the price received for the coffee can't cover the input costs and so many younger people don't want to go into coffee and many in coffee are leaving.

Other challenges identified included farmers diversifying away from coffee and the role of decreased prices and sales stemming from the global recession and its implications for the dealers.

One challenge unique to these respondents is what the CIB faces in carrying out its mandate of maintaining the high quality of coffee exports, the sustainable development of the local industry, and the protection of the JBM trademark around the world. Wage freezes, employee layoffs, government bureaucracy, and restricted funding have severely limited the functions of the regulatory agency. One strategy to increase their efficiency has been to establish close working relationships with farmers and processors to ensure the quality of coffee produced. This included encouraging farmers to adopt best practices in cultivation and pest management and facilitating product and market diversification by processors and dealers. Several CIB extension officers are also coffee farmers. One such officer said that by demonstrating all the things that he talks about with farmers, he can be '*leading by example*'.

As a regulator, with limited resources, the CIB reported focusing on encouraging best practices to maximize production efficiency and facilitating the ability of processors and dealers to diversify their sales base. A number of farmers and dealers interviewed charged the CIB with '*playing around with the industry*', mismanagement, and inefficiency in a number of areas. These included the limited provision of farm inputs, not clamping down on coffee imports, and claims of favouritism towards the largest stakeholders in the industry while ignoring the '*small man*'. These criticisms reflect the reality that the CIB is a government-run agency facing severe fiscal challenges and subject to political influence that has significantly hampered the effectiveness of the regulatory agency.

In the wake of the economic recession, the CIB has also focused its efforts on promoting the island's coffee by capitalizing on the awareness of 'brand Jamaica' subsequent to the country's significant successes in major track and field championships since 2008. Despite the decreased resources, the CIB appears to have made notable efforts to allow the most efficient stakeholders to succeed but this comes at a price. International competition in the specialty coffee market has meant that the CIB has to limit the price increases that can be granted if it wishes to retain its customer base. The CIB also worked closely with its most productive stakeholders, which has meant that smaller farmers tend to be ignored unless they too are productive. Ultimately, the regulatory agency has to maximize the returns on its resources and thus farmers, processors, and dealers have been told to 'step up to the plate' if Jamaican coffee is to maintain its CA.

Going Forward: Conclusions and Recommendations

The hypothesis proposed in this chapter was that rising production and maintenance costs were the major challenges to the CA of the JCI. Based on the findings, this certainly seems to be the case primarily among farmers but less so among processors, dealers, and the regulatory agency. While these costs were the most important for farmers, processors and

dealers were more concerned with local and international markets as their major challenge, while the regulatory agency had the challenge of catering to the needs of the various stakeholders—addressing the rising costs of production and declines in production, and alleviating the impact of the global recession on the JCI. Despite the variability of the challenges, the responses of each stakeholder group all point to maintaining their current CA.

In order to maintain its CA, the JCI needs to remain focused on product differentiation to retain relatively strong supplier bargaining power. Magretta (2012) notes that a key element of continuity is, understanding your core value proposition and the major trade-offs. The value proposition of JBM coffee is that the consumption of JBM coffee enjoins the consumer to the experience of drinking a coffee with a long and distinguished heritage and that this unique benefit is more than offset by the premium price that is paid (Coffee and Expresso Guide 2011). Stakeholders in the JCI must do their best to target potential customers in the emerging coffee consumption markets in China, India, and Eastern Europe while coffee consumption is still relatively new and unique. Those with higher amounts of disposable income would be ideal consumers as the appeal to luxury should resonate more with them. Since 'frequent strategy shifts are likely to be a significant drag on performance' (Magretta 2012, p. 165), it is important to keep the essential focus of the industry in sight as the stakeholders in the JCI continue to adapt to an increasingly challenging global market place.

Competitive advantage is focused on creating unique value, thus stakeholders must pursue strategies that do not conflict with its goals. With other long-standing issues to deal with (such as the inequalities in resources; tensions between farmers, processors, and dealers; and the high costs of producing coffee in Jamaica), the real point is that there is no longer room in the industry for the man, woman, or company who simply aims to 'get by'. In order to increase supplier bargaining power, all stakeholders involved have to make an impartial assessment of their future in coffee and either cut their losses and exit the industry or redouble their efforts to be an efficient producer and innovative marketer.

The JCI is at a point of redefinition as it seeks to maintain and increase its presence in the ever-competitive premium coffee market. This chapter

suggests that by focusing on increasing supplier bargaining power primarily through market diversification and producer efficiency, stakeholders will successfully negotiate the challenges currently being faced. It is anticipated that by making these informed decisions, the JCI will be on the path to regaining the CA it once enjoyed in the global specialty coffee market.

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Part III

Climate Change and Food and Agriculture

7

Multiple Stresses in a Globalized World: Livelihood Vulnerability Amongst Carib Communities in Northeastern St Vincent

Rose-Ann J. Smith

Overview

The concepts of double exposure and multiple stresses have become increasingly important in research that focuses on the vulnerability of livelihoods. The double impact of climate change and economic globalization on rural livelihood provides a valuable framework for understanding the vulnerability of rural households in northeastern St Vincent. This study, which forms part of a wider dissertation, utilized a mixed-methods approach, which consisted of 311 questionnaires, 70 semi-structured interviews with farmers, elite interviews, and focus group discussions. The study explains the vulnerability of rural households, recognizing that livelihood vulnerability is a key driver of poverty within the communities. It assesses the vulnerability of rural livelihoods to environmental change and globalization, while recognizing that there are other stresses faced by these households. This multiple exposure creates a form

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of powerlessness amongst households and functions to keep them in a vicious cycle of vulnerability.

The results reveal that economic factors such as access to markets and price fluctuations in goods and produce are key determinants of vulnerability. They prevent households from acquiring the assets necessary to improve and expand their livelihoods, forcing them to make decisions that are geared towards survival rather than livelihood sustainability. Rural livelihoods are also highly sensitive to climate change and climatic variability, and households' perceptions of climatic hazards significantly impact responses to vulnerability. Nevertheless, there are opportunities for increasing the adaptive capacity of households such as capitalizing on social networks, diversifying livelihood, and increasing financial assets such as livestock and savings.

Introduction

The impacts of economic globalization and climate change have been the focus of contemporary research on sustainable rural livelihoods in the Caribbean region (McGregor et al. 2009). At the local scale, research in Jamaica and St Kitts (Campbell 2011; Clarke 2012) has utilized the concept of *double exposure* (O'Brien and Leichenko 2000) to contextualize the simultaneous impacts of economic and climatic changes. While there are many similarities in vulnerability scenarios with respect to climate hazards and globalization, some components of vulnerability are location specific, depending on the particular characteristics of small-scale livelihood systems. For example, in the Greater Antilles, vulnerabilities and coping mechanism vary across different agro-ecological zones (Campbell et al. 2010) whereas in the Windward Islands, communities located on the leeward and windward coasts may experience differential impacts and vulnerabilities, reflecting island-wide rainfall distribution and topographic conditions.

This chapter adds to the growing literature on Caribbean vulnerability (Barker 2012; Barker et al. 2009; Campbell 2011; McGregor et al. 2009; Shah et al. 2013). Livelihood systems of the Carib communities in St Vincent and the Grenadines are challenged by the impact of climatic hazards, which may destroy crops, livestock, and land resources, and by

the daily economic challenges of market accessibility, price fluctuations, and praedial larceny over which households have little control, but which have serious implications for food security and income. This chapter also highlights the significance of access to assets, which influences a household's adaptive capacity to global changes.

Methodology

A mixed-methods approach was used to assess the vulnerability of livelihoods to global change. A detailed quantitative survey geared towards household heads was administered to 311 households using a combination of systematic and simple random sampling methods. It comprised 144 households in Sandy Bay, 94 in Owia, and 73 in Fancy, 3 remote communities in northeastern St Vincent (see Fig. 7.1).

Semi-structured interviews were also conducted with 70 farmers using snowballing and convenience sampling techniques. Following Hurricane Tomas in 2010, a total of 40 structured interviews were conducted in Fancy. Interviews were also conducted with key stakeholders in both the agriculture and disaster risk management fields in St Vincent. Focus group discussions were held in each community and field observations complimented the data collection.

The Study Area

The study area comprised three small remote rural communities (Sandy Bay, Owia, and Fancy) located on the Windward side in the northeastern section of St Vincent (see Fig. 7.1). These communities are also home to the indigenous Yellow and Black Caribs who were significant in shaping the history of St Vincent. The Yellow Caribs are descendants of the original Amerindians, while the Black Caribs were formed through intermarriages between the Amerindians and African slaves (Kirby and Martin 1972; Taylor 2012). The indigenous Caribs of St Vincent are described as being politically and economically marginalized (Bellot 2009; Twinn 2006).

Fig. 7.1 Map of St Vincent showing the study areas (Source: Author)

The Caribs were 'essentially a farming people [who] planted small manioc and sweet potato gardens…, and although they certainly fish…, they cannot be characterized as a society of fishermen' (Allaire 1999, p. 182). Farming remains a major activity form in the study areas, especially Fancy where 75 percent of the sampled households were engaged in it. In Sandy Bay and Owia, 52 percent and 55 percent, respectively, of the households had farmers. Farming is predominantly a male activity with 69 percent of household heads who are farmers being male. The 56 percent of household heads who are farmers over 53 years of age reflects an ageing farming population, which is characteristic of farming systems elsewhere in the Caribbean (Beckford and Campbell 2013).

Farming is mainly subsistence with any surplus sold locally. Livestock rearing (goats, cattle, pigs, and sheep) is integrated into crop cultivation by 63 percent of farming households.

Characteristics of Farming Systems

Cropping systems are influenced by traditional, economic, and environmental factors. Generally farmers are involved in multiple cropping to spread risks and secure an income and, in some cases, to minimize the effects of pests and diseases (McSorley 2008; Miller and Spoolman 2012). For example, on their main plot of land, 69 percent farmers cultivated more than one type of crop, while the other 31 % cultivated only one type of cash crop. Although farmers may cultivate a variety of cash crops, the main category grown across all three communities is root crops. Root crops include traditional indigenous crops such as arrowroot, cassava, and sweet potatoes. Sweet potato is the mainstay of cropping systems in the study area.

Hillside land, also referred to as 'mountain land', is the dominant land type; 79 percent of the respondents said their lands are steep compared to the 21 percent who described their land as flat. The communities exhibit multiple forms of land tenure arrangements, but 12 percent of farmers within the sample own land. Family land, a customary form of land tenure within the Caribbean, is the dominant form of tenure within all the communities.

Multiple Stresses and Shocks: Determinants of Livelihood Vulnerability

The rural households in northeastern St Vincent can be described as subsistence farmers and fishermen who sell their surplus on the local market. Livelihoods in the area are affected by many issues, over which households have little or no control. Christiansen and Subbarao (2001) described risks households faced as *idiosyncratic risks*, which include crop pests and diseases, job loss, asset loss, death, injury, illness, and *covariate risks* such as natural disasters and epidemics, which result in greater susceptibility to shocks that affect their income and endowment. Idiosyncratic risks occur on the micro level, that is, they are specific to the household and may lead to internal or idiosyncratic shocks, which may not be disastrous (World Bank 2000). Covariant risks, on the other hand, occur at the meso- and macro level, affect groups of households or an entire community, and may be disastrous (ADPC and FAO 2006; World Bank 2000). O'Brien and Leichenko (2000) focused on covariant risks/shocks and formulated the term 'double exposure' in reference to the global threats of climate change and economic globalization that affect different sectors and groups in society. They used terms such as *winners* and *losers* to demonstrate the differential impact of these global changes on people and society.

Thus, households may be simultaneously affected by both idiosyncratic and covariate shocks. Hence, to understand the vulnerability of rural households, it is important to recognize the multiple exposures to both internal and external shocks, which may occur at various geographical scales. The author proposes the model depicted in Fig. 7.2 as a useful framework for understanding the complexity of rural livelihoods' vulnerability. It is an adaptation of a similar model proposed by Badjeck et al. (2010), who reviewed the impact of climate change on fisheries. The model illustrates the multiple stresses and shocks faced by these rural households, their impact on livelihoods production and operation, and the outcome for households and the general economy. These issues are elaborated in greater detail in Table 7.1, which incorporates qualitative data statements from key informants.

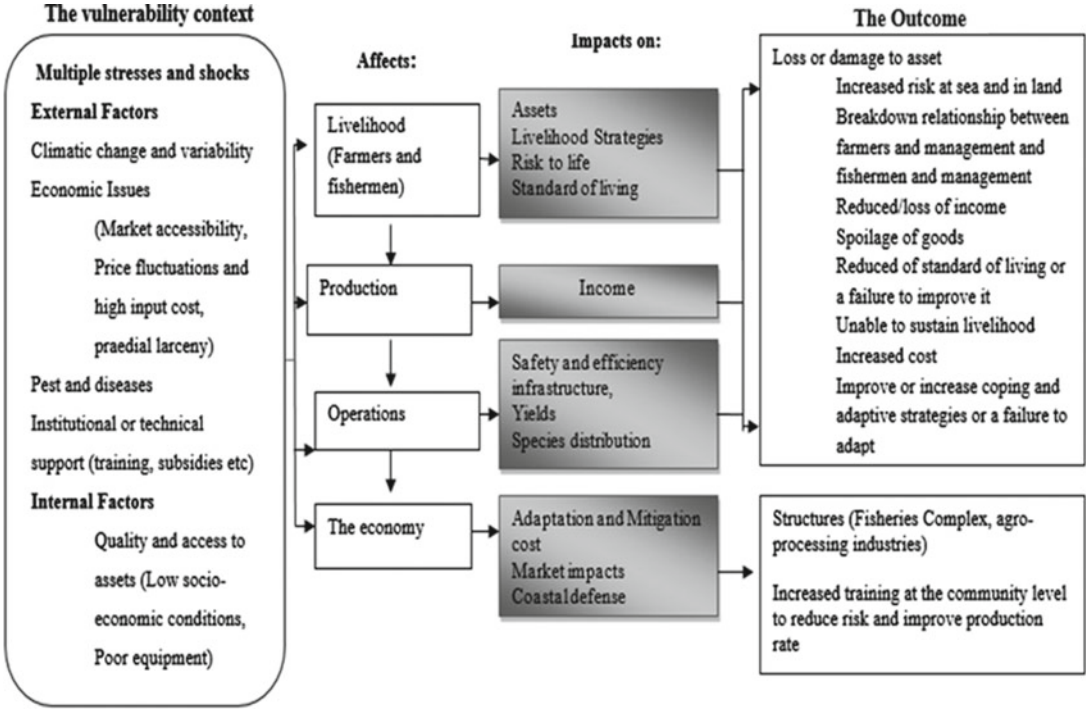

Fig. 7.2 Framework for understanding the vulnerability of rural livelihoods in Northeastern St Vincent (Source: Author; adapted from Badjeck et al. (2010), Impacts of climate variability and change on fishery-based livelihoods)

Table 7.1 Constraints of rural households and the impacts in an increasingly globalized world

Issues	Constraints	Impact	Comments from key informants/statistics
Credit	Limited access to credit	Unable to expand farm or agribusiness Unable to improve fishing vessels or take advantage of new technological advancements	'The major one is the business accruement, being able to give out some level of entrepreneurship, farm the land as a serious business person. The second issue is resource constraints, in the sense that they too don't have the money to invest in upgrading their farms and the difficulties in terms of having a credit line like going to banking institutions and being able to establish a credit line…' [Interview with Chief Agriculture Officer] '…the banks are not so confident about the farmers. When banana was up farmers could have gone and get credit easy, but now they have crops that will come in 8 and 9 months. It is hard now to go in front a bank with a business plan and get assistance.' [Interview with Extension Officer]
Assets	Limited access to land Land tenure arrangements (family land, squatter land) Low livestock production	Decline in the number of farmers rearing livestock due to praedial larceny Reduced income Limited access to credit due to land tenureship Limited production due to land fragmentation	'…Then you have the whole issue of the praedial larceny where even though a farmer might want to produce a certain crop and mix that with other things like small ruminants goat and sheep, the risk of people going and stealing is real so that sort of restrict the extent to which persons go and take risk to see how they can diversify their income' [Interview with Chief Agriculture Officer]
Market	With limited access to market	Market uncertainty Heavy reliance on community members and traffickers (at times unreliable and untrustworthy) Increased crop loss/ spoilage Reduced income	'… those who are into bananas and into Fairtrade, they don't have a problem, those who are with arrowroot, don't have a problem because it is one organization that buy the goods, but where you have the difficulty now is for the non-arrowroot and non-banana crops where the farmers are left and their own peril to find the market.' [Interview with Chief Agriculture Officer] 'There is no place that when you have your produce, you can get it sell. If that was the case, more people will be interested in farming… now you have to depend on traffickers. First time you dig your load and they buy it. Now you have to make order, if they want it, they take it, if not, they don't buy' [Interview with farmer]

Information	Lack of reliable information about market prices Access to information	Unreliable price information from traffickers who are accused of lowering price below market price Reduced income Increased risk (safety, production, assets)	Pricing information is generally obtained through informal networks such as traffickers or vendors '…when dem come, they giving you their own price, you don't believe ah we suppose to price the people dem? Dey come with the price they mean to pay we' [Interview with farmer]
Infrastructure	Poor quality road leading to farms Poor quality fishing vessels No or poor storage facilities	Low production Reduced farm acreage Increased crop loss	'Road [road in the land] is a problem… it damage so no transportation can get up. You have to pay workers to bring the load from the land to the road' [where traffickers pick them up]. [Interview with farmer] Researcher's words in parenthesis '…And some of the problem is like roads, the roads that lead to the farm that is a problem…' [Interview with Agriculture Extension Officer]
Socio-demographic characteristics	Age of farmers Low income households Low educational level Labour endowments	Movement out of farming into non-farm and illegal activities Ageing farming population Heavy reliance on traditional knowledge with little to no knowledge of scientific methods	82 % of household heads who are farmers are 42 years and over in age 89 % of these household heads' highest level of education is primary 51 % of these heads are within households that earn less than EC$500 per month

(*continued*)

Table 7.1 (continued)

Issues	Constraints	Impact	Comments from key informants/statistics
Inputs	High cost of fertilizers, seedlings, and other raw materials for farms High cost of petrol	Reduced income through reduced profits Loss of livelihood	'Things getting worse in farming. No market for produce, no support for farmers, fertilizers price too high' 'There biggest problem right now is financial support and when we say financial support we mean, when a farmer plant his crop, he is looking forward now for government help as it relates to inputs, like fertilizers, chemicals, those sort of things. Those are the two main areas, when you go on the farm, the asked what you have for me today or what you can help me with and most of the times, its fertilizers, agricultural inputs.' [Interview with Extension Officer]
Technology	Limited access to technology such as irrigation systems, new and improved seedlings	Low yields Crop failure	Only 3 farmers all located in Sandy Bay identified irrigation as a strategy for reducing the impact of the dry season within the quantitative survey
Remoteness	Limited access to training workshops Limited access to agriculture institutions	Unable to take advantage of training that can improve livelihood such as business management Breakdown in relationship between management and local communities	Which communities visited the most? 'Well to be honest with you, the areas that I concentrate on most is like Orange Hill, I have a lot of farmers within that area because the land there is gently slope, you have a lot of farming activities going on and Sandy Bay, Owia.' Which is the hardest? 'Well Fancy of course. I haven't done much in Fancy…' [Interview with Agriculture Extension Officer]

Source: Author

The Economic Side of Vulnerability

Trade is an engine of growth for economic growth and development for developing countries (WTO 2014). The objectives of World Trade Organization (WTO) are aligned with the Millennium Development Goals, in particular Goal 8, which recognized the importance of open trade for development in an environment that is 'rule-based, predictable and non-discriminatory' (WTO 2014, para 9). To achieve this, part of the proposed strategies include ensuring that developed nations improve and support market access for agricultural and other products from developing countries (IFAD 2003). Market access is a significant factor in reducing poverty and vulnerability and sustaining livelihoods for rural households (IFAD 2003). However, Dorward et al. (2003) argued that the role of markets in sustaining livelihood and reducing poverty is a missing link in much of the conceptual focus in livelihood studies. They acknowledge other social, political, and technical processes for instigating change in livelihood, but emphasized that:

> If the roles of markets and market relationships are not properly addressed in livelihood analysis and action, it can lead to failure to identify and act on (i) livelihood opportunities and constraints arising from critical market processes and (ii) institutional issues that are important for pro-poor market development. (Doward et al. 2003, p. 319)

This underscores the importance of market and market relationships in livelihood analysis.

Market Accessibility and Price Fluctuation: The Impact of Trade Liberalization?

In northeastern St Vincent, limited market access, price fluctuation of goods, and the high cost of inputs were identified as the main economic issues facing farmers. There is no significant difference at the community level with all the farmers interviewed within Owia and Fancy, and 87 percent in Sandy Bay acknowledging economic problems. However, in

highlighting their concerns, farmers emphasized market access and price fluctuations. Statements made by farmers include:

> The most problem we face [is] with market; we face plenty problems with market.
>
> Produce don't sell so, they don't have a marketing board. We have to beg people to come and buy our produce.
>
> Potato is $30 a sack. Things shouldn't be so bad that price should go so far. Farmers can't get anything especially when you have to pay workers.
>
> Right now me [I] buy manure for a $100 a sack and me [I] can't even make back a $100.

Market accessibility and price fluctuations for goods have an overall negative repercussion for livelihood sustainability and exacerbate households' vulnerability. The impacts go beyond economics—they are also psychological as households try to make sense of the dynamics affecting their livelihoods.

A major impact of market accessibility and price fluctuation is the challenge it creates for rural households to reinvest and expand their livelihood activities, while improving their capacity to cope with or recover from stresses and shocks. The International Fund for Agricultural Development (IFAD) argued:

> Strong links to markets for poor rural producers are essential to increasing agricultural production, generating economic growth in rural areas and reducing hunger and poverty. Improving these links creates a virtuous circle by boosting productivity, increasing incomes and strengthening food security. Better access by small producers to domestic and international markets means that they can reliably sell more produce at higher prices. This in turn encourages farmers to invest in their own businesses and increase the quantity, quality and diversity of the goods they produce. (IFAD 2014, para. 1)

Access to market is thus a significant determinant of livelihood vulnerability and sustainability as it impacts the ability to make a profit—an important dimension of households' vulnerability. As one farmer stated, arrowroot

is a year-long crop and it is important that at the end you get paid as this finance is important '*to plant it back [but] you can't even get all that*…'.

St Vincent's Chief Agriculture Officer identified creating entrepreneurial farmers and resource constraints, which prevent farmers from upgrading their farms, as two major issues affecting farmers. He mentioned that in terms of market challenges, the difficulty lays with the non-arrowroot and non-banana crops—the main crop types within the communities as farmers are '*left at their own peril to find the market*'. This again speaks to the importance of markets in livelihood sustainability. As stated by Ribot et al. (2005), access to market, inputs, and technical training are key obstacles preventing households from expanding livelihood activities into small enterprise.

Market accessibility and price fluctuations of goods and inputs therefore force rural households in these communities to operate marginally in terms of their livelihoods. This increases vulnerability as they are unable to increase their assets base and improve their socio-economic status. Psychologically, households are demotivated and frustrated, as they feel helpless to escape the cycle of vulnerability. The following statements by some farmers exemplify this:

> The price up and down and that give problem because you get a sack a manure for a $100 and it could be little addition on the hundred sometimes and then when you sell a sack of potato, sometimes all $40, $30 so. You can't make nothing so sometimes it just give you a different tation [affects you mentally]…it just like fish change. You might go and try go into something else, but when you go… it does fall the same way too
>
> Them kind of stuff they a bring weakness on you

Market for the Poor or Market of the Poor?

Posing the question of *Market for the Poor or Market of the Poor* presents a debate on whether there is a market for advancing the poor by creating conditions, which will reduce poverty and vulnerability, or whether poor people are trapped within a system where they are struggling to make ends

meet. While the former argues for the provision of markets that work for the poor through informed choices and empowerment, the latter emphasizes a market climate of uncertainty, no guarantees, and limited choices (Murphy 2012). In recent times, much attention and support have been given to marketing systems approaches or Making Markets Work for the Poor (M4P) by donor organizations such as the Department for International Development (DFID), Swedish International Development Cooperation Agency (SIDA), and Swiss Agency for Development and Cooperation (SDC) (DCED 2014). According to the Donor Committee for Enterprise Development (DCED), the governing principle is,

> the poor are dependent on market systems for their livelihoods. Therefore changing those market systems to work more effectively and sustainably for the poor will improve their livelihoods and consequently reduce poverty. (DCED 2014, para 1)

The major market for small-scale producers in the study areas is regional local fresh produce centres. For farmers in particular, there is a great dependency on traffickers as the main market source. A trafficker is the local name for small traders of agriculture produce who purchase local goods for resale on the regional market (Rittgers and La Gra 1992). They are referred to as higglers in Jamaica and as hucksters in other Caribbean islands (Beckford and Campbell 2013; Burton-James 1993; Gritzner 2004). Hucksters and traffickers in the eastern Caribbean are mainly engaged in the purchase of goods for inter-island trade by boat between islands in the Leeward and Windward (Baker 1997; Burton-James 1993; Rittgers and La Gra 1992). Eighty-four per cent of farmers sold to traffickers, so they represent a significant element in the distribution chain for these farmers.

Contact with traffickers can be direct or indirect and may occur in several ways:

(i) The trafficker may visit the community in search for goods to buy.
(ii) A farmer with produce to sell may contact a trafficker.

(iii) A farmer may create a linkage between another farmer and a trafficker though this is dependent on whether or not he carried the type and amount of produce required by the trafficker.

Following initial contact, arrangements are made for the traffickers to collect the goods. Once produce is harvested, it is placed at the roadside for pick up by the traffickers. Tikai and Kama (2010) referred to this phenomenon as a form of 'storage avoidance' where crops are harvested as needed. However, it can also be viewed as an example of maladaptation as produce left to the elements for long hours can become spoilt. Twenty-one per cent of respondents have a storage shed on their farm, but the physical condition of these storage facilities makes them inadequate and unsuitable for the proper storage of agricultural produce. Hence, they are mainly used for keeping fertilizers and equipment for short periods of time or shelter and shade. Consequently, farmers are confronted with the issue of post-harvest losses, which is a major constraint to local agriculture in Latin America and the Caribbean (Beckford and Campbell 2013; IFAD 2013; IICA 2013).

Thus, traffickers represent the most important and, in some cases, the only access to markets for farmers in the study areas. Small traders travel to the farming communities saving farmers' transportation and storage costs. As the most remote of the communities, Fancy has the greatest percentage of farmers who utilize traffickers.

Despite the importance of traffickers, there are a number of challenges with this marketing system that affect farmers' livelihood. Research by Grossman (1998) supports findings from this study, which reveal that over the last three decades, the relationship between traffickers and farmers and the system of trafficker itself has not changed, but continue to be one that is highly informal, unpredictable, and plagued with uncertainties and risks. The activities of traffickers are influenced by their perception of demand for goods. When asked, what will happen if traffickers do not come to the community, one farmer responded, '*right there* [referring to his produce in the ground], *they go have to stay*…'. Others spoke about having to '*beseech behind them*' or the '*traffickers come and bruk* [break] *style*' (meaning that they take a high-handed attitude) on their goods when there is a glut on the market. There is no guarantee that traffick-

ers will travel long distances to purchase goods if market demand is not strong. Thus, in their absence, there is a general lack of market for farmers and consequently an inability to sustain their livelihoods.

Farmers must therefore make critical decisions about the marketing and distribution of their produce. These decisions include whether to sell goods at the price offered by small traders and/or whether to credit these small traders their goods. While some farmers are adamant about not selling their goods for unattractive prices, others feel forced to accept these prices and accept the risks involved in developing insecure credit systems with traffickers, some of whom have at times refused to pay for goods because of limited sales on the regional market. Traffickers sometimes claim inability to pay because they were unable to dispose of the goods they credited. This is not unique to St Vincent as demonstrated by research elsewhere in the Caribbean (Beckford and Campbell 2013). Farmers are therefore operating within an uncertain market climate which forces them to make decisions focused on earning a living to survive rather than developing a sustainable form of livelihood to achieve resiliency.

In addition, farmers' decisions are affected by lack of proper pricing information, limited negotiation skills, and lack of cohesiveness amongst farmers. Pricing information is obtained from informal sources including other farmers and traffickers. One farmer in response to the question as to where he obtains information about market price stated, '*well, from people who dwell on the road*'. The lack of market information and organization among farmers in addition to limited market access has reduced their negotiating power. This is compounded by the inability of farmers to penetrate the domestic market on account of the remoteness of the communities, limited modes of transportation, and high transportation costs. Statements from farmers include:

> when them [referring to the traffickers] come, they giving you their own price, you don't believe ah we suppose to price the people them? They come with the price they mean to pay we
>
> We only have to depend on traffickers alone so the trafficker get together and say ok, so much thing come in, we will drop the price, but we don't have no cooperation so we just have to satisfy

Consequently, it is recognized that lack of formal market structures, limited access to market information, and limited cooperation among farmers in times of economic crises, coupled with the market uncertainty associated with traffickers, result in farmers becoming impoverished and keeping them in a state of vulnerability. IFAD (2003, p. 6) posited that in the uncertain, unpredictable, and risky economic climate in which rural households operate, they are 'often obliged to sell low and buy high, with little choice regarding where they conduct transactions, with whom, and at what price'. Furthermore, these farmers are generally passive rather than active in the market system and therefore operate in subsistence rather than market-oriented production systems (IFAD 2003).

As a way of combating the problem, one respondent argued for the establishment of a farmer's group so that farmers can set and maintain prices and so allow a formal system through which traffickers can purchase their goods. This would increase the negotiating power of farmers and minimize the ability of traders to take advantage of any one farmer. He stated:

> If things have to get better up here, you have to get a farmers union so that when the traffickers come or whoever come to buy, nobody does not get behind back go sell for $40. You [will] hold [one] price so that if is $150, the traffickers have to pay the $150.

Arguably, increased collective organization among farmers may empower them to interact more effectively with market intermediaries if this is supported within a framework of increased understanding of market structure and processes and efficient pricing information systems which are location specific and easily understood (IFAD 2003). However, farmers within the communities have been slow to organize themselves as groups or cooperatives. Fancy is an exception and has a farmer's group, but some farmers including past members described this as non-functional.

Climate Change and Climatic Variability Side of Vulnerability

In addition to economic issues, farmers are challenged by changing climate and weather patterns. Climate change is a global phenomenon with implications at national and local levels. The past decade has witnessed an expansion of the academic and development literature on the vulnerability of individuals or groups to climate change and climate variability. There is an increasing number of livelihood studies that focus on impacts on the agricultural sector and implications for rural livelihoods (Kurukulasuriya and Rosenthal 2013; Parry and Rosenzweig 1990; Wreford et al. 2010). The predicted impacts of climate change suggest an increase in drought episodes, hurricane, and storm surge activities, all with greater implications for rural households and their livelihood activities.

The Caribbean is predicted to experience a decrease in rainfall events of about 15–20 % and a subsequent increase in the frequency and intensity of drought (Trotman and Farrel 2010). Regional Climate Model and General Circulation Model projections predict an increase in average atmospheric temperature, a reduction in annual rainfall, increased sea surface temperatures, and possible increases in the intensity of tropical storms in St Vincent and the Grenadines (Simpson et al. 2012). These climatic changes have significant implications for agriculture in the country. The objective here is not to produce evidence of a changing climate or even ascertain how anthropogenic factors contribute to this phenomenon but to investigate the impact of hydro-meteorological hazards on rural livelihood at the community level in the context of a changing climate and coping and adaptation strategies employed by rural Carib households.

Perception and Impact of Climate Change

Investigation of climate change at the local level revealed a limited understanding of its meaning and its potential impacts. Focus group discussions revealed that even though a few individuals have heard the concept

mentioned on radio or television programmes, the majority is unaware as to what climate change entails. Participants had more questions than answers. However, when asked about specific changes they have observed in the weather and climate, it was revealed that there is a general perception that the local climate is changing.

Specific changes observed include rise in temperatures, increase in length of the dry season, and unpredictable weather patterns. These descriptions supported the quantitative account, which was given in the questionnaire survey. Although 29 percent of the respondents stated that they have observed no change in the climate, a significant percentage (42 percent) recognized temperature increase, while 14 % stated that the dry season is longer and 10 percent found the weather to be more unpredictable. Investigations at the community level revealed a statistically significant relationship between individuals' perception of climate change and the location of the community (χ^2-test give a p-value of 0.000). Respondents show similar perceptions of climate change in each community with most of them recognizing some change in the weather in terms of temperature increase and unpredictable weather patterns. Studies conducted in Georgetown, St Vincent, and the Grenadines show similar results—increased temperature, the unpredictable weather patterns, and even the increased intensity of storms (Simpson et al. 2012).

Farmers are particularly vulnerable to these changes. Within the sample studied, 35 percent of the respondents are household heads that are also farmers. The data revealed no significant difference in the results when compared to the rest of the sample population. A majority of the farmers (70 percent) recognized a change in the climate in terms of an increase in temperature, a lengthening of the dry season, and the general unpredictability of the weather. The following statements were also made in support of these changes:

> Since the hurricane season start is more sun than rain
> This year is a lot of heavy rain in May [a typically dry month]

The longer dry season and the unpredictability of the weather pose considerable threat to household livelihoods. As stated by one farmer,

'some crops can't have too much rain or too much *sun… crops such as ground nuts, when a lot of rain meet them in the ground they spoil'*. The major impacts reported were an inability to identify when and what to plant, a loss of income from crop losses, and difficulty obtaining planting material for the subsequent crop. Farmers are also unable to take advantage of micro climatic conditions that have yielded certain benefits in the past. According to one farmer, in normal years he was able to maximize income at certain times in the year when farmers on the rain shadow leeward side of St Vincent were unable to plant because of the lack of precipitation. He stated:

> *[I] normally plant potatoes from the first a December, but for the past 3 years the weather change so drastic that when you think is dry spell, none…it affect price too because places that couldn't plant because of dry weather, planting more, so I can't capitalize on that.*

Clearly, farmers are aware of the different agro-ecological conditions and seek to use them to their advantage as much as possible. While dry conditions were affecting farmers on the leeward side of St Vincent, more favourable wetter conditions were experienced on the northeastern side of the island and so the farmer was able to increase production and maximize income due to the increased demand. However, he recognized a loss of market and a subsequent decline in income, which he attributed to the changing climate ('*the rain coming in between*') , which have allowed farmers on the leeward side of the island to plant all year round. Efforts to further examine scientific data on climatic changes on the windward and leeward sides of the island were restricted by the limited number of rainfall stations in St Vincent and the deficiency in national records. However, the mountainous nature of St Vincent has given rise to a number of microclimatic conditions with temperature and precipitation varying with height, location, and orientation of the island (Ministry of Health and the Environment and Simmons and Associates 2000). Cooler temperatures characterize the interior of the island with increase in altitude and annual precipitation of up to 381 cm compared to 150 cm in coastal areas (National Environmental Advisory Board and Ministry of Health and the Environment 2000). The windward (eastern) side of the

island (location of the study communities) receives more rainfall (Fraser et al. 2013) and is also described as having more fertile soils and gently sloping land more suitable for agriculture (John 2006) side.

Sensitivity of Livelihoods to Climatic Hazards

Farmers suffer from both too much and too little rain but 78 percent reported that drought conditions posed the biggest risk to them. Extremes in both the dry and rainy seasons have major implications for rural households, especially when they occur in close proximity to each other. For instance, in 2010, farmers experienced a severe drought episode and a Category 1 hurricane—Hurricane Tomas. Following the drought, one farmer reported losing 700 plantain trees, while another stated that he was only able to harvest two sacks of potatoes from a field that should have given him 30 sacks. Hurricane Tomas also resulted in significant crop loss, as reflected by this statement made by one farmer, '*Well the amount of things that get blow down for me, you go have to take 3 days to check… peas, sweet potatoes, "grindy", banana, bread fruit*'. Other farmers reported similar experiences of significant crop loss in plantain, peas, sweet potatoes, and deciduous fruit trees. On a national scale, agricultural production was 20 percent lower on average due to the drought, while Hurricane Tomas caused an estimated EC$67.2 million worth of damages (CDEMA 2010).

For many households, agricultural production is the principal income earner and, in some cases, the only income earner. Farming is the only form of livelihood in 24, 25, and 40 percent of households in Sandy Bay, Owia, and Fancy, respectively. These households depend on farming for subsistence as well as income. The impacts of extreme weather events therefore have significant implications for economic well-being and food security within these households as these events force households to purchase food they would otherwise produce. As stated by one farmer, '*Tomas bring famine all around*'. Their vulnerability is further exacerbated by increases in food prices during these periods. Following the 2009–2010 drought, food prices rose significantly. For example, tomatoes which were EC$2.35 per pound in February 2010 rose to $6.00 per pound by March

2010 (Trotman and Farrel 2010). The sensitivity of these livelihoods therefore emphasizes the need for households to identify opportunities that would increase their adaptive capacity.

Adaptation and Adaptive Capacity

Adaptive capacity is defined as the ability of a system to adjust or to modify its behaviour to mitigate the potential damage from climatic stimuli, capitalize on opportunities, and cope with impacts (Adger et al. 2007). Adaptive capacity can be generic, such as relating to education, income, and health, or it could be specific to the climatic stimuli (Adger et al. 2007). Smit and Pilifosova (2001) emphasized economic, social, institutional, and technological conditions as determinants of adaptive capacity and acknowledged the importance of adaptation in assessing the impacts and vulnerability in climate change and response options.

Within the communities of Sandy Bay, Owia, and Fancy, the adaptation and adaptive capacity of households to climatic variability with respect to agriculture were assessed largely using the impacts of Hurricane Tomas as a case study. The study evaluated households' preparedness measures, daily responses to climatic variability, how these responses change in periods of extreme climatic shocks like Hurricane Tomas, and the different elements that were significant in the recovery process after the hurricane. The results revealed that perception and assets (human, social, and financial) are critical determinants of households' adaptive capacity. They also highlight the strengths, weaknesses, and opportunities in a household, which affect adaptive behaviours.

Rural households are generally reactive to climatic hazards and are limited in their adaptive capacity. For example, the survey revealed that on a daily basis 56 percent of farmers do not undertake any measures to protect their livelihood from climatic variability. Within the 44 percent who stated that they undertake measures, 36 percent identified replanting as a measure, indicating the reactive rather than proactive nature of farmers.

Structured interviews conducted with households in Fancy illustrated that 28 percent did not make any preparations for Hurricane Tomas. Of the 72 percent who took precautionary measures, no attention was given to the farm even though 73 percent of the respondents were farmers. A similar

pattern was found in Sandy Bay and Owia. The perception of the impending risks was found to be an important factor in the lack of preparation.

Perception is a key determinant of adaptive capacity. Grothmann and Patt (2005) emphasize the importance of subjective adaptive capacity (what an actor thinks he or she can do) and motivation (what an actor wants to do), which is related to how risk is perceived, as determinants of adaptation or adaptive capacity. In their socio-cognitive model of private proactive adaptation, they analyzed the significance of risk perception and perceived adaptive capacity in determining adaptation or maladaptation (Grothmann and Patt 2005). The model provides a good basis to analyze adaptation in terms of perception, although there is no explicit recognition of the root causes of perception within the model. Accordingly, in looking at perception, five descriptions of risk perception based on their origin or the factors, which influenced the form of perception, as observed in the study communities were developed by the author. These perceptions are generally taken from the perspective of farmers, but supported by information gathered from other stakeholders. These forms of risk perception influenced how individuals perceived their adaptive capacity and the resultant course of action they take in response to their perception of risk. Risk perception is based on individuals' spirituality, experiences, knowledge or lack of knowledge, and also on the hazard itself as it occurs. They can, and often do, act as constraints in developing strategies to mitigate climatic hazards.

Religion or spirituality plays a major role in determining people's vulnerability to natural hazards. Some persons within the communities viewed natural hazards as acts of God over which they have no control. Preparation is futile as the will of God will be done. Consequently, this form of perception impacts the decision and behaviour of individuals, which can be described as non-adaptive behaviour prior to the event and a reactive behaviour subsequent to the event. Implicitly, religious or spiritual perception may overlap with ignorant or ill-informed perception, where individuals' decisions are influenced by lack of awareness. Conversely, even in the presence of knowledge, people's spiritual connection may still determine how they choose to respond to catastrophic events. Previous research in the Caribbean has found similar issues. In a discussion of decision-making amongst smallholder farmers in Jamaica, Beckford (2002) wrote of the role of perception in farmers' decision-

Table 7.2 Types of perception to hurricanes in the communities

Types of perception	Description	Supporting data and source of information
(a) Religious/spiritually driven perception	Spiritual belief that God ultimately determines when, if, and how a climatic stimuli may impact. Persons with this form of belief generally do not make any preparations prior to hazard impact. Adaptation tends to be reactive rather than proactive	'No what is to be, have to be. Ah Jah work.' [Interview with farmer] 'Don't really study it… hurricane can blow down everyone house and ain't touch your house. God in control.' [Interview with farmer] 'It depends on the Almighty, don't know what you can do.' [Interview with farmer]
(b) Experience-based perception	Perception is influenced by past experience with climatic hazards. It may influence adaptive capacity positively or negatively depending on what was experienced during the passing of the climatic hazard	'They take everything for granted and say no hurricane nah come…even when huge wind a blow we does come outside and they outside.' [Focus group discussion, Sandy Bay] 'We didn't expect the hurricane to pass on land, usually pass on sea.' [Interview with farmer] 'I didn't really prepare, don't get affected in this area.' [Interview with farmer] 'Well me never know ah so, so it catch me unprepared because me nah really pack up nothing, because you use to hear about hurricane, but the sea water ah rough, but I never experience no kind a wind at all.' [Interview with farmer]
(c) Autoschediastic perception	Perception which is influenced by events as they occur on the very spur of the moment. These persons are often found reacting when the event is already upon them.	'If ah heavy wind start up now, then you would see people preparing themselves. People don't normally prepare themselves for anything except when the storm is bad.' [Leader of Disaster Group (inactive) in Owia]

(*continued*)

Table 7.2 (continued)

Types of perception	Description	Supporting data and source of information
(d) Ignorance/ill-informed perception	Perception is influenced by lack of expert, scientific, or formal knowledge. Adaptation is often reactive as a result of this knowledge gap	'Don't think anything can be done before the hurricane, but after we could go back quickly to the farm and care some of the crops that are still tender.' [Interview with farmer]
(e) Knowledge-driven perception	Perception is influenced by knowledge obtained from experts or handed down by parents or relatives. Persons with this form of perception are generally more prepared and often make extra effort, within the scope of resources that are available to them, to improve their chances of adapting to storm events, prior to the event occurring	One farmer who was asked how he mitigates against 'washing' (landslides) in his land stated, 'well you get some grass and plant like, you know range tree…glory cedar to hold up the land or you use contour grass'. [Interview with farmer] Another farmer applied his knowledge of contour drains (he identified deep drain and grass as methods to construct these drains) and terracing to his farm that he learnt from working as a labourer with the Ministry of Agriculture. He found it to be effective on hill slopes especially with controlling erosion and run-off. [Interview with farmer]

Source: Author's fieldwork

making frameworks and the role of fate in farmers' perceptions. Farmers displayed a fatalistic attitude to natural events taking a 'whatever will be will be' attitude (Beckford 2002).

Other significant forms of perception which may result in reactive behaviour are what may be referred to as 'autoschediastic' (spontaneous or extemporary) perception and experience-based perception (see Table 7.2). Although autoschediastic perception does not influence decisions to protect agriculture, it remains a significant aspect of farming households' decision with respect to protecting assets such as their homes. According to Campbell

and Beckford (2009, p. 1375), the house represents a significant 'production space of farmers' as it provides protection to the family, farm produce, and livestock. Autoschediastic perception generally occurs at the very point in time when the hazard occurs and is influenced by the intensity of the storm event. Hence, households seemingly tried to put minimal measures in place, 'when the storm is bad'. Autoschediastic perception may result in unsuccessful coping strategies such as putting cinder blocks or bags of sand on the roof of homes during the storm, which may cause risk to life or injury to others.

Experience-based perception may result in proactive or reactive adaptive behaviour depending on individuals' past experience with hazards. Within the communities, failure to adapt was mainly due to the perception that the hazard will pass on the sea rather than land, which is what occurred in the past. Following the storm, however, several farmers seemingly had a change in risk perception and mentioned that should they hear of another hurricane warning, they will take it more seriously and make preparations. Similar behaviour has been observed in other Caribbean islands (Hobson 2003). It is argued that the adoption of hurricane preparedness measures may be dependent on lack of hurricane experience and whether persons believe they are at risk (Hobson 2003). Grothmann and Patt (2005) conceptualized this form of risk perception as perceived probability in which people's decision is influenced by their perception of their level of exposure.

Knowledge-driven perception, on the other hand, generally results in proactive behaviour. This form of perception was observed on a minimal scale within the study areas due to lack of knowledge and lack of resources to undertake appropriate measures. Hence, factors such as the low socio-economic status of households, limited training, low access to technology, poor road networks especially in mountain lands, limited market opportunities, and lack of or limited institutional support are also barriers to effective adaptation strategies.

Adaptation and adaptive capacity are also affected by access to assets. Financial, human, and especially social capital were critical resources following Hurricane Tomas. Financial capital is a vital aspect of post-disaster recovery. Savings, remittances, livestock, income from other livelihood, and government support in the form of disaster or emergency relief were reported as means by which farmers sought to get back on their feet following the hurricane. These were not only important

in the rebuilding of livelihoods, but also in surviving in the immediate aftermath of the disaster. Outside of personal savings, which for the poor is often meagre (IFAD 2014), the results also highlighted the significance of multiple income sources that were also obtained through livelihood diversification, livestock ownership, and social capital in the post-disaster recovery period.

A significant asset in the recovery from Hurricane Tomas was social capital, mainly in the form of family and friendship networks. These networks provided manual support in the reconstruction of homes, in cleaning up and replanting of crops, and also in providing financial assistance (including remittances) to assist farm families cope and rebound. Government relief can also be important, but these resources are usually overstretched. Hence, rural households look internally at the resources that are available to them at no or limited cost. Aldrich (2012) argued strongly the effectiveness of social networks in post-disaster recovery as they provide both financial and physical assistance during the recovery process.

Human capital also has significant implications for post-disaster recovery in agriculture. A central part of the recovery process for farmers, especially given the importance of their livelihood, is to return to their farms as soon as possible, clean the land, and replant. The results revealed that 61 percent of affected farmers returned to the land within 6 weeks, 33 percent returned within a time frame of 1–6 months, and 6 percent were unsure. Factors such as the topography of the land (mountain land), inaccessible roads, and sickness were identified as barriers, which prevented the latter farmers from returning to their land in a shorter space of time. Human capital is therefore essential in enabling households to return to and rebuild their livelihood within a short space of time.

Conclusion: Are the Caribs of St Vincent Winners or Losers?

The rural households in northeastern St Vincent can be described as subsistence farmers who sell their surplus on the local market. Their livelihoods are gravely affected by multiple stresses and shocks, which have significant implications for income and food security. This multiple

exposure creates a form of powerlessness amongst households keeping them in a vicious cycle of vulnerability. At the core of this vulnerability is the double exposure from economic and climatic stresses and shocks.

Access to market, market uncertainties, and price fluctuations in goods and inputs are key determinants of livelihoods' vulnerability. These prevent households from acquiring the necessary assets whether physical, technological, or human, which are necessary to improve and expand their livelihoods. In the midst of this, the main livelihoods of the households are highly sensitive to climatic variability and change. Households' perceptions of climatic hazards also have significant implications for increasing vulnerability.

Nevertheless, there are opportunities for increasing adaptive capacity of households. One of the major opportunities lies within the social networks, which have been crucial in enabling households to mitigate and bounce back from the impact of climatic hazards. These are essential in providing physical assistance and finance to farming households to aid in their recovery. Other important adaptive measures include livestock rearing, a reliance on savings, and livelihood diversification. However, these operate on quite a small scale. Savings are often meagre and the strategies utilized for diversifying livelihoods are often based on low-skilled jobs. As such, they may be described as short-term survival mechanisms, which are unable to create any real positive changes in households' livelihoods.

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8

Climate Change and Quality of Planting Materials for Domestic Food Production: Tissue Culture and Protected Agriculture

Clinton L. Beckford and Anthony Norman

Overview

As a region made up largely of Small Island Developing States (SIDS), the Caribbean faces a number of ubiquitous vulnerabilities. Climate change and the global political economy combine to exert tremendous influence over lives and livelihoods. Nowhere is this more visible than in the food and agricultural sector. Research indicates that agriculture in the Caribbean faces stern challenges from climate change with increasing temperatures leading to sea-level rise, and increasing frequency and intensity of natural events, especially storms, drought and general unpredictability (Bueno et al. 2008; Gamble 2009; Gamble et al. 2010; Haites et al. 2002). One area in which climate change has affected agriculture that does not get the attention it deserves is the impact on plant diseases and pests. This can exacerbate the problem of the quality of planting materials available to small-scale food farmers in particular.

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Among the most pressing constraints to successful agriculture and development in the Caribbean is the unavailability of high-quality planting material to farmers (FAO 2009). Disease and pest infestation is a major constraint to both the export agricultural sector and the small-scale domestic food sector (Neufville 2012). Climate and weather are influential in disease and pest dynamics and indications are that rising temperatures are causing more unusual pest and disease problems (Christiana Potato Growers Cooperative Association [CPGCA] 2013a,b).

The issue of small-scale food farmers' access to high-quality planting materials has been on the food and agriculture agenda for some time. The Food and Agricultural Organization (FAO) has stated that ensuring that farmers were able to obtain high-quality planting material was a critical issue in agricultural production and development (FAO 2010). Ogero et al. (2012) endorse this viewpoint positing that in many parts of the developing world food production is undermined by the substandard quality of planting material available to small-scale farmers who are the backbone of food production systems in many parts of the developing world, including the Caribbean (Beckford and Campbell 2013), where root crops and tubers such as potatoes, yams, and cassava are staples in local diets and critical to household food security (Beckford and Campbell 2013; FAO 2010; Roberts and Georges 2013).

This chapter explores the impact of climate change on agricultural diseases and pests and the implications for the availability of high-quality planting materials for domestic food crops in the Caribbean. Based on qualitative research, the chapter examines the use of in vitro plant production and protected agriculture to develop disease-free planting material. The chapter looks specifically at the potential of tissue culture technology in the Caribbean to clean planting material, and protected agriculture through greenhouse technologies to increase productivity. It has been argued that tissue culture technology combined with protected greenhouse farming holds the key to the adequate and reliable supply of high-quality seeds year round for farmers (Christiana Potato Growers Cooperative Association [CPGCA] 2013).

Methodology

This study employed qualitative research design combining ethnographic, phenomenological, and case study methodologies. The study area included communities on the southern fringe of Cockpit Country in Manchester

and the Limestone Plateau area in Manchester, Jamaica. There were three key aspects of the research. The first was a case study of in vitro plant production focusing on tissue culture at the Christiana Potato Growers Cooperative Association (CPGCA). The second was a study of greenhouse farmers on the southern fringe of Cockpit Country in Manchester and the Limestone Plateau area in Manchester. The third was an exploratory study of small-scale food farmers. Data collection procedures comprised in-depth formal interviews with greenhouse farmers and other protected agriculture stakeholders in Jamaica, including Ministry of Agriculture personnel, informal interviews, and field observations. Document analysis provided data on tissue culture and greenhouse farming in other Caribbean countries.

Analysis of the extant literature on the topic served to ground the discussion in a wider international and global context, which revealed critical lessons for the Caribbean. The data obtained were analysed for emerging themes and categories, which form section headings throughout the chapter.

Food Security and Agriculture in the Caribbean

The evolution of Caribbean societies is inextricably linked with food and agriculture. The first peoples of the region were agriculturalists and many traditional farming practices today can be traced back to them. European colonization from the fifteenth century onwards led to the development of the plantation era in which the islands of the region developed completely into agrarian economies. This led to the introduction of slavery, and in 1838, when this officially ended, a new era in Caribbean agriculture was born. An independent peasantry of newly freed people established themselves as smallholder farmers, growing mainly domestic food crops for subsistence and local commercial enterprise (Beckford and Campbell 2013). A small-scale farming sector focused on a variety of roots and tuber crops and fruits and vegetables now existed and grew to become the backbone of the agricultural sector in the Caribbean. Many of the crops that were grown for local consumption including yams, potatoes, cassava, coco, dasheen, pumpkin, bananas and plantains are now lucrative export crops themselves though they are still grown predominantly by resource-poor farmers using traditional agricultural techniques on marginal lands and generally under rain-fed conditions.

Although no longer the major contributor to gross domestic product (GDP) across the region, agriculture remains important through contribution to GDP, export earnings, employment, and domestic food supply. Agriculture is a major source of industrial raw materials and a major land-use activity, and forms the basis of rural livelihoods (Deep Ford and Rawlins 2007; Potter et al. 2004). It is also important in poverty reduction through food provision and employment, and is still a significant foreign exchange earner in many islands. Its important role in maintaining biodiversity is under-researched and misunderstood (Beckford and Campbell 2013).

Fundamentally, the critical importance of domestic agriculture to the Caribbean is based on the implications for food security in individual countries and the wider region in terms of the Eastern Caribbean where interisland trade in food is still significant. Food security is already a significant concern and will likely be exacerbated by climate change (Beckford and Campbell 2013).

Agriculture in Decline

The significance of agriculture in the Caribbean '…is changing as economic imperatives shift, and island/country economies diversify to become more industrial based and service and technology oriented' (Beckford and Campbell 2013, p. 4). Agriculture accounts for approximately 25 percent of GDP in the Caribbean, which has experienced dramatic declines in agriculture's contribution to GDP in the last 50 years. For example, in St Kitts and Nevis, it fell from 40 percent in 1964 to being less than 6 percent at the turn of the century, while Barbados experienced a decline from 38 percent in 1958 to 4 percent (Potter et al. 2004). The decline of agriculture in the Caribbean occurs in the context of a rapid expansion of tourism (Beckford and Campbell 2013; Rhiney Chap. 2 this book). Potter et al. (2004) reported that tourism contributed 75 percent to regional GDP and contributed more than 50 percent in every country except Guyana and Haiti.

Regionally, agriculture is in decline. Traditional exports like sugar and bananas have not been able to withstand the loss of preferential access to

markets in Europe (Ahmed 2004; Beckford and Campbell 2013; Chesney and Francis 2004). Domestic food production has experienced dramatic declines over the last 20 years. The Caribbean Community (CARICOM) region is now a net importer of food (Deep Ford and Rawlins 2007; Caribbean Food and Nutrition Institute 2007), 'a paradise that cannot feed itself' (Ahmed and Afroz 1996, p. 4).

There are many reasons for this decline, but a major factor that has not received enough attention from a research point of view is the lack of access of small-scale farmers to high-quality planting material.

Climate Change, Agricultural Pests and Diseases, and Quality Planting Material

The main aspects of climate that could influence pests and disease dynamics are increasing temperature and changes to the hydrological cycle hence precipitation patterns and water shortage. According to the University of California, Davis (2015), 'Climate change poses a threat to the control of pests and disease invasions' including insects, plant diseases, and invasive weeds (http://iasscore.in/current-updates-13.html). With increased variability in climate, it is conceivable that new pests and diseases could invade agriculture.

Impact of climate change on the agricultural pests and diseases is likely to be variable depending on crop type and geographical region.

> Climate change has added new dimensions and challenges in the agricultural system. Elevated temperatures, droughts, rising sea levels, floods, changes in wind patterns and abnormal weather have been causing changes in the ecosystem balance particularly in pests and diseases behaviours and occurrences. (CGIAR/CCAFS 2014, p. 6)

Knowledge about the relationship between climate change and pests and disease dynamics is incomplete. This makes it difficult to plan adaptation strategies to reduce vulnerability of agri-ecosystems. 'Climate change also affects natural enemies and their interactions with pests in terms of predation behaviour, mobility, tolerances and adaptive responses to temperature changes and wind patterns' (CGIAR/CCAFS 2014, p. 6).

Field observations indicate the rapid evolution of pests and diseases to adapt to climate change.

> Many pests and pathogens exhibit considerable capacity for generating, recombining, and selection capacity and thus, there is little doubt that any new opportunities resulting from climate change will be exploited by them. (CGIAR/CCAFS 2014, p. 6)

'Climate and weather can substantially influence the development and distribution of insects' (Porter et al. 1991, p. 221). They suggest a number of ways in which climate change will likely impact pest and diseases.

> Changes in climate may result in changes in geographical distribution, increased overwintering, changes in population growth rates, increases in the number of generations, extension of the development season, changes in crop–pest synchrony, changes in interspecific interactions and increased risks of invasion by migrant pests. (p. 221)

Of relevance to CARICOM is the ongoing research to assess the potential threat of pests and diseases to root crops, tubers, and bananas, which are very important to food security and exports in the region.

Agricultural pests and diseases affect crop health and, therefore, the quality of planting materials available to farmers. For many thousands of farmers in the Caribbean, planting material comes primarily from the previous crop. In this scenario diseases and pests are transferred from one farm to the next and from one cropping cycle or season to the next.

Changes in temperature and rainfall are likely to have serious impacts on pest and disease distribution and proliferation but very little is known about which crops and which regions are most vulnerable. Caribbean research into this issue should focus on:

1. The influence of climatic variables on insect pests and diseases
2. Longitudinal monitoring of pests populations and disease outbreaks
3. Geographical distributions of pests and diseases
4. Long-term monitoring of pests' behaviour and evolution
5. Impact of climate change on beneficial pests
6. Monitoring pest migration trends

7. Collection of credible evidence about the current impacts of pests and diseases and how these are likely to change in a climate-change scenario
8. Pest risk analysis to increase knowledge of pests, diseases, and climate change scenarios

Quality of Planting Material as a Constraint to Agriculture

Concerns about the quality of planting material available to smallholder farmers in the tropics and subtropics are not new. The relationship between the quality of planting material and crop yields for especially roots and tubers and musa species is now well established by research. According to Shivaj Pandey, the Director of the Plant Production and Protection Division of the FAO, '… better quality of the materials used for planting will contribute significantly to improved agricultural production and productivity, and therefore to food security in many parts of the world' (Pandey 2010, p. xiv).

Research shows that the quality of planting material available to small-scale food farmers in developing countries is generally substandard (Bertin et al. 2012; Christiana Potato Growers Cooperative Association [CPGCA] 2012; DCED 2008; FAO 2010; FAO cited in Roberts and Georges 2013, p. 2; Ogero et al. 2012).

> Increasing the production and productivity in both crop and agroforestry sub-sectors is one of the measures taken to assure food security and livelihood enhancement. This improvement can only be realized if subsistence farmers have access to quality planting material. (Bertin et al 2012, p. 455)

They explain further that, 'The lack of quality planting material is also repeatedly identified as a major constraint to greater adoption of agroforestry innovations' (p. 455). Furthermore:

> Improving the genetic and physical quality of planting material can trigger yield increases up to forty percent and lead to substantial improvement in agricultural production and food security, especially if farmers continue to renew their planting stock. (Maredia et al. as cited in Bertin et al. 2012, p. 455)

According to Minot (2008) improved planting material is the single most important input in enhancing farm production and profitability. Combined with sustainable agricultural and agroforestry practices, improved planting materials can enhance production and productivity (Bertin et al. 2012).

'Ensuring that farmers have timely access to seed planting material of good quality is one of the most important elements of successful agricultural production and development' (FAO 2010, p. xiii). This prompted the development of the quality declared seeds (QDS) system to produce guidelines on standards and procedures for quality seeds (FAO 2010). However, QDS does not include vegetative structures like setts, stem cuttings, and tubers (FAO 2010). This means that important food crops like roots and tubers are not included. According to the FAO, with the exception of potato and musa species, vegetatively propagated crops have not received a lot of attention in the formal seed quality regulation system (Pandey 2010). Many of these crops, like yams and cassava, are staple foods in many tropical and subtropical regions where they make indispensable contributions to food security (Beckford and Campbell 2013; Ebert and van Gastel 2000; Pandey 2010).

Vegetatively propagated crops have a fundamental role in improving food security and human nutrition. They are important sources of starch and biofuels and, in case of economic crisis, can substitute for other types of crops (FAO 2010). They can make a significant contribution to improving hunger and poverty and sustaining livelihoods in developing countries in the tropics and subtropics (Pandey 2010). Micropropagation and production of disease-free planting material among other advanced technologies now make it possible to improve and develop vegetatively reproduced crops (Pandey 2010).

The potential and real contribution of traditional or local crops in enhancing global food security has also been recognized (FAO 2010). Soaring food prices and a number of food crises in the last two decades have focused more attention on traditional food crops and away from commercial crops. This is unconventional, as historically traditional crops have not benefitted from science-based systems for the production of planting material (FAO 2010).

In 2003 the FAO started the preparation of protocols and standards for the most important vegetatively produced crops (FAO 2010). The goal was the 'production of quality planting materials to overcome the degeneration due to diseases and pathogen accumulation' (FAO 2010, p. 1).

The Caribbean can learn from other tropical countries where systems for the development of high-quality planting material for vegetatively propagated crops are in place. A good example comes from Cameroon where a national seed and seedling system was established (Bertin et al. 2012), leading to smallholder farmers' access to good-quality planting material and increased yields for the participating farmers. Farmers also reported increased incomes (Bertin et al. 2012).

> The system has effectively improved the on-time dissemination, accessibility, affordability and availability of quality planting materials. Availability of quality seeds has increased on-farm crop yields by 20–40 %, while demand for improved seedlings has surpassed supplies in participating communities. (Bertin et al. 2012, p. 455)

Another example comes from Ghana, a country with many agricultural similarities with many Caribbean countries. There, roots and tuber crops also serve important subsistence and commercial functions (Ebert and van Gastel 2000). Almost the entire supply of planting materials is saved from the previous harvest and an informal process of distribution of planting material throughout farming communities causes the spread of diseases and pests (Ebert and van Gastel 2000). Ghana responded with the establishment of the West Africa Seed Development Unit (WASDU) in 1996. WASDU targeted the most important food crops—tropical roots and tubers, cereals, and legumes—to redress the problem of poor-quality planting material, which was contributing to bad yields (Ebert and van Gastel 2000).

WASDU sought to provide, multiply, distribute, and maintain clean stocks of planting material using selected community-based seed programmes with high-quality planting material (Ebert and van Gastel 2000). Participants in the programme reported significant success in improving small-farmers' access to high-quality planting material and improvements in yields and farm income. Other examples from Eastern and Central Africa may also be instructive (David and Sperling 1999; Rohrbach et al. 2002).

Elsewhere, Singh et al. (2011) have documented efforts and successes in producing clean disease-free planting stock for bananas and plantains in Asia and the Pacific. In Kenya, smallholder farmers have also had success in the adoption of clean tissue culture-based banana planting material (Singh et al. 2011).

Status of Quality Planting Material in the Caribbean

FAO describes the unavailability of high-quality planting material to small-scale farmers as a pressing constraint to successful agriculture and development in the Caribbean (FAO 2009). Disease and pests infestation is a major constraint to local agriculture for both the export agricultural sector and the domestic food sector (Neufville 2012).

Roots and tubers are staple food crops in the CARICOM region and play significant food security and income-earning roles. Crops like potatoes, yam, dasheen, coco, and cassava are staples in local diets and local domestic food trade (Beckford and Campbell 2013). For almost all small-scale farmers, their entire supply of planting material comes from selected cuttings from previous crops or from their neighbours through a variety of informal community arrangements including purchasing, swapping, and other customary procurement methods. Diseased plants from one cropping cycle are therefore used in following cycles.

The Caribbean has recognized the problem of lack of high-quality planting material for domestic food crops and several years ago began experimenting with enhancing vegetatively propagated roots and tubers (Roberts and Georges 2013). A project directed by the Caribbean Agricultural Research and Development Institute (CARDI) established several infrastructure and training facilities for the development of high-quality planting material for cassava, sweet potato, and yam during 2010–2013 (Roberts and Georges 2013). The aim of the project was to improve farm incomes and rural livelihoods through the establishment of advanced propagation infrastructure (Roberts and Georges 2013). They explain that

> The infrastructural facilities will allow for the conservation of germ plasm that could be used for future research and developmental activities. The development and distribution of quality planting material that is disease-free are also expected to improve productivity with lower inputs while production levels can be sustained and improved over the long term leading to improved food security and sustainable livelihoods for communities. (p. 3)

Roberts and Georges (2013) posit that the infrastructure developed would allow for the rapid multiplication of varieties at volumes that were

not possible prior to this. Also, planting material would undergo screening for pathogens, making it possible for propagated plants to maximize their yield potential and provide better economic returns to farmers. The project adapted a regional outlook focused on plant propagation to facilitate the production and distribution of high-quality planting materials in quantities sufficient to meet regional demand (Roberts and Georges 2013).

Facilities for the production of high-quality planting material for certain root crops and tubers—sweet potato, yam, and cassava—were established in several Caribbean countries including St Vincent and the Grenadines, Dominica, Barbados, Haiti, Jamaica, and Trinidad and Tobago. The facilities that were established focused on the production of clean planting material through tissue culture technology.

Plant Tissue Culture

According to Akin-Idowu et al. (2009) plant tissue culture is an important process in harvesting and using plant genetic resources. Navarrete-Frias et al. (2012, p. 1) suggest that 'Genetic plant resources have great potential to strengthen food security and make agricultural systems more productive and resilient'. This could result in improvements in productivity and nutritional value and enhanced crop resiliency in response to pests, diseases, drought, flooding, and the Caribbean's dependence on imported food (Navarrete-Frias et al. 2012). They suggest that genetic resources can be an important element in climate change adaptation strategies.

Tissue culture provides the ability to produce plants rapidly by growing them on artificial media, in containers free of bacteria and fungi—a process known as in vitro culture (Mitchell 2002). Although still not mainstream in the Caribbean, the technology has been around for some time (Mitchell 2002; Thorpe 2007). Initial plant tissue culture came from roots, but leaves and other parts of plants are also successfully cultured and in vitro methodologies are now widely used globally in agriculture (Mitchell 2002).

Though relatively new in the Caribbean, it has been successfully used with roots and tubers in other parts of the tropics (Krikorian 1994; Ng 1992; Otroshy 2006; Vassel and Thorpe 1994). In Nigeria, for example, the International Institute for Tropical Agriculture (IITA) has been

routinely using meristem, shoot tip, and node culture to eliminate disease from cassava and yam and for micropropagating cassava, yam, sweet potato, and cocoyam (Ng 1992).

Benefits of Tissue Culture

The benefits of using tissue culture include

- Creating genetic variability
- Improving health of planting material
- Propagating plants that are hard to propagate using other methods
- Transferring specific traits among plants
- Cleaning plants of viral and other infections
- Enabling rapid multiplication of plants as cleaned stock for agriculture and horticulture (Christiana Potato Growers Cooperative Association [CPGCA] 2012).

Tissue culture has proven useful in crop improvement because of its ability to produce superior plants (Hussein et al. 2012). Plant tissue culture is widely used for large-scale plant multiplication, elimination of disease, and plant improvement and production, and it has also been effective in conservation of endangered, threatened, and rare species (Hussein et al. 2012).

The technology would therefore bring significant benefits to Caribbean farmers:

- Rather than planting diseased material from previous seasons, farmers could use disease-free planting stock
- Disease-free plants will yield more
- The use of disease-free planting material will reduce the cost of fighting diseases and pests
- Farmers can obtain plants with desirable traits
- Tissue culture technology produces disease-free planting materials for roots, tubers, and rhizomes, high dry matter, drought, pest and disease tolerant

- Tissue culture technology reduces need for chemicals to control diseases
- Tissue culture technology enhances biodiversity in root crops and tubers

CPGCA Tissue Culture Laboratory

The CPGCA introduced in vitro plant production when it established a plant tissue culture laboratory in an old fertilizer warehouse at its headquarters in 2005 (see Fig. 8.1). It established tissue culture to provide disease-free planting material for farmers, break the dependence on imported seeds for Irish potato, and increase self-sufficiency in planting stock for local farmers (CPGCA 2012). Locally produced seeds would cut production costs and also make planting time more flexible by giving farmers more control over the production cycle. The end of the Irish potato season is March after which it is extremely difficult to obtain adequate quantities of good-quality seeds until October for planting in December. If Jamaica produced its own seeds, farmers could be growing the crop between April and September as well. In addition, Jamaica spends over $250 million importing potato seeds annually (CPGCA 2012).

Fig. 8.1 Preparing tissue culture at the CPGCA Laboratory

Tissue Cultured Crops at the CPGCA

The CPGCA uses several traditional domestic food crops in its tissue culture activities. These are Irish potato, sweet potato, ginger, and yam. They also produce in vitro plants of Anthurium and African violet and in the past experimented with cassava. This initiative of the CPGCA is note worthy in the context of the status of domestic food crops in the Caribbean. King (2014) argues that the domestic food production sector is routinely devalued. Research by other Caribbean scholars supports this view. An important element of the CPGCA tissue culture activities is the preservation of germplasm. For example, in Jamaica soft yam varieties, such as sweet yam and renta yam, are considered to be on the verge of extinction. Yam tissue culture at the lab focuses on these soft yam varieties and has established a bank of genetic resources (see Fig. 8.2).

The CPGCA collaborates with several research facilities and universities supplying germplasm and providing training. It also acts as a bank for genetic material in root crops and tubers. The organization also cleans planting stock brought to them by farmers for a fee. Its major distribution is the selling of tissue culture potato seeds to farmers from its farm store.

Fig. 8.2 Tissue culture yams

Farmers' Perception and Attitude to Tissue Culture Planting Material

Our survey of local farmers had interesting results. The survey results indicate that of the 29 farmers 21 were not aware of tissue culture technology at all while 24 were not aware of the CPGCA's tissue culture laboratory activities. Three of the farmers in the survey reported that they were part of a trial of tissue culture planting material for Irish potato from the CPGCA a few years ago. They were unable to give specific figures but reported that they experienced impressive yields. One farmer estimated that yields were 30 percent higher than those with traditional planting stock. However, these farmers have not planted tissue culture potatoes since then. When asked why this was so and why the technology did not take off given the apparently satisfactory trial, they said that there was no follow-up done. They got the material and planted it but were never approached to provide feedback on the results or to engage in further experimentation.

Twenty-seven of the farmers said they would consider using tissue culture planting material with two important qualifications. First, they would need information about the system and see evidence of its successful performance under normal field conditions. Secondly, they would need support from agricultural extension services. This is not surprising and points to the importance of extension services in the diffusion of agricultural innovations. Agricultural extension seemed to be particularly important to female farmers.

Cost was also an important consideration for farmers. Tissue culture plants are far more expensive and more delicate than potato seeds. There was a suggestion by some farmers that the average potato farmer would not be able to afford tissue culture planting material and that it seemed that it was for the 'big man'.

Two of the farmers with knowledge about tissue culture seemed to have initially confused the technology with genetically modified foods. They argued that '*those foods are not good for people*'. They suggested that people should eat '*natural food and not try to alter the food*'. Some farmers also raised questions about the use of chemicals in the tissue culture process.

The ability of the tissue culture technology to produce clean, disease-free stock of high-yielding plants resonated with farmers the most. Two of the farmers reported that they were in discussions with the CPGCA to access tissue culture plants. They said that they would be providing material to the organization, which cultures and hardens plants for them at a cost. This will be more cost effective than buying cultured seedlings. Farmers can access tissue culture planting material in several ways. They can buy tissue culture plantlets from the CPGCA; they can pay to have the CPGCA culture their own plants; or they can purchase tissue culture-produced potato seeds from the CPGCA. The last option was favoured by over 90 percent of the farmers.

Farmers had a very positive attitude towards locally produced potato seeds in general. All the farmers surveyed expressed their willingness to use locally produced seeds. Some conceded that they have traditionally used imported seeds but argued that was because that is what has been available and is usually less expensive. They suggested that if local seeds were as good as or better than the imported ones the only reason they might prefer the latter is if they were less expensive than local seeds. As one farmer puts it '*it all comes down to economics because times are hard and we have to watch the bottom line so I would have to go with the cheaper one*'.

Protected Agriculture

There is growing pressure on the natural resources required for agricultural production. An evolving response to this is the application of *protected agriculture* in the form of greenhouse farming. It has been suggested that tissue culture combined with protected greenhouse farming holds the key to the adequate and reliable supply of high-quality seeds year round for farmers (Christiana Potato Growers Cooperative Association [CPGCA] 2013). They argue that

> Through the advent of greenhouse technology GPGCA have [has] been able to put together a system whereby plants are protected from many of the obstacles, which come into play when raising top quality crops. With protected agriculture system in place, a farmer can produce more yield, with

> better quality, all year. (Christiana Potato Growers Cooperative Association [CPGCA] 2013, p. 2)

Other agencies concur with this assessment. 'Protected Agriculture strategies have proven to increase certainty for food production through adverse weather conditions while providing viable alternative livelihood opportunities to rural communities' (USAID 2008). According to ICARDA (2015):

> Protected agriculture is the cultivation of high-value vegetables and other horticultural crops in greenhouses—allows farmers to grow cash crops on small plots in marginal, water-deficient areas where traditional cropping is not viable. (http://www.icarda.cgiar.org/tools/protected-agriculture)

The Growth of Greenhouse Farming in the Caribbean

Greenhouse farming is on the increase in the Caribbean. In 2014, what is purported to be the largest greenhouse in the Caribbean was opened in St Kitts and Nevis. The Eco Park which it is part of integrates tourism, agriculture, and renewable energy (CARICOM TODAY 2014). In 2011, Spain and CARICOM collaborated to provide training in greenhouse technology for farmers from Dominica, Grenada, St Kitts and Nevis, St Lucia, Belize, Suriname, Trinidad and Tobago, and Jamaica (Serju 2011). The Spanish Government also donated two hi-tech greenhouses to Jamaica including one at an agricultural training school. The rationale for these initiatives is that greenhouse technology focuses on productivity and quality while providing farmers with crop management capabilities and ensuring consistent production, and reducing their vulnerability to weather conditions and seasonality (Serju 2011).

Greenhouse farming is also on the rise in Trinidad and Tobago. Local farmers are trying new ways to increase crop yield in the face of recurring flooding, drought conditions, and other climate and weather issues. Farmers are being encouraged to try greenhouse farming to produce better-quality crops and reduce the cost of labour and the use of pesticides (Caribseek News 2013).

Among the CARICOM countries, Jamaica is perhaps the country where the adoption of greenhouse farming has progressed the most. The first attempts began in the 1980s growing cut flowers for export. Later, farmers experimented with the growth of lettuce and tomatoes, primarily. Today many other crops are being grown in greenhouses, for example, cucumbers, sweet peppers, Irish potatoes, ginger, and strawberries. In 2015 approximately 180 Jamaican farmers were on record as using greenhouse technologies. In addition, there are a number of schools and agricultural colleges with greenhouses and several more with protected shade houses. In 2010, the Jamaican Government agreed to waivers making it easier for farmers to import greenhouse construction inputs (Serju 2010).

Much of Jamaica is suitable to greenhouse farming. For example, Manchester parish, especially the southern fringe of Cockpit Country and the entire Limestone Plateau, possesses the climate and soil conditions that are ideal for greenhouse agriculture and is home to some of the most successful greenhouse operations in the country (see Fig. 8.3). Greenhouses are often located on reclaimed bauxite land, where soils are often of poorer quality. They have great potential to help restore mined-out land to economic productivity.

Fig. 8.3 Greenhouse lettuce cultivation

Advantages of Greenhouse Farming in Jamaica

According to Rodriques (2008) greenhouse farming have brought a number of benefits to farmers in Manchester, Jamaica. These benefits include

- Greatly increased crop yield and rate of growth
- Increased quality
- Production of cleaner, disease-free foods
- Reduction in the need for pesticides and fertilizers
- Reduced labour input
- Less susceptible crops to weather and disease
- More appeal among youth farmers

Greenhouse farmers identified the following advantages and benefits:

- Improved quality produce (supermarket and hotel grade)
- Improved land and water use efficiency
- Increased control over crop nutrition
- Decreased use of chemicals and pesticides
- Protection from adverse weather conditions
- Reduction in insects and diseases
- A sterile environment/healthy plants
- Large increases in yield
- Year-round production

The Challenges in Establishing Greenhouse Technologies in the Caribbean Context

Surveys of greenhouse farmers and stakeholders in Jamaica identified several key obstacles to widespread adoption of greenhouse technologies among small-scale food farmers.

- The initial cost to construct greenhouses is beyond the means of most farmers. A 3000 ft^2 greenhouse costs $1.6 million (2014) , including frame, antiviral side mesh, plastic roof, and irrigation fittings.

- Creditors are generally reluctant to fund greenhouse operations because of the perceived high risks. Even where credit is obtained, interest rates are prohibitive to profitability.
- It is difficult to obtain insurance for greenhouses generally. Insurance risks include natural hazards such as hurricanes (main threat), pest and disease outbreaks—for example, the effect of *thrips*, tiny, slender insects with fringed wings, which feed on a large variety of plants and animals by puncturing them and sucking up the contents—and praedial larceny.
- Cultural inertia—resistance to change. The attitudes needed for effective implementation of greenhouse technology are largely foreign to the Jamaican culture.

Farmers suggest that successful adoption of greenhouse farming requires the following:

1. Funds to help finance greenhouse start-up operations, especially among small-farmer group
2. Access to credit for small farmers
3. Provision of insurance coverage for greenhouse operators
4. Training and education in greenhouse technologies and management for small farmers
5. Increase in awareness of the benefits of greenhouse farming through public education
6. Infusion of greenhouse instruction into schools and teacher education

Conclusion

The impact of climate change on the agricultural pests and diseases has not received much attention in the climate change and agriculture discourse and in the context of building agricultural resilience. Pests and diseases are often influenced by weather conditions. It is therefore important to consider how climate change and variability might impact the distribution, proliferation, and magnitude of agricultural pests and diseases (Vergara et al. 2014). Porter et al (1991) suggested that the impact could be devastating for developing countries in the warm humid tropics.

There are now initiatives in the Caribbean to improve and develop vegetatively reproduced crops (yam, cassava, Irish potato, and sweet potato). The aim is to contribute to the improvement of livelihoods along the root and tuber crop commodity chain in the Caribbean. The primary activities include the establishment of advanced propagation infrastructure for the purpose of increasing the availability of planting material of sweet potato, cassava, and yam to small-scale farmers in several countries, including Haiti, Jamaica, Trinidad and Tobago, Barbados, Dominica, and St Vincent and the Grenadines (Roberts and Georges 2013). The infrastructure allowed for rapid multiplication of clean planting materials.

The development and distribution of quality planting material that is disease free could also improve productivity with lower inputs while production levels can be sustained and improved over the long term leading to improved food security and sustainable livelihoods for communities.

In addition to tissue culture, other in vitro technologies and propagation techniques are also available, which are capable of improving production efficiency, increasing yields, and reducing the need for application of chemicals to combat diseases and pests (Jamaica Social Investment Fund [JSIF] 2013). 'The major issue related to production is the availability of disease-free planting material' (JSIF 2013, p. 2). In vitro plant production using tissue culture has proven successful in addressing diseases and pests issues.

Greenhouse farming has significant economic and environmental benefits and in the context of food security, climate change, and globalization can shape and transform the fortunes of farmers in the Caribbean. In the emerging era of climate change, smart agriculture greenhouse farming should take on a more central role. The ability to enhance food quality, use scarce water efficiently, reduce the impact of pests and diseases, reduce the use of chemicals especially pesticides, ensure year-round production, and reduce/control the effects of climate and weather on crops are factors that will enhance productivity and increase profitability in the long term through the reduction in production costs and increased incomes.

Through greenhouse farming, more women could become involved in food production, marketing, and small-scale agro-processing, leading to greater gender equality and enhanced fortunes for household food security and general welfare. This is important as women have limited opportunities and their contribution to agriculture tends to be undervalued

(King 2014). With regard to the cultivation of root crops and tubers, women farmers are not heavily involved because this type of farming is very labour intensive and farm labour is relatively expensive. However, women say they would be more inclined to be involved if high-quality planting material through tissue culture was affordable and available.

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9

Observations, Perceptions, and Responses to Climate Change and Variability Among Small Farmers in Sherwood Content, Trelawny, Jamaica

Ayesha Constable

Overview

By examining the human dimension of climate change, researchers seek to understand how different groups of people are influenced by the economic, cultural, and geopolitical variations of the process of climate change. Across the Caribbean, there is a thrust among academicians and planners to assess the impacts on food production systems in order to stave off the long-term, more debilitating impacts on agriculture. A better understanding of how farmers' perceive climate change, ongoing coping and adaptation measures, and the factors influencing the decision to adapt farming practices is needed to craft policies and programmes aimed at promoting successful adaptation of the agricultural sector to climate change and variability (Bryan et al. 2009). Farmers' perceptions on climate change and variability are important in adaptation as they determine decisions in agricultural planning and management by the farmers (Bryant et al. 2008; Moyo et al. 2012). Peters

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(1997) opined that perception is important because a misconception of a risk has undesirable consequences.

This chapter explores the changes observed and the perceptions of climate change held by residents of Sherwood Content, Trelawny, Jamaica. Using a mixed-methods approach to data collection, I examine awareness and perceptions of, and adaptation to, climate change in this rural community where farming is the base of the economy. This research contributes to the existing/burgeoning global research on climate change as well as the discourse on indigenous knowledge and climate change. In the local context, it is important as it looks specifically at resource-poor farmers in the rural space and their efforts at using traditional knowledge to enhance their capacity to adapt to changing and variable climate.

Introduction

The agricultural sector remains an important contributor to gross domestic product, employment, foreign exchange earnings, and rural life in Jamaica (Planning Institute of Jamaica 2009, p. 3). Agriculture is one of the sectors most susceptible to climate-change impacts (MWLECC 2013, p. 16). Climate-change impacts are already being observed in the Jamaican agricultural sector, resulting in lower yields due to the prevalence of more pests and diseases (Caribsave 2012). Climate- and trade-related factors have significantly disrupted livelihood activities for many small farmers (Campbell et al. 2010, p. 147). Evidence of the fragility of the sector and how potential climate-change impacts can result in immense destruction, and losses can be seen in the tremendous impact suffered by the sector during extreme weather events such as hurricanes and tropical storms (MWLECC 2013, p. 17). Consequently, there is a major effort to promote adaptation strategies as a means of reducing the impacts of climate change and variability. Adaptation to climate change has the potential to substantially reduce many of the adverse impacts of climate change and enhance beneficial impacts (Smit and Pilifosova, p. 879). Farmers' perception of climate change is crucial for their choice of adaptation

(de-Graft and Onumah 2011, p. 31). Rural peoples' perceptions of natural disasters/extreme events are important because they represent the first step towards planning a rational coping strategy to reduce such vulnerability (Roy et al. 2002, p. 5).

Eakin (2005) states that the high sensitivity of tropical agricultural production to climatic extremes and variability, the importance of the livelihood security of large numbers of people and the menial position of tropical food producers in world agricultural markets present a plethora of challenges for the region. The heavy reliance of poor Jamaicans on agriculture, the vulnerability of the sector to climate change, and the country's economic and social situation (GOJ 2011) demand that actions be taken to address climate change locally. Impacts of climate change pose disastrous effects for both agriculture and local food security. A summary of these impacts includes decreased precipitation and its effects on agro biodiversity, increase in temperature and its role in the breeding of pests and diseases, and the role of extreme events in agricultural infrastructure, livelihoods, and assets (CSGM 2012a).

'Climate-change perception' within the agrarian context is a key concept within the broader framework of the human dimensions of climate change Amdu, B., Ayehu, A., and Deressa, A. 2013, Leiserowitz 2006, Maddison 2007, Rejesus 2012. Perception refers to beliefs or opinions often held by many people based on how things seem to them. Knowledge, according to Blaikie et al. (as cited in Kisauzi 2012, p. 276), concerns the way people understand the world and how they interpret and apply meaning to their experiences. Perception is regarded as an integral precondition for effective adaptation as both perception and knowledge guide decision-making and consequently farmers' action on climate-change adaptation. Adaptation is a multifaceted concept, and for the purposes of this chapter the definition of Intergovernmental Panel on Climate Change (IPCC) will be adopted, which states that adaptation is the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC 2014). Perception and adapta-

tion are therefore inextricably linked and together are important variables in the vulnerability discourse, as accurate perceptions are the building blocks for successful adaptation that in turn can reduce the level of vulnerability.

Perception: The Theoretical Background

Perceptions of climate change raise questions about how people view climate change and climate-change risks in the context of their local experiences Boillat and Berkes (2009). A review of literature on perception reveals the complexity of the issue and the extensive body of work, which has been amassed over the last decade and a half. Generally, perceptions of the risks posed by climate change are influenced by an array of factors. According to Helgeson (as cited in van der Liden 2015) past research has suggested that risk perceptions of climate change are primarily influenced by four key dimensions, namely sociodemographic, cognitive, experiential, and sociocultural factors. Examples of sociodemographic measures such as sex, age, income, educational attainment, race or ethnicity, main source of news, political identification, political ideology, and voter registration were found to be determinants of climate-change perceptions in the USA (Leiserowitz et al. 2012). The ways in which people perceive climate-change risks are therefore informed by their social interactions and cultural worldviews comprising fundamental beliefs about society and nature (McNeeley and Lazrus 2014).

Determinants of perceptions include affect related to a person's relatively stable positive or negative evaluation of specific cognitive contents or worldviews derived from cultural theory (egalitarianism, fatalism, hierarchism, and individualism) (Slovic 1997). Despite the pervasiveness of affect-based decisions about climate change, people are unlikely to be motivated to take significant action, as politicians and the general public are not particularly worried about climate risks and because attempts to scare people into greater action may have unintended negative consequences (Weber 2010).

Considerations of psychological processes on human dimensions of climate change, such as perception, can offer knowledge and concepts that

can help explain the human understanding, causes, and consequences of climate change as well as inform responses to it and help make them more effective. A more place-based approach, as in the case of this study, has been more recently adapted to perception studies as climate-change effects, and susceptibilities to them will most likely be regionally and locally uneven (Crona 2013).

Perception is a function of various factors and varies according to space and time. It is evident too that 'incorrect' perceptions can lead to maladaptation and, in the context of climate change, can lead to a false sense of security among vulnerable populations.

Methodology and Study Area

The farming community of Sherwood Content located in Northern Trelawny is quite similar to other small rural communities in Jamaica. Historically, its economy has been largely agriculture based with an emphasis on sugar cane cultivation as it fell within what was aptly dubbed the 'sugar belt', a discontinuous belt around the island, excluding the mountainous and wet north-east (Eyre 1966). With its capital, Falmouth, a once booming Georgian town of Trelawny, once held the distinction of being the wealthiest and most advanced Jamaican parish. When Montego Bay and Ocho Rios were fishing villages, the town had multiple newspapers and had a piped water supply before any town in North America (The Gleaner 2007). These successes were built on the profits of sugar cane cultivation. At one point, the parish had one of the largest expanses of land under sugar cane, a total of 114,128 acres, fourth behind Clarendon, St Catherine, and St Elizabeth (STATIN 1968). The census also showed that overall, Trelawny had a high dependence on agriculture, ranking seventh in the total acreage designated to farming among the parishes. It is interesting to note that Trelawny still held this position when the 2007 Census was carried out. Based on the findings of that census, Trelawny had 7.6 percent of national farmland.

Though relatively fertile, the Sherwood Content community occupies what is considered marginal agricultural lands bordered to the south by the rough terrain and dense tropical forests of the Cockpit

Country. Nonetheless, the farmers have managed to eke out a living through small-scale agriculture. Most worthy of note is the gradual shift towards yam cultivation that has occurred in the last two decades. Trelawny's small farmers have managed to establish themselves as a force to be reckoned with on the global market, producing 40 percent of Jamaica's yam (STATIN 2007), a key export crop which is Jamaica's number one non-traditional export and is the lifeline of agriculture in Trelawny. According to the 2007 Agricultural Census, 52 percent of the land area was in export crops, where 'export crops' is primarily used in reference to yam and sugar cane. It is therefore evident that there is a great deal of reliance on agriculture as a livelihood strategy. Additionally, there are certain environment and socio-economic conditions, which make the area increasingly vulnerable to external shocks such as climate change.

The study integrated both quantitative and qualitative methods to complement each other and enhance the depth of the information collected. Available data on climatic attributes and socio-economic data for Jamaica were retrieved from secondary sources. Key informant interviews, focus group discussions, and a questionnaire survey were undertaken to understand in detail the local context and respondents' perceptions of climate change and variability and responses. Key informants were selected based on their involvement in agriculture and knowledge of the area; focus groups participants were locals who matched certain criteria for certain key groups of stakeholders. Questionnaires, which combined qualitative, measurable variables and quantitative variables, were administered to 160 household heads in the community. NVivo was used to analyse qualitative data related to perceptions of climate change and adaptation initiatives. Quantitative data were analysed by Statistical Package for the Social Science (SPSS) to generate frequency tables and cross-tabulations.

Participants: Demographic and Socio-economic Characteristics

Basic demographic and socio-economic findings related to the respondents are presented in this section. Sex, age, marital status, educational background, and household size are among the data presented. These are noteworthy as they have implications for how the farmers perceive and respond to the threats posed by climate change and the challenges of a shrinking global economy.

Gender

A total of 160 household heads were surveyed for the purposes of this research. Females accounted for 29 percent of the respondents and males were 71 percent, which was an indication of the disparity between the numbers of male- to female-headed households. The male-to-female ratio of household heads in Sherwood Content is reflective of the national population sex distribution reported by the Jamaica Survey in Living Conditions (JSLC 2007).

Age

The respondents range in age from 23 to 92 years with the largest percentage (27.5 percent) falling within the 60–69 years age group. There was an almost even distribution of 16 percent among the 30–39, 40–49, and 70–79 age groups. The youngest and oldest age groups were the ones least represented with 5 percent of respondents falling in each. The mean age was 55 years with a standard deviation of 16 years, while the modal age was 60 years. All the respondents in the 23–29 age group were male. Men also outnumber women in the 30–39, 40–49, 60–69, and the 70 and above age groups.

Educational Attainment

Sherwood Content has a weak educational base. This has affected the community's progress in several realms and the lack of economic advancement is also attributed to this fact. The analysis of the data reveals that 77.9 percent of respondents had been educated to the primary level. Those educated to the secondary level and those with no formal education were equal at 8.4 percent. Tertiary-level educated respondents accounted for 4.2 percent of the sample. A mere 1.1 percent of individuals were in the category 'Other', which includes training acquired through vocational institutions and adult literacy programmes. The cross-tabulation of age with gender revealed that males exceeded their female counterparts in numbers at every level of education. A representative of the Social Development Commission for the parish confirmed that the community is suffering from a serious case of 'brain drain'. She added that the young people who are left have a weak education base on which to build and to contribute meaningfully to the growth of the community. In addition, as is the case with many rural children, school is second to the farm, especially during the periods of planting and harvesting. Many children are therefore required to assist on household farms to offset the high cost of hired labour.

Household Size

According to the Social Development Commission's report on living conditions, single-person households are the norm in Sherwood Content. The field work survey validated those findings as it was found that the modal household size was one while overall 94.6 percent of the households had 1–5 members and 5.4 percent held 6–10 individuals. According to the analysis, the average household size is two members, lower than the national average of 3.6 (STATIN 2001). The situation in Sherwood Content is contrary to the widely held belief that rural households are generally large and comprise many generations of family members. Conversely, many young people have moved out of the community in search of a better life. Over 30 percent of respondents

aged 60–80 live alone. This further erodes the financial well-being of the respondents and affects economic projections for the community as a whole. As a consequence, households rely heavily on agriculture, producing for subsistence and domestic sale.

Farmers' Perceptions of Changes in Local Conditions

The study sought to examine the changes that have been observed by respondents in the local conditions and the ways in which these changes were perceived. Even with a seemingly homogeneous population there are distinct variations in the perceptions and observations made of certain environmental variables, hazards, and climate change. The majority of the respondents observed distinct wet and dry seasons and these had been altered over the last 5–10 years. Respondents noted that the formerly wet season is now characterized by drier conditions and vice versa.

A look at the short-term impact of disasters showed that droughts and hurricanes were perceived as the most threatening hazards with hurricanes perceived as slightly less threatening to livelihoods. Despite the frequency and intensity of hurricanes in the last 10 years, Hurricane Gilbert of 1989 was reported by the majority of respondents (64.4 percent) as being the most devastating they had experienced as it caused extensive damage to crops and infrastructure with one respondent describing it as a '*murderer*'. Since then hurricanes are perceived to have increased significantly in frequency by 80.5 percent while 13. 8 percent report that they had observed a decrease in frequency and 5.7 percent noting that they have remained the same.

In addressing the marked increased in the occurrence of hurricanes, one farmer noted that

> from mi a likkle bway a one hurricane mi hear bout one Friday nite, a from wah day, every year we get 2,3 hurricane [s].

Tropical cyclone activity in the Caribbean and wider North Atlantic Basin has shown a dramatic increase since 1995. Both frequency and duration display increasing trends significant at the 99 percent confidence level. While the number of intense hurricanes has been rising, the maximum intensity of hurricanes has remained fairly constant over the 35-year period (CSGM 2012).

Droughts and Rainfall

Droughts were reported as the most threatening hazard in the last 5 years and were considered by 40 percent of the respondents to have increased in frequency and intensity. However, 23.4 percent reported a decrease while 29.7 percent stated that drought frequency and magnitude had not changed. This observation is linked to the overwhelming agreement that rainfall patterns have changed in the last 20 years. According to the IPCC (2014) the range of projections for precipitation is quite large and the direction of change is not clear. It therefore means that rainfall pattern is likely to undergo an array of changes in response to climate change. In Sherwood Content, the overwhelming majority of respondents (78.9 percent) reported that there has been an obvious change in the rainfall pattern of the area, primarily in the last 20 years. The changing rainfall pattern was deemed by some respondents to be a reflection of changes in the broader environmental conditions.

There was a general consensus that rainfall has become less predictable, thereby affecting the consistency of the planting and reaping seasons. Farmers are therefore unable to rely on rainfall for successful crop growth. The month of May for instance has heralded drought instead of the long periods of rain usually associated with the period. Older, more experienced farmers admitted being troubled by this phenomenon as it has brought about an unforeseen change in their farming regime. They have had to plant earlier or later in the year in an effort to avoid the dry weather now being experienced at this time of year.

The observations made by the farmers are in keeping with the reports of the Meteorological Service of Jamaica. In comparing the 30-year

Table 9.1 Perception of changes in various climatic attributes

Rainfall pattern changed	
Yes	78.9
No	21.1
Temperature changed	
Yes	70.1
No	29.9
Droughts changed	
Increase	40.6
Decrease	23.4
Same	29.7

Source: Author's fieldwork

mean for the periods 1951–1980 and 1971–2000, the Meteorological Office reported that the overall rainfall pattern of the country has not been altered. However, the mean changes noted are wetter dry periods and drier wet periods (Meteorological Service of Jamaica 2011). This assertion is in keeping with the observations made at the local level by respondents (Table 9.1).

There are small percentage decreases in annual rainfall and summer rainfall per decade. The decrease in the June–August period is the strongest. A small increasing rainfall trend is evident for the drier seasons of the year (December–May) (CSGM 2012).

Temperature

Early models such as the Global Climate Model (GCM) predicted that climate change would cause temperatures to increase. Respondents in the study confirmed that local temperatures have been more erratic of late. The overwhelming majority of respondents felt that there had been a change in local temperatures. For many, temperatures seemed to have risen in the last two decades, an observation which led many to conclude that the '*sun a come down lower*'. However, the consensus was that '*nowadays when it hot it hot and when it cold it cold*' along with reported shift in daily temperature ranges as days are hotter and nights colder. This observation suggests that there are significant vari-

ations in temperature that are not in keeping with the normal expectations for the community. This observation seems to be in keeping with global and national projections that an increase in mean temperature will be accompanied by an increase in the frequency of extreme temperatures.

Since the late 1950s, the percentage of very warm daytime and very warm night-time temperatures over the Caribbean has increased significantly, while the percentage of days with very cold daytime and night-time temperatures has decreased (CSGM 2012). Corresponding values for Jamaica show that the frequency of very hot days and nights has increased by an additional 6 percent (an additional 22 days per year) every decade. The frequency of hot nights has increased particularly rapidly in June–July–August (JJA) by 9.8 percent (an additional three hot nights per month in JJA) per decade (CSGM 2012).

Climate-Change Awareness

The concept of climate change was not very well understood by respondents in the study but there was a high level of awareness of localized changes and variability. Seventy-two percent of those surveyed said they had heard the term climate change, compared to 28 percent who have never heard about climate change. A cross-tabulation of the variables of climate change and formal agricultural training shows that 16 percent more of those with formal training are aware of the concept than those without formal training; however, this was not statistically significant. The most widely observed evidence of change is heat in exhaustion in crops and other plants. Television and radio were reported as the most popular sources of climate-change-related information. Newspaper sources were the least popular among the respondents—possibly due to low levels of literacy and inability to afford to purchase newspapers.

Despite demonstrating an awareness of the term, it was clear that the majority of the respondents did not understand what it meant or the potential threats it posed. When asked to explain the meaning of the term, an array of responses was proposed. The most common ones are included in Fig. 9.1.

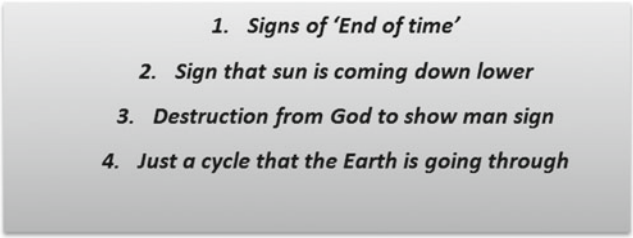

Fig. 9.1 Local perceptions of climate change

The range of responses revealed that respondents were not fully aware of the grave risks posed by climate change. Some respondents were however aware that it will have some negative impacts as 74.6 percent of respondents stated that it will lead to decrease in production while a relatively significant faction (23.7 percent) believed it will not impact their operations. Only 19.2 percent of those surveyed admitted that they were concerned about global warming/climate change and the likely impacts on their lives and livelihoods. Eighty-eight per cent of respondents were unconcerned about the potential effects that climate change is likely to have. Among the reasons given for the lack of concern were '*Mi cyaan do anyting bout it… A God business and mi nah fass inna God business… A end of times and prophecy a fulfill*'.

A national Knowledge, Attitude, and Practices study commissioned by the Planning Institute of Jamaica also showed that while there was a high level of climate-change awareness, knowledge and understanding of the concept was much lower, as 82.6 percent of respondents indicated that they knew the term, but only 56.4 percent indicated an explanation of the concept as change or variation in climate globally, precipitating shifts in precipitation, temperature, or general weather patterns. A cross-tabulation which explored the relationship between education levels of household respondents and their hearing the term 'climate change' showed that there was a significant difference among respondents' education levels in relation to whether or not they were familiar with the term 'climate change'. Persons who completed tertiary-level education were more likely to report having heard the term. This suggests that education levels should be considered a key segmentation variable when planning

any communication-based intervention (Caribbean Institute of Media and Communication 2012, p. 127).

Perceived Causes of Climate Change

Scientific knowledge of climate change among those sampled was generally low. The data however show that a greater percentage of male respondents had heard about climate change than their female counterparts—78.6 percent compared to 52 percent. Such awareness can be attributed to several factors, chief among them being higher levels of education among male respondents and a higher likelihood for male respondents to be members of farming groups. Such exposure would have allowed men greater access to climate-change-related information Alston (2013).

An examination of the perceived changes in the variables, rainfall, and temperature, revealed that similar numbers of males and females believed that rainfall patterns have changed. The disparity between males and females was larger in response to the question regarding perceived changes in temperature patterns. In the overall sample, the majority of respondents (80 percent) reported that local temperatures have increased. They were convinced that the days are much hotter than in years gone by. A look at the men–women dynamic revealed that 81.8 percent of women compared to 65.6 percent of men thought temperatures had changed. However, overall 74.4 percent of males thought that local weather patterns had changed compared to 63.6 percent of the females.

Respondents cited a variety of explanations for the variations in conditions and climate change (see Table 9.2). Many respondents attributed the changes to human-induced activities such as pollution, deforestation, and general misuse of resources. Some causes of climate change given include—man's going to the moon and the extensive use of various forms of technology such as cell phones and computers. A series of causes were attributed by many respondents to spiritual forces. Chief among the biblical interpretations was that climate change is God's way of punishing man for '*wickedness and disobedience*'. A very widespread view was that climate change was the fulfilment of biblical prophecy and a signal of 'end of time' and as such could not be averted. In this regard, responses

Table 9.2 Farmers' views on causes of climate change

Natural	Anthropogenic	God
Earthquakes	Bauxite mining	Punishment for wickedness
Sun lowered	Pollution	End of times
Earth opening up	Deforestation	
	Use of technology, e.g., cell phones	
	Use of chemicals in manufacturing	
	Bombs on the moon	

Source: Field survey

given by some respondents confirmed their fatalistic view on climate change, '*anything to happen will happen, wi can't do anything about it, wi can't stop it so why worry* and *mi just a leave it to God*'.

Impacts of Climate Hazards on the Farming Activities

The changes in local conditions have been linked to impacts in various aspects of the farming systems. As noted, droughts have been identified as the most disastrous in recent times. One farmer explained that the impact of droughts depends on the scale of agricultural production with more disastrous effects for farmers who produce on a larger scale. Farmers reported that they had lost several crops over the last 10 years due to the sustained changes in the environmental conditions. The majority of farmers had lost three fields of crops while 10.5 percent of respondents had not lost an entire crop. In this regard, female farmers were worse affected having lost three or more crops while males lost one to two.

Responding to Changes

The findings indicate that there is little effort on the part of farmers sampled to respond in definitive and substantive ways to hazards and to the perceived changes in local conditions. While there have been some

attempts to do so, the overwhelming majority of respondents had not implemented any strategy to reduce impacts. Respondents rank lack of awareness and financial resources as the most significant factors influencing their limited adaptation and response measures.

With the increased unreliability of rain and the perceived shift in the seasons, more farmers are relying on traditional methods of weather reading to determine the timing of their planting and reaping seasons. Several atmospheric and environmental signs are used to predict wet or dry periods and are the basis on which decisions are made to prepare fields, plant, or reap crops (see Table 9.3). Some farmers argue that these are the only reliable indicators of local weather patterns as the formerly set patterns have become more erratic and unreliable.

These natural indicators form the basis of a wealth of traditional knowledge on agro-meteorology that has been passed down from one generation to the next largely unchanged. Observations of animal behaviour seem to be most extensively used. Respondents vouch for the accuracy of these indicators with some expressing concern that more extreme changes in conditions could affect the reliability of these signs.

Table 9.3 Impacts of various hazards on farming activities

Drought	Floods	Extreme head	Hurricanes
Dry uncultivable soils	Waterlogged soils	Heat exhaustion in plants	Loss of crops; sometimes the entire crop
Insufficient rainfall	Erosion of top soil	Development of new diseases	Increased potential of praedial larceny
Increased prevalence of pests and insects	Washing away of seeds and small plants		Erosion
Failure of seeds to germinate			Landslides and slippages that damage hillside farming plots
			Death of livestock

Source: Field survey

Adaptation Strategies

Coping with Climatic Hazards

Adaptation to the adverse effects of climate change is vital in order to reduce the current impacts of climate change and increase resilience to future impacts (UNFCC 2011 Dang et al. 2008). However, adaptation occurs over a period of time, whereas coping strategies are usually a first response to the changes. Coping strategies are often a *short-term* response to a specific shock (Elasha et al. 2005). Local coping strategies are the basis for adaptation to climate change (Smit 2003). In the case of Sherwood Content, the residents are a long way off from adaptation. The situation is complicated by the fact that so many of them do not even understand the challenges being faced. However, they have been experiencing the changes and in most cases have been taking steps to respond in an effort to sustain their food supply or protect their source of income. These steps may be regarded as their 'coping strategies' (see Table 9.4). Among the most common responses is a shift in the planting season in order to avoid the driest or wettest periods. Farmers use similar farm planning and management practices in the drought stricken section of St Elizabeth in Southern Jamaica to cope with severe water shortages (Campbell et al. 2010, McGregor et al. 2009).

In responding to the challenges brought on by the changes in local environmental variables, the respondents are adopting an array of strategies. They are doing so in an effort to minimize the losses and cushion the blows dealt by the harsh economic times made worse by the impacts of the various hazards and resultant crop failures. One way in which they are seeking to offset the economic hardships is through remittances. While many had consistently received remittances, they are even more dependent on this periodical stipend to supplement the household income. Remittance flows form an essential source of financing to many Jamaican households in order to supplement household income for necessities such as food, utilities, and education (Ramocan 2011). Fifty-two percent of the respondents in the study reported that they receive remittances. A look at the gender dynamics revealed that 100 percent of the women received

Table 9.4 Strategies used by farmers to cope with hazards

Drought	Flooding	Extreme heat	Hurricanes
Water plants Implement rudimentary irrigation supplies Truck water from the river to farm Mulch crops Increased use of fertilizers Plant crops during full moon Fertilize plants in December and January to supply nutrients through drought	Change of planting season Digging trenches Pen animals Use 'signs' to predict rains Create stone walls to act as a breaker, wall to protect plants	Water plants Mulch Shading plants Intercrop tree crops and smaller ones to provide shade Plants yam heads deeper in the soil where it is cooler	Double stake yams 'Kotch' bananas and plantains Cut branches of tree crops Pen animals such as goats and cows Space crops such as bananas and plantains to allow 'breeze' to pass through Plant yam sticks deeper in the soil Plant fruit trees together to serve as wind breaks

Source: Field survey

remittances compared to 48 percent of men—a fact that has implications for male- versus female-headed households. These come primarily from children residing in other parts of Jamaica or overseas. Several residents also claim that the frequency and amount of remittances have decreased. They argue that '*tings get hard a "farin"* [foreign] *to*' and as such it is also having implications on those on whom they rely for financial support. This observation was confirmed by the Bank of Jamaica (BOJ) whose data show that in October of 2008, the impact of the global economic recession on remittance flows to Jamaica manifested itself with a consistent month-over-month decline in inflows (Ramocan 2011).

Crop Diversification

Farmers have altered the crops grown, moving from traditional cash crops such as yam and coffee due to unprofitability and environmental stress. Some farmers, for example, have halted yam production as the increased heat was leading to burning of yam heads in the soil. Other crops which

have longer growing periods or rely on large inputs of water have also been replaced by short-term crops which require less water. One farmer explained that she now plants cash crops also referred to as '*ketch crops*'—short-term crops because they have a shorter growing time and she can plant them closer to home where she can water them by hand. Other small crops or vegetables which are gaining popularity among farmers include cabbages, tomatoes, and peppers.

Livelihood Diversification

For some respondents, farming has grown increasingly difficult and unprofitable and the changing conditions have only worsened the experience. As such, some farmers are responding by turning to non-agricultural activities such as pottery making or basketry in the local craft industry, masonry, or carpentry and others are seeking jobs in the growing dry goods industry or tourism sector. Closer analysis reveals that among those turning to non-agricultural occupations, many of the participants are women. They explain that while income is not necessarily higher, they feel more secure. One key informant explained that the women have started basketry and weaving groups and are primarily the ones taking up training opportunities with local institutions.

Shift in Farming Calendar

There has been an almost organic shift in farm management practices in response to changing environmental conditions and weather patterns. Farmers have altered the time of year at which certain crops are planted. One farmer explained that *'if it's too wet, seeds will wash away and if it's too dry, ants and other insects will eat them'*. As a result farmers are extra careful to plant at the right time as whole crops can be lost if timing is off. In the first quarter of the year, when it is dry, farmers rest the land as conditions are increasingly unfavourable for cultivation. During this time some of them turn to non-agricultural jobs or rely on remittances. Crops that may have been sown are not transplanted at this time of the year, as rainfall is unlikely to be sufficient to ensure successful growth. Later in the year, planters prepare land in

expectation of rain or more conducive conditions. Planting of crops such as gungo and sorrel is delayed until rain is '*sure*' to fall.

Discussion

The data show that, overall, only a relatively small number of young people are practising agriculture. Older residents argue that young people are not interested in farming as they see it as '*a lot of hard work for nothing*'—meaning the investments of money, time, and energy do not match the returns. Many persons are therefore of the view that coupled with the other challenges facing the sector, the lack of interest on the part of young people is directly leading to the decline of agriculture in Sherwood Content. Additionally this has implications for the perceptions of climate change and adaptive capacity as older farmers tend to be more traditional and less receptive to some changes.

Based on the findings, it is evident that within the small population of seemingly limited diversity there is great variation in the socio-economic conditions of the respondents. The differences in their circumstances are linked also to variations in agricultural practices. It is also apparent that there are a range of perspectives on climate change even though there is limited formal, scientific knowledge about the phenomenon. Climate-change knowledge is reportedly mainly gained through radio and television sources, and a large percentage of respondents were at least aware of the term. Attempts by respondents to explain the term, however, demonstrated that there was a certain local use of the term, which did not allow for full understanding that reflected the threats posed by climate change. The perceived risks posed by climate change were, therefore, minimal as most respondents revealed that they were not concerned nor were they changing farming practices significantly to respond to the threats—a fatalistic approach usually linked to greater belief in fate, in the protection from God, and the denials of effectiveness of adaptive measures (Dang et al. 2014, p. 20). Even as respondents project significant impacts to agricultural production, there were not equally significant efforts to mitigate against said impacts. This finding is in keeping with Weber's theory that lack of anxiety leads to inaction of at-risk populations to climate-change

impacts. Visceral reactions like fear or anxiety serve as early warning to indicate that some risk management action is in order and motivate us to execute that action (Weber 2006). In the absence of such concern, as is the case of respondents in this study, farmers may fail to respond rapidly or aggressively enough to avert or reduce catastrophic impacts.

The limited understanding of climate change by respondents who rely on radio and television suggests that information should be channelled through other means. Suggested mediums include agricultural groups, extension services, church groups, or other community groups to promote social capital. At present, membership in agricultural groups is relatively low but should be encouraged as it can serve to connect farmers with technical information, markets, and other resources.

Where efforts are being made to respond and mitigate the impacts on agricultural productions, it is apparent that farmers are making use of local or traditional knowledge. In some instances these methods are used to reduce costs, because farmers are unaware of alternatives or because they have proven to be effective.

The perceived causes of climate change are also determinants of the responses. The pervasiveness of religious perspectives on climate change reveals the extent to which these beliefs influence perceptions and the potential to which they can shape response and adaptation mechanisms. In discussions with farmers, they explained the finality of climate change as it heralded the '*end of the world*' meant there was nothing they could do to negate its impacts and so they had no choice but to wait on '*God to do his work*'. In keeping with theory, the absence of fear or anxiety on the part of residents can suppress efforts to respond and adapt to the changes (Weber 2006).

It is also apparent that even at this juncture in the climate-change dialogue, when scientific information and findings on observed and potential impacts are more readily available, there are populations of vulnerable people who are not as well informed about the process. As such consistent efforts need to be made to sensitize such groups that do not have ready access to the information, for example, rural farmers like those of Sherwood Content. It is also critical that the information be packaged and communicated in a fashion that facilitates easy comprehension by the recipients.

There is a rich body of traditional knowledge held by farmers in the study area. Changing conditions have led to increased reliance on natural

indicators of hydro-meteorological events. The value of such knowledge has increased and is regaining popularity even as conditions change. It is important that the existence and value of this knowledge be acknowledged by climate-change scientists and practitioners as farmers are engaged in adaptation discussions.

Conclusion

The local weather conditions in Sherwood Content are obviously undergoing some shifts as evidenced by the changes observed by residents in the rainfall and temperature patterns. The shifts can be connected to changes occurring nationally, which have been attributed to climate change. It would therefore suggest that what is being observed in Sherwood Content is a local manifestation of the globally occurring phenomenon of climate change. The challenges being incurred by the environmental changes are being amplified by the weak economic base of the community and the bleak projections. Trade liberalization and the removal of agricultural subsidies decimated the sugar industry and have blighted the prospects for the crop while the global recession has put a dent in remittances which would serve to cushion the blow for many households in the community.

These conditions have exacerbated the vulnerability of the residents, made worse by the shortcomings in the other areas of the socio-economic profile of the residents of Sherwood Content. However, even among them there are variations in the vulnerability of the various subgroups with wealthier farmers (who more often than not are males) being able to diversify more. In response to the obvious changes, the farmers of the study area have drawn on local knowledge and expertise and implemented strategies to cope. The mechanisms adopted are basic, inexpensive actions to serve as short-term fixes. While they are now serving the intended purpose, they are not all sustainable or effective enough and so more long-term measures will need to be devised and adopted in order to ensure successful adaptation.

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10

Factors Influencing Perceptions of Climate Change Among Caribbean Coastal Artisanal Fishers: Case Study of Old Harbour Bay, Jamaica

April Karen Baptiste

Overview

Climate change impacts on Small Island Developing States have been well-documented, highlighting the disproportionate effects on many communities in these regions. Coastal communities have been listed to be at the forefront of climate change impacts. For the Caribbean the exposure to climate-related hazards, together with socioeconomic factors and the adaptive capacity of the community, all affect overall vulnerability. Understanding how coastal communities or subsections thereof adjust to the impacts of climate change on their daily activities is important, especially in cases where livelihoods are threatened by these impacts. The current chapter seeks to understand the levels of knowledge regarding climate change, perceptions related to the impacts of climate change on livelihoods, and current strategies that are being used to adjust to climate change among fishers. The case study of Old Harbour Bay, Jamaica, will

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be used to articulate patterns within the broader Caribbean context. For fishers, there are high levels of knowledge about the causes of climate change. Additionally, there is a clear, perceived relationship between climate change and threats to the physical environment and to livelihoods. Taking these perceptions into consideration, the question that must be addressed is the notion of what type of strategies, if any, are being used to adjust to the threats to livelihoods.

Introduction

> It's the poorer people in tropical zones who will get really hit by climate change—as well as some ecosystems, which nobody wants to see disappear. (Bill Gates)

The sentiments above provide quite an accurate synopsis of climate change realities for developing countries, especially those categorized as Small Island Developing States (SIDS). The following statement is no less poignant.

> Climate change is…a gross injustice—poor people in developing countries bear over 90% of the burden—through death, disease, destitution and financial loss—yet are least responsible for creating the problem. Despite this, funding from rich countries to help the poor and vulnerable adapt to climate change is not even 1 percent of what is needed. (Barbara Stocking, CEO of Oxfam GB, Global Humanitarian Forum, May 29, 2009)

Climate change is one of the most pressing threats to SIDS with cross-cutting implications for economy, environment, and society. Given the size of these countries, in many cases their low-lying coastlines and the limited financial resource base and capacity, they are in extremely vulnerable positions to climate change effects (Fry 2005; Mertz et al. 2009; Nurse et al. 2014). These climate change effects are expected to be manifested in sea-level rise, increased sea surface temperatures, increased ocean acidification, and increased air temperatures (Ford 2013; Pulwarty et al. 2010). Many of these climate change indicators are already conspicuous in the Caribbean region and continue to put people and places at risk.

In the scholarly literature on climate change, there is a lot of focus on the impacts on countries, that is, the macro level is the primary focus of analysis (Codjoe et al. 2012; Mertz et al. 2009). Fewer studies have focused on the meso and micro levels of analysis, that is, the community and individual levels. Moreover, there is currently very limited research on knowledge, perceptions, and behaviors of persons in the Caribbean toward climate change effects. This chapter begins to fill the gap by looking at these variables for a subset of Caribbean population who are extremely vulnerable to the effects of climate change—fishers.

Fishers are on the frontlines of vulnerability to climate change because of their dependence on marine resources. Impacts of climate change on fishers have been recorded as pertaining to both the physical environment and their livelihoods. For the Caribbean, there is a young but growing body of literature that examines ways in which fishers are affected by climate change (Baptiste 2013a, b).

This chapter discusses the findings of a study that sought to deepen our understanding of the knowledge, perceptions, and behaviors of fishers in Old Harbour Bay (OHB), Jamaica, and possible implications for similar communities, the wider Caribbean region, and other SIDS. It begins with an overview of knowledge, perceptions, and behaviors followed by a brief description of the research design and the findings. It will end by explaining the implications of the research for climate change-adaptation planning for the Caribbean.

Knowledge, Perceptions, and Behaviors to Climate Change: An Overview

Concerns about climate change, particularly in the context of sustainable development, have been increasing on a global level (Baptiste 2013a). However, when compared to other human concerns, climate change concerns are often not prioritized (Bord et al. 1998; Brechin 2003). Studies about knowledge related to climate change have found that there is some confusion as to the causes of this phenomenon (Bord et al. 1997, 1998; Bostrom et al. 1994; Brechin 2003; Kempton et al. 1995; Mertig and Dunlap 1995; Plotnikoff et al. 2004; Sterman and Booth Sweeney 2007).

There is also an indication that there may be a lack of understanding of the scientific underpinnings of climate change among communities (Sterman 2011; Weber and Stern 2011). There is often the assumption that local communities are not knowledgeable about climate change, its causes, or consequences, and, by extension, are unable to engage in adjustment strategies to address the threat (Baptiste 2013a). As such there is a postulation that these communities require information from outside bodies (Driesen and Popp 2010; Tessa and Kurukulasuriya 2010).

Recent studies, however, have begun to push back against the assumption that local communities are limited in their knowledge about climate change (Baptiste 2013a; Nanlohy et al. 2014). It is clear that different stakeholders think about climate change differently (Bord et al. 1997; Mog et al. 2009). Most of the studies on knowledge and perceptions of climate change have been done on the public (man on the street) and mainly in the developed world context. The focus of these has been generally on worldviews and the influencing factors of these worldviews as they relate to climate change (Bord et al. 1997, 1998; Bostrom et al. 1994; Brechin 2003; Kempton et al. 1995; Mertig and Dunlap 1995; Plotnikoff et al. 2004). A smaller but now growing body of literature has begun to focus on communities who are considered to be the most vulnerable to the impacts of climate change and who have been experiencing real impacts (Lazrus 2012; Nanlohy et al. 2014; Shah et al. 2014). Within this second group of studies, the Caribbean region has not been an area of focus.

Baptiste (2013a, b), however, has examined the perceptions and responses of fishers to climate change in the Caribbean region. These studies have indicated that fishers do perceive that climate change impacts are taking place in the region and that the effects negatively impact them. Further, findings from one study (Baptiste 2013a) indicated that perception of climate change among scientists, policy makers, and local communities differ particularly in terms of scale—both spatial and temporal—of the problem. What have not been explicitly examined are the levels of knowledge regarding climate change of different marginalized groups in the Caribbean and the factors that might influence adjustment measures to climate change. Given the significant dearth of research on knowledge, perceptions, and behaviors to climate change in

the Caribbean, this research begins to fill this gap. The chapter specifically addresses the following two research questions:

1. What are the knowledge, perceptions, and behaviors toward climate change impacts among fishers in OHB, Jamaica?
2. What do the aforementioned environmental psychological parameters indicate about the implications for broader climate change issues in the Caribbean and beyond?

For the purpose of this discussion, knowledge estimates how much an individual knows about the causes and consequences of climate change based on the accepted scientific definition of the phenomenon. Perception looks at what individuals believe are the impacts of climate change both on the physical environment and on their livelihoods. Behaviors examine the strategies that are used by individuals to adjust to the real and perceived impacts of climate change.

Why should we be concerned about the knowledge, perceptions, and behaviors of marginalized groups in the Caribbean to climate change? By understanding levels of knowledge and perceptions related to climate change and the factors that contribute to adjustment strategies, there is potential for policy makers to take a more informed approach to adaptation to climate change among marginalized populations in the Caribbean and beyond. This case study of fisher folk in OHB, provides some insights into the knowledge, perceptions, and behaviors of high-risk local communities to climate change.

Case Study

Jamaica is the largest island of the English-speaking Caribbean and is found south of Cuba in the Caribbean Sea. The fishing industry is quite extensive with approximately 20,000 registered fishers across the island with the largest fish-landing sites located on the south coast (Caricom Fisheries Resource Assessment and Management Program [CFRAMP] 2000; Food and Agriculture Organization [FAO] 2005; Kong 2006). OHB is the largest fish-landing site in Jamaica and a major provider of

fish to the local market (FAO 2012; Social Development Commission [SDC] 2009). Located along the southern coast of the island, the effects of climate change for OHB is immediate (Fig. 10.1). For example, it is predicted that approximately 100 km^2 of land will be lost due to sea-level rise in the next century, and the increased intensity of storms will also affect livelihoods in the community (Richards 2008).

The fishing population of OHB includes marine capture fishers (those who go out to sea), scalers (those who clean fish for customers), and vendors (those who sell fish). To understand how these livelihood groups view climate change and its impacts, a survey was conducted in the community between February and May 2013, with a pretest conducted in January 2013. The sample size was therefore determined using an available sample frame, which was the list of registered fishers for OHB as reported by the Fisheries Division (Government of Jamaica [GOJ] 2010). Using a standardized approach (Rea and Parker 2005), the sample size was determined to be between 239 and 397, at a 5 percent and 3 percent margin of error, respectively, and 95 percent confidence level.

Methodology

A purposive, snowballed sample of 241 fishers was obtained from among residents of the OHB fishing community. Given the difficulty in identifying fishers within the community, snowball sampling was deemed the most appropriate approach to take (Daniel 2012; Wegner 2007). To maximize participation and properly identify fishers in the community, local informants were hired and trained to administer the survey. Face-to-face 20–30 minutes surveys were then conducted in the late afternoon and early evening period, usually between 3 and 8 pm by interviewers, everyday, with the exception of Sunday. The survey asked specific close-ended questions on knowledge, perceptions, and behaviors toward climate change. Descriptive and inferential statistical tests were then used to interpret and analyze the relationships between the previously mentioned variables to examine how fishers view climate change.

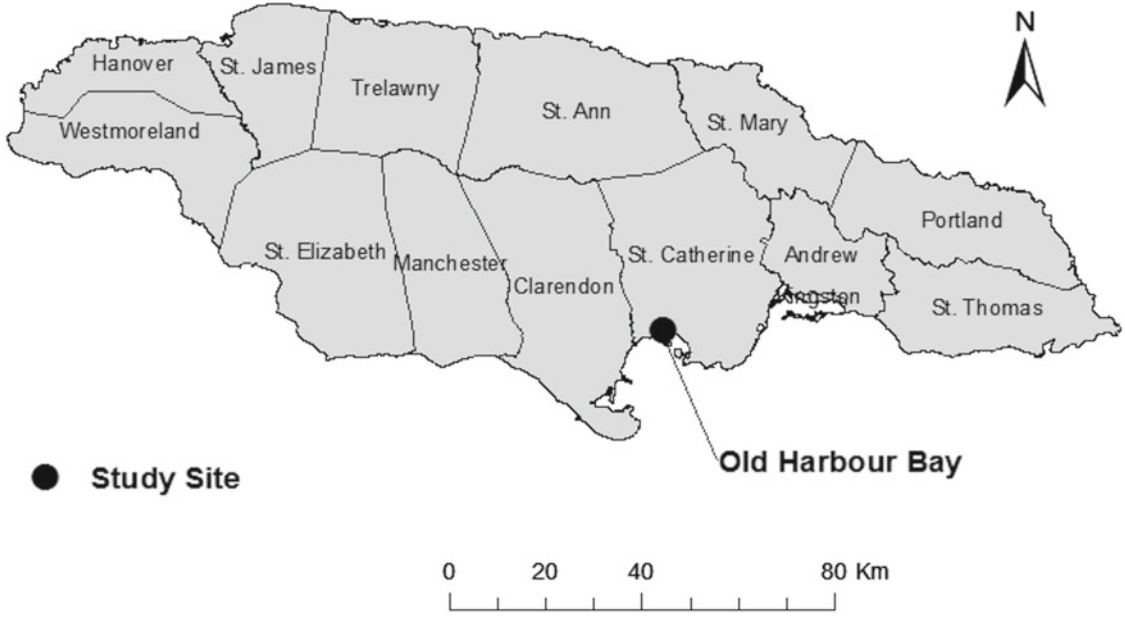

Fig. 10.1 Map of study area—Old Harbour Bay (Source: Previously published in *Caribbean Geography* (2012), used with permission)

Description of Sample

For the total sample, there were more males (84.5 percent) than females (15.5 percent) (Table 10.1). This pattern held true for those who identified as marine capture fishers; however, the opposite was true for those who identified as scalers and vendors, where females dominated these roles (Table 10.1). A majority of the respondents were long-term residents of the community with over 10 years of residence (96.3 percent). This pattern was also displayed across the different roles. Given that the length of residence is long term among a majority of respondents, home ownership also indicated a similar pattern of longevity. For example, the majority (63.5 percent) of the sample indicated that they owned their homes, while a small percentage indicated that they rented. Across roles, this pattern was also dominant (Table 10.1).

In terms of employment status in the fishing industry the majority (77.1 percent) of the fishers were involved full-time, and this was true across the occupational roles as well (Table 10.1). For the overall sample, the highest educational level was secondary school for a slight majority of respondents (58.0 percent). Across roles, though, secondary school was the highest educational level only among marine capture fishers, while for vendors the majority of respondents had primary school education as the highest educational level. For scalers, though, there was even distribution between primary and secondary school educational levels (Table 10.1).

From an economic perspective, the majority (58.1 percent) of respondents in the overall sample recorded a monthly income of 6000–24,999 Jamaican dollars (JMD) (US$600–2499). This distribution was visible for vendors and marine capture fishers, while for scalers the distribution was evenly split between the 6000–24,999 JMD and the less than 5999 JMD categories (Table 10.1).

Finally, for the overall sample and for marine capture fishers, there were no clear patterns for the length of time that a respondent was involved in the fishing industry. However, for scalers the majority (75.0 percent) of respondents were involved in the industry for less than 10 years, while for vendors a large amount of respondents were involved in the industry for 21–30 years (Table 10.1).

Table 10.1 Demographic characteristics of the sample of fishers in Old Harbour Bay, Jamaica, examining gender, length of residence, home ownership, employment status, educational level, monthly income, and length of time involved in fishing industry

Variable	Total sample (%) ($n=241$[a])	Role in fishing industry (%)		
Gender		*Scaler*	*Vendor*	*Capture fisher*
Male	84.5 (202)	8.3[b] (1)	13.8 (4)	99.5 (197)
Female	15.5 (37)	91.7 (11)	86.2 (25)	0.5 (1)
Length of residence (*years*)				
>10	96.3 (232)	100.0 (12)	96.8 (30)	96.0 (190)
6–9	1.0 (1)	0.0 (0)	0.0 (0)	0.5 (1)
1–5	2.5 (6)	0.0 (0)	3.2 (1)	2.5 (5)
<1	0.8 (2)	0.0 (0)	0.0 (0)	1.0 (2)
Home ownership				
Owners	63.5 (153)	50.0 (6)	71.0 (22)	63.1 (125)
Renters	9.5 (23)	8.3 (1)	6.5 (2)	10.1 (20)
Live for free	27.0 (65)	41.7 (5)	22.6 (7)	26.8 (53)
Employment status				
Full time	77.1 (185)	91.7 (11)	90.3 (28)	74.1 (146)
Part time	22.9 (55)	8.3 (1)	9.7 (3)	25.9 (51)
Educational level				
Preprimary	5.5 (13)	0.0 (0)	3.2 (1)	6.2 (12)
Primary	33.6 (80)	50.0 (6)	61.3 (19)	32.8 (64)
Secondary	58.0 (138)	50.0 (6)	32.3 (10)	57.9 (113)
Higher education	2.9 (7)	0.0 (0)	3.2 (1)	31. (6)
Monthly income (*JMD*[c])				
>130,000	0.4 (1)	0.0 → (0)	0.0 (0)	0.5 (1)
80,000–129,000	2.5 (6)	0.0 (0)	0.0 (0)	3.1 (6)
40,000–79,999	9.3 (22)	9.1 (1)	6.7 (2)	9.7 (19)
25,000–39,999	7.2 (17)	0.0 (0)	6.7 (2)	7.7 (15)
6000–24,999	58.1 (137)	45.5 (5)	70.0 (21)	56.9 (111)
<5999	22.5 (53)	45.5 (5)	16.7 (5)	22.1 (43)
Length of time involved in fishing (*years*)				
>40	10.4 (25)	0.0 (0)	3.2 (1)	12.1 (24)
31–40	17.8 (43)	8.3 (1)	16.1 (5)	18.7 (37)
21–30	24.5 (59)	0.0 (0)	41.9 (13)	23.2 (46)
11–20	24.1 (58)	16.7 (2)	19.4 (6)	25.3 (50)
<10	23.2 (56)	75.0 (9)	19.4 (6)	20.7 (41)

n given in parentheses

[a]Even though the full sample was 241, for some demographic variables there were nonrespondents, hence some totals do not equal 241

[b]The percent of the total population within the subcategory

[c]Jamaican dollars

Findings

Knowledge, Perceptions, and Behaviors

For the aggregate level of knowledge among the fishers there was a mean score of 3.70 (SD = .615, $n = 240$), based on the five-point Likert scale where 1 = low levels of knowledge and 5 = high levels of knowledge. This score indicates a moderate level of knowledge regarding the causes of climate change. When the individual components of the scale were examined, it was found that on three of the four statements about the causes of climate change, there was a median score of 4, while on two of the "pseudocauses"[1] of climate change, there was a median score of 3 (Table 10.2).

When knowledge scores were categorized into low (those with an average score between 1 and 2.9), moderate (those with an average score between 3 and 3.9), and high (those with an average score between 4 and 5) groups, the following results were obtained. In the low-level category there were 3.7 percent ($n = 9$) respondents; in the moderate-level category there were 63.5 percent ($n = 153$) respondents; and in the high-level category there were 32.4 percent ($n = 78$) respondents.

For the scale on perceptions of effects of climate change on the physical environment the mean was 3.75 (SD = .62, $n = 235$). For the scale on perceptions of the impacts of climate change on livelihoods the mean

Table 10.2 Median scores among fishers in Old Harbour Bay for the knowledge about the causes of climate change

Variable *Climate change is caused by*	Median (*n*)
Cutting down trees	4 (240)
Burning oil and gas	4 (239)
Overpopulation	3 (238)
Air pollution from factories and cars	4 (240)
Pollution from fishing boats	3 (237)

[1] Pseudocauses were included to cross-check whether individuals have a true understanding of the causes of climate change based on the Western scientific understanding.

was 4.14 (SD = .66, $n = 235$). Respondents indicated a stronger perception that climate change impacts their fishing livelihoods (M = 4.14, SD = 0.66) when compared to perceptions of impacts of climate change on the physical environment (M = 3.75, SD = 0.53). These impacts on livelihoods included increased sickness in fish, increased migration of fish species, decrease in fish catch, increases in fish expenses, and the increased occurrence of unusual fish species. The perceptions of the impacts of climate change on the physical environment included the following: increased sea surface temperatures, increased occurrences of hurricanes, increased intensity of rainfall, decrease in coastal areas, and increased air temperatures.

Of the respondents that indicated that they did not notice any changes in the past 5 years, 5.3 percent of respondents ($n = 1$) indicated that they have been engaged in adjustment strategies. Interestingly, 70.8 percent of respondents indicated that they noticed changes in the past 5 years, but they did not engage in any type of adjustment strategy ($n = 138$). However, 29.2 percent indicated that they noticed changes in the environment and that they engaged in adjustment strategies ($n = 57$). Within the group that have engaged in adjustments, specific strategies included going further out to sea (42.9 percent, $n = 27$), decreasing the number of days out to sea (36.5 percent, $n = 23$), changing the type of fishing done (17.5 percent, $n = 11$), or changing the fishing grounds (28.6 percent, $n = 18$).

Factors Influencing Behaviors

There were no statistically significant relationships between any of the demographic variables and engagement in adjustment strategies (Table 10.3). For gender, females tended to be less engaged in adjustment strategies. The main reason might be because women do not go out to sea and hence they did not engage in the strategies that were presented by the survey which targeted marine capture fishers. However, one might be cautious in interpreting this observation as an overall pattern of nonadjustment by females. Interestingly, vendors and scalers had similar percentages for those who did not engage in adjustment strategies, while

marine capture fishers, though a smaller percentage (71.0 percent) in the nonengagement category when compared to the other roles, still had a high percentage of respondents who did not engage in adjustment strategies (Table 10.3). There were relatively high percentages across the length of residence categories for those who did not engage in adjustment strategies, and a similar trend was seen for those who owned, rented, and lived for free in the community (Table 10.3). A larger percentage (73.4 percent) of those employed full-time in fishing were not engaged in adjustment strategies when compared to those that were part-time employed (Table 10.3). Those who had a preprimary school level of education had the highest percentage (76.9 percent) among the educational groups for those who did not engage in adjustment strategies (Table 10.3). For those that did engage in adjustment strategies, the highest percentage (41.2 percent) was in the 25,000–39,999 JMD category. Finally, of those that did engage in adjustment strategies, the highest percentage (33.9 percent) was found among those that were involved in fishing for 21–30 years (Table 10.3).

Though there was no statistically significant association between knowledge or perceptions and engagement in adjustment measures, respectively (Table 10.3), there were some interesting relationships seen. For example, there was the highest percentage among those with high levels of knowledge, indicating that they did not engage in adjustment strategies (76.3 percent; Table 10.3). However, it was those with the lowest perceptions regarding the impacts of climate change on the physical environment and on their livelihoods who had the highest percentage of those who did not engage in adjustment strategies (Table 10.3).

Discussion

This chapter sought to examine some basic factors that can influence how local communities like fishers view climate change, particularly when there are reported impacts on personal livelihoods or physical living spaces. The results reveal interesting patterns about the influence of knowledge and perceptions on actual climate adjustment strategies.

Table 10.3 Chi-square associations between demographic variables, knowledge, perceptions, and engagement in adjustment measures

	Percentage (*n*)					
Variable	Engaged	Not engaged	χ^2	df	*p*	V
Gender						
Male	29.4 (59)	70.6 (142)	1.90	2	.386	.091
Female	13.3 (4)	86.7 (26)				
Role in fishing						
Scaler	20.0 (2)	80.0 (8)	3.38	1	.066	.121
Fisher	28.9 (57)	71.0 (140)				
Vendor	16.7 (4)	83.3 (20)				
Length of residence (*years*)						
<1	0 (0)	100 (2)	3.76	3	.288	.128
1–5	16.7 (1)	83.3 (2)				
6–9	100 (1)	0 (0)				
<10	27.5 (61)	72.5 (161)				
Home ownership						
Own	29.0 (42)	71.0 (103)	1.38	2	.502	.077
Rent	31.8 (7)	68.2 (15)				
Live for free	21.9 (14)	78.1 (50)				
Employment status						
Full time	69.8 (37)	73.4 (130)	.271	1	.603	.034
Part time	30.2 (16)	26.6 (47)				
Educational level						
Preprimary	23.1 (3)	76.9 (10)	.232	3	.972	.032
Primary	26.7 (20)	73.3 (55)				
Secondary	28.6 (38)	71.4 (95)				
Higher education	1.9 (2)	71.4 (5)				
Monthly income (*Jamaican dollars*)						
<5999	31.4 (16)	68.6 (35)	3.40	5	.638	.122
6000–24,999	25.8 (34)	74.2 (98)				
25,000–39,999	41.2 (7)	58.8 (10)				
40,000–79,999	19.0 (4)	81.0 (17)				
80,000–129,999	33.3 (2)	66.7 (4)				
>130,000	0 (0)	100 (1)				
Length of time involved in fishing (*years*)						
<10	22.6 (12)	77.4 (41)	3.37	4	.498	.121
11–20	21.1 (12)	78.9 (45)				
21–30	33.9 (19)	66.1 (37)				
31–40	30.0 (12)	70.0 (28)				
>40	32.0 (8)	68.0 (17)				

(*continued*)

Table 10.3 (continued)

Variable	Percentage (*n*)		χ^2	df	*p*	V
	Engaged	Not engaged				
Knowledge						
Low	37.5 (3)	62.5 (5)	1.04	2	.594	.067
Moderate	28.6 (42)	71.4 (105)				
High	23.7 (18)	76.3 (58)				
Perceptions of impacts on environment						
Low	11.1 (1)	88.9 (8)	1.47	2	.481	.081
Moderate	29.6 (37)	70.4 (88)				
High	27.2 (25)	72.8 (67)				
Perceptions of impacts on livelihoods						
Low	16.7 (2)	83.3 (10)	4.13	2	.127	.135
Moderate	38.8 (19)	61.2 (30)				
High	66.7 (42)	74.5 (123)				

First, there seems to be a moderate level of knowledge about the scientific causes of climate change, while there are also moderate levels of knowledge regarding the consequences of climate change on the physical environment. However, there is a high level of knowledge regarding the impacts of climate change on fishers' livelihoods. As mentioned earlier, fishers indicated that climate change would impact their livelihoods in a number of ways. First, through decreased fish catch. This decrease can be influenced by increased sickness in fish and increased migration of fish species—both indicated by fishers. Second, fishers indicated that fishing expenses would increase. This might be attributed to increased incidences of unusual fish species. While this may seem counter to the previous point of reduced fish catch, it is actually not so. Unusual fish species may not sell well on the local market due to unfamiliarity to consumers. Expenses increase as fishers now have to spend more to store stock that does not sell as quickly or they have to go further out to sea to attempt to capture familiar species because of increased stock of unusual fish species.

Second, despite the high level of knowledge on the impacts of climate change on fishers' livelihoods, most respondents do not engage in adjustment strategies though they have indicated that they noticed changes in

the environment. As discussed later in this section, there are reasons for this disconnect between knowledge and behavior or action.

Further, the results indicated that 29.7 percent of persons engaged in adjustment strategies. Why did they engage? Baptiste (2013a) addressed the type of engagements that fishers are involved in, which are similar to the strategies recorded in the results section. What is more crucial is that in the Baptiste (2013a) study, there was also an indication that a small number of persons were engaged in adjustment strategies. Though the percentage seems low, there is no way to determine whether or not this is a small or large number as this is relative. For example, there is no record to indicate that the percentage of fishers recording adjustment strategies is more or less than the previous years. However, it is worth mentioning that in Baptiste (2013a) it is suggested that those who engaged in adjustment strategies were exposed to external knowledge from nongovernmental organizations, governmental agencies, or international news on climate change issues. This suggests that perhaps their knowledge base increased and influenced them to participate in adjustment strategies. Perhaps this is also true for the 29.7 percent of persons in the current study that did engage in adjustment strategies.

While the above may be true, what is also important to examine is that there were more persons across categories who did not engage in adjustment measures than those who did engage in them, despite the fact that they did notice changes in the physical environment. This was also similarly observed across all demographic categories. Additionally, this pattern of high-to-moderate knowledge levels but low adjustment behaviors was also observed for perceptions of the impacts of climate change on both the physical environment and personal livelihoods. The biggest question that these observations raised is, why is there this disconnect between knowledge and perceptions related to the threat of climate change and actual adjustment behaviors on the part of fishers?

Within the literature on knowledge, perceptions, and behaviors, it is posited that ideally an increase in knowledge and concern about an environmental problem may be a necessary condition for an increase in the resultant behavior to address that problem (Fransson and Garling 1999; Kollmuss and Agyeman 2002; McKenzie-Mohr 2000; Pe'er et al. 2007). However, is it always the case that knowledge, or even the perception

of a threat, is a prerequisite for a resultant behavior? There is some disagreement in the existing literature regarding the influence of specific knowledge on behavior. Fransson and Garling (1999), for example, argue that the level of knowledge for an individual or population can help predict the level of engagement in environmental behaviors. Alternatively, Schahn and Holzer (1990) argue that the effect of knowledge on behavior in empirical studies is often indirect. In terms of the influence of knowledge on perceptions, it can be assumed that knowledge can shape an individual's concern for that issue (Fransson and Garling 1999; Kollmuss and Agyeman 2002). However, in cases where no direct relationship between knowledge and perceptions is seen with actual behaviors, what might be the driving factors as seen in this case study?

One of the less cited reasons in the literature for high levels of knowledge about environmental issues is that of lived experiences. Baptiste (2014) and Baptiste et al. (2015) are two of the few studies that have posited the relationship between lived experiences and high levels of knowledge. Though specific to storm water management, these studies indicated that residents who experience negative impacts of storm water overflows tended to have high levels of knowledge about the problem. Perhaps in the case of OHB the main driving factor for the high levels of knowledge and even possibly the high-to-moderate perception levels about climate change impacts is related to the lived experiences of these fishers. This can perhaps be supported by the finding of high percentages of fishers, indicating that they have observed changes in the physical environment, related to climate change in the past 5–10 years.

Even though there may be lived experience within the community, driving the knowledge and perceptions levels, these do not explain the lack of actual adjustment behaviors by large percentages of fishers within the community. Baptiste (forthcoming-a) suggests that in cases where small percentages of persons adjust to impending threats, this may be explained by the lack of personal and external access to resources to assist in the adjustment (Baptiste forthcoming-a, forthcoming-b). Access to personal assets is important for any community to adjust to threats, but these assets can only be accumulated in cases where community members are beyond the point of making ends meet on a daily basis. There must be access to revenue that can be accumulated for community members

to take proactive steps to first cope—short-term adjustment measures—and then adapt—long-term adjustment measures (Baptiste 2013a). As documented by other studies, many fishers in OHB lamented that it is often difficult to put aside savings, given the precarious nature of their livelihoods with decreasing fishing stocks (Baptiste 2013a, b). This leads to a growing dependence on external financial resources.

Dependence on external financial resources can take two forms. The first is access to financial assets that will assist in purchasing equipment or other recovery efforts after an adverse climate-related event, or to take proactive measures like storing boats and other equipment prior to the event. Second, external resources might be in the form of protected areas for the dependent ecosystem resources that are threatened by climate change. For OHB this is seen by the Portland Bight Protected Area of which the community is part of, which includes a fish sanctuary specifically geared to enhancing the livelihoods of fishers. These two measures can act as main drivers for providing support for communities in cases where they are unable to have resources to engage in adjustment strategies.

Conclusion

It is clear that there are high levels of knowledge about the causes of climate change and its impacts on both the physical environment and livelihoods among OHB fishers. Specifically, fishers are aware that climate change can have adverse impacts on the environment such as increased sea surface temperatures, increased rainfall, potentially increased storm activity, and increased loss of coastal areas. In terms of livelihoods, fishers are aware that climate change has the potential to decrease fish stock through increased fish migration and increased illness in fish. Further they are aware that there will be increased fishing expenses as they attempt to continue in the industry.

What is more interesting is the lack of adjustment strategies reported by high percentages of these fishers. This chapter posits that lived experiences explain the high levels of knowledge and perceptions, while the lack of adjustment strategies can be explained by the lack of access to personal and external resources. As such, to better protect and prepare marginalized

communities like those of OHB, for climate change impacts, attention must be given to access to resources.

The questions that must be raised for similar Caribbean contexts and even those in other SIDS are what types of personal and external resources are needed and how do we make these resources available to marginalized communities? This is perhaps where an expansion of this research is needed. There is room for studies on understanding the types of personal and external resources that are required for adjustment to climate change. For example, might traditional knowledge be seen as an asset in some cases? Additionally, there is room for studies on developing pathways through community public participation and engagement for the best ways to make resources accessible to community members. Climate change is no longer simply a matter of a phenomenon that will occur. Rather, it is a phenomenon that is occurring, that has real and realized impacts on Caribbean communities, and therefore attention to ways to ensure that communities are adjusting to the impacts must be foremost on community, national, and regional agendas.

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Part IV

Synthesis

11

Future of Food and Agriculture in the Caribbean in the Context of Climate Change and Globalization: Where Do We Go from Here?

Clinton L. Beckford and Kevon Rhiney

Overview

In this chapter, we seek to synthesize the key themes, findings, lessons, and implications raised in the preceding chapters. Our aim is to make some generalizations about the interface between globalization, climate change, and agriculture and food in the Caribbean. We will focus on the lessons learned from the research and suggest some critical steps the Caribbean region might consider in addressing the dual threat of globalization and climate change—double exposure. We will consider where the region stands in its response to globalization and climate change. For example, are there opportunities we are missing in the banana, coffee, and sugar industries? Globalization is often discussed in terms of the inequities and how it disadvantages developing countries vis-à-vis the developed countries. But it

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is now clear that globalization presents opportunities if countries position themselves to take advantage of these. Based on the insights provided by the respective authors, and a broader analysis of the extant literature, we discuss ideas to reduce the adverse impact of globalization and climate change on the agricultural sector in the region.

Similar to globalization, discussions about climate change tend to centre on negative issues of vulnerability and risk. Our discussion here will seek to illuminate possible ways of building resilience and adaptability in the face of this seemingly uncontrollable force.

Agriculture and Food in the Caribbean

> Agriculture is a critical source of domestic income, employment, foreign exchange and livelihoods in the Caribbean. Yet the sector is constrained by lack of suitable growing crops for local conditions. This situation is expected to worsen in coming decades as climate change increases the frequency of heat waves and droughts. Such changes are set to reduce crop productivity and increase instances of failure, representing a substantial risk in terms of regional food security and rural livelihoods (CARIBSAVE 2012 http://cdkn.org/project/climate-impacts-and-resilience-in-caribbean-agriculture-assessing-the-consequences-of-climate-change/)

Beckford and Campbell (2013) explain the integral place agriculture holds in Caribbean economies. Agriculture is still the basis of rural livelihoods in most Caribbean Community (CARICOM) countries. The industry no longer has the stranglehold it once had on the economies of the region with a drastic decline in its contribution to gross domestic product (GDP) experienced by most countries. However, agriculture still accounts for about 25 percent of GDP regionally. This figure is an average that is heavily influenced by a few anomalous cases, mainly Guyana and Haiti, where it accounts for over 50 percent of GDP (Potter et al. 2004).

Despite agriculture's decline in GDP contributions, the sector still makes indispensable contributions to Caribbean economies providing foreign exchange, absorbing surplus labour, fuelling industry through food processing, and providing subsistence for thousands of farm

families (Government of Antigua & Barbuda 2008; Government of Grenada 2011; Government of Guyana 2013; Government of Haiti 2010; Government of Jamaica 2009). Agriculture is critical to rural development and food and nutrition security (FNS). This is true for both the export sector and domestic food sector.

History has created a structural dichotomy in Caribbean agriculture. Barker (1993) describes this as a form of 'agricultural dualism'. This is characterized by two distinct, though not entirely mutually exclusive, sectors. One is an export sector dealing with the production and export of produce like sugar, bananas, coffee, cocoa, citrus, and spices such as pimento and nutmeg. The second is a small-scale domestic sector focused on the production of domestic foods that are staples of local diets including a range of root crops and tubers (sweet potato, Irish potato, yam, dasheen, cassava, coco), fruits and vegetables, and condiments. The situation is more complicated, however, as many small-scale farmers are engaged in export production of crops such as sugar cane, bananas, coffee and spices, and several traditional food crops in which small-scale farmers specialize now have international markets.

This dualism in agriculture is characterized by a bias against the small farming sector in respect to resource allocation, and physical and institutional infrastructure example, access to financial credit, research and development, marketing and distribution arrangements, among others. However, both sectors are experiencing declines in production and productivity, and both are susceptible to the ubiquitous natural hazards that plague the Caribbean. Both are facing internal and external challenges. None of these are more immediate or serious than globalization and climate change.

Sustaining agriculture—increasing productivity, responsible management of agricultural resources including land and water and use of agrochemicals, adapting to globalization, and enhancing climate change resilience—is an imperative in the Caribbean. This will require investments in science and technology, innovation, and research and development into climate-resistant crops, including drought-, disease-, and pest-resistant crop varieties as well as disease-free planting materials, and raising awareness among farmers about climate change impacts on specific crops (Selvaraju et al. 2013). Enhancing the status of farming as a dignified and lucrative economic activity and attracting more young people to

farming are also critical. We advocate the mainstreaming of agricultural science in school curricula, with strong emphasis on appropriate regional response pathways to the double challenges of global climate change and economic globalization. The marginalization of women in agriculture is a critical developmental issue that must also be addressed.

It is incomplete to talk about food and agriculture in the Caribbean without a discussion of FNS. This takes on even more importance in the contexts of climate change and globalization. Both of these phenomena hold profound implications for FNS in CARICOM. The stagnation and decline of agriculture in the region has resulted in decreased production and productivity and an increase in food imports. Most CARICOM countries have large and burgeoning food import bills. The region, which once produced most of its food, is today a net importer of food (Deep Ford and Rawlins 2007). The decline in food production has also impacted rural poverty, and in many rural areas, hunger is becoming a greater reality. This pattern can be reversed through strengthening local food production systems and increasing domestic production (Beckford and Campbell 2013).

Given that hunger and poverty are concentrated in rural areas, targeting local food systems represents the single biggest opportunity to increase food production, boost food security and reduce vulnerability. Local, ecologically sound food systems have huge potential to provide livelihoods, occupation, employment, healthy lifestyles and socio-cultural meaning to a very large share of the Caribbean working population. (Tandon 2012, p. 1)

Kendall and Petracco (2003) from the Caribbean Development Bank articulated a new agricultural policy for the Caribbean with three main pillars:

1. Expansion of non-agricultural exports and de-emphasis on agriculture
2. Agricultural export diversification with a focus on breaking dependence on sugar and banana and going more into non-traditional exports.
3. Competitive import replacement by breaking dependence on imported food and focusing on domestic production.

The latter point has been supported by other researchers who have argued that the strengthening of the domestic food production systems is the key to enhancing regional food security and reducing some of the impacts of trade liberalization (Beckford 2012; Beckford and Campbell

2013; Tandon 2012). Research by the International Food Policy Research Institute also supports the strengthening of local food systems as an important policy piece in developing countries (International Food Policy Research Institute (IFPRI) 2009, 2010).

In terms of de-emphasizing agriculture, Rhiney's discussion in Chap. 2 is important as it not only chronicles the regional shift away from agriculture to services, but also points to some possible ways the sector could be reintegrated and sustained. The shift from agriculture has seen tourism become more important to many CARICOM countries. The irony is that the tourism industry is just as vulnerable to climate variability and change as agriculture and in many ways might actually be more vulnerable.

Agriculture, Food, and Globalization

Despite the hype and hysteria that often comes with discussing it, globalization is not a new phenomenon. Its footprints are large and historical, but its nature today is different and decidedly more profound. While there is still some uncertainty about what the term means and whether it is a positive or negative phenomenon, we will stick to a very broad definition here and suggest that globalization refers to a process whereby certain forces exert progressively more influence over others. In a nutshell, global economic, political, sociocultural forces exert pressures on local, national, and regional ones (Chesney and Francis 2004; ECLAC 2002; FAO 2011). While globalization affects many aspects of Caribbean life, it is the adverse impact on the agricultural sector that has dominated the discourse. Most CARICOM countries are experiencing stagnation or declines in their agricultural sectors precipitated by the decline of traditional export crops like sugar and bananas, which have been hit hard by the erosion of preferential trade arrangements in the EU (Ahmed 2001; Grossman 1998; Pemberton 2006).

The impact of globalization on food and agriculture is the subject of much research (Jolly et al. 2008). 'Globalisation is having a major impact on food systems around the world…affect availability and access to food through changes to food production, procurement, and distribution and food trade environment…' (Kennedy et al. 2004, p. 1).

Discussions of the impact of globalization on agriculture in the Caribbean tend to focus on the banana and sugar industries. Ahmed (2004) described sugar and bananas as the two most lucrative cash crops for ten independent British Commonwealth Caribbean countries, namely Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines, and Trinidad and Tobago.

For more than three centuries sugar was one of the largest foreign exchange earners for the Caribbean. Globalization has had debilitating effects on the sugar industry in the Caribbean. Given the importance of sugar, this is not surprising. At the close of the twentieth century, the industry was a vital cog in the economic wheel, earning valuable foreign exchange and providing employment for thousands of unskilled and semi-skilled persons. In 1999, the Caribbean earned US$338.0 million from sugar exports. Add its by-products especially rums and spirits and the figure more than doubles. At the same time the industry employed 150,000 people (Ahmed 2004). Globalization led to a drastic decline in output and lower prices on the world market. Jamaica, which produced in excess of 500,000 tons of sugar in the halcyon days of the 1960s, could barely produce 200,000 tons at the close of the century. Government initiatives to save the industry have been numerous and are ongoing. The government has even bought factories to keep them afloat and has injected massive sums of cash into the industry (Ahmed 2001). In the meantime, sugar cane producers, workers, and former workers continue local level initiatives and experiments to survive. Burrell's research in Chap. 5 from Jamaica and Clarke's in Chap. 3 from St Kitts tell two different sugar stories, both with serious lessons for the future.

The banana industry is the economic lifeblood of the Windward Islands (Ahmed 2001; Fingal 2008; Grossman 1998; Parsans 2012). The islands of St Lucia, St Vincent and the Grenadines, Dominica, and Grenada all depend heavily on this industry. The industry is also significant in Belize and Jamaica, and these six countries have been severely impacted by globalization of bananas. A major impact of globalization was the decline in employment, which it precipitated. For example, in 1990, the banana industry in the Windward Islands employed 57,000 workers. By 1998 that number had reached 36,000 and in 2012 that number had dwindled to just 5,000 (Parsans 2012). The banana industry was hit immediately

and hit hard by globalization and the measures imposed by the World Trade Organization (WTO) (Ahmed 2001). According to Ahmed:

challenges faced by the sugar and banana industries from globalization are a result of the lack of increased production and productivity, absence of economies of scale of production, continued labour problems and its high cost, slow pace of crop diversification, few value added products developed, higher costs of inputs resulting from currency liberalization, low level of technology used in the production systems, and inadequate research and development support. (Ahmed 2001, p. 1)

We would add to these the inability of CARICOM producers, governments, and other stakeholders to adapt effectively to a changing global trading regime.

Caribbean governments have been forced to take hard decisions about the banana and sugar industries in the face of globalization, specifically the challenges imposed by trade liberalization and free trade market forces. Especially in the case of sugar, countries have had to close some unprofitable facilities. As Clarke discussed in Chap. 3, the sugar industry in St Kitts has been dismantled. In Jamaica, several sugar estates and factories have been closed over the last 20 years and those remaining opened have adapted by diversifying their products—moving generally towards the production of alcohol and spirits and away from just sugar (see Burrell in Chap. 5). Thousands of acres of land have also been taken out of sugar cane cultivation. For example, in the Parish of St Mary, former sugar cane lands of the closed Grays Inn Sugar Factory now grow pineapples, cassava, and other crops. While some of these decisions to close sugar factories were economically prudent, they have had devastating impacts on peoples and communities that depended on them for their livelihoods. Clarke chronicles the experiences of female former sugar workers in St Kitts in coping with the closing of the 357-year-old sugar industry. The discussion clearly indicates that there was no coherent sense of how people and communities would adjust. Very little was in place to absorb the surplus labour that resulted from the closure and the affected workers were not included in the decision-making process. A similar picture has emerged in Jamaica with displaced workers swelling the ranks of the unemployed, underemployed, and informally employed. Rural small

towns and communities, once vibrant and growing, are in serious decline with blight showing everywhere.

Gaps in the Research Literature on Globalization's Effects on Food and Agriculture in the CARICOM

An emerging area of globalization research is its effect on nutrition and diets. Scholars are now identifying a *nutrition transition* that is taking place in many developing countries as a result of globalization. According to Hawkes et al. (2009) within food systems in the developing world, globalization is linked to increases in poor quality diets. This no doubt has implications for diet-related diseases, which are deemed to be on the increase in the Caribbean (Caribbean Food and Nutrition Institute/Food and Agricultural Organization 2007). These are likely to increase more rapidly as food systems become more globalized with '…the growth of TFCs including transnational supermarkets, liberalization of international food trade and foreign direct investment (FDI) and global food advertising and promotion' (Hawkes et al. 2009, p. 241).

The rapidly increasing access to processed foods through transnational supermarkets and fast food chains plays a huge role in this. Liberalization of food trade makes foreign processed foods more available and global food promotion and advertising influences food preferences (Hawkes 2006; Hawkes et al. 2009; Hughes and Lawrence 2005; Kennedy et al. 2004) and consumption patterns (Hawkes et al. 2009; Hastings et al. 2007; McGinnis et al. 2006) and creates a process whereby local people become estranged from their traditional foods and diets (Beckford 2012). This has implications for health-care budgets as the need for care and specialized services increases. This issue of globalization and its impact on nutrition transition is a critical one that was not discussed in this book. Neither has it been seriously researched and discussed in the Caribbean.

Another area of neglect in terms of the research on globalization and agriculture in the Caribbean is the impact on smallholder farmers who bear the responsibility for domestic food production and household food security and nutrition. The current food situation in the Caribbean is charac-

terized by dependence on imported food in nearly all countries (Beckford and Bailey 2009; Beckford and Campbell 2013; CFNI 2007; Deep Ford 2003; Deep Ford and Rawlins 2007). Over the last four decades, domestic food production in the Caribbean has declined steadily, and today the region is a net importer of food, Guyana and Belize being exceptions (Beckford and Bailey 2009; Beckford and Campbell 2013; CFNI 2007; Deep Ford 2003; Deep Ford and Rawlins 2007). Many small-scale food farmers have been displaced as many foods that they grow are now imported. Beckford and Campbell (2013) posit that the dependence on imported foods constitutes a threat to local food security. They argue that

> purely from a livelihood perspective, it does immeasurable damage to local production and rural development. Faced with unfair competition and the dumping of cheap, heavily subsidized food mainly from the United States, many farm families experience difficulty providing a satisfactory livelihood for themselves. (p. 32)

The opening up of local markets to foreign foods through trade liberalization has forced local producers into 'unfavourable, often insurmountable, competitive situations' (Beckford and Campbell 2013, p. 32), a situation that is played out in many developing countries across the world on a daily basis (Short 2000; Spitz 2002; Walelign 2002).

Given the dominance of the banana and sugar industries in the discourse on the effects of globalization on the Caribbean, Mighty's work in this volume is noteworthy as it sheds light on how another very lucrative traditional export crop, coffee, is being impacted by global forces (Chap. 6). Not a lot of research has been conducted in this area, and some of his findings indicate that some urgent action is needed if the world famous Jamaican Blue Mountain coffee is to retain its reputation and market share and if the livelihoods of thousands of coffee producers, workers, traders, and other stakeholders are to be secured. An area of future research in this context must be the impact that climate change and variability could have on the coffee industry and the livelihoods of participants in the industry. The impact on female coffee stakeholders also needs to be explored in a fulsome way.

Adapting to Globalization

While discussions of the banana industry tend to focus on the disadvantages faced by banana producers in the context of the dismantling of preferential trade arrangements, Fingal-Robinson's research in Chap. 4 has shown how the banana industry in St Lucia has benefitted from the advent of Fairtrade practices. The discussion highlights the capacity of local peoples to take advantage of opportunities to adapt and cope in challenging environments. The chapter also sheds light on the potentially important role global alternative food networks can play in safeguarding the livelihoods of disadvantaged producers in the developing world.

The research by Joyelle Clarke (Chap. 3), Dorlan Burrell (Chap. 5), Chanelle Fingal-Robinson (Chap. 4), and Mario Mighty (Chap. 6) demonstrates the clear impacts of globalization on Caribbean agriculture with specific reference to sugar, bananas, and coffee. This research shows the varying degrees of success achieved in the efforts to fashion adaptive responses at the household, community, national, and regional levels.

It should be noted that both the sugar and banana industries were problematic even during the period when the Caribbean enjoyed preferential market access to Europe. To be fair, Caribbean sugar and bananas were never truly competitive and would not have been profitable without the preferential treatment in European markets and the US Sugar Quota. In the end, these arrangements proved to be unsustainable. But, there was recognition of this unsustainability years before the WTO. For example, in the 1980s, there was a failed attempt to diversify from sugar cane in Jamaica when the government implemented a project to grow winter vegetables on a 600-acre farm (former sugar cane lands) in Spring Plains, Clarendon. The project was unsuccessful and short-lived with an estimated US$48 million loss (Ahmed 2001). There have been other efforts of diversification in the last 10 years with mangoes, papayas, and pineapples being grown on small-to-medium size farms, but not at a scale to make an international, let alone global, impact.

In Trinidad and Tobago there were efforts to develop livestock systems with sugar cane-based feeds, and the sole sugar cane factory in the twin island republic diversified its operations to include aquaculture, beef and

milk production, and rice and fruit production (Ahmed 2001). The impact of this on former sugar workers and families has not been researched.

The issue of the unsustainability of dependence on sugar and bananas and on preferential trade arrangements leads to questions about the Jamaican coffee industry. In Chap. 6, Mighty explains that the Japanese market absorbs 80 percent of Jamaica's Blue Mountain Coffee exports. This represents a dangerous dependence on one market that makes the industry vulnerable to economic shocks in that market. Mighty reported that market expansion is being pursued in the USA, Europe, and other Asian countries outside Japan, most notably China and India—the two most populous countries in the world. The success of these initiatives is partly dependent on the coffee industry's ability to re-organize itself and the impending threats posed to the sector by a changing regional climate regime and disease and pests proliferation.

At the international or global level, CARICOM governments must lobby for fair treatment of Small Island Developing States (SIDS) and their unique and special circumstances (Tandon 2012). They must lead the advocacy for more ethical trade arrangements (Fingal 2008). Fingal-Robinson in Chap. 4 shows how local farmers can benefit from ethical trade in her discussion of Fairtrade and the St Lucian banana industry.

There are opportunities to benefit from the process of globalization, but these have not been fully appreciated and taken advantaged of in the Caribbean. Many poor countries have experienced improving fortunes as a result of globalization (Robbins and Ferris 2003). Parsan (2012) discusses how Africa as a whole has created new opportunities to capitalize on the world's attention on the continent. Where does the Caribbean stand where this is concern? Globalization presents opportunities, but these opportunities have to be recognized and seized. We would highlight one possibility here. Mighty in Chap. 6 has spoken to the challenges facing the Jamaican coffee industry in the international marketplace. The Fairtrade coffee movement has developed into a major force in North America and Europe and is a major marketing tool in terms of differentiating coffee products. What threat does this pose to Jamaican coffee? More importantly, are there any gains to be achieved from becoming involved in Fairtrade coffee?

Benefits of Globalization

Despite the adverse impacts of globalization on many aspects of Caribbean food and agriculture, some benefits have accrued. These are largely epistemic influencing changes in attitude, mindset, and philosophy towards globalization. It has increased awareness of international trade issues in the Caribbean and the need to become more competitive producers. There is now more emphasis on repositioning farming as a business and modernizing farming practices through the introduction of advanced technologies to produce and market crops. It has forced Caribbean governments to rethink agricultural policies and do more to facilitate competitive and sustainable agriculture. It has stimulated a recognition that there needs to be full participation to achieve food security in the Caribbean and has led to gender-based initiatives aimed at better integrating women into the production and distribution of food and the decision-making process where these are concerned.

Globalization has reinforced the value of diversification in the agriculture sector—a recurring theme in Caribbean history. Economic crisis with traditional exports, especially sugar in the nineteenth century, led to recommendations by the Norman Commission in 1896 to diversify the economy (Greenwood and Hamber 1980). The Moyne Commission Report some 40 years later was another response to economic crisis and declining fortunes of sugar. The report was very critical of the sugar industry, pessimistic about its future, and called for wide-scale diversification of British Caribbean economies and agriculture (Greenwood and Hamber 1980). There was some success in establishing other export crops, but in truth the dependence on sugar was not significantly diminished. Globalization in the late twentieth and twenty-first centuries has again brought the issue of economic diversification front and centre of Caribbean consciousness. However, while the value of diversification has continuously been recognized, the success in implementation and the impact of diversification is still to be seen and felt. This has implications even at the farm level. Mighty's research in Chap. 6 discusses the role of diversification in the Jamaican coffee industry with farmers identifying it as their major coping strategy. Burrell's research in Chap. 5 also shows that diversification is a key strategy among small-scale sugar cane farmers.

Food and Agriculture and Climate Change Resilience in CARICOM

The impact of climate change on the world in general will be variable. In some areas it might actually lead to agricultural expansion. In other areas it will decrease productivity due to droughts and desertification (Hutchinson et al. 2013). Increased precipitation will increase yields for some crops, while at the same time rising temperatures are expected to have negative effects in tropical areas. The outlook then is one of uncertainty, which makes the future of food and agriculture tenuous at best. Early climate models tended to predict severe negative impacts on global food supply, but more recent models have emphasized that

there will be very negative impacts in some areas, especially in the tropics, in areas vulnerable to changes such as sea level rise, and in areas heavily dependent on rain-fed agriculture (mainly rural areas) for the sustenance of their livelihoods. (Antle, cited by Hutchinson et al. 2013, p. 25)

Antle (2008, 2009) posited that climate change will have a positive aggregate effect on global food supply. Cline (2007), in contrast, suggested that while the effects might be initially moderate, a negative effect would be felt by late century. The impact of climate change on global food supply is therefore contested but there is general agreement that the effects will be variable and, most significantly, will be felt more in developing countries (Hutchinson et al. 2013).

Climate change is expected to exert pressure particularly on agricultural environments in SIDS including the Caribbean region (Davies et al. 2009; Gamble 2009; Gamble et al. 2010; Haites et al. 2002; Hutchinson et al. 2013; Maletta and Maletta 2011; McGregor et al. 2009; Pulwarty 2004; Pulwarty et al. 2010; Vergara et al. 2013). The economic and social impacts could be catastrophic if climate change is not addressed and planned for (Bueno et al. 2008). Agriculture could be affected by increased temperatures in soil and air, changes in atmospheric concentrations of CO_2, sea-level rise, changes in the hydrological cycle, unpredictability in climate and weather, and increased frequency of extreme meteorological events especially floods, droughts, and storms (Vergara et al. 2014).

The CARICOM Context

> Two waves of change—long term climate change and immediate-term economic crises—are bringing the issue of food security into sharper relief—particularly in those Caribbean countries where food security is already volatile and faces a series of risks and challenges. Climate change adds urgency and the need for renewed focus and prioritisation as well as ensuring that adaptation is wholly integrated into natural resource management, land use policies and, especially, into broader long-term macro economic frameworks. (Tandon 2012, p. 1)

Extreme weather due to climate change is considered to be a major threat to Caribbean FNS as farmers across the region struggle to maintain adequate production of staple foods and export crops including bananas, roots and tubers, cereals, and vegetables (ECLAC 2010). Farmers are often hit by contradictory weather patterns in quick succession. Long bouts of unseasonal dry weather cause drought conditions that are often followed by devastating floods. Both of these scenarios have resulted in crop failure and losses.

Agriculture is sensitive to climatic variations although protected agriculture through greenhouse technologies offers mitigating potential. However, most agriculture in the Caribbean is open-field, making it susceptible to the vagaries of weather and climate. In addition, most small-scale Caribbean farming systems are based on rain-fed agriculture, making them vulnerable to variations in precipitation. Open-field agriculture is also more vulnerable to agricultural pests and diseases—the distribution of which is also being affected by climate change (Porter et al. 1991). Beckford and Norman in Chap. 8 provide some insights into this under-researched impact of climate change. It is felt that climate change will have significant impact on the distribution of agricultural diseases and pests (IPCC 2013). This is an area that requires urgent research and attention in the Caribbean.

'The two dozen island nations of the Caribbean, and the 40 million people who live there, are at front lines of vulnerability to climate change' (Bueno et al. 2008, p. 2). Given the myriad of changes that are likely to occur and the geographies of the region, the authors warn that the consequences of inaction could be dire. Assessing the effects of climate change on CARICOM countries, Haites et al. (2002, p. 35) wrote:

Most CARICOM countries are exporters of a limited range of products and importers of a much wider range of food products. Climate change will affect production globally and hence have an impact on international prices. Climate change will also affect production levels, after adaptation in the Caribbean and elsewhere. The economic impact on agricultural exports, then, depends on the changes in production levels and the changes in world prices, while the economic impact on food imports depends on the changes in world prices.

Climate change might disrupt precipitation patterns with less rain in traditionally wet seasons and more during traditionally dry seasons (Haites et al. 2002), resulting in serious disruption to cropping systems and cycles. Rain is also predicted to be concentrated in fewer, more intense episodes; a situation that is already being reported by small-scale food farmers in St Elizabeth, Jamaica (Campbell et al. 2010). One crop that is likely to be severely impacted is banana, which is a major crop in several CARICOM countries and is highly sensitive to precipitation and lack of water. Other major export crops are also sensitive to precipitation levels including sugar, coffee, and nutmeg (Haites et al. 2002). Many domestic food crops especially fruits and vegetables are also highly sensitive to precipitation levels and will be affected by rainfall variations if the dependence on rain-fed agriculture persists.

Since production of all of the main crops of CARICOM countries is sensitive to precipitation, these changes could affect production. The impact could be to reduce or increase output depending on the sensitivity of the crop to the timing of precipitation. (Haites et al. 2002, p. 37)

It has been suggested that Caribbean farmers are largely unaware of the dynamics of climate change and how it is likely to affect them and their livelihood.

Despite the importance of the agricultural sector, farmers throughout the Caribbean have limited information on the likely future impacts of climate change and the potential of their crops to withstand these changes. (CARIBSAVE/CDKN 2014, http://cdkn.org/project/climate-impacts-and-resilience-in-caribbean-agriculture-assessing-the-consequences-of-climate-change/)

The reason for this might be related to the limited dissemination of scientific information to regional farmers and the farmers' general lack of access

to information regarding crop/plant genetic variations and tolerance levels. Yet there is Caribbean research that shows smallholder farmers identifying changes to weather that they have observed in recent times (Campbell 2011; Campbell et al. 2010). Farmers in the south of St Elizabeth Parish, Jamaica, have observed less rainfall events but more intense showers that are less beneficial to crops. They have also reported longer dry spells and general unpredictability of the weather (Campbell 2011; Campbell et al. 2010). There is thus a growing recognition that Caribbean farmers are aware that the climate is changing and its implications for the sector.

April Baptiste's research discussed in Chap. 10 also indicates that local people are aware of manifestations of climate change. However, her study of the perspectives of fisher folks about climate change indicates that just having knowledge and awareness is not enough—people must be prepared to use available knowledge and information to protect their livelihoods.

Enhancing Agricultural Resilience Through Climate-Smart Strategies

Given the dependence of Caribbean rural populations on agriculture and fisheries, climate change has implications for poverty, household FNS, and rural development. This increases the urgency for adaptation policies that are contextually appropriate. In this section, we discuss some of the important responses that can make a difference to the CARICOM region.

1. Adopting crop diversification and transiting to weather-resistant crops. The Caribbean should be looking into crops that are drought resistant, are highly tolerant of rising temperatures, and are hardy in the face of pests and diseases.
2. Improving agricultural infrastructure to make them climate proof or climate smart. Examples would include sustainable irrigation, water storage on farms or in farming communities, water management systems, and water management training for farmers.
3. Growing more short-term crops that have the capacity to recover quickly from severe weather like hurricanes.
4. Using modelling approaches to assess the impacts of climate change on crops, livestock, and aquaculture.

5. Mainstreaming climate change issues into agricultural management.
6. Devising strategies to reduce post-harvest loss and developing storage facilities and technologies to ensure food security in the face of extreme weather events (GOJ/EU/UNEP 2013).
7. Providing effective response to natural disasters in agriculture. A common complaint among small-scale farmers in the Caribbean is the inadequate response in the face of natural disasters. Relief is often late and weak if not totally non-existent.
8. Adopting agricultural risk management—sustainable practices, access to credit, crop, and livestock insurance.
9. Strengthening of climate change monitoring systems and networks to close gaps in monitoring and facilitate comparability of data and synthesis of data from different levels—national, regional, and global (Caribbean Community Climate Change Centre 2012a).
10. Having reliable information and making it available to stakeholders including farmers is critical in building climate-smart agriculture and enhancing climate change resilience in agricultural systems.
11. Preparing customized models and assessments of climate change impacts to plan appropriately. Global climate change models are of limited use given the peculiarities of CARICOM countries including small size. The work of regional climate modellers over the last few years has significantly increased the access of the region to scale relevant data that are contextual. This work needs to be solidified and expanded to build resilience.
12. Adopting new technologies in agriculture, expansion of protected agriculture, post-harvest storage of food, water harvesting and storage, soil management, and provision of high-quality planting material.
13. Building of institutional capacities at all levels by CARICOM to address climate change through establishment of climate-resilient agricultural practices.
14. Redefining sustainable agriculture to include climate resilience. We would argue that climate change resilience must become a pillar of sustainable agriculture in Caribbean SIDS.
15. Educating the region's farmers about climate change should be prioritized.

'Climate-smart' strategies must include provision of reliable information on expected changes in climate, strengthening of extension services, programmes to target small- to medium-scale farmers who are the most vulnerable groups, gender-specific programmes that accommodate vulnerable rural smallholder farmers, strengthening of marketing and distribution networks/systems, and on-farm adaptive research and experimentation.

The Caribbean Community Climate Change Centre (CCCCC) points out that while many climate-smart strategies that are being proposed are not new, there is inadequate empirical evidence in the Caribbean to support their effectiveness in building climate change resilience (CCCCC 2010, 2012). Empirical evidence is important if we are to

build the body of evidence needed to change current policy and promote agricultural growth, food security and poverty reduction within the face of climate change (scaling up of interventions); and sensitize and build the adaptive capacity of small resource farmers and other key stakeholders to the vagaries of climate change. (CCCCC 2012, p. 60)

The CCCCC articulated a four-pronged strategy to enhance climate change resilience in Caribbean food systems:

1. Data gathering to obtain evidence of climate change in the Caribbean and planning appropriate adaptation strategies
2. Dissemination of evidence-based climate change in agriculture scenarios to drive policy and regulations in support of climate-smart production, harvesting and storage and marketing
3. Enhancing awareness and knowledge of climate change and its likely impacts among farmers and other agricultural stakeholders
4. Facilitating the mainstreaming of climate-smart agriculture and influencing policy to address food and nutrition security in the Caribbean (CCCCC 2012).

Caribbean countries must make their own policy determinations on how to manage these [climate] changes: otherwise, their agendas could be predetermined by the priorities and terms set by donors and private-sector interests who, while well intentioned, might not fully grasp the ethno-cultural and gender sensitivities of development in small island developing states (SIDS). (Tandon 2012, p. 1)

The CARICOM needs an integrated climate change policy that accounts for the interfaces between key sectors of economy and society (Inter-American Development Bank 2011). The Food and Agriculture Organization (FAO) has suggested the following general climate change adaptation priorities for Jamaica and these are all relevant for the rest of CARICOM.

1. Strengthening of institutional mechanisms and technical capacities
2. Mainstreaming of climate change priorities into policies, plans, and programmes
3. Assessing vulnerability and impacts of climate change on key agricultural subsectors and strengthening of climate information services
4. Strengthening of data collection, monitoring, and forecasting
5. Investing in water resources development, conservation, and management
6. Strengthening of production and productivity programmes for improved domestic food crops
7. Promoting livelihood adaptation to climate variability and change
8. Using traditional and local knowledge to speed up adaptation planning
9. Developing agricultural weather risk management
10. Strengthening of research and development links (FAO 2013).

Community-Based Coping and Adaptation Strategies

We argue that a major element of climate-resilient strategies in the Caribbean must be locally fashioned solutions. This view has support in the literature on climate change and agriculture in the Caribbean. Tandon (2012, p. 1) writes that the time is right for 'Caribbean peoples to frame their own solutions to food and nutrition security—and what this entails in an unpredictable climate context'. We argue that if given the resources and support, local communities hold the key to solving their own problems. The vast reservoir of local knowledge must be brought to bear on the real threat of climate change impacts on community livelihoods and development. A growing body of recent and emerging research in the Caribbean has demonstrated very clearly that smallholder farmers have vast traditional

knowledge of local environments and a keen sense of changes that are occurring within these environments (Beckford and Bailey 2009; Beckford and Barker 2007; Barker and Beckford 2006; Beckford and Campbell 2013; Beckford et al. 2011; Campbell and Beckford 2009). Participatory farmer-led selection could be an appropriate response pathway to selecting climate-resistant crop varieties for local cropping systems (Berhawi and Beyene 2015). Recent research in other parts of the tropics also supports the validity of local knowledge. For example, Segnon et al. (2015) demonstrate the rich expertise farmers in Benin possess about diversified farming systems.

Pilot Programme on Climate Resilience PPCR (2011a) has reported climate change adaptation strategies by Jamaican farmers including improvised irrigation systems in the face of moisture deficiency, crop diversification, moisture retention in open fields, and storage of water. Campbell and Beckford (2009) have reported on coping strategies by farmers in Jamaica before and after a hurricane. Campbell et al. (2010) have reported on farmers in St Elizabeth, Jamaica, and their adaptive responses to drought including sharing water, scaling back production in dry periods, planting more drought-resistant crops, using grass mulch to retain soil moisture, installing drip irrigation, and manual watering of individual plants using a water can, among others.

Smallholder farmers have also engaged in local experimentations with soil erosion control, community risk mapping, sustainable farming techniques, water management techniques including water harvesting, protected agriculture, selected cropping to suit weather and soil conditions, and modifying cropping cycles (PPCR 2011; Rivero Vega 2008). The FAO has also identified, and champions, community-based coping and adaptation practices (FAO 2010c). Practices employed by farmers to mitigate high winds during the hurricane season include planting of dwarf varieties, hedgerow, and alley cropping systems (FAO 2010a, b).

There is need for grassroots and community involvement in climate change research and responses. We argue that this has to be an important part of climate change strategy in Caribbean SIDS. Case studies from other SIDS offer lessons the Caribbean might adapt. We advocate the role of local and traditional knowledge in fashioning responses. For example, how might local knowledge about plants inform how we respond to droughts? Are there distinctly Caribbean solutions that are appropriate and depart from the *one-size-fits-all* climate change strategy that is often invoked?

Climate Change and Gender

Climate change has socioeconomic implications that should not be overlooked. Many observers are concerned about the exacerbation of inequities and inequalities especially as they relate to women. It is now acknowledged that climate change has greater economic impacts on women farmers than their male counterparts.

For women who are the majority of farmers in many parts of the world, most notably in Asia, Latin America, and Africa, it means more hardships. Their socially constructed roles and responsibilities and relative lack of access to resources will likely make them more vulnerable than men when droughts, floods, desertification, and increasing frequency and intensity of storms disrupt cropping cycles, destroy crops and livestock, and destroy farm land. The implications for women and their children are dire. The impact of climate change on women is a critical developmental and food security and nutrition concern. Research shows that the nutrition and food security—and therefore health—of children are directly related to women's economic fortunes (Center for Universal Education at Brookings 2011; Gates Foundation 2012). This is so because the vast proportion of women's income goes towards providing food for their families (Veveer 2011, 2012; Kumar and Nair 2004).

Still, rural women in developing countries are largely marginalized in the climate change debate. Research shows their leadership in sustainable agricultural practices, improvisation, and adaptation, yet their perspectives remain undervalued and therefore underutilized (Satyavthi et al. 2010; Tandon 2012; Veveer 2011). Participation of women in decision-making is still limited (Satyavthi et al. 2010). Fingal-Robinson's research in Chap. 4 speaks to this in the Caribbean context. So does Clarke's research in Chap. 3.

Conclusion

The Caribbean region has always faced certain ubiquitous challenges. The nature of the CARICOM countries, especially the characteristics that make most of them SIDS, makes these challenges and vulnerabilities inevitable realities that must be managed to secure the environmental, economic, and sociocultural well-being of the region.

This volume has addressed some pressing contemporary and future vulnerabilities and challenges based on research and examples from several CARICOM countries. Unfortunately, an endeavour like this book will have difficulty capturing the entire CARICOM experience. It is hoped that future work will include cases from other countries including the non-English-speaking CARICOM territories like Cuba, Suriname, the Dominican Republic, and Haiti. The main themes in this volume—food and agriculture, globalization, climate change, and gender—now hold prominent places in development policy and planning across the region. We must emphasize, however, that there is still a great deal to be done in all areas.

We suggest that a key priority for CARICOM is to take a holistic look at these challenges and recognize the ways in which they are integrated (and also their various interfaces) and bring this to bear on the planning process. There is much to be learned from the experiences of other countries, and the region must foster strategic partnerships at all levels that will allow for the transfer of knowledge and technology. However, it is imperative that strategies and solutions to the vulnerabilities we face be uniquely Caribbean in their contextual appropriateness.

This volume has provided some valuable insights into some pressing concerns. It has also raised some issues for future research. Much more work of this nature needs to be done. However, for the moment, the researchers and contributors who have shared their work here deserve commendation for a job well done.

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