

Introduction

Property rights are an important factor in natural resource management. Recognizing this fact, governments in different parts of the world have taken over the control of natural resources that previously were controlled by the local users. For instance, as it will be seen in Chapter 3, before the government intervention in controlling the irrigation systems in Philippines, local farmers had controlled the system for various years. Governments intend to manage the natural resources better and consequently increase productivity.

Nevertheless, often government's priorities are more related to economic growth than natural resources protection (Larson, 2002). Hence, often blinded by the economic growth, governments seem to assume away various factors in their attempt to control the natural resources. They forget that the livelihood of local users living close to the resources depends on the natural endowment that surrounds them. They forget, as a number of studies argue, that the local users that have been using the resources for long periods of time *may* be the ones who can manage the resources in a more effective way (Meinzen-Dick and Knox, 2001; Udaya, 2000). They may even take the natural resources to degradation (Ibid). Browder (1995) also demonstrates that not only long-term inhabitants are able to develop an "indigenous knowledge", but also new colonists may develop their own indigenous knowledge that eventually will allow them to manage the natural resources efficiently^{1,2}. Whoever the local users be, long term inhabitants or

¹ "Indigenous knowledge is the knowledge that people in a given community have developed over time, and continue to develop. It is based on experience, often tested over centuries of use, adapted to local culture and environment, dynamic and changing" (Recording and Using Indigenous Knowledge: A Manual (IIRR, 1996, 211 p.).

² Browder (1995) makes a more profound explanation of Indigenous Knowledge, and also compares it with the "modern" knowledge.

colonizers, they have the potential to develop sound practices to efficiently manage natural resources.

Taking into account the previous statements, a major policy of decentralization of natural resources management from government agencies to user groups has taken place (Meinzen-Dick and Knox, 2001). Projects to devolve natural resource management to the local users are generally based on the assumption that they will perform the roles that the state did for a while (Ibid). In the decentralization process there has been a particular emphasis on the organizations and regulations but not to the role of property rights (Ibid). When devolution programs do not pay ample attention to property rights they are impeding further progress unless these rights are adequately addressed (Ibid).

This paper is about the management of natural resources under common property rights. Chapter one discusses the role of property rights in natural resource management. After a brief introduction at the beginning of the chapter, the first section defines property rights from different perspectives; the section begins with Locke's definition of property rights and ends with a modern definition of property rights to natural resources. Since there are numerous types of property rights, the final section discusses the most utilized typology, and addresses its weaknesses and strengths. From this typology, two types of property rights have been widely used (i.e. state property and private property), and the section concludes with the reasons for the predominance of these two types of property.

Chapter two describes in more detail one of the property rights studied in the preceding chapter, the common property rights. It begins by distinguishing between two terms that are often confused, common property and open access. This chapter also

surveys the reasons for addressing common property rights. The final section evaluates the conditions needed for successful common property rights.

Chapter three presents a case study of how the devolution of property rights to the local users can result in a sustainable and efficient use of the resources. The case is based on various scholars' works about the irrigation systems in the Philippines, which are known as *zanjeras*. It shows how the water users managed the resource before the intervention of the government, and how the government recognized the importance of devolving some rights to the local users. Finally, using the framework developed in the previous chapter, this chapter evaluates if local users fulfill what is required for manage the resources in an efficient way. In chapter fourth, the most important issues developed through the paper are summarized.

1. Property Rights in the Environmental Realm

One of the various ways people are connected with the natural resources is through the system of property rights³. Indeed the study of the relationships between property rights and the environment has a long history. The early debates began with authors such as Hardin (1968), who claimed that when the resources are open to everyone (i.e. absence of property rights) the users will compete with one another to use a greater share of the resources, which eventually will cause resource degradation.

Conversely, when property rights are well defined, users would take the consequences of their decisions into account, making it possible to structure the rights to natural resources in a different way from that described above (i.e. open access). According to a number of authors, property rights are often classified as private (held by an individual or group of individuals), public (held by the state), and common (held by a group of users). Since a deeper analysis of each type of property right is given later in this paper, for now suffices to say that this typology is only theoretical. As Berkes (1989) claims, few resources fall in one of the previous mentioned types; most are a combination of these “idealized types” (p. 9)

According to Fuchs (2003) “...rational decision-makers will only manage a resource sustainably and make investments and consumption decisions accordingly, if they are reasonably certain that they will be the principal beneficiaries of the pursuit of sustainability” (p. 43). Obviously, when the users are more than simply “users”, but also the “owners” of the resource (which is derived from the allocation of property rights) they will have more incentive to manage the natural resource. However, one has to be

³ Other ways are labor and technology (Hanna and Jentoft, 1996)

aware that there are cases where those owning the resource have been responsible for resource degradation. Private owners, for instance, may quickly use natural resources in order to earn cash and make financial investments. The state, on the other hand, may be more likely to surrender to short term economic priorities instead of environmental priorities.

There is a need, therefore, to address first the property rights problem in order to protect the natural resources from depletion. According to Hanna, Folke, and Maler (1996), some types of property rights are better than others in specific contexts. In general, policies to establish property rights regimes should consider the ecological, cultural, geographical, and economic context in which property rights are to function.

1.1. Property Rights Foundations.

One of the first theorists that talked about property rights was John Locke. He claimed that everything on the earth belongs to the person that takes it through his labor (Locke, 1994). Supporting this idea further, he argued that "...every man should have as much as he could make use of...since there is land enough in the world to suffice double the inhabitants..." (Ibid, 433). Locke claimed that the role of the government was not to create property rights but only to recognize and preserve the existence of the natural rights (Edwin West, no date). The first theorist that recognized the crucial role of the government in recognizing property rights was Jeremy Bentham. He stated that rights are created and granted by law (Ibid). In the contemporary theory of property rights it is less likely to find authors defending Locke's theory of property rights.

Bromley (2003) defines *rights* as "...the capacity to call upon the collective to stand behind one's claim to a benefit stream". He characterizes rights not as a relationship between a person and an object, but as relationships between persons with respect to an object. Those rights are always protected by the state. *Property*, on the other hand, is the benefit stream (Ibid). For instance, if I buy a house, I am really buying a the benefit stream of that house, that is my property. Then, property rights is "a triadic social relation" involving the relationship between the individual who possesses the right, others that have to refrain from interfering with the right holder's exercise of those rights, and an institution to backup the claim. Randall (1981) also recognizes this triadic relation; he argues that property rights specify the relationships among people with respect to the use of things, and the penalties for violation of those relationships. So, there must be an institution to enforce the claims and decide which claim is valid. According to Bromley (2003), the claims to a benefit stream derived from the property rights, are enforced by "some higher body (usually the state), which will agree to protect through the assignment of duty to others who may covet, or somehow interfere with, the benefit stream" (p. 84).

Defining property as a stream of benefits implies that property does not refer to an object per se, but rather to a social relation that defines the property holder with respect to the benefit stream against all others.

1.2. Types of Property Rights to Natural Resource Management.

It has been said so far that one of the various ways people are connected to natural resources is through the system of property rights. What has not been said is that property rights can take different forms, which are known as *property regimes*. According to

Fuchs (2003), property regimes are “property arrangements characterized by different combinations of property rights, in terms of ownership, access, and withdrawal regulations” (p. 49).

Berkes (1996) observes that social systems and natural systems interact in various ways depending on property regimes. This section describes the main types of property regimes and how they influence human interaction with the natural environment.

Although there are numerous types of property rights regimes, several authors have categorized property rights into four different “property rights regimes”, namely open access, state property, private property, and common property⁴. Evidently, this is a very theoretical division and only relevant for analytical purposes. They are useful as starting points to pursue more reasonable delineations of property rights regimes. For instance, in the Philippines case study addressed in this paper, there is a mixture of regimes between the farmers (common property) and the government (state property)

The next sections analyze the property regimes according to how well they solve two problems that Common Pool Resources (CPRs) typically have. According to Wade (2003) CPRs are to be understood as a subset of public goods. The latter have the characteristic that it is impossible to exclude people from their use, since it is open to everyone. CPRs are public goods in the sense that they are open to everyone, but unlike public goods, CPRs have finite benefits, which may lead to their overuse, depletion, or degradation. Some examples of CPRs are: inshore fisheries, smaller grazing areas, groundwater basins, irrigation systems, communal forests, and wildlife habitats.

⁴ authors that have made the fourfold division are Hanna, Folke, & Maler (1996); Browley (2003); Berkes (1996); Feeny, Berkes, McCay, and Acheson (1990). Others such as Santopietro and Shabman have made a slightly different division.

According to Berkes (1996), McKean (2000), Ostrom et al. (1994), Gardner et al. (1990) there are two main characteristics that play an important role in the management of CPRs: 1) exclusion or control of access of potential users is problematic and costly, and 2) each user is capable of subtracting from the welfare of other users. On the one hand the difficulty of *excluding* beneficiaries, due to the physical nature of the CPRs, provides a strong incentive to free ride. On the other hand, given that the boundaries of a CPR are often unclear, it can be very difficult and costly to monitor its *use* and somebody is capable of subtracting from the collective welfare⁵.

The next paragraphs, besides analyzing the property regimes in function of how well they solve the two problems mentioned above, will also identify which of these property regimes is more likely to fail in protecting the natural resources.

1.2.1. Open Access

Is a situation where access and use of the resources is free and open to all, and therefore anyone can exploit the resources without limit. In this type of setting, there are not well-defined property rights or they are not present at all. According to Berkers (1996), where there is not exclusion in the use of the resources, there are more possibilities for degradation. He adds that when the resources are abundant vis-à-vis the necessity, this regime is not problematic, at least in the short term. McKean (2000) asserts that these regimes are acceptable when there is not a need to manage resources at all, “when demand is too low to make the effort worthwhile” (p. 30). However, in the long term even the most plentiful resource cannot bear the pressures of economic and population growth (Swaney, 2003).

⁵ these problems are also known as the free-riding problem and the jointness problem respectively.

Hardin's *tragedy of the commons* refers to an open access situation⁶; he states that in the absence of well-defined property rights and authority systems, people will use (and in the long term deplete) the natural resources before someone else does. That was the case of the North American Bison, where depletion occurred rapidly, before changes in the institutional arrangements or changes in the cultural values could stop it (Berkes, 1996).

1.2.2. State Property

In this regime entitlement to the resource is completely held by the state, enabling it to control access and regulate use of the resource. States attempt to protect the resources in two ways: 1) by nationalizing a large amount of resources to create parks, reserves, and national reserves; and/or 2) by passing laws designed to protect the natural resources (Acheson, 2000). Individuals or groups are permitted to use the resources only at the forbearance of the state. Nevertheless, it has to be mentioned that many state property regimes have transformed themselves into open access regimes due to the lack of effective management and enforcement (Bromley, 2003; Udaya, 2000; Sundar, 2001). Examples of state property rights regimes include national forests, national parks, and military reservations.

The state can control the inputs and outputs of the natural environment in various ways (e.g. through taxes or subsidies to the natural resource use) (Ciriacy, S., and Bishop, R., 1975)⁷. The state can also manage natural resources through specialized organizations

⁶ Although Hardin tried to represent a common property situation he represented an open access one. The next section analyze *the tragedy of the commons* in more detail.

⁷ According to Bromley (2003), coercion not necessarily come from the state however it is the highest body to enforce property rights.

that are permitted to use them for a period of time (Bromley, 2003). In governments with fiscal crises, decentralization is also probable because the costs (e.g. salaries for the staff, and monitoring) of directly managing the resources can add up to large sums (Meinzen-Dick & Anna Knox, 2001)⁸. When the means of enforcement are lacking the state may even devolve the resources to the control of the local users (Berkes, 1996). For instance, in the Philippines case study shown in chapter three, the productivity of the irrigation system and the sustainable use of the water were only possible when the governmental agencies actively facilitated the local users participation, not only in devising the means of enforcement, but also their participation in monitoring.

But governments can also fail in managing the natural resources. According to Berkes (1996) state property regimes do not necessarily guarantee a sustainable use of resources because their decision-makers do not share the same time horizon or values of nature as resource users would. Additionally, states usually do not have enough financial resources or information to enforce the protection and to manage natural resources (Meinzen-Dick and Knox, 2001). Finally, states tend to prioritize economic goals over environmental protection (Ibid).

1.2.3. Private Property

Under this regime an individual or corporation has the right to exclude others and to regulate the use of the resources. Berkes (1996) states this regime provides the institutional arrangement for a successful exclusion because this type of property is more effective in making the government enforce their rights. Bromley (2003) claims that “[p]rivate property regimes *appear* to be stable and adaptive because they have the social

⁸ Other factors that lead to political decentralization are the international donors pressure, and the idea of promoting democracy by “bringing the state closer to people” (Meinzen-Dick and Knox, 2001)

and legal sanction to exclude excess population, and effectively to resist – through the power of the state – unwanted intrusions” (p. 93).

The incentives the individual or private corporation has to regulate resource use is effective from the private economic point of view, but not necessarily from a sustainable approach. How sustainable the resources are, depends on their use and also on the characteristics of both the market and the resource (Berkes, 1996). Acheson (2000) recognizes some circumstances where private property leads to the over-exploitation of the resources. First, when the growth rate of the resource value is less than the financial interest rate, the owner of the resource might prefer to rapidly use the resource in order to maximize profits. Second, uncertainty about availability of the resources in the future, can lead to overexploitation. Third, the current precarious economic situation of many owners will force them to overuse the resources in the short run, without considering strategies to maintain the resources in the long run.

1.2.4. Common Property

Under this type of regime the resource is held by an identifiable group of users who can exclude others and regulate the resource use. According to Fuchs (2003) “[c]ommon property generally refers to resources for which the exclusive title is in the hands of a group of individuals” (p. 49). In spite of the fact that a group of individuals can have various organizational forms, they are social units where long term interaction among members exists. Due to their long-term occupancy of the resource, these individuals attain specialized knowledge that permit them to improve their abilities through the years. Browder (1995) claims that, besides local users that have developed a indigenous knowledge through the years, new colonizers are also likely to obtain a

similar knowledge in their interaction with the natural resources. Hence, it should not be assumed that only those long-term local users are able to generate sound practices for the management of the resources; there are also new users that may interact in a similar way with the resources.

Therefore, groups that have developed abilities to exclude outsiders from the use of their natural environment, include tribal groups, villages, colonizers, kin systems or extended families. However, there are a number of factors that may contribute to the breakdown of the local users' mechanisms for exclusion. According to Acheson (2000), this can occur when "groups are large, when people have not built up social capital and know who to trust, where boundaries cannot be enforced, and where people do not have to live with the consequences of their actions" (p. 19).

Since common regulation is the oldest type of regulation, local users have developed a number of mechanisms to regulate the use of the resources (Bromley, 2003). However, it does not necessarily mean that a common property regime is successful in regulating the resource use. By "successful" Bromley means that the natural resource has not been depleted, that some level of investment to enhance the natural resource has taken place, and that the group of users is not in a state of anarchy. According to Fuchs (2003), there is the need for a superior body such as the state to assure that the expectations to control the use of the resources are met. Without the state's backing, there are many chances for the regime to degenerate in open access (Ibid). Then, the legal status of property is extremely important for the environmental outcome (Ibid).

According to Bromley (2003) irrigation systems represent all the characteristics of a common property regime: "there is a well-defined group whose membership is

restricted, there is an asset to be managed (the physical distribution system), there is an annual stream of benefits (the water which constitutes a valuable agricultural input), and there is a need for group management of both the capital stock and the annual flow (necessary maintenance of the system and a process for allocating the water among members of the group of irrigators) to make sure that the system continues to yield benefits to the group” (Ibid, p. 96). Building on the previous statement, chapter three explores an irrigation system case study.

In conclusion, it has to be mentioned that in reality few resources are absolutely open access, state property, private property or common property; most have some characteristics of each type. Thus it is possible to find fisheries, forests, or any other natural resource nationalized, privatized, managed by a group of individuals, or even unmanaged. (Berkes, 1989). First it is important to determine the characteristics of the resources and the problems they face; then it may be important to match them with the institutions capable of solving those problems. Finally, this endeavor might need to combine various elements of the different regimes.

1.3. Influential Theories in the Natural Resources Management.

From the types of property regimes, analyzed in the previous section, two have been widely recommended as the most efficient option to manage natural resources, private property and state property regimes. Common property regimes have been left aside because it is supposed that people placed in a situation where everyone could gain from cooperation will be unlikely to do so in the absence of external forces. Therefore, the only solution would be private enclosure or state regulation (Wade, 2003; Nicita,

2002). Behind the support of these regimes rests the great influence derived from theories of collective action such as *The Prisoner's Dilemma (PD)*, and *The Tragedy of the Commons (TC)*⁹.

The Prisoners' Dilemma

PD can be summarized as follows. The police arrest two suspects. Since the police investigator has insufficient evidence, he visits each of the suspects separately in order to obtain a confession, and offers them the same deal. If A confesses and B remains silent, B gets a full 20 year sentence and A goes free. If B confesses and A remain silent, A gets the full 20 year sentence and B goes free. If A and B stay silent, they will receive only 10 months for a minor charge. If A and B confess, they will get 12 years.

Adapting the PD in CPRs, the choices individuals face are either to cooperate (i.e. following the rules of use and access to the resources) or not to cooperate. The preference order of options each individual face are: 1) everyone else follows the rules while the individual enjoys unrestrained use and access to the resources; 2) everyone, including the individual, follows the rule; 3) no one follows the rule; and 4) the individual follows the rules while the rest do not. Given this order of preferences the most likely outcome is the third ranked alternative, no one follows the rule. It results because the individual does not want to be the “sucker” that follows the rule while no one else does. In fact, the individual will evaluate to follow the first alternative, but he does not because he thinks

⁹ A detailed explanation of the influence of these models in Natural Resource Management can be found in “Governing the Commons: the evolution of institutions for collective action” by Elinor Ostrom (1991), or “The management of common property resources: collective action as an alternative to privatization or state regulation” by Robert Wade (2003).

that everyone else will try to do the same. Since everybody will make a similar analysis, the most likely outcome is alternative three.

The Prisoners' Dilemma is based on two key assumptions. First, players make their choices without knowing each others choices. Second, players chooses only once and cannot change their mind after knowing the other decision.

The Tragedy of the Commons

The TC is a metaphor that illustrates how individuals act in collectivity. In summary the metaphor goes as follows. There is a pasture "open to all" where it is expected that each herdsman will try to keep as many cattle as possible in order to maximize his utility. All the herdsmen have the same behavior, which lead to a point where their aggregate activities begin to exceed the sustainable yield of the pasture. However, each herdsman is still motivated to add more and more cattle, because in doing so he acquires all the benefits of selling additional animals and shares the costs of overgrazing. Therefore, each man is locked into a system that motivates him to increase his herd without limit. Then, Hardin argues that the only way to control the herdsmen activities is through an institution external to those using the resource, namely the state.

Like the PD, the TC assumes that the herdsmen do not have information about each other's choice, and consequently they do not know when the resource is going to collapse. According to a number of authors (e.g Wade, 2003; Ostrom, 1991) Hardin fails to differentiate between situations of open access and situations of common property, and as explained before, the outcome in each case is different. The tragedy of the commons

fits better in open access situations. In common property regimes, however, the chances to cooperate to protect and efficiently use the resources are higher.

A common characteristic of these two theories is the free-rider problem: “[w]hen ever one person cannot be excluded from the benefits that others provide, each person is motivated not to contribute to the joint effort, but to free-ride on the efforts of others” (Ostrom, 1990, p. 6). Thus, if everyone chooses to free ride, which tends to be the dominant option, the collective benefits are not achieved.

The great influence of these models depends on two factors. First, they are particularly useful to explain a variety of settings where the individual behavior is facing a collective action situation (Ostrom 1990). In such conditions, Hanna and Jentoft (1996) contend, individual behavior often has a self-centered and short perspective vis-à-vis the broader and long term vision of the social behavior. To Nicita (2002) “...individual rational strategies lead to collectively irrational outcomes...” (p. 121). Since these types of arguments are behind the theories of collective action, those theories sustain that the individualistic behavior results in the overuse and degradation of the resources, unless external authorities enforce its use and exclusion. Second, policies derived from the mentioned theories are easy to develop and can be imposed at low cost by external authorities (Ostrom, 1990). In fact, supporters of the external authorities frequently encourage oversimplified institutions (Ibid).

In spite of the convenience of using these theories, they can be very dangerous when used as a foundation for policy. They are based on assumptions that cannot be applied in all the situations or if used they lead to pessimistic conclusions about the management of the resources in the hands of the local group of users (Wade, 2003).

Ostrom (1990) summarizes the assumption made by these theories in this way: “[t]hey are useful for predicting behavior in large-scale CPRs in which no one communicates, everyone acts independently, no attention is paid to the effects of one actions, and the costs of trying to change the structure of the situation are high” (p. 183).

In conclusion, theories of collective action suppose that natural resources have universal attributes that could only be changed by external authorities such as public or private regimes. Nevertheless, not all natural resources situations have the same characteristics, hence environmental problems do not have a single solution but a wide range of approaches. The next chapter will discuss the common property regime, which for a number of scholars is the best regime for the management of common pool resources.

2. Common Property Rights

According to McKean (2000) common property regimes were once widespread around the globe. However, due to a number of reasons such as the stresses of population growth, technology change, the expansion of capitalism, and the influence of the collective action theories, common property regimes have been left out of government legal recognition. Indeed, many common pool resources (CPRs) have been transferred to external regimes such as the government or to a private institution. However, there are cases where these external regimes did not achieve the objectives of sustainable resource management¹⁰.

This chapter analyzes the main factors of the management of CPRs under common property regimes. After this brief introduction, the chapter clarifies two concepts that tend to be confused. Then it is going to be evaluated what are the reasons for addressing common property rights. Finally, it identifies what are the conditions that CPRs should meet to be managed efficiently.

2.1. Common Property vs. Open Access

The misunderstanding between these two terms, common property and open access, often leads to different recommendations and therefore consequences for resource management. According to Berkes (1989) the confusion is partly because the Western view of property is either private or belonging to the state. Based on the aforementioned view of property, resources that are not owned by one of the two regimes should be “common property” or “everybody’s property”; both terms, then, would represent an

¹⁰ Illustrative examples of the failure of external institutions in managing natural resources can be found in “Varieties of Institutional Failure” by Acheson (2000).

open access system. However, as stated in chapter 1, to include open access as a type of property rights does not make sense because it does not refer to any form of property, but instead to its absence. When the resources are owned by a group of people it should be labeled “common property”, as explained in some detail in Chapter 1.

According to Ciriacy and Bishop (1975) an open access lacks one of the main characteristics of properties, the feature of exclusion. Conversely, in a common property regime, there is property and it is vested to an specific group of users who hold their rights of access and use in common. McKean (1992) argues that “[t]he unfortunate misuse of ‘common property’ to mean unowned resources not only makes hash out of the term ‘property’ by referring to its absence, but also blinds us to the possibility that a resource used in common can actually be owned exclusively by the group that uses it” (p. 250). Actually, that is a mistake government officials have made when they do not acknowledge common property institutions where they exist, and prefer to take over and control the resource, resulting many times in the degradation of the commons. In the case of the irrigation systems in Philippines presented in chapter 3, the resource began to be managed inefficiently when the government took over and did not take into account the local farmers institutions.

It is worth mentioning that the influential Hardin’s *Tragedy of the common*, also made the same mistake and confused common property situations with open access. Policy recommendations based on this theory encourage the management of the resources either by the state or a private organization, in order to avoid the degradation and destruction users would impose (Swaney, 1989; Berkes, 1989; Ostrom, 1990, McKean, 2000).

2.2. Benefits for Addressing Common Property Rights.

Meinzen-Dick and Knox (2001) identify various arguments for taking into account the common property rights. I consider three of these arguments important for the objectives of this paper. First, they consider that common property rights provide incentives for management. They will extend the time horizon of the users, and consequently sound investments and careful management would take place in expectation of a future benefit. In the Philippines case study, it will be seen that when the government was the total owner of the irrigation system, the farmer did not follow the rules, did not help to maintain the system, and not help to enforce the adequate work of the irrigators. Moreover, the farmers used to sabotage the system until they were given partial ownership of the irrigation system.

Second, without property rights the local users do not have the authority and control over the resource. In an absence of property rights, the local users are less able to stop outside polluters from degrading the environment. Even within the group, when the property rights to the resources are held by a central government the chances of collaboration will decrease. Only when the Philippines farmers were given property rights did they help to enforce and create more effective rules.

Finally, transferring property rights to the local users demonstrates the willingness of the government to collaborate with them. There are cases, such as the one in Philippines, where the local users did not collaborate with the government in its multiple attempts to enhance the rice production. When the government decides to transfer some rights to the farmers the rice production increased considerably.

Besides these reasons for addressing property rights, authors such as Larson (2002) and Udaya (2000) argue that central governments usually do not have enough financial resources or information to enforce the protection and manage of NRs, and central governments tend to prioritize economic goals over environmental protection. Conversely, local users may manage NRs better because they have a better knowledge of the resources, and they can identify and prioritize environmental problems better. Local users in particular, the authors argue, have a greater level of dependence that motivates them to maintain the resources over time. Moreover, their knowledge about and their closeness to the resources allow local users to better monitor the use of the resources.

Many of these reasons should be taken into account when evaluating the common property regime as an alternative to protect NRs. This regime, however, is not exempt from problems. Then, in order for the regime to succeed, there are a number of conditions they have to meet. What follows is an attempt to describe the most important conditions for the common property regimes to succeed. The reader has to be aware that there are a number of conditions that may be left out. The wide characteristics that both the resources and the users could have, make impossible to enumerate all the conditions required for a regime to succeed (McKean, 1992).

2.3. Barriers Common Property Rights Face

It is important to note that, in spite of the advantages of managing a CPR under a common property regime, there are various limitations that could threaten achieving of these benefits. This section, which functions as a hinge between the previous and the next section, analyzes the limitations of common property regimes. In general it can be said

that people responsible of managing a resource under a common property regime often do not have social capital, are very heterogeneous, do not always live in harmony with the natural resources, do not have well-defined rights of use, among other limitations.

Lack of Social Capital. So far, one could think that a community managing a resource is tightly integrated and works in a coordinated way; however, we have to be aware that individuals in rural communities sometimes are selfish and hence do not work in a cooperative way (Oates, J., 1999). In fact, there are communities where “individual selfishness and social unreliability” (Ibid, p. 93) are highly rooted in the community participants, creating a difficult environment to collaborate.

Heterogeneity. When members of the community have different economic interests and use perceptions of the resource, group members are restrained from coming to a common agreement (Jain, 2004). Sources of heterogeneity could include *caste, economic status, different relations to the resource, political influence, physical location, etc.* Additionally, when there are many users, it is even more difficult to define the rules to manage the resource.

Rights Deficiently Defined or Incongruent to Local Conditions. When users are not clear on how to use a natural resource, they are more likely to deplete it. Additionally, it is very difficult for guards to control the use of the resource when it is not clear how they have to protect it. Finally, when the rules for use do not fit well to the local conditions, the best way to take advantage of the resource is breaking the rules.

Disharmony Between Users and the Environment. We can think of the users of a resource as living in harmony with the environment, but that is not always the reality. Often external forces, such as the market, pressure the users to overuse the natural

resource. Sometimes the users need to have a high rate of using the resource in order for them and their families to survive.

These are only some of the limitations the management of the natural resources has under a common property regime. They only serve to understand that the community does not always provide successful natural resources management as individuals are exposed to different forces that lead them to deplete the resource; hence in those situations, a common property regime may not be the best option. In the next section the reader will find that there are a number of conditions that are necessary for the system to function under a common property regime.

2.4. Conditions Needed for Successful Common Property Regimes

There is a set of conditions needed for successful solutions to collective action problems that may emerge in governing CPRs. They are mainly derived from Ostrom (1990), McKean (1992), and Wade (2003). Studying several CPRs cases geographically separated and historically unconnected, these authors identified some conditions for successful solutions to collective problems. In general, it can be said that a regime is successful when individuals are able to achieve productive outcomes in situations where temptations to free ride are always present. Some factors that foster the ability of the local users to overcome their collective action problems are: homogeneity of the group, a clear definition of boundaries, the ability to exclude outsiders, the ability to learn from the resources and devise effective rules, and the government recognition of the common property rights.

Clearly Defined Boundaries and Users

A clear definition of both the boundaries of the CPR and the authorized users should be the first step in organizing a collective action situation. If it is not clear what is being managed or for whom, the situation will encourage outsiders to make use of the resources and turn the management of the resources in an open access regime. Hence, it is more likely that the local users will face a reduction of their income, and the resource will be depleted. In general, it can be said that the smaller and more clearly defined the boundaries of the CPRs, the greater are the chances of success. The same applies with the number of the users: the smaller and better identified are the users, the better are the chances of success. The CPRs are highly benefited when the users are the local residents. Local users reduce enforcement costs because any outsider could be immediately distinguished. Local residents also have the knowledge and are crucial to be part of the process of creation of rules comprising conflict resolutions, use time and dates, opening and closing of commons, etc.

A crucial aspect in the size of the users depends on the eligibility criteria for membership. According to McKean (2000) it may be good for the resource if the eligibility criteria do not allow the rapid expansion of the number of members. One way to do this is conferring rights to use the resource to households instead of individuals; this practice not only limits the number of users but it also discourages population growth (Ibid). In the case of the Philippines irrigators, we will see another way to limit membership to avoid the problems generated by the population growth.

Transferability

An important condition to take into account in order to improve the successful management of the CPRs is transferability. At maximum CPRs could be bequeathed, but would not be sold to outsiders. According to McKean (2000), as soon as the fruits from the resource become commercially attractive, individuals outside the users will try to buy rights to the resource in order to acquire those commercial opportunities. Even worse, since outsiders do not share the same time horizons of those living and depending on the CPRs for a long time, it is more likely that they will not have the same interests in protecting or taking care of the common, nor the willingness to invest in enhancing its quality. McKean (1992) argues that “[f]orbidding the sale of shares in the commons, especially to ‘outsiders’, is one way to guarantee that co-owners of the commons all have fairly similar economic objectives and will be able to reach agreement about how to use the commons” (p. 262).

Congruence Between Rules and Practices, and Local Conditions.

As it is going to be addressed later in the case study, the technology, material, investments, rules, and use periods must all be related to local practices in order for the regime to work. Indeed, that was one of the main problems that the Philippines government did not take into account in their attempts to manage the resources. For instance, government agencies were trying once and again to impose external practices such as developing technologies and constructing dams in inappropriate sites. Typically, rules devised from external agents are misunderstood by the users resulting in a low

quality of compliance. Conversely, when the rules, tools, dates of using the common, etc., are developed internally, it is easier to follow them. When the rules are highly internalized, users easily know if they are using the common in an illegitimate or illicit way.

The best way to ensure that the rules will be well tailored to the local circumstances is permitting the individuals that are in constant interaction with the environment, to have an important participation in the process of modification and creation of the rules. Those individuals are the "...first to detect evidence of resource deterioration and resource recovery and so need to be able to adjust rules to ecological changes and new economic opportunities" (McKEan, 2000, p. 45). The knowledge of the context will also permit individuals to develop a better set of monitoring and sanctioning rules, which are rather crucial for the sustainability of the resource.

Monitoring and Penalties

Close attention to monitoring and penalties is crucial for the success of the CPRs management. Again, they must be undertaken not by external authorities but must be conducted or supervised by the members of the group of users itself. Thus, the "guards", will have an interest in protecting the resource. This work might rotate through the entire area of the resource permitting different individuals to be the guards. Since the guards may be always exposed to bribes, there are different alternatives that the local users could utilize. A first alternative could be to permit the guards to retain the fines imposed to the violators. Another is to have more than one individual patrolling the common, so they are more effective and exert mutual surveillance. A third alternative, very useful in irrigation

systems, is to have guards that are located at the tail of the system, so they will be very interested in control of a fair distribution of water. The sanctions depend on the seriousness and context of the offense. Mild sanctions are imposed for first transgressions and severe for repeated offenses (McKean, 1992; Ostrom, 1990)

A central point for the monitoring and penalties to function is that rules should be clearly stated; in that way the users not only know their limits but also avoid conflicts between users and guards about how to use the resource. There are some rules that are easy to enforce such as the technology permitted to harvest; other rules such as the boundaries, are subject of interpretations.

Government Recognition of the Local Users' Rights to Organize

Wade (2003) argues that it is difficult "...to define the conditions under which a set of common pool resource users may agree to follow a rule of restrained use without an external enforcer of the agreement" (p. 181). One thing is that the participants develop their own institutions. Another is that they are part of a higher governing jurisdiction; hence the recognition of the government is needed. If the appropriators devise their own institutions without considering the higher governing body, the regime is more likely to fail. On the other hand, if the governments do not recognize the rights of the participants to organize, there is a high probability that an external enforcement will fail. Therefore, both parties, the government and the individuals have to accept the participation of each other in order to achieve a sustainable use of the resources. The government should help the local users to create a legal framework that later could be included as a national law, and the local users should permit the government to act as an enforcer of last resort.

Governments can also help local systems by providing technical assistance on how to use technology, finance and administration skills.

3. Case Study: the Irrigation Water Rights in the Philippines

Water has been called the first resource. Without it, life could not exist. With it, not only life but health, prosperity and power can be obtained. And yet it is becoming increasingly scarce, polluted and politicized. In today's world of growing competition for this precious resource, it is becoming increasingly urgent that society and nations develop equitable property rights for water and enable local communities to manage water services... (Vermillion, 2004, p. 1)

3.1. Selection Criteria and Case Study Purposes

The case study explored in this paper is one of the clearest examples of collective action settings where a common property right regime may work better. The mobility of the resource in only one way and the fact that it can privilege those at the head of the system over those at the tail makes an irrigation system setting particularly suited to common property regime. Then, in an irrigation system it is possible to find a well-defined group with membership restrictions, an asset to be managed, and an annual stream of benefits. This case study describes an example of irrigation systems in the Philippines, where water and the infrastructure that delivers it, is shared by their co-users on such a basis. The purpose of this case study is twofold: first, to demonstrate that the concepts developed through the paper are likely to apply in practice; and second, to identify policy recommendations which may lead to tangible efforts to devolve the management of natural resources from governments to local users.

This example is rather important because it demonstrates how a history of local users participation in the management of irrigation activities results in the gradual acceptance of the farmers' practices by the national government. It will be shown that the external control (state regime) of the resources was not enough to effectively use the services of the irrigation system. The constant participation of the farmers for a

sustainable and effective functioning of the irrigation systems became crucial. In summary, this case is especially important because, as Siy & Korten (1989) argue, “[a]lthough calls for greater people’s participation in development are commonly heard, it is rare to find major programs that actively involve local people in meaningful ways, and even rarer to find such programs carried out by large government agencies” (introduction, p. xvii).

Besides the conceptual framework developed through the paper, this chapter is based also on the work done by De los Reyes (1986), Raby (1997), Ostrom (1990), Siy (1989), Bagadion (1989), Vermillion (2004).

3.2. Background and the Indigenous Irrigation Systems

With a total land area of 300,000 sq. km and with a population of 70 million, the Philippines is an archipelago of some 7100 islands divided in three groups: Luzon in the north, Visayas in the center, and Mindanao in the south. The country is bounded by the South China Sea to the west, the Pacific Ocean to the east, the Sulu and Celebes Seas to the south, and the Bashi Channel to the north. The climate of the islands consists of a dry summer, from November to May, and a rainy season from June to October. Besides their national language, known as Filipino or tagalog, there are also 87 other languages and 111 dialects in the archipelago.

The Philippines inherited from the Chinese the high value they place to family ties, helping each other, and respecting elders. Family values are also reflected in ties to the land ownership and residence in the barrio, which is the smallest unit of political representation. The spirit of helping one another is rather evident in agrarian groups.

Thus, it is possible to find family members and neighborhoods providing free help during planting and harvesting activities. In some provinces of the northern Philippines, a typical form of collective ownership of water sources are the *zanjeras*, small-scale irrigation societies whose members are in charge of building the dams, and maintaining and managing the system.

Early in the history of Philippines (i.e. long before the governmental intervention to control the irrigation systems) various indigenous irrigation systems were developed without any engineering skills or financial assistance from the state. “[They] consisted of digging out the hillside and building a stonewall on the edge of the terrace which required large amounts of labor in its construction...” (Rabi, 1997, p. 3). This system suffered periodic deterioration due to the poor materials used, and brought together communal labor to work in reparation practices. In spite of the fact that no one had exclusive rights over the use of the system, the terraces at the head of it had priority. Hence, those at the upper levels had the obligation to release water to the lower level and subsequently until reaching the lowest farm.

It was with the arrival of Spanish conquerors to Philippines in the sixteenth century that new methods of irrigation were initiated. In order to increase the productivity of the lands, the Spaniard priests directed native people in the construction of irrigation systems, covering more than 20,000 hectares. According to Ostrom (1990) from this mixture of traditions emerged the *zanjeras*. *Zanjeras*, as Siy (1989) defines them “are indigenous irrigation associations found in the Northern Philippines, [which] are generally considered exceptionally well organized” (p. 21). The organization of the *zanjera* involved a complex set of activities including construction, maintenance, water

allocation, and conflict management. Zanjeras have been established by farmer's owners of the land and those landless farmers that aspire to acquire portions of land in return of building zanjeras. The latter allows the landowner to retain ownership while permitting the use of the land, which is known as "sharing of the land". "Some 40% of farms are cultivated by leaseholders, mostly on a share cropping basis" (Rabi, 1997, p. 3).

3.3. The Role of the State

The central government intervention in the irrigation systems began in 1908. Government officials were authorized to build irrigation systems in response to requests from municipal councils or villagers. Among others activities, the assistance consisted of "...replacing a log and stone diversion weir with a concrete one and constructing canals to expand the irrigated area" (Bagadion, 1989, p. 4). In 1912, the government was authorized to manage the systems and to collect irrigation fees from the farmers to cover the costs of construction, operation, and maintenance (Ibid). In 1964 the Philippines government created the National Irrigation Administration (NIA) with the objective of enhancing the rice production to respond to the country's increasing demand. Among its main activities, the NIA administered the construction, operation and maintenance of the irrigation systems, and collections of irrigation fees from the farmers (Ibid). Since the beginning of the project, NIA gained wide recognition for the engineering and construction of the systems (Bagadion, 1989).

Six years later the NIA realized that its objective of increasing rice production was not being achieved. The problems appeared in the operation, maintenance and fees collection. "In the national irrigation systems only about 80 percent of the service area

was irrigated during the wet season and about 30 percent in the dry season. Farmers often complained about unsatisfactory service. Distribution of water was generally inequitable and production was below expectations” (Bagadion, 1989, p.5). The low collection of irrigation fees created a profound funding constrain, leading to the immediate assistance of the government to cover the costs of operation and maintenance of the system.

In the middle 1970s, recognizing the failure of state property regime and the history of success of indigenous irrigation systems, the NIA decided to change its approach. The NIA decided to allow the local users to participate in planning, design, construction, operation and maintenance of the irrigation systems. The local users participated through irrigators’ associations. The farmers and the state (through the NIA) worked as partners in planning, design and construction of the irrigation system. For instance, NIA engineers in collaboration with farmers designed the map of the area covered by the irrigation system and decided what were appropriate locations for the canals (Bagadion, 1989). The operation and maintenance of the system was initially undertaken by the government and gradually devolved to the irrigators’ associations. Once ready, the irrigators’ associations took over fee collection and had total control over the distribution of water among local users of the system (Ibid).

The participation of beneficiaries created a sense of ownership of the system; facilitated the enforcement of rules about the distribution and use of water; and, reduced operation and maintenance costs. As a result, fee collection improved, water was more equally distributed, and rice production increased (Bagadion, 1989). This new approach proved to be much more efficient and effective than the state property regime alone so

the NIA ended up applying it to all small scale irrigation systems and even to some of its large scale irrigation systems (Ibid).

The state had a pivotal role in making this new approach successful. First of all, through the national policy the state gave the irrigators' associations not only a stronger role in NIA's irrigation program but also power to allocate water rights (Bagadion, 1989). Also, once registered in the Securities and Exchange Commission, irrigators' associations were legally recognized by the state. Second, the construction of the irrigation system could not have been possible without NIA's subsidy. While farmers contributed 10% of the construction costs (with labor, materials, or money), the government covered the other 90% (Ibid). NIA increased the period of time farmers had to repay construction costs from 25 years to 50 years and did not charge interests (Ibid). NIA also completely covered other related expenses, such as road infrastructure.

Third, the state provided capacity building to develop and empower the irrigators' associations. NIA fielded community organizers to live with different group of farmers, gain their acceptance and organize them. NIA also built the farmers' capacity in conflict and financial management, mobilization of resources, operation and maintenance of the irrigation system, and decision-making (Bagadion, 1989). Finally, the NIA documented and evaluated the results of its pilot projects, which allowed the NIA to learn from and improve upon them. Thanks to this learning process, the new approach could be applied successfully to other irrigation systems and benefit other communities.

The experience of the Philippine Irrigation Program demonstrates that the state and the local users can work together effectively, and that a pure state property regime may not be the most appropriate, efficient, or effective approach to manage common pool

resources. However, when the beneficiaries are involved in managing the resources, the role of the state should not be diminished. On the contrary, as this case study shows, the state played a central role in providing and enforcing an adequate legal framework, and building capacity and empowering local users to participate effectively in the process. Finally, as already discussed in chapter two, one important condition for the success of common property regimes, is the government recognition of the users' rights. This and the rest of the conditions will be evaluated in the next section.

3.4. Did the Zanjas Meet the Conditions for a Successful Management under a Common Property Regime?

This section assesses the extent to which the Philippines irrigation system meets the conditions required to be managed under a common property right regime. As explained in chapter two and exemplified in this chapter, settings such as irrigation systems are the ideal for a common property regime to function. The problems that NIA faced and that resulted in an insufficient rice production were generated by the lack of knowledge NIA had about the institutions developed by the water users. Furthermore, NIA was trying to impose a governmental system that clashed with these institutions. Thanks to the organizers, they discovered that for the system to function better, they had to devolve some rights and responsibilities to the local users.

For common property rights to function, a number of conditions must be met. The following paragraphs explain how the Philippines irrigation system meets the conditions required for the system to function under a common property regime.

Clearly Defined Boundaries and Users

Defining who has the rights to the water and defining its boundaries can be thought as the first step for organizing a common pool resource where a collective action problem is likely to happen. In the case of the Zanjeras, this condition is clearly met. The farmers divided the area to irrigate in various sections allocating each farm in each section from the top of the system to the bottom of it. If the farmers would not know what are the boundaries of the area covered by the system an outsider may use the irrigation services without any type of returning effort. At the same time the definition of the boundaries allows everyone to know who is a member and what are their rights as well as their duties. This type of organization assisted the zanjera system to persist successfully without state interference for various centuries.

Transferability of Rights

An important condition that carries the successful management of the CPRs is that they cannot be transferred by selling them. This condition intends to ban the sale of shares to 'outsiders' because they may not share the same economic objectives. In the case of the Zanjeras it is permitted to bequeath the lands based on specific laws created to protect the sustainability of the system. While the farmers population grow, zanjeras tend to be divided in various shares. For instance, if the parents of four sons have a share, they expect to bequeath the land to their sons based on an even distribution. Hence, in the future it is going to be four individuals responsible of fulfilling an obligation that previously had only one individual responsible. Zanjeras, therefore, have created some

mechanisms to face this problem. One option is to appoint one of the new users of land responsible to oversee the others responsibilities. Another option is, before permitting further divisions of the lands, to make the prospective members pass through an approval process, where they must understand and accept their future obligations. Signing an agreement to backup their acceptance of the obligations will make new members know that if they fail they may be suspended or excluded from the zanjera, hence losing any right to the land.

Congruence Between Rules and Local Conditions.

This condition is especially important. Without it the adequate functioning of the system would not be sustainable in the long term. Indeed, thanks to the centuries in which the rules to manage the zanjeras have been tested and improved, today the system contains a set of rules that are highly efficient. This is something that the Philippines government failed to realize, creating a clash between its institutions and those institutions already in place. For instance when the government engineered and built the new system, the new canal networks did not conform to the previous distribution systems, thus destroying any farmers' previous organization. Efforts to organize new farmers' organizations based on a new distribution of water generally failed and the distribution of water failed as well. Operation and maintenance of the system did not work well either. Additionally, the government had to spend high sums of money policing the system and enforcing users compliance.

Before the governmental arrival to the area none of these problems were evident; they appeared along with the intervention of the government. The efficient functioning of

the system was based on the rules in place, which were adequate to the local environment. Water were allocated proportionally to the size of the land area cultivated, as is the size of the input of labor and material that each user must contribute to the operation and maintenance of the system. The level of compliance was based not only in the sense of fairness but also in the excellent method of monitoring it. The “guards” were not external agents but the same farmers with interests in making the system work. Among the mechanisms to select the guards is to give them portions of lands at the end of the system so they will be highly interested in making everyone use only the amount of water needed for their crops.

It is important for the rules to be congruent with the local conditions, that those individuals affected by the rules, be included in the process of modification and creation of them. That will generate a higher level of compliance because, rules developed by individuals directly interacting with the system, know what fits better to their needs and to the characteristics of the resource.

Monitoring, Penalties, and Conflict Resolutions

These conditions, which must be the result of the previous one in order to be effective, are rather clear in the zanjeras. As stated above monitoring and sanctioning activities must be undertaken not by external authorities but by the farmers in order to be effective. In the case of the Philippines irrigations systems, they give lands located at the tail of the system to the guards, hence they will be very interested in controlling an evenly distribution of water.

Since different zanjas may share a single diversion dam, social adaptations were necessary to settle conflicts between users. There must be a mechanism to resolve conflicts because in the long-term process of interacting with the environment, it is possible that participants have different interpretations of the rules, hence conflicts may arise. For instance the rule that states that the irrigators must send an individual to clean the system in certain periods of the year should be interpreted in a number of ways. “An individual” is not well defined and some could send a boy or other individual who is less helpful in the farm and evidently in the process of cleaning the system. “Cleaning the system” may be interpreted by some as only cleaning the portion next to their own farm. The cases of interpreting rules are therefore countless. The more rules in place the more opportunities to avoid them. Farmers are usually able to settle disputes by themselves. However, in resolving major conflicts, assistance may be required from external organizations such as the local police, government officials, and officials of irrigation agencies (De los Reyes, 1986).

Government Recognition of the Farmer's Rights to Organize

This condition has been crucial for the effectiveness of the zanjas. Before the intervention of the government, the farmers were organized in a de facto manner but were not recognized by the central government. Therefore any decision or action made by the group, could be threatened by any individual outside the group of farmers, which might result in the failure of the system. In order to avoid this, a two-way recognition and acceptance of the other party participation is important. On the one hand, local users should not devise their own institutions without considering the higher governing body,

because sooner or later the regime will fail. On the other hand, if the government does not recognize the rights of the participants to organize, there is a high probability that an enforcement fail. In this case study, the community organizers played a central role bridging the interests of the government with those of the farmers.

3.5. Implications and lessons

The case of the Philippines irrigation systems is one of the best examples of how local users can efficiently manage common pool resources. Besides the conditions needed for the irrigation system to be successful and avoid collective action problems, there are other lessons that can be derived from this case. First, it has to be said that participants who had a high sense of ownership contributed to building and later maintaining the irrigation system. In spite of the fact that the national law only recognized the farmers' *use* rights, this sense of ownership seems to have stimulated their willingness to invest in maintaining the system's functions. Hence, a higher level of recognition of rights such as ownership of the assets may be very useful too. However, governments have been much more willing to hand over the dirty work of canal cleaning, maintenance and operation of the system than to transfer ownership of assets and water rights.

A second lesson is the importance of the interrelationship that appeared in the process of constructing and maintaining the system. The farmers had evolved solutions to many irrigation problems over several decades. They developed many management methods well suited to the constraints of their particular system and the environment. For instance while planning and taking every single step for the construction of the irrigation systems, they were simultaneously constructing the skills to work as an organization,

resolving conflicts, assigning tasks, making group decisions, etc. These skills and others were of invaluable worth later when they had to devise solutions for the maintenance and operation stage. For instance, the leaders of the construction process later became the leaders that managed the operation of the system. This process should be understood by the government officials before deciding to implement new procedures where the local users have developed their own throughout the years, otherwise any project will not produce the expected results. It does not matter how innovative or new is the technology the external institutions plan to install; they first have to understand the way that the users of the resource interact. Doing so increases the possibilities of enhance the farmers practices for the benefit of the whole country.

During various years governments were advised to take over the common pool resources in order to be more effective in its management. However, due to the number of problems generated by the nationalization of the resources, governments should consider gradually devolving some rights to the local users. At what extent this devolution may be done depends on how well the resource match with the conditions described before. In the case study described in this chapter, the Philippines government decided to devolve use rights to the farmers. Keeping its ownership rights, the central government helped the farmers to create a legal framework that later was included as a national law and permitted the government to act as an enforcer of last resort. Governments also helped local systems by providing technical assistance on how to use technology, finance, administration, etc.

4. Conclusions and Policy Implications.

Common property resources (CPRs) can be an important source of livelihood for certain individuals within households, especially in developing countries. When governments attempt to control the CPRs to make a more efficient use of them, the local users previous practices with the resources are often forgotten. In fact, governments from developing countries are usually more concerned with a rapid economic growth rather than an individual level development. Such centralized policies have often resulted in poorly designed regulations, a lack of buy-in by user groups, low levels of compliance, and ineffective controls on exploitation. These problems have shown that government control is often ineffective in promoting the long-term sustainability of the CPRs. As a response to that, “[t]he past decade has witnessed a major policy trend of devolving control over natural resources from government agencies to user groups” (Meinzen-Dick & Anna Knox, , p. 41). The move towards *decentralization* of resource control provides opportunity for more efficient, equitable and sustainable resource use.

Among the benefits derived from addressing common property rights to natural resources, the following we found rather important. First, when local users have property rights to the resources, they have more incentive to perform a better management. Local users will be surer that they own the resources for a long period of time and consequently sound investment decisions and careful resources management will take place in expectation of a future benefit stream. Second, when the government transfers property rights to local users, it encourages the latter collaboration with the objectives of the government (e.g. the increase in rice production in Philippines). Third, local users tend to manage the natural resources better than the governments. The former can identify and

prioritize environmental problems better and their closeness with the resource makes them more able to enforce the rules. The latter, especially in developing countries, usually do not have enough financial resources to enforce the protection of the natural resources, and the priorities of some governments often tend to place economic objectives over environmental protection.

In sum, a number of experiences all over the world shown that when the CPRs are under a common property regime they have the potential to be better managed. However, not all the resources could be efficiently managed by the local users, it is also possible that the management of the resources under a common property regime lead the resource to depletion. We have seen that common property rights can have various factors that may deplete the resources. The most influential factors are that people do not have social capital, users are very heterogeneous, users not always live in harmony with the natural resources, and rights of use are not well defined, among others.

Therefore, unless some conditions were meet the potential common property rights to achieve benefits could be threatened. Thus, the first condition required for a common property regime to function is to have a clear delimitation of boundaries and users. Second, when the local users are given rights to the resources, those rights should imply not to sell the resources to outsiders, unless the latter agree to follow the same rules as the rest of the local users. Third, for the rules of managing the resource to function, rules have to be congruent with the local conditions. Fourth, the local users should do the monitoring and penalties activities. As was seen in chapter 2 that there are various ways the local users can perform this activity. Finally, one of the most important conditions is the government recognition of the local user's rights to organize. It implies that a

common property regime alone is not enough to guarantee the sustainable use of resources. There are cases such as the Philippines irrigation system where the government had a stake in it, so they worked along with the farmers.

Unfortunately to those segments of the population totally dependent upon CPRs, many times the government does not have an interest in protecting or recognizing their rights. Therefore, if the state holds common property regimes in low esteem, external users with no interest in protecting the CPR will be motivated to gain, and eventually deplete, its services.

In conclusion, when the natural resources meet the conditions detailed in this paper, the government should recognize the crucial role of the local users. Doing so, the country as a whole can gain in the long term. First, an efficient protection and sustainable use of their natural resources is more likely to take place. Second, there are more possibilities of maintaining the productivity of the natural resources in the long run, and thus more chances to respond to the demand of certain products derived from the nature. Third, since the people that depend on CPRs in developing countries are usually poor people, encouraging common property regimes is a way to contribute to decrease the country's poverty.

Finally, as it was seen in the case study, the best way to manage the resource should be through a combination between state property rights and community property rights. Both the state and the community have a lot of benefits that could be blended for a successful management of the natural resources. In fact, as Berkes (1989) argues that there are few resources that can be managed by one of the types described in this paper

(i.e. open access, state property, private property and common property). In fact, most of the resources fall in a combination of these types.

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