Description and analysis of Institutions for Communal Forest Management in Monte Verde, Bolivia.

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Abbreviations

| FL: Forest Law | NGO: Non-government Organisation |
| INRA: National Institute of Agrarian Reform | TCO: Traditional Communal Land |
| LL: Land Law | CICC: Organisation of Indigenous Communities of Concepcion |
| BC: Bolivian Constitution | APCOB: Support for Peasant-indigenous People from the Tropical Lowlands |
| MP: Management Plan | WWF: World Wildlife Fund |
| GPS: Global Positioning System | FSC: Forest Stewardship Council |
| CIFOR: Center for International Forest Research | UN: United Nations |
| SNV: Netherlands Development Organisation | CFM: Communal Forest Management |
| FAO: The Food and Agriculture Organisation of the United Nations | CPR: Common Pool Resources |
| OICH: Indigenous Chiquitano Organisation | |
Abstract

This study contributes to the Common Pool Resources debate by describing and analysing institutions that currently structure governance of community-based forest management in Santa Mónica and Palestina, within the Monte Verde region, Bolivia. It explores the interplay between innovative communal and central-authority institutional features, the way they work and how they enable forest conservation. The method is narratology and analysis of institutions and documents produced by this governance system through the lens of Elinor Ostrom’s institutional framework for the ‘alternative solution’ to the commons problem. The results reveal that local communal rules and central-authority rules are complementary rather than competitive. The local communities and the central-authority share power to devise and enforce institutions for communal forest management, which enable the local communities to exclude external actors, known as ‘timber pirates’, who illegally harvest timber in this region. The central-authority establishes guidelines that are sensitive to local cultural contexts. Local governance develops rules conforming to these guidelines. The main reasons behind successful forest conservation in Monte Verde lie on the fact that a healthy forest is in the interest of local communities due to its contribution to economic development. Ecosystem services such as traditional forest produce, profits from timber sales and related employment are vital contributors to the local economy. Governmental institutions and international conservation principles support this local interest and, therefore, this collaborative relation is successful. This case study also explores an innovative approach for dealing with the problem of free-riding. Collective appropriation of timber products by local communities prevents internal individual appropriation race and enables them to make a more effective monitoring over unauthorised forest users.

1. Introduction

During the last decades forest conservation appears to have gained some attention since numerous studies have demonstrated the importance of these ecosystems for human well being locally and for absorbing CO2 (MA, 2005). Recently, climate change has been argued to challenge natural thresholds or planetary boundaries of the Earth system (Rockström et. al., 2009). CO2 concentration in the atmosphere has already reached 387 ppm, well over the 350 ppm considered to be within the safe boundary of greenhouse gas
concentration (Ibid). Nave and colleagues (2009) claim that today approximately half of the total amount of the terrestrial CO2 is stored by forest soil. They add that this is fundamental in relation to global CO2 cycle, since it lowers global temperatures through CO2 sequestration. Simultaneously, forest ecosystems provide a variety of other services that are important for human life globally (e.g. soil formation, wood and fiber, flood regulation, recreational and others). At a community level, forest may provide wild food, fuelwood, fodder, medicinal plants, timber and other services (MA, 2005). Studies on natural resource management by indigenous people show that forest is not only part of cultural values but also it is conceived as an important economic source for survival that has to be respected (Begossi, 2002).

Rodger in a recent publication by FAO (2009) reveals that forest loss today is a global phenomenon that continues a steady trend year after year. Forest biodiversity loss is caused by deforestation and degradation. Deforestation refers to complete clearing of forest cover in a specific area while degradation refers to loss of biodiversity components. Global estimates of forest loss are currently around 0.5% to 1.0% per year. Moreover, it is likely that 2-8% of currently recognised species will become extinct by 2015. The main reasons for forest loss are burning/clearing for cultivation (63%), felling for firewood (8%) and commercial exploitation of timber (6%). Despite the fact that most nations have adopted conservation policies, forest cover continues to shrink. Martinez (2002) argues that until 1996 in Bolivia regulations supported extensive forest exploitation. The argument of the authorities was that this policy would develop the timber industry more rapidly. Consequently, between 1992 and 1996, 1.7 million ha of forest cover were lost. However, since 1996 this sort of policy was replaced by institutions orientated towards conservation (Cronkleton and Albornoz, 2005). Today, systems such as natural reserves, municipal forest areas and forest concessions to local groups are being implemented throughout the country. Nonetheless, these systems in many cases did not stop illegal forest exploitation in areas poorly monitored or not monitored at all by the government. In Monte Verde this activity is known as ‘timber piracy’ and it is one of the main causes of forest degradation (Martinelli, 2002). The most common system of concession is known as communal forest management (CFM) (de Jong, Ruiz and Becker, 2005). This study describes how communities have been able to preserve forest ecosystems by means of co-management in Monte Verde, Eastern Bolivia. Specifically, it explores institutional arrangements for CFM since they have never been scientifically described before.
Institutions are human devised constraints that structure human interaction. They ‘forbid, allow or permit people to do something’ (Ostrom, 1990). Formal institutions are rules, laws and constitutions; while informal institutions are norms, behaviour, conventional and self-imposed codes of conduct. Rule enforcement characteristics also constitute part of social institutions (North, 1993).

Management of large natural or man-made resource systems known as common Pool Resource (CPR) according to Ostrom (1990), Berkes, Folke and Colding (1998), Hanna, Folke and Mäler (1996), Baland and Platteau (1996), Berkes (1989) and other authors, necessarily needs different approaches. No single management prescription can be suitable to solve all problems related to resource overuse and environmental degradation (Ostrom, Janssen, M. A., and Anderies, 2007). Management systems, as property rights regimes, necessarily should be designed to fit the appropriator’s attributes and geographic and ecological conditions of the field-settings where they are to be applied (Ostrom, 1990 and Hanna, Folke and Mäler, 1996). Consequently, a variety of them may be found in different field-settings (Berkes, 1989 and Ostrom, 1990). These locally evolved constrains and the worldviews and ethics altogether constitute the cultural capital of a given society (Berkes, Folke and Colding, 1998). Ostrom (1990) adds that developing the right institutions requires reliable information about time and place variables as well as an array of culturally acceptable rules. Hence, optimal CPR management systems require an emphasis on institutions and property rights (Agrawal and Ostrom, 2001 and Berkes, Folke, and Colding, 1998).

The local-orientated or locally adapted approach for CPR differs considerably from current models and practices. In this study the main focus is the resource user rather than resource system itself (Berkes, Folke and Colding, 1998). The appropriator inevitably weights costs and benefits and tend to prioritise immediate benefits (Ostrom, 1990). Therefore, forest conservation systems must also address local socio-economic problems (WWF, 2009). The economic precariousness of Caicaras and Caboclos people in the Amazons constitute good examples regarding living conditions in these areas (Berkes, Folke and Colding, 1998). Social-ecological resilience is necessarily built both on strong natural and cultural capital (Hanna, Folke and Mäler, 1996). Therefore, local involvement on ecosystem management is of crucial importance not only for empowerment of

1 http://www.panda.org/who_we_are/wwf_offices/bolivia/our_work/forest_program/
appropriators (Agrawal and Ostrom, 2001) but also for keeping ecological resilience and hence a sustained flow of forest ecosystem services (Walker and Salt, 2006).

As demonstrated by Janis and colleagues (1998), CFM constitutes one way of preserving forest ecosystems (See Theoretical background in chapter 2). Indigenous communities in Mexico, Peru, Brazil, Ecuador, Guatemala and other countries have been using CFM for several years and it is believed that it has contributed positively to forest conservation (Caycedo, 2005 and McIntosh and Renard, 2010). Coincidently the MA (2005) recommends policies in relation to empowerment of local communities for sustainable use of forest (see relevant literature on the CFM in chapter 2).

WWF (2009)\(^2\) claims that Bolivia is among the countries with the largest forest cover area under CFM in the world. Here CFM is understood as a system based locally and managed collectively (Pacheco, 2005). It has mechanisms that deliberately seek to involve all members of the community making them participate in the responsibilities and benefits (Sajise, 1995). The first CFM project approved was in 1998. Until 2002 the total extension had reached 540402 ha. and more recently, in 2005, Caycedo estimates that this figure increased to 1.5 million ha, approximately 2.8% of the total forested area in Bolivia. Most of the CFM receives support from NGOs, international co-operation agencies and private timber companies. However, these organisations play only a supportive role (See CFM in Santa Mónica and Palestina, chapter 3). Management power is shared between the central-government and local communities. The former produces and enforces institutions that establish guidelines on ecological conservation and poverty alleviation applicable nationwide and the latter based on these guidelines and their own attributes, devise their own institutions. Hence, community and central-authority have power to design and enforce rules within their own scope (See chapter 5).

1.1. Aim of the thesis

The aims of the study is to describe and analyse institutions developed at communal and national level which currently structure governance of CFM in Santa Mónica and Palestina, Santa Cruz Department. The study is focused particularly on these two cases from this region given that these communities are the most experienced on CFM. The

\(^2\) http://www.panda.org/who_we_are/wwf_offices/bolivia/about/
method for understanding the foundation of this institutional system consists in comparing it with Elinor Ostrom’s institutional framework for the ‘alternative solution’ (Ostrom 1990).

1.2. Research questions

1. What are the institutions for collective forest governance in Monte Verde?
2. How do they work in relation to Elinor Ostrom’s framework for the ‘alternative solution’ for governing the commons?
3. In what way does this governance system conserve forest ecosystems in Monte Verde?

1.3. Thesis structure

The structure of this study has been organised in 7 chapters. The theoretical framework, chapter 2, synthesised relevant literature on the subject. It gives an overview on the ‘prominent models’ which describe the problem of the commons (e.g. the tragedy of the commons) as also the solution proposed by scholars (centralisation and privatisation). Then the most important features of the local-orientated approach for CPR management are highlighted. Chapter 3 describes the study area. The method followed for conducting this research can be found in chapter 4. The results section, chapter 5, contains a review of the institutions for CFM in Santa Mónica and Palestina and a comparison of these rules with the framework for the ‘alternative solution’ to the commons proposed by Elinor Ostrom. Chapter 6, the discussion, analyses the implications of similarities and differences of these two systems for forest conservation. Finally, chapter 7 draws some conclusions based on the results of this research.

1.4. Contribution of the study

Scholars in Latin America and particularly in Bolivia have paid little attention to the study of institutions for CFM. Co-operation agencies and NGOs usually finance research projects and apparently they have influence on the research agenda. In Monte Verde studies were focused mostly on history and traditional culture. This primary concern seems to overshadow academic interest on the dynamic character of this culture. Communities in Monte Verde are in almost permanent contact with outsiders. This makes them even more exposed to change than other indigenous cultures. In relation to CFM,
studies focus their attention mainly on measuring the impacts of this activity in an economic and social sense. Apparently, CFM is perceived as an activity that must yield short-term impacts in terms of poverty alleviation.

Research is almost completely focused on general features of CFM in Monte Verde. Some institutions at national level are frequently cited and discussed as part of general studies on forest management; however, there are no studies specifically on institutions for CFM. Some reports criticise some apparently ambiguous and bureaucratic rules by the Forest Law; nevertheless, research on governing institutions has been almost completely neglected. This thesis encourages researchers to study further CFM in Bolivia in order to increase understanding of how to preserve forest in this region. Since national institutions are applicable nationwide, studies should focus on the adaptation of communal institutions to national guidelines and how they work in reality. These institutions might show significant differences from one community to another given that they are based on local attributes.

1.5. Limitations of the study

This is an interpretative research and therefore that may be its greatest limitation. This sort of research method relies on the skills, competence and rigour of the researcher when collecting and interpreting data (Patton, 2002). It is likely that my views had some influence in the analysis. Moreover, it is worthwhile remembering that some secondary data was collected by NGOs that may have organisational interests (Smartwood and APCOB). I personally participated in the evaluative audit conducted in Santa Mónica.

2. Theoretical framework

2.1. Relevant literature on the CFM

2.1.1. Initiation and objectives of CFM

The Food and Agriculture Organisation of the United Nations (FAO) in partnership with international co-operation agencies started to promote CFM in 1970. The energy crisis and alarming rate of forest degradation in some countries motivated this initiative (Pragtong and Akaha, 1990). It was conceived as a poverty-relief alternative for deprived
communities in the countryside; a means for ‘helping the poor to build their own
development’. On the one hand, this activity would be focused on satisfying local needs
(e.g. charcoal, medicinal plants) and/or to commercialisation (e.g. timber, crafts), on the
other. Communities themselves would manage these ventures collectively and governance
systems would be based on their own culture. Human communities traditionally were
somehow related to forest ecosystems and CFM was supposed to reinforce this relation
(FAO, 1978). Thus, numerous meetings were held at country and regional level to discuss
the extent of CFM. The 8th Forestry Congress named ‘Forest for the people’ in Jakarta,
Indonesia, in 1978, found clearer roles for community forestry. Hence, organisations such
as the World Bank started financing CFM projects (Pragtong and Akaha, 1990).

Apart from economic gain, CFM may pursue political, social, cultural and environmental
objectives (Berkes and Davidson-Hund, 2010 and Agrawal and Ostrom, 2001). In San
Juan (Mexico), for example, CFM supported prevention of illegal timber exploitation and
private land appropriation (Quintero and Davidson-hund, 2010). Local empowerment and
control of contested lands as social and cultural objectives may be reached through
ventures led by local groups. These variants make this sort of undertaking different in
relation to mainstream business (Berkes and Davidson-Hund, 2010).

2.1.2. CFM in Latin America

Studies on CFM and particularly on governing institutions are few and far between in
Latin America (Berkes and Davidson-Hunt, 2007). The debate is focused mainly on ways
for improving impacts in terms of economic benefits for appropriator communities
representatives from different Amazonian countries agree that CFM is a collective choice
which pretends to improve well-being among appropriator communities and conserve
forest ecosystems. Sustainability is understood as a fundamental constituent of CFM. It
refers to ecological conservation, social equality and respect/recovering of traditional
knowledge and finally sustainability in an economic sense (economically beneficial).
CFM is basically a joint venture led by communal organisations that pursue a variety of
benefits that contribute to poverty alleviation (see table 1).

<table>
<thead>
<tr>
<th>General characteristics</th>
<th>Objectives of CFM</th>
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Table 1. General characteristics and objectives of CFM in Latin America
1. It is a system managed by indigenous, settlers and peasant groups.
2. The property, usufruct or customary rights are collective.
3. Management objectives are common/collective.
4. The managers of CFM are communal organisations.

| 1. Basic subsistence (e.g. conservation of hunting and fishing sites) |
| 2. Commercialisation of timber |
| 3. Generation of employment |
| 4. Ecotourism |
| 5. Conservation of biodiversity |
| 6. Conservation of sites spiritually valuable. |

**Source.** Based on Caycedo (2005)

Caycedo (2005) adds that currently CFM faces a number of problems that are found in most Latin American countries. Legislation problems are related to insufficient central-authority support for consolidation of land tenure in favour of indigenous communities. This usually provokes failure to sanction illegal timber exploitation. Another problem is associated to suboptimal forest stewardship and administrative capacity. Appropriator communities are not sufficiently trained in these fields. Similarly, they face commercialisation difficulties due to unsuccessful integration to the timber production market chain. Competition by illegal timber exploiters makes matters even worse. Moreover, financial (e.g. for field operations) difficulties make appropriators dependent on support from third parties (e.g. NGOs and co-operation agencies) given that this activity is considerably costly.

Legal frameworks for CFM vary from one country to another given that national legislations are relatively different. In some countries communities are the owners of the areas under management (e.g. Peru and Bolivia), while in others the State owns it (e.g. Brazil, Ecuador and Guatemala). In the last case, usually communities living close by forest cover areas are entitled to apply for concessions for limited period of time. Equally, manager organisations can be communal organisations, co-operatives, associations or corporations. In Brazil, Bolivia, Guatemala and Peru the managers are usually individual and associations of communal organisations, while in Ecuador and Mexico they can also be families and corporations, respectively.

### 2.1.3. CFM in Mexico

Mexico was the first country in Latin America that promoted CFM. In 1970 reforms to the legal system enabled indigenous communities to claim property rights over forest cover areas and create timber ventures (Barsimantov, Racelis, Barnes and DiGiano,
2010). Today 45% of the total forest under management in the whole country belongs to indigenous organisations. Certified forest managed by these communities represents 9% of the total in Mexico. Today, CFM shows a considerable variety of timber commercialisation systems. Here, groups that sell standing trees to manufactured products can be found. Caycedo emphasises that Mexican communities not only received support from the State but also from other civil organisations. In the past the State promoted CFM and certification buying timber from communities. The main lessons to be drawn from this experience are that CFM has made appropriators relatively better off and forest ecosystems have been conserved. Nowadays, the challenge is to match traditional ways of forest management with new business-orientated practices. This approach intents to make CFM economically more attractive.

Orosco and Davinson-Hund (2010) report that in San Juan, one of the oldest CFM ventures in Mexico, institutions at higher level were adapted to local structures. Francisco Ruiz, a community representative, in a interview says ‘(w)e had a structural model that was small but very effective, and in that same way we presented it to the government, trying to explain all detail and under the parameters established by law, but adapting legal frames to our local institutional structures (...)’ Rules were developed for creating the Communal Council which is the decision making body regarding forest management matters. Each neighbourhood has a representative in this organisation which makes it accountable to the whole community. The community altogether do not make decisions directly. They receive an annual report from the Communal Council and then ensure that the enterprise fulfils its mission. The Communal Assembly Board still is the official political representative of the community; however it does not intervene in CFM matters.

2.2. Theoretical background

2.2.1. The problem of the commons

The debate over CPR governance continues without a model applicable to all settings and situations. Ostrom (1990) claims that ‘(w)e do not yet have the necessary intellectual tools or models to understand the array of problems’. She argues that current models are applicable to some settings and not to others. Models such as the tragedy of the commons, the prisoner’s dilemma game and the logic of collective action would be useful to explain some but not all important features of natural resource user’s behaviour (see the
influential models, below). The constrains assumed by these metaphorical models would be dangerous for policy making, given that reality is more complex. Thus, further work would be needed to find a consistent and helpful foundation for policy analysis. Hanna and colleagues (1996) argue that ‘a frequent representation of human behaviour towards nature is that of individual shortsightedness and greed’. However, human behaviour would also be capable of taking a collective-centered perspective. She says that ‘society needs to maintain the productivity of the natural environment, and this collective goal may lead to coordinated long-term actions which place social necessity above individual desires’. This theoretical deficiency motivated Ostrom to study numerous successful and unsuccessful CPR governance systems in different parts of the world. The outcome of these studies provides illustrations for the development of a new theoretical approach for CPR governance. An alternative approach based on a better understanding of the appropriator’s capabilities and limitations (see the alternative solution, below).

The ‘influential models’

The tragedy of the commons model was developed by Garrett Hardin in 1968 and holds the thesis that the deterioration of the environment should be expected wherever many individuals use a scarce resource in common. Perhaps Hardin’s own words in his article express better the foundation of this model: ‘Each man is locked into a system that compels him to increase his herd without limit – in a world that is limited. Ruin is the destination towards which all men rush, each pursuing his own best interest (…)’. It is famous the metaphor that Hardin uses to explain the logic of action that a CPR appropriator uses in pursuit of his own objectives. A pasture open to all is the scenario where the tragedy of the commons happens. The pasture has a limited capacity of feeding animals; however herdsmen can only maximise their gain by adding more animals. One more animal means more profits for the owner (+1); however the deterioration cost of the pasture (-1) is shared by all herdsmen. Thus overgrazing caused by that extra animal is covered only partly by the owner. This is a conscious or unconscious individual rational that lead to CPR deterioration.

The prisoner’s dilemma game is closely related to Hardin’s model. Ostrom (1990) explains this game over an imaginary scenario of two herdsmen sharing the use of a meadow. This meadow can feed only a limited number of animals per season (L). A ‘cooperative strategy’ (1) consists in allocating L/2 animals per herder; while the ‘defect strategy’ (2) is for each herder to graze as many animals as they like. Given that both herdsmen limit their animals to L/2 they obtain 10 units of profit each. However, if they choose the defect strategy they both obtain 0 profits. In the case that one herder chooses a cooperative strategy (L2) and the other a defect strategy, the first obtains 9 units of profits (-1) while the second obtains 11 units (+1). If both herdsmen don’t base their decisions on a binding contract, it is likely that both will choose the defect strategy and therefore will obtain 0 profits. Being this a non-cooperative game, without communication, each player has a ‘dominant strategy’ (2) which is the one that yields more profits therefore both overgraze the meadow. Hence, none of the two has an incentive to cooperate independently of the other’s decision. Ostrom finally says that the usefulness of this game is to demonstrate how ‘individual rational strategies lead to collectively irrational outcomes’.

The logic of collective action model was developed by Marcus Olson in 1965 and it also reflects the difficulty of driving appropriators to pursue collective welfare. This view agues against the group theory. It claims that only if the individuals have a common interest or object and all of them would be benefited by the achievement of that objective, then they would co-operate to achieve that common objective. Hence, the group becomes only a means to achieve individual objective (1965). Moreover, variables related to the size of the group and individual motivation would also produce co-operative or non-cooperative behaviour. In regards to this Olson (1965) states that ‘unless the number of individuals is quite small, or unless there is coercion or some other special device to make individuals act in their common interest, rational, self-
interested individuals will not act to achieve their common or group interests’. Olson conditions co-
operative behaviour to visibility of individuals among the group and/or coercive measures. Voluntary co-
operation is seen as a non-realistic alternative.

2.2.2. Centralisation and privatisation as solutions to the commons problem

The three ‘influential models’ described above show relatively similar problems and the solutions proposed by policy-scientist refer to two alternatives: centralisation and privatisation. The common problem identified by these models is free-riding or individualistic rational (Ostrom, 1990). As the models describe, an individual would be too busy thinking about his/her own good to think about others. Ophuls (1973) propose to rely on central governments for dealing with free-riding behaviour. If co-operative behaviour is not an option a coercive force will be needed to compel individuals to act towards collective objectives. “Iron governments’, perhaps military governments, would be necessary to achieve control over ecological problems’ (Heilbroner, 1974). Other authors (Welsh, Demsetz, Smith, Sinn, etc.) claim that privatisation would be an optimal solution to the commons problem. Smith (1981) cannot be clearer when he says that ‘the only way to avoid the tragedy of the commons in natural resources and wildlife is to end the common-property system by creating a system of private property rights’. In other words, that meadow that once was everyone’s or no one’s property would now become one or many private properties which will be tightly controlled by the owners and therefore overgrazing will be avoided. On balance, both centralisation and privatisation recognise that appropriators alone are unable to manage optimally their resource systems.

2.2.3. The local-orientated or bottom-up approach as an alternative solution

The local-orientated approach claims that a variety of institutional arrangements are needed to tackle the commons problem (Ostrom, 1990; Agrawal and Ostrom, 2001). One of the main supporters of this approach is the resilience theory. Social resilience is conceptualised as the ‘ability of human communities to withstand shocks to their social infrastructure’ (Adger, 2000). That ability to deal with unwelcome events is supposed to constitute the key factor for finding optimal solutions for problems such as the commons. Studies by Berkes, Folke and Colding (1998); Walker and Salt (2006); Hanna, Folke, and Mäler, (1996); Dietz (1990) and other scholars similarly support local initiatives for natural resource management. Pomeroy (1994), Ostrom (1990) and Agrawal and Ostrom (2001) claim that communities may manage common resources through completely self-
regulated systems or through co-management arrangements in which users share authority with governments. This view is illustrated by numerous successful and unsuccessful cases by the authors mentioned above.

Ostrom (1990) and Agrawal and Ostrom (2001) agree with the solutions and challenge policy scientist to conceptualise CPR users as part of the solution rather than the problem. Theories of human organising should be ‘based on realistic assessment of human capabilities and limitations in dealing with a variety of situations that initially share some or all aspects of a tragedy of the commons’ (Ostrom, 1990). In other words, CPR governance systems can be as different as every field-setting and situation is. A single formula can not be applied to all cases. She argues that developing ‘the right institutions’ requires reliable time/place information and an understanding of local attributes. Hence, governing institutions should conform to the field-setting’s natural and human characteristics where they are to be applied. Conversely, central-authorities would be in a weak position or at least would need considerable time and economic resources to understand accurately these variables (Ostrom, 1990, and Agrawal and Ostrom, 2001). Ostrom (1990) illustrates this view describing how nationalisation of forest in some developing countries, where there was a limited-access common-property resource before, resulted in open access systems.

2.3. Definition of relevant terms

2.3.1. Natural resource management

Elinor Ostrom provides valuable definitions concerning CPR governance. Common pool resource is defined as ‘a natural or man-made resource system that is sufficiently large as to make it costly to exclude potential beneficiaries from obtaining benefits from its use’ (1990). Resource systems are stocks variables capable, under favorable conditions, ‘of producing a maximum quantity of a flow variable without harming the stock or the resource system itself’ (1990). Examples of resource systems are grazing areas, lakes, bridges, etc. Those flows or yields from resource systems are known as Resource units which are what individuals appropriate or use (e.g. cubic feet of wood harvested) (1990). This process of withdrawing resource units is known as Appropriation. Those people who withdraw resource units from a resource system are called Appropriators (e.g. timber harvesters). Failure to contribute to the provision of the resource system will be
understood as free-riding behaviour (e.g. harvesting timber individually in a collective CFM system). In a forest system the resource system is the forest itself. The resource units are the cubic feet of timber withdrawn from the system and the appropriator is the group of individuals who form part of the manager community.

### 2.3.2. Communal Forest Management

Pacheco (2005) defines Communal Forest Management (CFM) as a system based locally and managed collectively. The community constitutes a group of people that live in an area neighbored by forest cover fields legally belonging to this community. The management is to be conducted in a way that seeks deliberately to involve all members of the community making them participate in the responsibilities and benefits. This is an opportunity and/or responsibility for communities to manage their own resources, define their needs, goals and aspirations and make decisions affecting their own well-being (Sajise, 1995).

The land that belongs to a certain group of people is to be understood as common property. Through this system rights are assigned to a given group of people (Hanna, Folke and Mäler, 1996). Communal lands are usually common properties therefore local people are entitled to withdraw resources from forests, rivers and other resource systems found within them. Nonetheless, common property is not only about rights for using a given resource system but also about obligations. Usually the central-authority (e.g. the State) is the right’s assigner and the one who defines duties and responsibilities to be performed by the beneficiaries (Berkes, Folke and Colding, 1998). For instance, common property rights may be conferred to a community under the express condition that all natural resources within it are conserved.

Social interaction for ecosystem management is regulated by specific institutions. These are human devised constraints that structure human interaction. Formal institutions consist of rules, laws and constitutions; while informal institutions are norms, behaviour, conventional and self-imposed codes of conduct. Rule enforcement characteristics also constitute part of social institutions (North 1993). Thus, institutions may define the amount of trees that can be logged from a given forest cover area under sustainable criteria. It is also important to clarify traditional ecological knowledge. Berkes and colleagues (1998) define it as a cumulative body of cultural knowledge and beliefs with
regards to the relationship of humans and other living beings with one another and with their environment. Traditional refers to the historical and cultural continuity of these elements. Shamanic knowledge in relation to medicinal plants can be a typical example of traditional ecological knowledge.

3. Description of the case study

3.1. Case study area

The Indigenous Chiquitano Organisation, OICH, (2003) reports that Chiquitano people arose from a biological and cultural mixing of different ethnic groups. Previous to the Spanish colonisation, about fifty tribes inhabited today’s Eastern lands of Santa Cruz department (See figures 1 and 2). In 1557 the Spanish immigrated to the region to exploit natural resources using local workforce. From 1692, the locals where settled by Jesuit missioners in ten mission towns. Under this regime, Chiquitano people not only learned about Christianity but also about new economic activities such as natural resources management at large scale. Local rulers did not have any power over this region because it was directly under the King’s authority. In 1767 the Jesuit missions were dissolved and non-indigenous people settled in these towns. Thus, some Chiquitano people moved to small villages.

Santa Mónica and Palestina were founded by migrants mainly from the Mission of Concepción, today’s capital of the Ñuflo de Chávez province. Santa Mónica is located 30 km Northeast of Concepción and Palestina 60 km North. Both communities are located within the Monte Verde region (See figure 2) (OICH, 2003). In 2007 Monte Verde was officially recognised as Indigenous Territory or TCO (Tierra Comunitaria de Origen). This legal mechanism recognises collective rights over the land and renewable resources in favour of the local communities (APCOB, 2008).
APCOB (2008) claims that today’s Chiquitano culture contains elements of old and new times. Old elements of paganism and new ones from Christianity are constituents of Chiquitano’s culture. For example, today the expression Jichi is still used to refer to the owner or god of some elements of nature. Water, forest or mountains have their own owner. Humans must respect them and ask for permission before extracting something from their domains and then thank them for their generosity. The ‘owner’ of the forest generally would take the shape of an enormous snake and would live in specific places.

APCOB (2008) adds that Palestina and Santa Mónica base their economy on different activities and show similar organisational features. Fruit collection, hunting and fishing continue to be important; as also are agriculture, animal farming and wage labour. On the other hand, organisational structures are similar in both communities. Although the Communal Assembly take the decisions, they have a Communal Board and secretariats for education, development projects, mother’s centre and a township that represents the central government. Each secretariat deals with matters related to its corresponding field. The Catholic Church is represented by a group of religious leaders (see figure 6).

The Chiquitano region belongs to the sub-tropical lowlands which most of the year has warm and humid conditions. The annual average temperature varies between 23 y 24°C and humidity between 1080 and 1115 mm (APCOB, 2008). The OICH (2003) claims that
topographically Monte Verde is part of the Escudo Precámbrico Chiquitano, a region, that to the East, reaches the Brazilian borders. Here, forest covers undulated and flat lands interrupted by gentle mountains and outcrops. There are two rivers and numerous streams which feed the main rivers. Frequently communities are located on riversides because they are the main sources of water and fish. Palestina lies by the Black river (Rio Negro) (APCOB, 2008) and Santa Mónica by the Zapocó river (Arrien and Salazar, 2004).

According to the OICH (2003) the Chiquitano region has a significant variety of ecosystems rich in biodiversity. The locals use mainly animal species such as fish, mammals, birds and reptiles. In total the inhabitants claim to know 191 species. The majority of them are used as part of their diet. With regard to flora, the communities use around 137 species for building houses, making decorative objects, fuel, medicine, crafting furniture and others contribute to the population’s diet. On balance, the inhabitants of Santa Mónica and Palestina have a good knowledge of flora and fauna especially regarding to those species that they use in their everyday life.

3.2. CFM in Bolivia

Cronkleton and Albornoz (2005) report that CFM in Bolivia was crucially boosted by the Land and Forest laws approved in 1996. The land law creates indigenous rights to access TCO and natural resources management. Hence, some communities prevented external appropriation of their land through CFM. It also proved that they were using the land over which rights were being claimed. With the approval of the Forest law, the timber production monopoly, controlled by 173 timber companies in whole lowlands, came to an end. This sorted out the players and referees of the timber production game establishing guidelines for sustainable forest management. Indigenous communities, until then excluded from this activity, became able to apply for CFM permits.

The above authors identify three different governance systems for CFM in Bolivia. In the first case, communities control field operations, timber processing and commercialisation, while in the second, they control field operations. However, they hire private companies for activities that require heavy machinery and specialised forest stewardship knowledge (e.g. timber transport and forest mapping). Finally, communities may confer management rights to private companies which exclude direct communal involvement. They only
receive a share of the revenues from timber sales. Currently these CFM systems are being used in La Paz, Pando, Beni and Santa Cruz departments.

Caycedo (2005) forecasts that CFM will continue to expand in Bolivia regardless of financial and forest stewardship deficiencies. The first CFMs officially approved were within the Lomerio and Yuracaré regions in 1998. Until 2002 the total extension of CFM had reached 540402 ha. and in 2005 this figure increased to approximately 1.5 million ha. However, communities generally lack knowledge on forest stewardship and financial resources for meeting the requirements stipulated by the Forest Law. Hence, most of the CFM receives support from NGOs and co-operation agencies. The rest exchanges lower timber prices for support from private timber companies. As we shall see below, CFM in Monte Verde faces similar challenges.

3.3. CFM in Santa Mónica and Palestina, Monte Verde

Santa Mónica and Palestina are among the first communities in the Monte Verde region which created CFM ventures (see figure 3 and 4) supported by Apoyo Para el Campesino-indígena del Oriente Boliviano, APCOB. This NGO (2008) reports that studies found that communal lands had great potential for this activity. The locals aimed to find mechanisms for forest conservation and economic development. CFM seemed to serve both purposes. Income from timber sales and employment would reduce poverty and forests would be conserved through prevention of unsustainable exploitation or ‘timber piracy’ as this is locally known. Besides, this would effectively support Chiquitano land claims before the State.
Nowadays, Santa Mónica and Palestina have one of the richest experiences on CFM in Monte Verde. Institutional arrangements that govern CFM at communal level are almost the same in both communities given that social and ecological characteristics are similar. The Santa Mónica venture has been operating since 1997 (Arrien and Salazar, 2004), while Palestina since 2000 (APCOB, 2009). They were promoted by the regional indigenous organisation CICC (Central Indígena de Comunidades de Concepción) with technical and financial support from the NGO APCOB.

Table 2. CFM in Santa Mónica and Palestina in figures

Note. CFM areas were divided into timber harvesting and ecological conservation areas. This may contribute to the regeneration and reproduction of species. Again the harvesting areas were sub-divided into smaller areas known as Annual Areas for harvesting. Only one of them is picked to be thinned every year.

<table>
<thead>
<tr>
<th>Community</th>
<th>appropriators</th>
<th>Managed, ha.</th>
<th>Harvestable, ha.</th>
<th>thinning cycle, yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. Mónica</td>
<td>269</td>
<td>5389</td>
<td>5032 (93%)</td>
<td>30</td>
</tr>
<tr>
<td>Palestina</td>
<td>114</td>
<td>4000</td>
<td>3921 (98%)</td>
<td>20</td>
</tr>
</tbody>
</table>

Based on APCOB, 2009

This thesis describes and analyses those institutions that govern CFM in Santa Mónica and Palestina (see table 2). It explores the interplay between communal and national rules for forest management. Complex issues such as rule-devising, enforcement and monitoring are thoroughly scrutinised. CFM is not a new system, however; Monte Verde shows some innovative variants which may only be applicable in Monte Verde given that they conform to local attributes. This is one more illustration that supports the theory that
no single management prescription can solve all problems related to resource overuse and environmental degradation (Ostrom, Janssen, M. A., and Anderies, 2007).

4. Methodology

4.1. Epistemological background

This thesis takes a pragmatic approach in regards to epistemological background and methodology. Since the aim is to find qualitative answers, it was suitable to choose a qualitative background. Exploring institutions for CFM requires description and analysis instead of numerical generalisations. As Patton (2002) claims, this approach has no constrains in relation to predetermined categories of analysis. This contributes positively to openness when studying a given subject. The study was limited to Santa Mónica and Palestina therefore the findings shall not be generalised. These methods produce detailed information on small groups which increases the depth of understanding (Patton, 2002).

The data collection method was narratology or narrative analysis. This qualitative method was introduced as a scientific tool by Todorov in 1969 (Riessman, 1993). With its emphasis on interpretation and context, this approach informs narrative studies similarly to interpretivist social science, literary nonfiction, and literary criticism. The essential value of stories and narratives is that they highlight cultural and social meanings of study objects. This method was influenced by the phenomenology that focuses on understanding lived experience and perceptions of experience (Patton, 2002).

4.2. The research process

As I was unable to visit Santa Mónica and Palestina due to financial reasons, the data recollection method was narratology. Firstly, I conducted a theoretical literature review in order to understand different views on CPR and solutions to the commons problem. Secondly, I went through national and community institutions as well as literature on CFM in Monte Verde. The sources were the Bolivian Constitution, Forest Law and Land Law and also the Communal Code and the Management Plan. Additionally, socio-ecological audits conducted by Arrien-WWF, Smartwood-FSC and APCOB were also reviewed. These sources provided valuable information on institutions for CFM in Monte Verde.
The main literature sources were publications by authors from the Resilience Alliance and authors specialised on CPR. The bottom-up approach for CPR management and most definitions for relevant terms were drawn from books and articles written by scholars who follow the resilience theory. The main sources for describing the problem of the commons and the solutions mostly come from articles by the developers of these ideas. The literature on CFM was drawn from authors specialised in this field in countries of the American continent. I reviewed publications which explore CFM by indigenous people since these cases are scientifically more useful for comparing with the Monte Verde case. The bottom-up approach constitutes the bigger picture and CFM by indigenous people the specific. Studies by Chiquitano organisations were also important sources in relation to local socio-ecological characteristics (e.g. Chiquitano culture).

4.3. Data sources and motivation

4.3.1. Legal Sources

All communal and national institutions for CFM were thoroughly reviewed and analysed. Relevant articles were studied in detail and then translated into English. Based on the analysis table 3 was designed, which contains the most relevant institutional features for CFM in Monte Verde. The table first describes the general characteristics of each institutional body and the two principles over which these regulations are based. The first column defines the essence of institutions and their scope. The second and third describe what those regulations establish in regards to forest conservation and poverty alleviation respectively. In these columns, I included only articles that concern CFM. This synoptic table is presented at the results sections and constitutes the basis for comparing the Monte Verde system for CFM with the Ostrom’s framework for the ‘alternative solution’ to the commons problem.

4.3.2. Sources for comparing the Ostrom’s alternative solution to the commons and the institutional system for CFM in Monte Verde

The alternative solution to the commons or game 5 was drawn from the book titled ‘governing the commons’ published by Elinor Ostrom in 1990. This publication provides an alternative theoretical approach for CPR governance. This is explained in a game named ‘the alternative solution’. Thus, I gathered the most important features of this game and then compared them with the Monte Verde system in table 4. The first two columns
contain the main features of each institutional system, respectively. The similarities and differences between these two systems are described in the third column and each difference found is concisely explained.

I chose the ‘alternative solution’ for the comparison due to some fundamental reasons. I consider this theoretical approach to be the most rational for CPR given the diversity of field-settings and situations. Socio-ecological characteristics vary significantly from place to place therefore a flexible approach is needed. Trying to find a single solution for a wide diversity of situations would be equivalent to attempting to find a single cure for all illnesses. Self-governance may be suitable in some cases while in others it may be more appropriate to have an appropriator-central authority system. This flexibility may be fundamentally important for developing successful CPR governance systems.

4.3.3. Audits sources

In recent years Smartwood, Arrien-WWF, and APCOB conducted socio-ecological audits on CFM in Santa Mónica and Palestina. All of them focused their attention mainly on ecological and social impacts. The Smartwood audit was conducted for certification purposes while the others aimed to systematise and evaluate the CFM experience. Smartwood found that these two ventures were ready for certification. The other two organisations reported strengths and weaknesses and recommended future actions. All audit reports contain valuable information on rule compliance and incompliance. Additionally, these audits aimed to register lessons for the communities themselves and other local groups, NGOs and co-operation agencies.

I personally participated as a researcher in the Arrien-WWF audit conducted by end of 2004 in Santa Mónica. On that occasion, we stayed in the community for more than two weeks and made several visits for shorter time. I had the opportunity to observe and participate in activities related to opening roads for transporting timber from deep inside the forest. I also enjoyed long conversations with the locals both day and night. We interviewed more than 20 people in total. Among them were current and former members of the Forest Committee and the Communal Board. We conducted group and individual interviews with people of different age and gender. Other participative research methods were also used for comparing the past and the present socio-economic situation in the community.
4.4. Reflexion on Methods

In relation to the theoretical literature, I tried to be selective and chose only the most prominent contributors to the study of CPR governance (Tjörnbo, 2007). Thus, my list of sources was reduced to the most cited authors in this field. I decided to use a bottom-up approach for CPR governance because I consider that this theory has useful tools for understanding the complexities of reality more accurately than other theories. I agree with authors who argue for local participation for designing and implementing systems for natural resource management. I consider local knowledge in relation to socio-ecological characteristics a vital base upon which successful governance systems may be built.

As I was unable to travel to the field-study setting my focus is on text analysis. National laws and communal regulations were thoroughly reviewed. I had a copy of all of them in Spanish. Thus, analysed them in my native language, and therefore there is a low risk of misinterpretation of these documents. The first time I read them I identified some legal terms that I was unfamiliar with. Consequently, I used the Real Academia Española dictionary to clarify them. In general, this was a straightforward work given that all relevant institutions use a common terminology to refer to CFM. This makes easier to identify relevant sections and articles. Regarding the additional literature, I only included reliable and prominent independent authors and organisations that have been working in Santa Mónica and Palestina for decades. This long experience specifically of CFM and other topics makes them the most credible sources available.

The tables that I produced from analysing these documents that contain the regulations, the regulation’s compliance and the audits and my interpretations of these were sent to people currently working in CFM in Santa Mónica and Palestina. However, regardless of my persistence, I did not receive any comments on them. I spoke with APCOB’s director and sent reminders to people working in the communities without success. I interpret this as that they did not object to my findings.

4.5. Finding data sources

Data sources were obtained from different public, NGOs and indigenous organisations. National regulations for CFM were downloaded from the Bolivian National Congress
website, while communal regulations were provided by APCOB. This organisation also provided several administrative and audit reports on CFM in both communities. The framework for the alternative solution to the commons problem was drawn from the book ‘Governing the commons’ published by Elinor Ostrom in 1990.

5. Results and Analysis

5.1. National and Communal institutions for CFM in Santa Mónica and Palestina

5.1.1. General characteristics

The institutions for CFM in Bolivia are devised and enforced by actors at national and communal level (see figure 5 and 6 and table 3). At national level we find the Bolivian Constitution, Forest Law and the Land Law (Ley INRA); while the Management Plan (MP) and the Communal Code (Reglamento Comunal) are devised by appropriator communities. However, ‘the Constitution is the supreme law of the Bolivian legal system and has precedence over any other regulatory provision’ (Constitution, article 410). This is the cornerstone of all regulations in the country. The Forest Law specifically ‘regulates the sustainable use and protection of forests and woodlands for the benefit of present and future generations, harmonising social, economic and ecological aims’ (Article 1). Finally, the Land Law recognises indigenous rights over communal lands, respect local attributes and authorise the use of renewable natural resources sustainably (article 3). At communal level, we find institutions produced and enforced by appropriator communities. The MP contains forest stewardship and referential information on the area under management. This defines the procedures under which CFM is to be conducted. Finally, the Communal Code establishes ‘norms and forest stewardship and administrative mechanisms for managing revenues from CFM’ (Article 1).
5.1.2. Forest conservation and collective socio-economic benefits

All institutions for CFM at both levels contain articles directly related to forest conservation and collective poverty alleviation (see table 3). Forest ecosystems are recognised as ecosystems that are ecologically and economically valuable. There is an explicit linkage between these two elements. The institutional system doesn’t legitimise any CFM unless it falls under the sustainability criteria established by the Forest Law. CFM brings together and makes operative these two features. It is a means to keep the natural value of the forest and, at the same time, a source of income and other benefits for appropriator communities (see table 3).

CFM must include strategies for maintaining ecological stability among forest under management (Forest Law, article 69). In Monte Verde those strategies are ecological reservoirs and tree-thinning methods for timber harvesting. These are buffers to reduce potential risks. In regards to reservoirs one of the guidelines for CFM establish that ‘the management plan shall establish ecological reserves including harvest restrictions within different habitats in order to protect critical areas for shelter, feeding or reproduction of endangered and rare species and/or nesting sites, according to the geographic and ecological characteristics of the area’ (Forest Law, article 69). The Communal Code states that CFM is to be conducted ‘in a way that guarantees reproduction, structure, functions,
biological diversity and long term ecological processes’ (article 4). Moreover, article 5 says that ‘a wide variety of environmentally and commercially viable forest species shall be harvested, limiting waste of harvests and avoiding unnecessary damage to remnant forest’.

The Forest and Land law created mechanisms for collective renewable resource management by local communities. Forest management by local groups is one of those legal mechanisms. The main requirements are that applicants are local residents for more than five years and legally recognised by the State. Moreover, the group must be composed of at least twenty members (C Forest Law, article 1). This collective understanding is expressed in the Communal Code. ‘We as community members (...) are committed to compliance of current forest legislation and our own regulations established in previous articles (...) being our official internal organisations and authorities in charge of conforming to these commitments’ (article 7). In relation to revenues from timber sales the Code establish that it will be distributed in two ways: ‘(...) one share will be invested in communal infrastructure and acquisition and/or purchase of property for collective enjoyment; the other share will be distributed equally among all families living in the community’ (article 34) (see annex 4).
Table 3. Synthesis of National and Communal institutions-I for CFM in Monte Verde drawn from the Bolivian Constitution-BC, Forest Law-FL, Land Law-LL, Management Plan-MP and Communal Code-CC (article number in parenthesis). Ecological conservation and poverty alleviation are the principles under which these institutions are based.

<table>
<thead>
<tr>
<th></th>
<th>General characteristics</th>
<th>Ecological conservation</th>
<th>Poverty alleviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC</td>
<td>It is the fundamental legal framework of the country over which all regulations and international agreements are based. In regards to natural resources it establishes domains, management principles, rights, duties and administrators (410)</td>
<td>The State ensures sustainable forest management (342, 349) and ecological recovering in degraded areas (386). It institutes the protection of forest with cultural and ecological relevance and sustainable harvesting within socio-economically valuable areas (387). Forest conservation/safeguarding are duties for all citizens (108) and specific official bodies (351).</td>
<td>The BC institutes strategies for, access, manufacturing and constrains within degraded areas (251, 386). It recognises preferential management rights for indigenous communities (388) respecting their own institutions and the national regulation (30, 352). Any non-renewable natural resource exploitation by non-locals shall respect the local culture and be approved by local communities who shall also receive compensatory benefits (352).</td>
</tr>
<tr>
<td>FL</td>
<td>It regulates forest use and conservation for future generations. It balances socio-economic development and ecological conservation. It prescribes requirements and procedures for forest concessions (30, 39, CR 82). It prevents illegal exploitation by giving mechanisms for legal management.</td>
<td>It gives guidelines for sustainable forest use (2). It requires scientific plans (27) over the area under management which must identify timber harvesting areas and natural reservoirs (CR, 39). It establishes monitoring by citizens and State (audits and inspections) (33, CR, 89) and sanctions against forest mismanagement (39).</td>
<td>It encourages individuals and groups in general to benefit from forest (timber) in a sustainable way. It facilitates forest concessions in favour of deprived indigenous communities, entitling them exclusive rights to manage their neighbouring forests collectively. It also requires them to pay the minimum patent; thus, the main beneficiaries are the manager communities rather than the State. However, the rest of the requirements withstand (31).</td>
</tr>
<tr>
<td>LL</td>
<td>It establishes official structure and attributions and procedures for land management (1). It institutes indigenous rights over TCO and management. It prescribes conditions for TCO granting, e.g. collective use and NO alienation, seizing as guarantee or acquisition by prescription (3).</td>
<td>This law not only guarantees indigenous collective rights over the land but also entitle them to manage natural resources in a sustainable way (3).</td>
<td>It recognises traditional indigenous areas where they may develop their own way of life. TCOs are collective properties inalienable, indivisible and irreversible (41). It defines justifications for establishing TCOs. E.g. be beneficial to indigenous communities and peasants and seeks collective socio-economic enterprising and biological conservation (2). These properties are exempted from taxation (4) and are acquired free of charge (42).</td>
</tr>
<tr>
<td>MP</td>
<td>A plan based on the national regulation and international conventions. It contains information on the area’s geology, hydrology, wildlife, weather, roads, etc. And on the community’s culture, infrastructure, economy, etc. Information on the way the management is to be conducted.</td>
<td>This describes forest characteristics, harvestable species and sustainability measures. It creates natural reservoirs and annual harvesting areas. It stresses on ecological monitoring and mitigation according to the forest recovery. It institutes procedures for reducing operations impacts and maps of commercially valuable species for applying a tree-thinning system.</td>
<td>It organises a collective enterprise seeking to generate not only economic resources but well-being. Key fields for the project are organisation boosting, training on forest stewardship issues of forest management, administration, evaluation, marketing, etc. It creates individual benefits for the families (employment and revenue share) and collective ones through investment on health care, education, infrastructure and other public services that the community needs.</td>
</tr>
<tr>
<td>CC</td>
<td>It institutes norms and mechanisms for managing CFM revenues (1). It defines functions for communal organisations and supporting NGOs (11-25). It sanctions rule breakers (17, 18). This code is based on the Forest Law and internal regulations (2). It emphasises the characteristic of the management in regard to harvesting and natural sustainability (4).</td>
<td>It institutes that harvesting shall be limited to areas rich in species commercially valuable (5). Species without value shall not be harvested. All activities of the CFM shall follow the MP approved by the Forest Superintendence. The community shall produce a forest inventory, a census of commercially valuable species and operative annual plans (6). The compliance of the Communal Code shall be controlled by the local authorities (7).</td>
<td>It institutes mechanisms for establishing partnership with external organisations giving those functions (documentation and training) and responsibilities (19-21). It dictates guidelines for revenues administration assigning a specific percentage for each item and assuring that all the community receives a share of the benefits apart from employment (29-43). It adopts the communal organisational system and respect hierarchies and decision making processes. The General Communal Assembly takes decisions not the Forest Committee (10). CFM is basically a collective communal enterprise.</td>
</tr>
</tbody>
</table>
5.1.3. Recognition of local institutions and allocation of responsibilities

National institutions for CFM recognise local cultural ‘modus operandi’ of communal organisations. Indigenous and peasant people have rights to ‘(…) recognition of their institutions as part of the State’s regulatory system (and) (…) to use their political, judicial and economic systems according to their traditional worldviews’ (Constitution, article 30). This article recognises local institutional structures as acceptable ways of governance. However, the Constitution establishes that this freedom can not justify violating the national regulatory system (article, 410).

The land law transfers rights over communal lands to local communities, including management rights of renewable resources. The Forest Law makes this regulation operative assigning exclusive rights to legitimated communal organisations within TCOs to manage their neighboring forest. However, appropriator’s responsibilities in relation to forest sustainability withstand. The forest management plans ‘should establish guidelines on conservation of ecological reservoirs and trees that produce qualitatively and quantitatively good seed’ (Forest Law, article 69). ‘Law incompliance will result in reversal or cancellation of the rights of use’ (Constitution, article 358). Moreover, ‘the professionals and technicians in (…) forest units are civil and criminally responsible under the law’ (Forest Law, article 68).

5.2. Similarities and differences between the Ostrom’s ‘alternative solution’ and the Monte Verde institutional system

The set of institutions described above has defined a particular way of CPR governance in Monte Verde. Institutions at national level were adapted to institutions at communal level and vice versa. Nonetheless, what are the main characteristics of this institutional system? How do they work in reality? For a better understanding of this institutional system we will compare it against the ‘alternative solution’ or game 5 for governing the commons proposed by Elinor Ostrom (1990). This is a game that explains the main characteristics of self-regulatory systems for CPR management as one of the alternative solutions to the commons problem. The table below is a synopsis that illustrates similarities and differences between these two institutional systems. We will concentrate on the differences given that apparently they are crucially important for forest conservation.
Table 4. Main features of the ‘alternative solution’ for governing the commons (1) proposed by Elinor Ostrom (1990) and the case of Monte Verde (2). The last column contains similarities and differences between these two systems.

<table>
<thead>
<tr>
<th>1. The Alternative Solution</th>
<th>2. Monte Verde Case</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriators are multiple individuals or groups that use the resource system at the same time.</td>
<td>There is just one appropriator group that works collectively.</td>
<td>No difference</td>
</tr>
<tr>
<td>Individual appropriation of resource units happens immediately after withdrawal from the resource system.</td>
<td>Resource units withdrawn are collective, only when they are sold, part of the revenues is appropriated individually.</td>
<td>1. Appropriation race 2. No appropriation race</td>
</tr>
<tr>
<td>Appropriators are conscious of what internal and external variables enhance or impede collective or individual efforts to deal with perverse problems (e.g. the tragedy of the commons).</td>
<td>CFM was a strategy for preventing land appropriation, exploitation and destruction of natural ecosystems by outsiders.</td>
<td>No difference</td>
</tr>
<tr>
<td>Appropriators negotiate on the carrying capacity of their resource system and cost of rule enforcing prior to any appropriation. They share equally the sustainable yield of their resource system and rule enforcement cost.</td>
<td>Professionals in sustainable forest management study and decide on the carrying capacity of forest ecosystems and appropriators enforce these decisions.</td>
<td>1. Appropriators decide 2. An expert on sustainable forest management decides</td>
</tr>
<tr>
<td>Appropriators are not dependent on information obtained by central government officials but they based their strategies on information they have at hand.</td>
<td>Strategies are based on information provided by the appropriators. APCOB play only a supporting role.</td>
<td>No difference</td>
</tr>
<tr>
<td>Appropriators determine their own contract (institutional structure) based on their own collective attributes (culture) and ask the internal or external enforcer to enforce only that on which they have agreed.</td>
<td>Communities negotiate and agree their own contract based on national institutions which are devised and enforced by the central-authority.</td>
<td>1. Appropriators devise their contracts and enforcers are accountable to them 2. Community and central-authority devises and enforce them</td>
</tr>
<tr>
<td>Appropriators have autonomy to make positive changes in relation to their own institutional structures. Uncertainty on basic problem structures may provide room for trial and error learning.</td>
<td>Communities have autonomy to change their rules but they have to conform to central-authority institutions for CFM.</td>
<td>1. Appropriators manage their institutions autonomously 2. Their autonomy is partial; it follows central-authority institutions</td>
</tr>
<tr>
<td>Arbitrators may not need to hire a monitor, the self interest of those who have negotiated the contract will lead them to monitor each other and to report observed infractions so that the contract is enforced.</td>
<td>The appropriators monitor each other and outsider’s incursion in their land. The State monitors also through forest audits and inspections.</td>
<td>1. Monitors are internal or external but accountable to appropriators 2. Appropriators and central-authority both have a monitoring roles</td>
</tr>
<tr>
<td>Graduated sanctions keep rule-following rates high enough to avoid triggering a process of higher rates of infractions which may fuel even higher rates. Minor infraction means minor punishment but continue rule infraction leads to more severe sanctions.</td>
<td>Infractions to appropriator’s rules are dealt by the community and infractions to the national rules by the central-authority (Penal Code).</td>
<td>1. Monitor apply graduated sanctions 2. Appropriators sanction infractions to their rules</td>
</tr>
<tr>
<td>Appropriators have time-and-place information to apply accurately the appropriate fines to induce cooperative behaviour.</td>
<td>Appropriators apply internally negotiated fines against infractions to their rules (e.g. economic fines).</td>
<td>1. Appropriators apply sanction that may induce to cooperative behaviour 2. No mention to this.</td>
</tr>
</tbody>
</table>

Source: Based on Ostrom (1990) and APCOB (2009)
5.2.1. Resource units withdrawal and appropriation

Two differences of this comparison are related to the appropriator’s strategies for resource units withdrawal (e.g. cubic feet of wood) and the subsequent appropriation of those resource units (see table 4). Game 5 conceives CPR governance as an organised set of individuals using a common resource system and working under common regulations, however, pursuing immediate individual interests (economic gain). This does not exclude the possibility that in some cases they may undertake collective work (e.g. road construction). Conversely, in Monte Verde appropriators are conceptualised as a collective unit, as just one appropriator. The community goes into the forest and harvest timber. The harvest continues to be a collective property until it is sold into the market. The revenues obtained may be object of individual appropriation. Consequently, regulations for CFM refer to appropriators as ‘the community’ and rights and responsibilities are collective. In both, Ostrom’s game and Monte Verde cases, appropriators pursue individual benefits. The difference lies on the appropriation strategy and time-related stage when individual appropriation happens. In game 5 individual appropriation is immediate while in Monte Verde it is not. Hence, posterior individual appropriation may reduce free-riding behaviour among appropriators. The Monte Verde case shows almost non-existent free-riding behaviour (See annex 1). One of the reasons for this is perhaps this collective feature during the appropriation process.

5.2.2. Decision making in relation to the carrying capacity of the resource system

Ostrom’s game claims that appropriators should decide on the carrying capacity of the resource system while in Monte Verde this is decided by a specialist on sustainable forest management. Appropriator’s knowledge should be used for negotiating and agreeing on the sustainable carrying capacity of the resource system, claims game 5. This is based on the assumption that appropriators have relatively detailed and accurate information given that they have had a long-term relation with their CPR. In Monte Verde the system’s carrying capacity is decided by a professional on sustainable forestry (see annex 2). Institutions at national level give credibility only to plans based on scientific knowledge. Local knowledge comes into the picture once the system’s capacity has been decided and it is time for action. In practice, the central-authority decides how many trees can be logged and the community decides when and how those trees will be logged.
The Ostrom’s framework for the ‘alternative solution’ states that appropriators may hold decision power for changing their governance contracts and enforcement; in Monte Verde this happens only at communal level. Ostrom advocates for appropriators themselves, if possible, to decide and change their CPR governance contracts and enforcement. This autonomic ‘modus operandi’ would lead to a rich trial and learning process. In Monte Verde the central-authority and communities share contract devising power (See figures 5 and 6). While the national regulatory system gives general sustainability guidelines, the communities produce institutions adapted to those guidelines and to their own cultural attributes (e.g. institutions for revenue administration). Once rules have been negotiated and agreed rule-enforcement and sanctioning comes next.

5.2.3. Rule-enforcement and sanctioning

Both institutional systems support appropriator’s participation on rule-enforcement and sanctioning; however, communities in Monte Verde only deal with infractions to their own rules. Game 5 proposes that rule-enforcers should be accountable to appropriators. Internal or external agents are to enforce only those rules that have been agreed by the appropriators. An external arbitrator would take a comparable role of a referee in a football game. Self-monitoring would facilitate information flow among appropriators and therefore mutual monitoring among themselves. One strategy could be that appropriators rotate the role of rule-enforcer among themselves. In Monte Verde the central-authority monitors the compliance of the national regulations; while the communities enforce their local contracts. The central-authority itself performs inspections and hires independent auditor companies for conducting in depth socio- ecological audits. At communal level, the Communal Board enforces local institutions and General Assemblies agree and apply the corresponding sanctions (see annex 5 and figure 6). Additionally, reporting any illegal and/or ecologically harming activity to the corresponding authority constitutes a duty for every citizen (Constitution, articles 351, 108, and 135). Communities in Monte Verde may use these regulations against illegal timber exploiter or ‘timber pirates’ as they are locally known.

Ostrom’ game suggests that appropriators should apply graduated sanctions against rule-breakers while in Monte Verde there is no mention of this feature. The ‘alternative solution’ says that the one who breaks the rules should be punished by the appropriators
based on infraction recurrence. Increase on infraction rates would also increase sanction’s severity. Moreover, appropriators would be in a better position to fine rule-breakers instead of other agents because they have time-and-place information. In Monte Verde communal assemblies negotiate and agree on fines. There are some infractions that already have fixed fines while others don’t (see figure 6 and annex 5). In all cases, communal regulations sanction only infraction to local rules; infraction to the national regulatory system are dealt by the national judicial system (e.g. set the forest on fire, log an excessive number of trees, etc.).

6. Discussion

The Monte Verde case illustrates the interplay between communal and national institutions for CFM. The national institutions are the Constitution, Forest law and Land law, while the Communal Code and the Management Plan are communal institutions. The former are devised and enforced by the central-authority and the latter by appropriator communities. The national are applicable nationwide and the communal within their corresponding jurisdictions. Both levels respect and legitimise each other and perform duties within their scopes of action. This is a communal-central authority governance system which adopts forest conservation and poverty alleviation as their ultimate purpose.

Self-regulation for CFM seems to be unsuitable in Monte Verde. Appropriator communities are yet unable to assume self-governance. They may successfully devise and enforce some institutions but not all of them. Consequently, appropriators share this responsibility with the central-authority. While national institutions establish guidelines for CFM, communities negotiate and agree on local institutions using an approach compatible with their own attributes. Timber withdrawal and appropriation are collective and only revenues from timber sales may be appropriated individually. Moreover, the forest carrying capacity is set by an expert on sustainable forest management. This suggests that communities are in an incipient stage regarding to self-regulation and enforcement, therefore, external support continues to be needed.

Institutions for CFM establish appropriator’s rights and responsibilities over the forest. They recognise timber harvesting rights and responsibilities in relation to forest conservation and equal distribution of related benefits. Today forest supplies and revenues
from timber sales are vital contributors to well-being in Monte Verde. Communities recognise the value of the forest and this is expressed through co-operative behaviour. It also has tightened up monitoring among appropriators themselves and over ‘timber pirates’ and other threats. Institutions for CFM provided legal tools to defend forest from outsiders and the importance of it makes them willing to resist unauthorised use.

Hence, Institutional structures for CFM in Monte Verde are neither based on self-governance nor on a centralised system. Appropriator communities and central-authority have rule devising and enforcement power and together shape the rules under which the CFM game is played. The overall aim of these ventures is to conserve forest ecosystems and alleviate appropriator communities from poverty.

In a broad sense, I would argue that accepting either centralisation or privatisation as optimal solution for all cases would be a mistake. To label them ill-conceived would also be a mistake. Both solutions might be successfully applicable in realms where they fit best. However, a combination of both may also be a possibility. Pomeroy (1994), Ostrom (1990) and Agrawal and Ostrom (2001) support power sharing between government and local groups in relation to operational and constitutional rules. Similarly, in Bolivia land property rights do not include rights over the forest. Forest is a public property administrated by the State (Forest Law, article 32). Any forest clearing within private properties has to be authorised by official bodies (see theoretical framework).

Regardless of the fact that local communities owned the land, the central-authority controls forest use in Monte Verde. The Forest Law regulates all forest regardless of property categories. Within TCOs, CFM is governed by national and communal institutions. The central-authority devises sustainability guidelines; while communities, based on these guidelines and their own attributes, produce their own institutions (see figures 5 and 6). Central-authority institutions are applicable nationwide while appropriator’s contracts within their communal jurisdictions. Similarly, in Mexico the Agrarian Reform and the Natural Resource and Environment Secretariat provide guidelines for the formation of officially recognised communal institutional structures which regulates access to forest and other resources (Orosco and Davinson-Hund, 2010). Conversely, in the British Columbia province, Canada, the Esketemc and Ulkatcho local
groups have lesser rule devising power. Forest management practices simply must adhere to provincial forest institutions (Boyd and Trosper, 2010). In Monte Verde, the Land and Forest law recognises exclusive rights to local communities over forests. This appears to have had a positive psychological impact on them. What previously was everyone’s forest now became ‘communal forest’. This sense of ownership appears to enable forest conservation. Today, ‘timber pirates’ and other unwelcome phenomenon find a more radical opposition. This was proved in 2004 when fire broke out nearby Santa Mónica’s forest and the locals were ready to postpone agricultural activities and spend weeks putting it out. Fire was seen as a threat to forest supplies and timber sales revenues (Arrien and Salazar, 2004). This suggests that now it is in the interest of the community to keep the forest healthy not only due to its traditional but also monetary value. In general, assurance of rights to continue using a forest may motivate conservation interests among appropriators (Agrawal and Ostrom, 2001).

In Monte Verde local knowledge on forest species and forest stewardship are asymmetric. Traditional ecological knowledge (Berkes and Folke, 1998) on individual species contributes positively to CFM. However, approximately a decade back communities did not have experience on forest management as it is conducted today (De Jong, Ruiz and Becker, 2005). Appropriators were relatively new starters on CFM and therefore needed specialised support from APCOB. Agrawal and Ostrom (2001) claim that scientific and local knowledge may be effectively combined in these cases. This approach is still implemented in Monte Verde given that several studies conclude that coaching continues to be required (see annex 1). Without scientific support there would be more wrongs than rights and perhaps forest sustainability would be put at risk. Possibly conservation principles would be overlapped by economic ambitions. Then it would be another tragedy of the commons story. Likewise, the Esketemc and the Ulkatcho in Canada and the Huastec, Totonac and Purepechan in Mexico had inadequate experience on forest ventures. Therefore they focused on developing capacities during the first years (Boyd and Trosper, 2010; Berkes and Folke, 1998).

The CFM collective feature seems to be a crucial contributor to forest conservation in Monte Verde. This also appears to conform to local attributes and national institutions. Firstly, Chiquitano people traditionally undertake large enterprises collectively. This is incorporated into the complex nature of social interrelations of reciprocity among families.
(Arrien and Salazar, 2004). Secondly, national regulations establish that CFM is to be conducted by communal groups. Thus, the collective feature is not only culturally accepted but legally compelling. And thirdly, timber harvesting is economically and technically demanding and therefore requires a joint effort. For individuals living hundreds of kilometers away from the market, this would be a daunting challenge (see case study area). So far no evidence of individual timber harvesting has been found (see annex 1). In San Juan Nuevo, Mexico, forest management on an individual basis failed back in the 70s. Consequently, the community decided to merge family-owned patches and co-manage them through a communal enterprise. This venture was not only able to offer better prices than middlemen but also stopped over-exploitation (Berkes and Folke, 1998). Hence, in Monte Verde as in San Juan collective venture boosted communal control over forest and this reduced, if not eliminated, internal free-riding. The danger is external to the appropriator group. That is illegal logging by ‘timber pirates’ (Arrien and Salazar, 2004). In Monte Verde this was common in the past and continues to be a threat today. CFM replaced illegal and unsustainable exploitation and became a legal and sustainable initiative. Now the players of the game are ‘visible’ and can be punished in case of rule-breaking.

Perhaps the collective feature in the Monte Verde case can be better explained using the meadow and the grazing sheep metaphor. The meadow is a collective property owned and managed by the local community. As the rainy season finishes the community evaluates the available pasture and accordingly allocates a number of sheep. The authorities and the community, in general, prevent other sheep from grazing in their meadow. Once the sheep are grown up enough they are slaughtered and part of the meat is consumed collectively and the rest distributed equally among all families living in the community. Next year the sheep farming will start once again after the rainy season. This differs significantly from Hardin’s tragedy of the commons idea, since not only the meadow is common property but also the sheep. There are no individual but only collective strategies.

Forest dependency and self-employment may also stir co-operative behaviour among appropriators in Monte Verde. If the group has common objectives it is rational to think that they will co-operate to achieve that objective (Olsom, 1965; Agrawal and Ostrom, 2001). This is all about weighting costs and benefits before making choices (Ostrom, 1990). In Monte Verde, those common interests are forest conservation and economic
gain. As long as appropriators need forest resources it is likely that they will co-operate. Nowadays, communities continue to be forest-dependent in a number of ways (e.g. meat, medicines, etc.). This dependency appears to be critically important for conservation. Besides, self-employment seems to be another incentive. Previously these communities were wage labourers in neighboring landholdings (Arrien and Salazar, 2004). CFM has given them a self-employment opportunity within their communities. Thus, co-operative behaviour comes as no surprise given that they continue an old practice including extra benefits (e.g. better income). Likewise, Caycedo (2005) in the Amazons, Boyd and Troser (2010) among the Esketemc and Ulkatcho Nations in Canada, McIntosh and Renard (2010) in Fondes Amandes in Trinidad and Orosco and Davinson-Hund (2010) in San Juan Nuevo in Mexico, find that CFM is a source of employment for local people and this effectively links forest conservation and poverty alleviation making them interdependent.

Rule-devising and monitoring duties in Monte Verde are shared between the central-authority and appropriator communities. Self-regulation and monitoring seems to be unsuitable. Appropriators are yet unable to devise and enforce all regulations given that CFM is a relatively new activity. The central-authority acknowledges this weakness therefore establishes guidelines for institution devising and enforcement in a given place and time. Hence, communities produce and enforce their own institutions. These rules define roles and responsibilities and establish socio-ecological criteria. Sustainability rules enable forest conservation and collective appropriation poverty alleviation. Appropriators have limited coercive power; therefore, ‘timber pirates’ might see more danger in challenging the central-authority than indigenous communities. Similarly, in Mexico communities may manage forest conforming to central-authority’s socio-ecological criteria (Mexican Constitution, article 27 and Agrarian Reform, 11). In British Columbia the Forest and Range Practices Act focus on ecological aspects and establishes precise rules for forest stewardship. Appropriation shall simply conform to central institutions. Local regulations are not even mentioned. Berkes, Folke and Colding, (1998), Agrawal and Ostrom (2001), Ostrom (1990) and Pomeroy (1994) support rule devising by local groups and argue that rule devising on timing, location and technology of use enable them to learn to devise rules adapted to their field-setting.
The weakest link in Monte Verde appears to be CFM revenue administration (see annex 4). Audit reports question management of revenues from timber sales and identify it as a conflict source. Wage payments in advance or loans make accountability chaotic. Arrien and Salazar (2004) explain that it would be unlikely for a Chiquitano man (the treasurer, in this case) to deny loans to fellow neighbours. Social reciprocity and distribution of resources among families are cultural local attributes. Problems emerge when loans are not honored back to the CFM treasury. Besides, accountability systems are inefficient given that administrators are poorly trained. Consequently, economic reporting to the communal assembly becomes the hardest part. Usually the spending is more than the amount backed by receipts. This provokes mistrust among CFM authorities and the rest of the community. In San Juan Nuevo these issues were also common during the first implementation years. Leaders learned from their mistakes and over the years these problems disappeared. As they were familiar with local attributes they were able to find solutions (Orosco and Davinson-Hund, 2010). In Monte Verde, it appears that institutions for revenue management mismatch local attributes. In general, rules for CPR should relate specifically to local attributes (Ostrom, 1990; Agrawal and Ostrom, 2001; Berkes, Folke and Colding, 1998; Walker and Salt, 2006; Hanna, Folke and Mäler, 1996; and Dietz 1990). This principle seems to be neglected in this case and therefore it impacts negatively. If rules are not adjusted effectively, this may deteriorate co-operative behaviour.

7. Concluding summary

Forest conservation in Monte Verde is in the interest of appropriator communities due to its contribution to their wellbeing. Traditional forest supplies and economic benefits from timber sales are vital contributors to the local economy. These Communities understand the value of their forest and are willing to keep it for local enjoyment. However, willingness is not enough. They had to design a system that would enable them to effectively use and protect their forest. Communal Forest Management serves both purposes; communities themselves manage their forest through collective ventures and, at the same time, it is a means to halt illegal timber exploitation, which historically has been the reason for its over exploitation. This management system yields ecological and social benefits that have attracted support from governmental and non-governmental
organisations. This external support filled in communal gaps on the local level in relation to legal and financial issues, as well as issues related to forest stewardship.

Communal institutions for Communal Forest Management have been successfully adapted to higher level principles and guidelines. This is a co-management system between the central-authority and appropriator communities. The central-authority establishes guidelines and the appropriators implement their ventures conforming to them. In Monte Verde, FCS certification awarded by Smatwood and audit reports by specialised organisations give evidence that Communal Forest Management conform to Forest Stewardship Council conservation standards and most central-authority institutions. This study has found that current practices for forest stewardship face no mayor challenges. It indicates that this system has been successful for forest conservation so far. However, the administration of profits from timber sales gained by the community is still a problem. Communal institutions need to be adapted to local attributes in order to avoid conflict among appropriators.

I would argue that in all cases local involvement for developing optimal governance systems of Common Pool Resources is not only important but vital. However, external intervention should only cover internal limitations rather than impose a ‘top down’ approach. Other external organisations such as Non-governmental organisations may also be fundamental contributors to not only identifying appropriator’s limitations but also providing support for developing solutions. MacDaniel (2002) claims that co-operation agencies already invest an enormous amount of resources on natural resource management. He adds that this support is channeled through grassroot organisations.

The Monte Verde case illustrates an innovative approach for dealing with the problem of free-riding. Collective appropriation controls the forest stewardship and this is the means by which the community is able to exclude external forest pirates. This governance approach becomes an effective barrier against unsustainable forest exploitation. There are no multiple appropriators but a single organisation that withdraws timber together and individual appropriation happens once revenues have been collected from timber sales. Consequently, there is no individual appropriation race. The system does not favour self-centered behaviour.
Could the Monte Verde approach for forest management be applied in other field-settings? Perhaps it could. In realms where collective ventures conform to local attributes, it might be a possibility to be considered. In the Amazonian region, it is likely to find local groups who might see this management system as a useful mechanism to tackle forest loss and promote socio-economic development. This alternative approach could be studied in depth by appropriators during their rule-devising negotiation process and by central governments for forest conservation policy making. The challenge consists in finding the right alternatives which will enable societies to deal with forest degradation and deforestation.

7.1. Future studies

This is an interpretative research focused mainly on formal institutions for communal forest management in Santa Mónica and Palestina. Short term, future studies should also pay attention to informal institutions which might play an important role for making these ventures successful. Administrative issues in general also need a closer study in order to explain why current institutions do not work and what rules would be more appropriate or more compatible with local attributes. In the long term, broader studies will be needed. Communal forest management in Monte Verde is a relatively new activity. Local communities are in a knowledge building process and some decisions may yet be taken by people from outsider supporting organisations. This is an activity that currently has a certain degree of financial and technical dependence on NGOs. Thus, the big question is: will these local communities be able to continue managing their forest successfully as they have done so far without external support? Only time will tell.

Acknowledgments

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Glossary

**Resilience** is ‘the capacity of the system to absorb disturbance without shifting to another regime’ (Holling, 1973). Disturbance (e.g. drought, market crunch, etc.) can be the result of human or natural dynamics (Hanna, Folke and Mäler, 1996) and it can have the capacity to move the system into a threshold and then into a new ‘stability regime’, in which their functions, structure and feedbacks are different in relation to the previous stage (Walker and Salt, 2006). For instance, a resilient forest ecosystem would have the capacity to recover from a considerably harmful pest attack and continue producing the goods and services that were produced before the disturbance.

**Ecosystem** is a complex variety of plants, animals, and microorganisms that live in biological communities interacting with one another and also with the physical and chemical environment, adjacent ecosystems, and the atmosphere. ‘(T)he structure and functioning of an ecosystem is sustained by synergistic feedbacks between organisms and their environment’ (Hanna, Folke and Mäler, 1996). In a forest, for example, trees, animals, insects, soil and the rest of the components together constitute the ecosystem.

**Ecosystem services** are the benefits that human communities obtain from neighboring forests and other ecosystems. In a broader sense, it refers to four categories of ecosystem services that in general people obtain from natural ecosystems; ‘provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling’ (MA, 2005).

**Sustainable development** is the ability to ‘meet the needs of the present without compromising the ability of future generations to meet their own needs’ (World Commission on Environment and Development, 1987).

**Sustainable systems** have capacity to survive and reproduce biologically and avoid major economic disruptions and collapse. These characteristics are prerequisites for keeping a system within a stable state. In actual fact, it means that a system can be considered sustainable whilst having the ability to persist or continue to survive (Hanna, Folke and Mäler, 1996).

**Co-management** is a flexible strategy that provides and maintains room for discussion among resource users, stakeholders and government regarding to ‘participation, rule making, conflict management, power sharing, leadership, dialogue, decision making, knowledge generation and sharing, learning and development’ (Pomeroy, 1997). Unlike centralised models and practices, a co-management approach values participation of all stakeholders and it is open to positive changes.
## Annexes
### Annexe 1

### Synopsis of audit reports on CFM in Santa Mónica and Palestina

1. **Santa Mónica**

   **XX=** major non-compliance; **X=** minor non-compliance

<table>
<thead>
<tr>
<th>Field</th>
<th>Strength</th>
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<tbody>
<tr>
<td>General issues</td>
<td>The socio-political organisational system supports democratic participation, deliberation and collective decision making. The local culture is respected; there is no violation of them. The Forest Committee is recognised as the leading organisation on forest management. Project’s activities do not impact negatively on other traditional economic activities.</td>
<td>X Participation and credibility by the locals on the project is limited. The community lacks strategies for avoiding illegal or unauthorised activities over the forest under management.</td>
<td>Smartwood FSC Jun 2008</td>
</tr>
<tr>
<td></td>
<td>The project boosted cattle farming due to the availability of more financial resources and did not have any impact on fishing.</td>
<td>Due to the nature of field work women are excluded and only participate as cooks. There were negative impacts on agriculture, hunting and domestic animal farming.</td>
<td>Arrien – WWF Nov 2004</td>
</tr>
<tr>
<td>Forest stewardship</td>
<td>There is sufficient knowledge regarding to forest stewardship such as mapping (Census), timber harvesting and ecological mitigation activities with just some NGO support.</td>
<td>Writing of legal documentation required by the Forest Superintendence is yet dependent on APCOB. There isn’t enough capacity to operate modern technology for statistical purposes.</td>
<td>APCOB Dec 2008</td>
</tr>
<tr>
<td></td>
<td>Agrees with APCOB and mentions that the community has experience for developing plans of land use. The community has financial resources to pay wages for a forest engineer and other coaches. There is knowledge on ecological impacts of the management.</td>
<td>XX There is incompliance of norms for access and use of natural resources. There is not a written guide for harvesting. Community and company lack studies over socio-cultural impacts of forest management into the community. Forest mitigation measures are not applied. Studies on biodiversity richness and conservation measures are also missing.</td>
<td>Smartwood FSC Jun 2008</td>
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<tr>
<td></td>
<td>Arrien agrees with APCOB and claims that this is the only field where training has been successful. This project has been certified by FSC recently.</td>
<td>The community does not have a forest engineer yet.</td>
<td>Arrien – WWF Nov 2004</td>
</tr>
<tr>
<td>Administration and accountability</td>
<td>Training is having a positive impact in the community. Literate people have shown important improvements in regards to administration and accountability.</td>
<td>There is not any person in the community able to operate and produce accountability reports. Training is in an incipient stage.</td>
<td>APCOB Dec 2008</td>
</tr>
<tr>
<td></td>
<td>The community is in a process of consolidation of an accounting system which will make possible a better social control on administration matters.</td>
<td>X Agrees with Arrien on revenues administration and social control and mentions an urgent need for training in this field.</td>
<td>Smartwood FSC Jun 2008</td>
</tr>
<tr>
<td></td>
<td>No strengths</td>
<td>Revenue administration is chaotic and the perceptual distribution established by Communal Code is not followed completely. Social control and reporting do not work. Some trained people in the community have become very influential and the rest assume a passive role.</td>
<td>Arrien – WWF Nov 2004</td>
</tr>
<tr>
<td></td>
<td>The community has established a stable relation with Impa Parket. This company is not only the timber buyer but also has contributed to the forest certification. Certified timber today has better acceptance in the market than non-certified.</td>
<td>The community has not undertaken any market study for finding other possible clients. Training on commercial issues is needed.</td>
<td>APCOB Dec 2008</td>
</tr>
<tr>
<td></td>
<td>Formal written agreements between the</td>
<td>XX Agrees with APCOB and adds that the</td>
<td></td>
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community and timber buyers were found. This facilitates control on agreement’s compliance. community does not have basic information on timber prices. Consequently, they ignore whether their current transactions are fair or not. Social consultation over sale agreements is needed before formalising them.

The community currently has a stable buyer company

There is no negotiation capacity in the community due to the humble character of people. There are training needs in this field. Some companies acquire timber, however, delay payments for a long time.

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<td>X The community has organisational problems and migration also impact negatively. Participation and credibility of the local inhabitants on the project is limited. The community lacks strategies for avoiding illegal or unauthorised activities over the forest under management.</td>
<td>Smartwood FSC Jun 2008</td>
</tr>
<tr>
<td><strong>Forest stewardship</strong></td>
<td>There is sufficient knowledge on forest stewardship due to training arranged by the timber buyer Impa Parket. There is enough capacity for implementing mitigation measures in the forest. This forest venture was certified by FSC.</td>
<td>The area under management is reduced therefore it produces low harvests.</td>
<td>APCOB Dec 2008</td>
</tr>
<tr>
<td><strong>Administrative and accountability</strong></td>
<td>As a result of previous training the community has some people able to deal with administration issues and operate electronic tools.</td>
<td>There is insufficient knowledge on basic accountability; more training is needed.</td>
<td>APCOB Dec 2008</td>
</tr>
<tr>
<td><strong>Timber market</strong></td>
<td>The community has established a stable relation with Impa Parket. This company is not only a timber buyer but also has contributed to forest certification.</td>
<td>The community has not undertaken any market study for finding other possible timber buyers. Training on commercial issues is needed.</td>
<td>APCOB Dec 2008</td>
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2. Palestina

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<td>There is sufficient knowledge on forest stewardship due to training arranged by the timber buyer Impa Parket. There is enough capacity for implementing mitigation measures in the forest. This forest venture was certified by FSC.</td>
<td>The area under management is reduced therefore it produces low harvests.</td>
<td>APCOB Dec 2008</td>
</tr>
<tr>
<td>Agree with APCOB and mentions that the community has experience for developing plans for land use. The community has financial resources to pay wages for a forest engineer and other coaches. There is knowledge on ecological impacts of the management.</td>
<td>XX There is incompliance of norms for access and use of natural resources. There is no written guide for harvesting. Community and company lack studies over socio-cultural impacts of forest management on the community. Forest mitigation measures are not applied. Studies on biodiversity richness and conservation measures are also missing.</td>
<td>Smartwood FSC Jun 2008</td>
<td></td>
</tr>
<tr>
<td>Administrative and accountability</td>
<td>As a result of previous training the community has some people able to deal with administration issues and operate electronic tools.</td>
<td>There is insufficient knowledge on basic accountability; more training is needed.</td>
<td>APCOB Dec 2008</td>
</tr>
<tr>
<td>The community is in a process of consolidation of an accounting system which will make possible a better social control on administration issues.</td>
<td>X Revenue administration is chaotic and the perceptual distribution established by Communal Code is not followed completely. Social control and reporting do not work. There is also lack of monitoring on social and ecological impact of the management.</td>
<td>Smartwood FSC Jun 2008</td>
<td></td>
</tr>
<tr>
<td>Timber market</td>
<td>The community has established a stable relation with Impa Parket. This company is not only a timber buyer but also has contributed to forest certification.</td>
<td>The community has not undertaken any market study for finding other possible timber buyers. Training on commercial issues is needed.</td>
<td>APCOB Dec 2008</td>
</tr>
<tr>
<td>Formal written agreement between the community and timber buyers where found. This facilitates control on agreement’s compliance on both parts.</td>
<td>XX Agrees with APCOB and adds that the community does not have basic information on timber prices. Consequently, they ignore whether their current transactions are fair or not. Social consultation over sale agreements is needed before formalising them.</td>
<td>Smartwood FSC Jun 2008</td>
<td></td>
</tr>
</tbody>
</table>
Annexe 2

Functions of the Forest Committee established by the Communal Code

Note. The table below describes functions of the Forest Committee and functions of the external forest expert.

<table>
<thead>
<tr>
<th>Forest Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Enforce the dispositions of the general communal assembly</td>
</tr>
<tr>
<td>- Communal Code enforcement</td>
</tr>
<tr>
<td>- Coordinate with public and private organisations regarding to training</td>
</tr>
<tr>
<td>- Organise and facilitate the participation of the community in all activities of the project</td>
</tr>
<tr>
<td>- Produce a written economic report and explain it to the community (savings, investments, etc.)</td>
</tr>
<tr>
<td>- Regulate the use of fauna (CC, article 16)</td>
</tr>
</tbody>
</table>

Annexe 3

Functions of the forest expert established by the Communal Code

The forest expert shall produce:
- General Plans for forest management
- Annual Operative Plans
- Written reports for the Forest Superintendence
- Organise training sessions
- Support the process of harvesting of timber and non timber resources
- Offer advice regarding to revenue management and administration (CC, articles 19, 20 and 21).

Annexe 4

Distribution of revenues from timber sales in Santa Mónica and Palestina established by the Communal Code

<table>
<thead>
<tr>
<th>Item</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venture investment (equipment, tools, work force, etc.)</td>
<td>30%</td>
</tr>
<tr>
<td>Technical support and training (forest expert wages)</td>
<td>30%</td>
</tr>
<tr>
<td>Communal Board (representation costs)</td>
<td>5%</td>
</tr>
<tr>
<td>CICC Board (representation costs)</td>
<td>5%</td>
</tr>
<tr>
<td>Direct community investment (infrastructure and/or acquisitions of communal goods; family share) (CC, articles 29-34)</td>
<td>30%</td>
</tr>
</tbody>
</table>

Annexe 5

Infractions and sanctions established by the Communal code

<table>
<thead>
<tr>
<th>Infractions</th>
<th>Sanctions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunting and fishing for commercial</td>
<td>The Communal Assembly takes a</td>
</tr>
<tr>
<td>Activity</td>
<td>Sanction</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dispose plastic and other contaminant material</td>
<td>Not defined</td>
</tr>
<tr>
<td>Consumption alcohol while working</td>
<td>Fine agreed by the Communal Assembly</td>
</tr>
<tr>
<td>Individual decision making</td>
<td>Warning by the Communal Assembly</td>
</tr>
<tr>
<td>Decide individually or arbitrarily over management of economic resources</td>
<td>Warning by the Communal Assembly</td>
</tr>
<tr>
<td>Embezzlement</td>
<td>Dismissing and devolution of economic resources and no right to be elected as communal authority</td>
</tr>
<tr>
<td>Sell timber illegally</td>
<td>Penal Code, article 223, sanctions with 1 to 6 years in prison</td>
</tr>
<tr>
<td>Hunting for commercial purposes</td>
<td>Not defined</td>
</tr>
<tr>
<td>Illegal timber logging</td>
<td>Penal Code, article 223, sanctions with 1 to 6 years in prison</td>
</tr>
<tr>
<td>Set the forest on fire</td>
<td>Penal Code, article 206, sanctions with 2 to 6 years in prison</td>
</tr>
</tbody>
</table>