Building Networks in the Climate Change Convention — Co-ordination failure in the establishment of Clean Development Mechanism (CDM) in Mexico

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Abstract

This thesis evaluates why the implementation of a tree plantation project in Chiapas, Mexico, called *Scolel Te* failed in its attempt to participate in the CDMs scheme. The *Scolel Te* project brings together farmers and local organisations into a network of exchange of resources that aims at producing an outcome that is only possible through the co-ordination and co-operation of all participants: the emission of carbon certificates. This thesis studies the co-ordination problems that local actors face at the moment of establishing the carbon projects by identifying how formal and informal mechanisms such as contracts, economic incentives, trust, and reputation, create or solve co-ordination problems in the *Scolel Te* network. The thesis also describes how changes in the distribution of power among actors affect the functioning of the network and how individual's interests and strategic alliances have the potential of derailing the aims of the environmental project. For such purposes, this thesis analyses the exchange relationships among actors at the micro level and identifies how exchange relationships evolve over time. Then an overall picture of the exchange relationships is presented (macro level) with focus in understanding how and why power in the network is exerted. Findings suggest that relying on economic incentives as the main mechanism to generate commitment among communities has failed to create stable exchange relationships in the long term. Trust and reputation are stronger mechanisms to achieve commitment. Moreover, we find that the ability to generate commitment depends highly on the generation of interdependencies between tree plantation projects and the main economic activities of local actors. However, type of land tenure, main economic activity, and pre-existing power relationships embedded at local level are also the principal factors that determine the dynamism of the social exchange relationships and commitment in the long-run. This thesis considers that co-ordination failure occurs because a lack of knowledge about the real dependencies between local actors and their natural resources in the design of CDMs. At macro level, this thesis found that the lack of accountability of the unregulated local carbon market at local level has created unintended incentives for actors to adopt less environmentally responsible strategies and disincentive participation in the CDMs.

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To Alfonso

List of Abbreviations

CDI	National Commission for the Development of the Indigenous People
CDM	Clean Development Mechanism
CDR	Common but Differentiated Responsibility
CEPCO	Estatal Co-ordination of Coffee Producers of Oaxaca
CONAFOR	National Commission of Forest
CONANP	National Commission of Natural Protected Areas
CSS	Cognitive Social Structure Data
DOE	Designated Operational Entity
ECCM	Edinburgh Centre for Carbon Management
ECOSUR	South Frontier College
ET	Emission Trading
FBCC	Bio-Cambio Climatico Fund
FCCC	UN Framework Convention on Climate Change
FMCN	Mexican Fund for Nature Conservation
GOs	Governmental Organisations
IHN	Natural History Institute of Chiapas
INE	National Institute of Ecology
IPCC	Intergovernmental Panel of Climate Change
JI	Joint Implementation
NGOs	Non- Governmental Organisations
OECD	Organisation for Economic Co-operation and Development
PAJAL	Pajal Yakac-Tick
PPP	Polluter Pays Principle
PRODESI	Projects for Rural Development of Indigenous Groups

PVF	Plan Vivo Foundation
PVS	Plan Vivo System
RM	Reforestamos Mexico A.C.
SAO	Environmental Services of Oaxaca
SEMARNAT	Ministry of Environment and Natural Resources
SET	Social Exchange Theory
SNA	Social Network Analysis
SPOSEL	Society of Organic Producers of the Lacandona Jungle
tCO2	carbon sequestration tons
UN	United Nation

Chapter 1

Introduction

Human activity is causing climate change in our planet and causing major natural disasters that have enormous human and economic costs in all corners of the world. Every human living on Earth contributes to climate change. What we eat, drink and wear all have an environmental footprint. If we decide to travel to work or school by public transport instead of using a car has, again, consequences in terms of how much each of us contributes to climate change. Not everyone contributes the same and not everyone suffers the same consequences when our changing planet is hit by a natural disaster. The one who consumes the most, and the most environmentally unfriendly products, is not necessarily the same person who is hit by hurricanes and droughts. That is, the actions that one individual takes today has consequences for unknown third people in distant places. And what is true for individuals also applies to nations. Some countries pollute more than others, and the most pollutant nations are not necessarily the ones who pay the highest cost for climate change. Because of this, major efforts to establish working, efficient, and equilibrated *international environmental governance* in our planet has been pursued since the 1950s.[1]

The demand for institutions to cope with both broadening and deepening interdependencies in the climate change context has created the need for cooperation and co-ordination among distinct levels of authorities and social groups from the local, through the national, to the international sphere. In response to these needs a global environmental governance system has been created through a series of multilateral

[1]Governance is understood here as set of informal social institutions/rules rather than — and in opposition to — a bureaucratic system established by the State.

agreements. These social institutions try to solve collective problems that arise as a result of interdependencies among the activities of distinct individuals or social groups. One major problem of building international environmental governance is that local environmental needs are not easily integrated to the global agenda, which is largely dominated by international organisations and large multinational NGOs. Clearly, the dominance of the global environmental agenda by strong actors limits the ability of poor countries and local communities to properly address their specific development and environmental problems.

The Kyoto Protocol, through the Clean Development Mechanism (CDM), tries to coordinate a complex institutional system based on the idea that effective environmental governance should allow the active participation of State and non-State actors in the setting of climate change policy. It is thought that, by pooling their resources, local organisations may achieve the required bargaining power to bring their local environmental needs into the environmental agenda. Also, It is suggested that the intervention of transnational political actors, such as NGOs, as intermediaries between the local and the global can generate unprecedented opportunities to connect and coordinate the local and global environmental issues allowing the effective setting of the climate change agenda.

Most literature in sociology points out the potential of NGOs for delivering major services at the local level such as facilitating decision making, capacity building, coordination, and cooperation. However, there is little understanding about whether and how the creation of environmental networks under the carbon market approach creates/solves coordination failure at the local level and affects the welfare of indigenous communities and the environmental outcomes of a given carbon project. Also there are few analyses of how international actors exercise their power in environmental networks or how local actors develop strategies to counteract this power. Clearly differences in the control of resources in the network may have considerable implications on the degree of influence that actors may exert on one another to change the environmental aims of carbon project or its likelihood of success.

Developing these ideas, this thesis evaluates the implementation of a tree plantation project in Chiapas, Mexico, called *Scolel Te* which was rejected from the CDMs scheme. This thesis consider that the analysis of the *Scolel Te project* is valuable

because provide a vivid example of the co-ordinations problems that emerge to build and international environmental governance, specially when the aims of global agenda does not take in account the social context of the forest areas in the developing countries. This thesis evaluate the *Scolel Te* project from a network theory perspective. In this context, the *Scolel Te* project is managed by a local environmental NGO called AMBIO which allow the connection between local and international actors. I treat *Scolel Te* as a productive network because it involves a set of organisations, or collective *actors*, exchanging resources through formal and informal mechanisms with the aim of producing an outcome that is only possible through the co-ordination and co-operation of all participants. Each actor brings different resources and abilities such as land, economic resources and human capital. As a result, the *Scolel Te* can be treated as the structure of the network in which actors are embedded and have access to a set of available opportunities, such as information broadcasting, flow of resources, and influence. This thesis studies how informal social mechanisms (also known as relational mechanisms), such as trust and reputation, create or solve co-ordination problems in the *Scolel Te* network. I analyse the *exchange* relationships among actors starting from the dyad (micro level), or the relationship between two actors, and try to identify the changes, or dynamics, of such relationships over time. Once the exchange relationships at a micro level are understood, the overall picture of the exchange relationships in the *Scolel Te* network is analysed (macro level). I am particularly concerned in understanding how and why power in the network is exerted. Similarly, the thesis describes how changes in the distribution of power among actors affects the functioning of the *Scolel Te* network. In specific, I look at how individual interests and strategic alliances have the potential to derail the aims of the environmental project.

This case study is both a qualitative and quantitative piece of research that uses social exchange theory and social network analysis (SNA) as its main theoretical frameworks. The study collected cognitive social structure (CSS) data which consist of collecting the set of beliefs/judgements that each participant of a network has about all other participants. I collected data by means of both a questionnaire and semi-structured interviews. I interviewed 49 actors in total that represent most of the participants of the process of exchange in *Scolel Te* network. More specifically, this

involved representatives from 35 local farming communities in the regions of Chiapas and Oaxaca, 6 environmental NGOs in Mexico and the UK, and 5 governmental organizations in Chiapas, Oaxaca, and Mexico City.

The analysis of the implementation of the *Scolel Te* carbon project shows that the policy of the Kyoto protocol is hardly a feasible alternative to generate sustainable development in the forest sector in Mexico. It indicates that the local carbon projects in Mexico face serious difficulties in the regulated international carbon market (CDMs) for two main reasons. First, the local farming communities assign a low value to tree plantation projects because the economic and environmental benefits they obtain are rather small from their point of view. This, leads to low participation and interest in carbon projects. Second, the lack of accountability in the unregulated local (domestic) carbon market has substantially reduced the value that farming communities assign to the *Scolel Te* project, which is the most committed local actor with the aims of the CDMs. This, in turn, creates unintended incentives for actors to adopt less environmentally responsible strategies.

In terms of the dynamism of the process of exchange and according to the field work and the interviews, this thesis found that communities assign value to the *Scolel Te* project for three main reasons: (1) because of its environmental benefits, (2) because of the resources derived directly from the trees, such as wood, and (3) because of the money that actors obtain by participating in the tree plantation scheme. These motivations have led the author to develop a parallel set of analytical categories. Namely, it is suggested that one could define three *ideal types* of community (actors): (i) environmentalists, (ii) resource seekers, and (iii) income seekers. This is just a theoretical taxonomy, as all communities are to certain degree environmentalists, resource seekers, and income seekers. However, by looking at the relative importance that each community gives to dimensions (1) to (3) we assign to each community a working label (i), (ii) or (ii), always keeping in mind that in reality the communities are always a combination of (i), (ii) and (iii). This classification is useful for understanding the dynamics of exchange in the *Scolel Te* network. We find that communities re-evaluate the value of the project over time, as they engage in the exchange process. This, in turn, implies a re-ajustement of their initial perceptions about the project. In this context, environmentalist communities become

more rent seekers and therefore less committed to the project. Similarly, resource seekers become more environmentalist. Findings indicate that income seekers are the large majority of the participant communities but that they leave the project relatively soon. Hence, their numbers are heavily underrepresented in the data.

Results indicate as well that the main problem of the *Scolel Te* project is the generation of long-run commitment among local actors. In this context, I find evidence that relying on economic incentives as the main mechanism to bring and generate commitment among communities has failed to create stable exchange relationships in the middle and long term. In this context, this thesis found that relational mechanisms are the key factor in the enrolment and the continuing participation of local communities into the scheme. Results also indicate that the ability to generate real commitment between the local communities and the *Scolel Te* project depends highly on the degree of risk and costs that each community must bear to stay within the scheme. Type of land tenure, main economic activity, and pre-existing power relationships embedded at local level are the principal factors that determine the dynamism of the social exchange relationships and commitment in the long-run.

The Thesis is organised as follows. Chapter 2 describes the problem of Climate Change, its social impacts, and how the institutional answer to the political pressure created by environmentalist groups lead to the establishment of the Clean Development Mechanisms (CDMs) under the Kyoto Protocol framework. Then, Chapter 3 introduces the main theoretical ideas that are used for the analysis. Next, Chapter 4 discusses methodological issues and Chapter 5 describes the formation of the the *Scolel Te* network and its elements of the exchange: (i) type of network , (ii) actors, and (iii) the rules of the game. Chapter 6 analyses the problems of uncertainty and commitment in the *Scolel Te* project. Next, Chapters 7 and 8 describe the enrolment process and the initial conditions of exchange. That discussion is followed by the description and analysis of the process of exchange among environmentalist and income seeker communities. And Chapter 9 describes the process of exchange among resource seekers. Next, Chapter 10 (Phase III-c) describes how local communities/farmers re-evaluate their initial values about the project and how this leads to important changes in behaviour. Finally, Chapter 11 studies power in the network. Specifically, we look at how individual interest and strategic alliances in the

carbon market may derail the aims of the environmental project. To understand the problem it is necessary to explain how the carbon market works and what is the role of carbon sequestration projects from the point of view of the international environmental policy. Chapter 12 offers conclusions.

Chapter 2

Climate change, environmental governance and network theory

2.1 The problem of nature

Climate change has been at the center of the controversy due to the absence of forceful evidence about the factors that lead to climate change. In this context, the climate change problem cannot be understood without discussing the two main strands of the debate (Paterson and Grubb, 1992). On one side, the scientific strand is focused over whether or not, and to what extent, human activity plays a role in climate change. Indeed, scientific evidence shows an increase in the overall temperature of the Earth generating rapid global climate change. However, there is a divided opinion among the scientific community about the causes of climate change: (a) those who consider that the climate change is a direct effect of the economic activity of human beings and, (b) those who consider that climatic variations obey other causes. Even though the former approach is the consensus view among the scientific community, there is ongoing uncertainty about how much of the observed climate change can be really attributed to human activity.

A second strand of debate is concerned with the political dimensions of climate change. Here the scientific evidence about global warming is a less central matter as recognition of at least some of the potential impacts of climate change has entered the political mainstream. In this context, the political debate is focused in the strategies to reduce greenhouse emissions. Specifically, the debate is divided between those

who emphasise international environmental governance and those who suggest that developing green technology should be the main strategy to reduce the greenhouse emissions (Helm, 2008). In other words, it is regulation versus technology (Pielke and Sarewitz, 2005). This thesis follows the scientific consensus that climate change is a result of human activity and also assumes that some level of international environmental governance is an essential part of the response to climate change. It is from this perspective that this chapter discusses the problem of climate change and the international environmental agenda.

2.1.1 The problem in general

Climate change is the result of an imbalance in the mechanisms that regulate the temperature of the earth. Greenhouse gases play a key role in the normal process of global warming by allowing the rise of temperature of the Earth up to 10c of its normal temperature. Without such increment of the temperature life, as we know it, is not possible. In the last century, however, the expansion of industrial activity and the process of deforestation in the world have increased the emissions of greenhouse gasses into the atmosphere raising significantly the temperature from its normal standard (Ojima et al., 1991; Figueres and Ivanova, 2002).

The complexities of establishing a global environmental policy to revert climate change cannot be understood without taking into account the transboundary character of contamination and the wide variation of its impacts not only over nature but also over social life in different areas of the world.

The emissions of greenhouse gasses to the atmosphere is a transboundary phenomenon because the release of gasses to the atmosphere such as carbon, fluorocarbon, lead, cadmium, copper, and other toxic gasses cannot be confined within a tightly defined geographic space due to the action of winds, which makes them travel long distances. The negative effects of toxic gasses are felt in places other than the one where pollution is actually created (Gay, 1994) (Hinchcliffe and Belshaw, 2003) . Further, the impact of emissions of toxic gasses in the atmosphere have direct and indirect negative effects over natural ecosystems in geographies other than the one where they are created. Direct effects include modifications in the flow of water and

greenhouse gases that change fundamental climatic forces and modify the environment in ways such as global warming and the depletion of the protective ozone layer. Indirect effects refer to all side effects produced by the rapidity of climate change that make it difficult for vulnerable ecosystems to cope with the new conditions.

Change in the biological and physical properties of humidity, albedo and wind can drastically modify local, regional and global-scale vegetation, land surface, water, and in general, all natural ecosystems (Ojima et al., 1991). Moreover, indirect effects of climate change may generate reduction of rainfall, runoff and soil moisture and exacerbate desertification and droughts. Also, climate change can increase the incidence of natural phenomena such as hurricanes, tsunamis, and the rise of sea levels at various latitudes.

2.1.2 Social impacts

The interweaving relationship between nature and social life makes it difficult to estimate and address side effects that are caused by climate change. Clearly, from a social point of view, the impact of climate change must be seen in terms of the *vulnerability* of the affected human populations (Giddens, 2011). Social vulnerability must be evaluated in at least two terms. First, the degree of regional and local exposure to risk: (i) timing of the change, (ii) magnitude, and (iii) duration. Second, the capacity of the affected populations and ecosystems to respond and recover (Wohl et al., 2000). Developed countries, for instance, are less vulnerable to climatic and environmental stress due to their large economic and political capacity. Developing countries, in contrast, are more vulnerable because most of their populations depend on agriculture and the use of natural resources. A major environmental event can generate therefore a sharp decline in the standards of living and put at risk the future opportunities of more people (UNDP, 2002).

Environmental stress affects the poor more than the rich for a number of reasons. First, poor people typically live in ecologically vulnerable zones that are highly exposed to environment disaster. Second, due to their lack of financial resources, the poor are not well equipped to give a swift response to minimise the damage caused by environmental stress or disruption. Third, ecological shocks commonly

destroy the only assets of the poor, such as houses and crops, and lead therefore to serious economic distress. Finally, poor people have less capacity to recover in the short run from contingencies. All these factors increase the vulnerability of the poor (UNDP, 2002).

The declining of environment resources can affect in different ways different groups and/or individuals. For example, in the case of women and children a shortage of natural resources can generate substantial time costs because these groups of persons spend a long proportion of the day in activities such as carrying water and collecting fuel wood. Also, ecological disruptions may result in scarcity of resources and lead to gender and racial conflicts for access and control (Davidson et al., 1992).

2.2 Coordination and the Setting of a Climate Change Agenda

The need for new institutions to cope with the transboundary character of climate change and its complex impacts over nature and social life has given rise to discussion on how to accommodate local, national, and regional interests and create international environmental governance. In this context, climate change has changed the form of how human being think, feel, and act in a word of interdependencies (Hulme, 2009).

For many scholars the transboundary character of climate change implies a problem of interdependencies among different groups and policy issues, which in turn create a need for reconfiguring the international environmental governance in many ways. First, the traditional idea of authority must be abandoned to address properly the cross-border challenges that are created by global climate change. Here the emergence of mechanisms that create supranational norms and regulations tend to redefine agency, authority, leadership, and even citizenship (Elliot, 2004; Jasanoff and Martello, 2004).

A narrow concept of "authority" is, according to Lipschutz (1999), the main problem of the current international environmental regime. Lipschutz argues that the environmental problem has brought a process of political fragmentation, where the *authority* is split among many centres, from the local to the international level. The existence of many sovereign actors inter-playing in the global arena makes it

difficult to coordinate actions and achieve agreement upon an effective common environmental policy. The difficulty of coordination has tempted rich countries and international bodies to launch initiatives that often do not consider the opinions of small local sovereign groups. Such attempts to improve the governance of environmental issues at a global dimension have, however, proven to be ineffective because they normally face fierce political opposition from the sovereign groups that were left aside in the drafting of the policies (Lipschutz R, 1996). As a consequence, the author says, in order to achieve effective global environmental governance it is necessary to include all the levels of authority, including the local sphere. For instance, experience shows that, rather than promoting sustainable development, the implementation - or imposition - of environmental policies by governments or international organisations such as the World Bank can harm traditional livelihoods of local groups and induce the overexploitation of natural resources. This is so because policy makers usually do not take in account the specific knowledge that local people have about their livelihoods — such as traditional forms of production and management of natural resources and the ecological challenges that they face (Shiva, 1989).

As a consequence, the climate change problem has fostered the decentralisation of decision-making. The complexity of addressing the specific problems that face different individuals and social groups has weakened National State decision-making. In other words, it is recognised that the national state system can no longer represent the interest of a society as a whole but only the interest of the majority. The impossibility of governments addressing the diverse environmental needs and problems of large number of groups has mobilised local and global social movements, acting in many political spheres in order to bring their problems to the public policy agenda and to coordinate actions with all other individuals/groups who face similar problems (Young, 1994). One example of this is the emergency of the Alliance of Small Island formed by 36 countries and non-country islands which are affected for the rising level of sea. This movement emerged as broad-issue political block to act not only actively in climate change negotiation forums but also to create a network which would provide information and resources for countries who face similar problems. In this context, climate change can not only be represented at global level

because it is also a local and social problem (Barnett, 2007).

2.3 New institutions and climate change

The collective problem that represents climate change has fostered the emergence of new institutional arrangements to coordinate actions. Initially, international negotiation was based on the multilateral agreements only among nations. The climate change problem surfaced to the international agenda in 1988. By that time, increasing evidence had created a consensus in the scientific community that human emissions of toxic gasses to the atmosphere would lead to global warning and quick climate change. Scientist argued that if this situation were to carry on it would create a major environmental disruption with catastrophic effects on human life. Such calls of alert from the scientific community stimulated the emergence of environmental groups that started creating political pressure for the inclusion of the problem into the international agenda. The establishment of the Intergovernmental Panel of Climate Change (IPCC) in 1988 was the first attempt for further engagements of environmental issues at international level. It was after 1992, however, that the UN Conference on Environment and Development adopted the UN Framework Convention on Climate Change (FCCC) which tried to establish a coherent and comprehensive control regime and specified a series of further meetings among member States (Adede, 1995)

The recognition that climate change is a global common concern because it generates cross-border externalities and its diverse effects upon regions was evident during the FCCC. Here the process of negotiation and bargaining during the FCCC brought a major debate between developed and developing countries. For instance, developing countries considered that developed countries are responsible for most worldwide greenhouse gas emissions due to the expansion of their industry and their high level of demand for fossil fuel. For instance, the United Stated alone accounts for as much as twenty-one percent of total worldwide emissions. In contrast, 136 developing countries are collectively responsible for only twenty-four per cent (Figueres and Ivanova, 2002). Developing countries also pointed out that industrialised countries have a historical responsibility because they have led to an irrational

exploitation of natural resources in developing countries.

Developed countries considered, on their side, that population growth in developing countries have generated pressure on natural resources especially in forest areas where deforestation is increasing in a dramatic way. Also, developed countries argued that developing countries are reluctant to sign binding commitments because they perceive environmental protection as a form of weakening their sovereignty in the management of their natural resources (Urquidi, 1994). Notwithstanding such disagreement, the debate in the FCCC made clear the singular environmental problems that each country faces and that environmental policies must consider the social and economic characteristics of each country in their institutional design (Parks and Roberts, 2008). So that the FCCC enacted the principle of "common but differentiated responsibility" (CDR) that allowed a special treatment regime for developing countries and a major responsibility for industrialised countries.

Later on, the emergency of transnational actors such as NGOs with the capacity of generating knowledge, broadcast information and act as a brokers between the local and the global started to compete with the authority of national States and to generate conflict between citizens and the international governance system demanding the inclusion of new actors in the process of negotiation and bargaining within the multilateral environmental forums (Fogel, 2004).

2.4 Kyoto Protocol and Clean Development Mechanisms (CDMs)

The institutional answer to the political pressure created by international environmental NGOs lead to the establishment of The Clean Development Mechanisms, under the Kyoto Protocol framework. The main objective of the Kyoto Protocol is to achieve reductions of greenhouse gas emissions between 5 and 8 percent of the current total emission of toxic gases emission during the period 2008-2012 (Patterson and Grubb, 1992).

The main idea of The Kyoto Protocol is to create a contamination market through the exchange of certificates for greenhouse gas emission. The total of emissions according to the Kyoto target is divided in certificates of pollution among all

the member countries. Each certificate embeds a contamination right and it also represents one part of the total emission target. One important characteristic of the framework is the fact that certificates can be bought or sold by participants. If a country has a good environmental policy and reduces significantly its gas emissions below the level allowed by its endowment of certificates, such a country may sell its spare pollution rights to a third party. On the contrary, if a country is less effective in managing its pollution, it may buy pollution rights in the market (Garcia, 1992).

The implementation of the Kyoto protocol is based on the principle of CDR (common but differentiated responsibility principle) where countries with most emissions must provide funds and technological transference to developing countries for climate studies and projects. According to the CDR, developed countries are obligated to reduce emissions either domestically through Emission Trading (ET) or abroad through the use of a flexible mechanism. The latter option allows a particular country to avoid having to reduce its own gas emissions directly.

Two programmes compose the flexible mechanism programme. Joint Implementation (JI) involves a developed country investing in projects that reduce emissions in other industrialised, and Clean Development Mechanisms (CDM) involve a developed country investing in projects in developing countries (Caruso et al., 2005). The aim of a CDM is to assist developing countries to reduce greenhouse emissions and to promote sustainable development.

CDMs involve the creation of ecological projects to reduce emissions and/or projects to sequester carbon through reforestation or afforestation activities. In order to implement a CDM project, the investor country must show that emission reductions are real and unlikely to occur without the project. Also, a CDM project needs to establish the effect on sustainable development such as poverty alleviation and rehabilitation of degraded land in the host country (Aune, 2003).

The different stages that CDM projects involve can allow the participation of a broad range of actors like public and private networks, including NGOs, to develop, execute, finance, and supervise them (Streck, 2002). The idea of the Kyoto protocol is the inclusion of smallholders or communities that have problems to access to CDM benefits by allowing the participation of third party like a NGO to help bringing people together to the scheme and assuring the provision of information and the

proper management of funds.

2.5 Clean Development Mechanisms and Network Theory

The institutional design of CDMs exploits the idea that collective environmental problems can be addressed by the establishment of organic (informal) social systems. These organic mechanisms intend to deal with diverse interests and facilitate coordination among authorities at all levels, from the local to the international level. Also, in the lack of public resources, these mechanisms intend to promote an exchange of resources, information, and division of tasks, that allows bringing together an environmental project. There are two main objectives that a CDM intends to achieve: (1) carbon sequestration, and (ii) promotion of sustainable development in less developed countries.

Regarding the first objective the CDMs framework uses an scheme of incentives to oblige industries to internalise the cost of their contamination. In order to achieve such an objective each industry under the CDMs provisions are allocated a binding individual carbon emission quota that limits its contamination rights. Emissions over the assigned quota incur an economic cost that is set equal to the total cost of sequestrating an equivalent amount of carbon through planting trees or avoiding deforestation in participant developing countries.

The second objective — i.e., the promotion of sustainable development — is pursued in the assumption, and/or belief, that part of the problem of deforestation in developing countries is the lack of development alternatives at local level that are innocuous, or at least less harming, to the local ecosystems. As a consequence, CDMs entail that financial resources are directed at the local level to promote investment in sustainable development alternatives in developing countries. In this context, CDMs try to create new niches of economic activity based on tree planting programmes that aim to sequester carbon.[1]

CDMs are also designed to foster an organic system of exchange between industries in developed countries and local communities in developing countries. The

[1] Among other technicalities that CDMs have to deal with is the establishment of a carbon accounting system that allows to know the quantity of carbon that is sequestrated per planted tree.

system works as follows. One hand, industries that need to offset carbon provide the project with financial resources. In exchange, local communities offer their organisational capacity (social capital) and *natural resources* to offset carbon through planting, and caring for, trees.[2] Once the trees have been planted and the amount of carbon sequestrated by those trees accounted for, then the participant industry obtain certificates of carbon sequestration that are in turn used to fulfill their emissions commitments at home.

A major challenge for the establishment of a successful CDM, however, is the fact that neither participant industries nor local communities have the technical skills, knowledge, or *know how*, needed to manage and make a carbon sequestration project viable. In this context, CDMs allow the inclusion of transactional actors such as NGOs that can contribute the missing human resources, technical capabilities, and experience. One the one hand, NGOs can help to contact and persuade industries and other potential actors from developed countries to participate in the scheme. Also, NGOs can promote local environmental projects as an alternative to offset carbon and income generation at local level. Finally, NGOs can act as intermediaries to allow a more efficient communication between the local and the global actors. On the other hand, the experience of NGOs in generating knowledge, capacity building, broadcast of information can help to resolve the specific problems that local and global groups face not only in the implementation of planting trees project, but also in the development of sustainable projects at local level. Hence, the participation of NGOs can help to distribute resources (human, social, and financial capital) and facilitate their exchange among diverse actors.

Clearly, the connection between local and global environmental issues is the key part of the CDMs framework and the institutional arrangements of the CDMs are thought as an organic systems that work as a social exchange network rather than a formal bureaucratic institution. The next chapter considers how it is the best conceptualised and analysed. I argue that a CDMs are social networks of exchange

[2]I use italics for "natural resources" because this is a quite relevant pre-condition or factor that the participant communities have to meet in order to enter successfully a CDM forest project. They need in the first place to own land that is suitable for creating new forest areas and that has no other more profitable use. Moreover, scale is a relevant and participant communities need to have a large enough plot of land such that entering the CDM project produces positive or non-negative revenue at the price paid per unit of sequestered carbon.

that can be analysed on the basis of exchange theory and social network analysis.

Chapter 3

The theory of social exchange

3.1 Introduction

This thesis focused on how the creation of environmental networks under the carbon scheme creates/solves co-ordination failure at local level and affects the welfare of indigenous communities and the outcomes of carbon projects. Problems of co-ordiantion in the network has been analysed from many theoretical perspectives. Studies of social capital have dedicated more attention to analyse how changes in the relation among persons in a given social network facilitate the action of actors (Coleman, 1988). Here, social relationships are considered as a capital that can increase the functioning of the social networks by fostering social cohesion, norms of reciprocity, and trustworthiness (Putnam, 1995). Network diffusion approach has developed research about how innovations, actions, and practices are transmitted among actors through interpersonal contacts (McAdam et al., 2008). This approach intends to explain why social practices and innovations diffuse at different rates and conditions in organisations, institutions, social movements, and social networks (Strang and Soule, 1998) (Burt, 1987) (Givan et al., 2010). Studies in collective actions highlight how interest groups do not always lead to the pursuit of common benefits (Olson, 1965). This approach tries to analyse the logic of the interest groups by identifying size of the group, membership, participation, and individual incentives (Oliver and Marwell, 1988). From these studies we learn how actions, practices, and values in a social context are shaped and how such social relationships influence individual behaviour. What we know little about is how such social relationships

entail power relationships and their implications in a given social network.

In this context, this thesis selects Social Exchange Theory (*SET*) as the main theoretical approach for two main reasons. First, SET allows the study of power relationships from a dyadic (micro) perspective. The primary aim is to observe a pair of actors during their process of exchange to identify the value of the relationship by analysing the intrinsic characteristic of actors (role/function, resources, context) and identifying their degree of dependency in such a relationship. Second, SET helps to study how power relationships among actors modify the structure of the network by analysing changes in the degree of dependency among actors over time and their strategic alliances in the network. The more dependent an actor is in a relationship, the less powerful and vice versa. This thesis focuses specifically on Emerson (1972b)' approach because his work is the most important attempt to provide a single theoretical framework of social exchange by unifying the ideas of major representatives of SET such as Homans (1958), Kelly and Thibaut (1978), Blau (1964) among other scholars. One of the principal critics of the theory has been its similarities with the economic rationality and reductionist reasoning. Indeed, according to the economic ideas individuals always seek for the highest return (reductionism) at the moment of establishing a relationship leading actors to analyse their expecting utilities (rationality) before taking any action. Emerson counteracts such critics by specifying that the relationship (dyad) in SET is the basic unit of analysis while the economic approach is the individual. In this context, SET analyses actors as part of an organic exchange context. Then, actors take actions not only in terms of their rational expectations, but also in terms of their own values and experiences during the process of exchange. In contrast, economic approach describes the behaviour of individuals in isolation under a non-historical process.

Also, most critics focused on the tautological argument of SET. In fact, the idea that people choose what they value or they value what they choose can be seen as a circular argument. SET counteracts such critics by clarifying that such tautological problem is solved by assuming the relationship as the unit of analysis because it allows to measure the value that each actor gives to his/her exchange partner without generating a circular argument. Indeed, the relationship (dyad) is the medium through which actors provide a specific value and reciprocate actions

to their exchange partner. So, the perception of each actor is contingent on the perception of the exchange partner. Then the establishment and evolution of a given relationship depends on the positive perception among two actors, a fact that not always happen because actors can differ in perceptions Emerson (1972b). The next section will describe in more details SET approach.

3.2 Social Exchange Theory approaches

Social exchange is not a theory, but a frame of reference where many theoretical frameworks converge (Emerson, 1976) mainly from psychology, anthropology, sociology and economics. There are two general positions to social exchange: the collectivist and the individualistic approach.

The collectivist approach considers that social exchange is shaped by social values and rejects the idea that economic and/or psychological motives lie behind exchange among individuals. This approach attaches symbolic values to exchange items, which have value not because of intrinsic qualities, but because of what it represents within society (Ekeh, 1974). For instance, in western culture Christmas gifts are not valuable, or are not supposed to be valuable, for their price, but because it represents the incarnation of feelings and social values such as love, friendship, kinship, commitment, peace, and gratitude — some gifts are in fact priceless such as an old family picture. The tradition of exchanging gifts at Christmas is intended to create an opportunity for social interactions among individuals. The aim is not to obtain a better gift, but to build-up social solidarity.

In contrast, the individualistic approach considers that the final purpose of social exchange is to obtain individual rewards (gains). In this framework individuals are thought to derive specific benefits from social relations, which is why they actually relate to each other. Moreover, individuals are thought to anticipate potential rewards, assigning expected gains to every potential partnership, and to choose the best alternative among the set of all available choices.

According to Blau (1964), individual objectives (objective function) in social exchange are determined by the economic and psychological motives of individuals. That is, individuals associate with each other in order to fulfil material or immaterial

needs — material needs being those that are satisfied by consuming goods and services and immaterial needs being those that are satisfied by experiencing personal feelings such as love, power, and reputation.

The assumption that individuals try to fulfil their needs (objective function) makes it easier to clarify the mechanisms behind social exchange. Emerson (1976) points out that even if individuals take pre-established social values as a guide for their current and future actions, any decision an individual takes is ultimately directed to seek self-interest. For instance, people that engage in charity may be trying to acquire social reputation, peace of mind, or other personal satisfaction, rather than be genuinely concerned about the welfare of the poor.

The collectivistic approach differs essentially from the individualistic approach in the idea that actors engage in social exchange to build up networks of social relations or solidarity regardless of motives that are behind each actor. In this context, the collectivistic approach is interested in the consequences of a given exchange process in terms of the building of social solidarity and cohesion within a group rather than in its material consequences for the individuals that engage in it. In contrast, the individualistic approach considers that individuals engage in social relations to fulfill individual needs rather than collective goals and rejects the idea that individuals may act to preserve the interest of the society as whole.

The present thesis will use the individualist approach of social exchange because the objective is to analyse how in a given governance system individuals behave in the presence of inequalities of power and resources. Clearly, the difference of power among actors, in terms of the control over valuable resources, the position access to those resources, and the considerable influence that one actor can exert on one and another, have impacts on the results of a given policy.

3.3 Concept of Social Exchange

Social exchange theory is based on the idea that some interactions among individuals do not pass through the market. Consider for instance the case of an exchange of dinners among friends. Each dinner establishes intrinsically a commitment for the guest to reciprocate at some unspecified point of time in the future. How do

individuals measure and agree upon the value of something that has no market price? Why should today's guest spend time, resources, and effort to fulfil a lax and unspecified commitment that cannot be legally enforced?

According to Blau (1964), the association between two or more individuals is the primary force that leads to social exchange. Such association is normally defined as the force that connects one person to another and presupposes the existence of economic needs and/or psychological motives that foster the formation of a relation. Following this idea, Emerson (1976) suggests that individuals seek to form associations with the most valuable people that they have access to — and that every potential association is evaluated in terms of its expected benefits. The formation of an association between two persons involves investments; *giving* in the expectation that such investment will generate a commitment to reciprocate on the behalf of the other. In this context Ekeh (1974) believes that the initial investment in an association is the pre-requisite for the generation of trust. For instance, individuals who engage in a new social relation start with few small commitments at the very beginning in order to generate trust and, over time, if the relations becomes stable, the type and relevance of the involved commitments change and increase.

Emerson (1976) highlights that social exchange happens exclusively when the involved persons have the expectation of meeting each other in the future even though today it is not evident to them how likely and relevant such an encounter will be. This implies three main assumptions.

First, social exchange is only possible in the context of repeated interaction. If individuals' actions are repeated over time, these actions can be seen as part of an organic environmental exchange that allows the analysis of observable behaviour patterns. In an exchange of dinners among two people for example, the repeated action of dining together helps to see the strength of the friendship bond and the degree of trust that exist. Hence, dining helps each actor to evaluate future, and probably more substantive, interactions. In contrast, an encounter with someone that one does not expect to see ever again create neither opportunities nor incentives to engage in social exchange because no relation can exist.

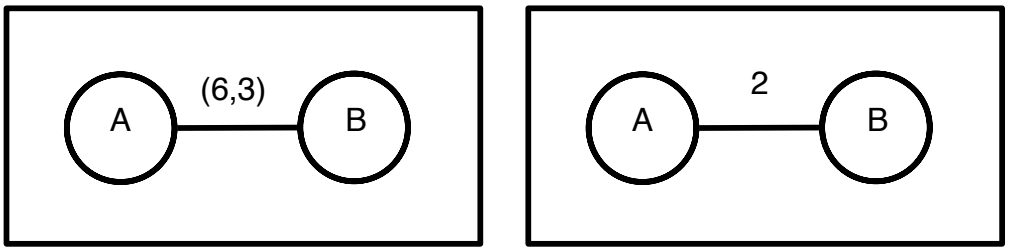
Once within the context of repeated actions individuals have incentives to reciprocate the actions of others, not only to foster further social interaction but also as a

mechanism to regulate behaviour. Consider for instance two waiters, A and B, that do a mutual favour to cover each other when one of them cannot work. Both A and B have incentives to behave nicely to the other and return the obligation to keep the mutual commitment in future interactions. Conversely, suppose that A always covers for B, but B fails to reciprocate the favour whenever the opportunity arises. In that case, A can spread the news about B's misbehaviour among other colleagues and the reputation of B may suffer. Once B has build up a bad reputation, no one will do favours for B. This kind of social sanction creates incentives for actors to behave well when there are repeated interactions.

Second, social exchange in principle entails unspecified obligations because the terms of exchange are not negotiated and hence it creates no binding obligations. Indeed, non-negotiated social transactions create intrinsically a commitment to return the benefits an individual receives. The commitment, however, does not specify the form in which the obligation will be discharged. It may be satisfied by delivering material goods, services, or actions. As a consequence, this non-negotiated transactions is not binding and there are no formal institutions that regulate the form, the time, and the quantity of the return. Non-negotiated transactions establish diffuse obligations and its policing is left to the discretion of the involved parts (Blau, 1964).

New approaches of social exchange, however, consider that actors may negotiate the terms of the transaction in the process of social exchange (Molm, 1997). Consider, for instance, a father and a son who negotiate good behaviour at school in exchange for free time with friends on Saturdays. In such a case, the son knows in advance the obligations, the time, and the rewards that she/he can expects if she/he behaves at school. Here, actors have determined all the aspects of a transaction during the bargaining process: form, time, and object. Obviously, not all three aspects of a transaction have to be determined in the context of social exchange and a mutual agreement can have different degrees of formality.

This thesis will consider the analysis of social exchange where both negotiated and non-negotiated transactions take place. I expect social interaction to be dominated by negotiated transactions, as CDM projects involve specific obligations under the Kyoto framework. For instance, industries that need to offset carbon provide the project with financial resources. In exchange, local communities offer their or-



(a) Asymmetric value (b) Symmetric value

Figure 3.1: The *dyad* relationship between A and B, A;B, and the value that each actor assigns to it. The line between A and B is called a link and the value that each actor assigns to the relationship is written above the link. In panel (a) the relationship is assigned an asymmetric value: A assigns a value of 6 and B assigns a value of 3 — and we write the value of the relationship as vector $(6, 3)$ with the first entry containing the value assigned by A and the second entry containing the value assigned by B. In panel B the relationship is assigned a symetric value $(2, 2)$ and we simply write a value 2 above the link for simplicity.

ganisational capacity (social capital) and natural resources to offset carbon through planting, and caring for, trees. These obligations are formally binding and establish time, quantity, and form of exchange. However, it is expected that some interactions in the CDM project in Chiapas will involve non-negotiated transactions. For instance, the participation of NGOs can involve a series of exchanges like advice, knowledge, or broadcasting of information. Many of these resources are provided by the NGOs in an informal way and there are no specific commitments about the form, the time, and the quantity of the exchange. Furthermore, many NGOs participate in this kind of exchange not because they expect a monetary return but because they pursue other type of benefits such as reputation and/or altruism.

Finally, the basic unit of analysis in social exchange must be the relation rather than individuals or actions. And the basic relation is the *dyad* or the relationship between two actors or nodes (see Figure 3.1). We refer to relationship between actor A and actor B as the relationship A;B. In general, an actor can be an individual or a collective entity, such as an organisation, a club, or an State. The specific psychological needs and economic motives of each partner in a relation may be valued in a different way by different individuals. Moreover, the intrinsic value of each individual action is determined by the contingency character of the relationship between two actors (Emerson, 1976). Consider, for instance, the case of an exchange dinners between two people, A and B. Each individual has her own specific needs.

Suppose that A is shy, lonely, and needs companionship whereas B is popular and does not need of companionship. In this context, the relation of A;B is contingent to the needs of A and B. That is, the relationship between A and B is intrinsically defined by the fact that A finds the relationship more rewarding than B. Then, A has more incentives to keep the relationship alive and to show active interest. Hence, it is not surprising to find that A invites for dinner B more often than B invites A for dinner. As a result, we can say that the value of an exchange action between two individuals is determined by the rewards that each person gets, who is the most attractive and for how much, and the contingent character of the relationship itself rather than the value of an individual or an action considered in insolation.

3.4 Elements of social exchange

Social exchange embeds an ongoing process where many conditions can affect its development. In this context, there are three elements that determine the specific features in a given social exchange process: a) actors, b) resources, and c) types of exchange.

As we have seen the basic unit of social exchange is the relation. A relation can be formed by a person; a collective actor such as corporate groups or organisation, a role-occupant such as as neighbourhoods or States (Emerson, 1962). Actors in social exchange take voluntary actions and actions are motivated by their expected returns. There are two approaches for explaining what motivates an individual to take such actions. On the one side, the economic approach highlights self-interest as the main mechanism by which people give something to others. In this scenario people take conscious *giving* decisions based only in the potential reward/benefit that they will have in return. So, individuals expect to engage in relationships where there is reciprocity. The higher the *return*, the most likely an individual will engage in social exchange (Emerson, 1976).

In contrast, social exchange theory considers that individuals are motivated not only by the potential material rewards/returns but also by the social values that are intrinsic in a given social relationship (Emerson, 1976). Here social values involve some sort of norm that has been transmitted from individual to individual over a

long period of time and that has become socially acceptable. In other words, the social exchange approach assumes that individuals do not take rational decisions in the sense that people evaluate all the time, all potential actions, and all expected gains. Instead, the social exchange approach considers that during the social process people take decisions and that some decisions have proven to be more successful than others over time. Then, those successful actions are imitated and replicated by others and become social norms. Hence, when an individual takes a decision she/he takes into account, though not necessarily explicitly, previous social experience, in the form of norms. In other words, individuals take decisions considering all the possible actions that have proven to be rewarding in previous instances.

This thesis will not consider the motives that are behind the decision-making of actors. Instead, this thesis is only interested in understanding the process of exchange among actors regardless of how actors take actions, whether rationally or not.

Actors exchange valuable resources/benefits/rewards. In social exchange an actor treats an object/action as a resource only if there is another actor that also values the object (Emerson, 1976). In other words, in an exchange relationship, the supplier and receiver can have two distinctive and independent values of the exchanged resource. Hence, the resource has a contingency character which is an attribute of the relationship between two interacting actors rather than an attribute of the resource. In this context, *resources* refers not only to valuable material goods and services, but also valuable actions that satisfy personal feelings such as love, power, reputation or social approval.

Due to the fact that an exchange relation entails a longitudinal process, each actor has to engage in a series of investments in order to obtain benefits/rewards/resources. This investment helps to strengthen the exchange relationship and ensure the continuity of exchange relationship over time. However, this exchange process implies that each actor incurs a series of costs to keep the relationship going. According to Molm (1997) an exchange relationship implies many kinds of costs such as investment costs, direct costs, and opportunity costs. Investment costs refer to the time and effort spent to start or open a social relationship in a context of maximum uncertainty where there is an unknown probability of eventual pay-off. If the re-

source is a material good, then the investment is completely 'lost' in the exchange process. *Opportunity cost* refers to all the alternatives foregone because an actor has engaged in an specific social exchange. For instance, devoting time to a friendship relation can imply less time to do exercise or other personal activities. Then, there is a trade-off between keeping a friendship or doing exercise. If the friendship relationship is very rewarding the opportunity cost will be the time forgone that is not spent in the gym. Finally, *direct costs* are those spent on the maintenance of an ongoing relationship where there is an empirically learned, and somehow stable, probability of return.

However, for Blau (1964) costs also have a contingent character. This implies that the value of costs are difficult to determine because they depend on how each actor perceives his/her own costs in a social exchange. Consider, for instance, an actor A who needs advice and actor B who finds advice-giving very rewarding. If A asks B for advice, B does not bear a cost but obtains a reward from giving the advice. Molm (1997) agrees with Blau and points out that if the benefits are larger than the costs, then actors have a positive outcome (or say gains, profits, rewards, reinforces, or utility). In contrast, if costs are higher than benefits, actors have a negative outcome.

There are three main assumptions about outcomes. First, benefits should outweigh costs in average. In other words, actors should not participate in social exchange if they have to bear systematic looses. Moreover, actors should normally accept only a limited degree of uncertainty about the probability of losing in any given transaction. And such a limit depends on the needs/wealth of each actor and the scarcity of the resource being exchanged. Second, the value of an outcome is a decreasing function of the units received. This principle of "local satiation/deprivation" or "diminishing marginal utility" implies that the value of a resource depends on its relative scarcity and the actor's needs. For instance, companionship is more valuable for a shy person than for popular person. This is because the cost in time and effort to find a friend is larger for a shy person than for a popular one.

The local satiation/deprivation assumption also implies that some outcomes can generate a reduction in the value of other outcomes that share the same *domain*.

Consider, for instance, the case of a chess player A who usually plays every saturday with either B or C. Both B and C fulfill the needs of A to play chess. However, the time that A spends with B reduces the value of time that A spends with C and vice versa. In such a case, B and C share the same domain in their relation with A because they compete with each other for the time of A. Third, the amount of valuable resources obtained in a series of transactions from a single source should become neutral over time (Homans, 1958; Emerson, 1976). To clarify this last point consider, for example, a mother that always gives a lollypop to her child when she returns from work. If the mother wants to give a little incentive to the child for tidying up his/her room, then giving the lollypop everyday will not do because the child will take the lollypop for granted. As a consequence, the value of the lollypop will become neutral in the exchange relation between son/daughter and mother.

It is important to notice that benefits (or say outcomes, gains, profits, rewards, reinforces, or utility) in a social exchange are not always mutual. This suggests the existence of three types of social exchange.

Direct exchange refers to a relationship in which reciprocity is limited to two actors —say the relation A↔B, where the double arrows indicate that in this relationship benefits flow in both directions from A to B and from B to A. In contrast, generalised exchange refers to the situation when reciprocity is indirect and involves at least three actors — say the relation A→B→C→A, where the single arrow indicates the direction in which the benefits flow. This is a system in which all parties give something to one exchange partner but the return comes from another partner in the same system. In others words, the benefits that each actor obtains from a social exchange are indirect and, in that sense, non mutual (Ekeh, 1974). Finally, we say that productive exchange is present when the benefits depend on the cooperation of each single actor in the process of social exchange (Molm, 1997). In such a context the lack of contribution of a single actor leads to the loss of benefits for everybody. For instance, the construction of a leather chair needs the coordination of both a carpenter and a furrier. If either the carpenter or the furrier fails to do his/her job, then no final outcome is obtained. As a consequence, neither of them can have their reward.

This thesis will primary analyse a system of generalised social exchange, where

nonetheless some productive exchange is possible. This is so because CDMs projects, according to the Kyoto framework, intends to coordinate actions among many actors with different interests (industries, local groups and NGOs) to establish an exchange of resources, information, and division of tasks that allows bringing together an environmental project. As a consequence, we expect that the exchange of resources will bring indirect benefits not only for the involved actors but also for the aims of the international environmental policy. The lack of coordination among actors can lead to the failure of the whole project. In general, coordination failure can prevent the accomplishment of the outputs of the international environmental policy to mitigate the climate change.

3.5 Exchange Relations and Networks structure

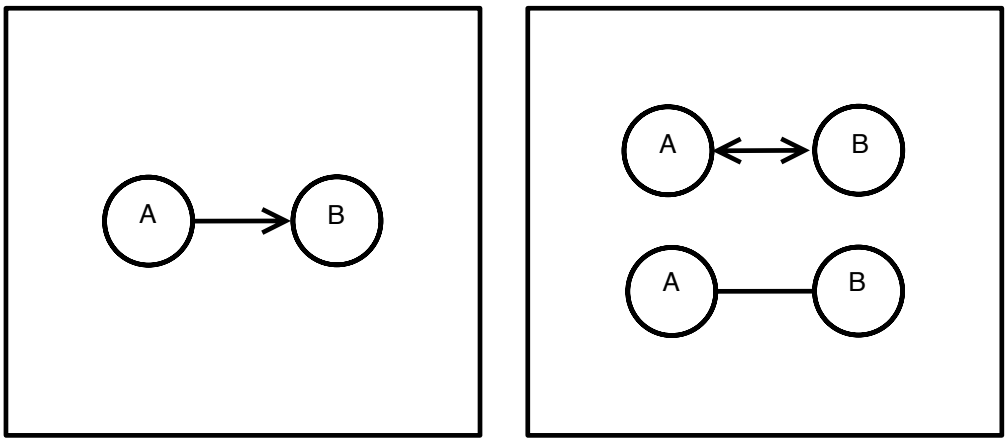
According to Cook et al. (1983) an exchange network is defined as a specific social structure formed by a set of three or more connected exchange relations. Here, each connection in the network can create opportunities of transaction among actors. Building upon on the concept of exchange network, Collins (1981) points out that the specific social structure of a network affects not only the opportunities of transaction but also constrains the capacity of actors to gain benefits. This is because actors are embedded in social exchange relations that are beyond their control and those social relations determine the consequences and the conditions under which actors behave in the network.

Furthermore, Yamagishi et al. (1988) considers that the set of dyadic relations available to an actor is the key factors that allow determining if he/she can get benefits/losses in a given exchange network. According to the author, the connections of dyadic relations in a given exchange network work in such a way that events occurring at a specific place in the network have predictable effects in other parts of the network. However, for Cook and Emerson (1978) not all the relations in an exchange network imply the existence of a connection between actors. In this context, Emerson (1972b), points out that a connection exists only if the magnitude (frequency of interactions) of a transaction in one relation is a function of the transactions in other relations. Consider, for instance, the case of an environmental

network exchange where three NGOs A, B, and C, exchange two different kinds of resources: information and financial capital. In this case if A;B exchange information and B;C exchange financial capital, we can say that there is not a relation B-A-C, this is because both relations A;B and B;C provide a different resource to A. In other words, the exchange relation A;B and A;C *are not in the same domain* so the relation between B and C does not exist. In contrast, if B and C exchange only information to A, then B and C are connected because share the same domain with respect to A.

Emerson (1972b) says that there are at least four types of connections in an exchange network: (a) unilateral connections, (b) bilateral connections, (c) positive connections, and (d) negative connections. First, we say that an unilateral connection from A to B exists if the establishment of a link allows the flow of resources/information/behaviour from A to B but not from B to A (see Figure 3.2 panel (a)). A bilateral connection exists if a unique link is enough to exchange from A to B and from B to A (see Figure 3.2 panel (b)). For example, if A sends an e-mail to B the information can only flow in one way in a single letter. This is because the nature of the link (the e-mail) does not allow the use of the same link to answer back. If B wants to answer back to A, it is necessary for her to send a different communication and pay for it (this is illustrated by Figure 3.2 panel (a)). In contrast, if A calls by phone to B the flow of information from B to A would be allowed in the same phone call (bilateral) (this is illustrated by Figure 3.2 panel (b)). That is, A establishes a link with B where the information can flow both ways: B receives the information transmitted by A and can answer back regardless the fact that A bears the whole cost of connection (remember, A initially did the call).

Second, according to Emerson (1972b) negative connections exist if exchange in one relation is contingent to a non-exchange in the other. Consider, for instance, the case of a firm B that buys certificates of carbon reduction from a local community C_1, where C_1 is a local community that establishes a planting tree project to sequestrate carbon in order to sell carbon reduction certificates to the industry. Suppose further that, due to a binding contract, B must buy all its carbon reduction certificates from a single source. Now imagine another local community C_2 that starts imitating C_1 and also offers carbon reduction certificates to B. In this new context, B can fulfill



(a) Unilateral connection (b) bilateral connection

Figure 3.2: Unilateral and bilateral connections. In unilateral connections the arrowhead indicates the direction in which resources flow. Bilateral connections are denoted by a double arrow, or simply by a line with no arrowheads, to emphasise that resources flow in both directions in this type of relationships.

its needs of carbon reduction by acquiring carbon certificates from either C_1 or C_2, but not from both. Then we can say that C_2 is an alternative exchange actor to B. So if B buys the carbon certificates from C_1, C_1 obtains the contract and C_2 gets nothing. Hence we can say that the relation $B;C_1$ is negatively connected to the relation $B;C_2$ because C_2 introduces a negative or competitive factor to the exchange network. In contrast, Emerson (1972b) says that a positive connection exist if an exchange relation is contingent on the exchange in other relation. If we consider for instance the same case described above, but now let N be an NGO which serves as a broker between B and $C = (C_1, C_2)$. Then we can say that if B wants to obtain the carbon certificate from C it is necessary for B to interact with N to facilitate the flow of resources from B to C and from C to B. If N allows the connection between B and C, there is a positive connection. In most cases exchange networks involve mix of connections, positive and negative.

3.5.1 Power and balancing operations in exchange networks

Emerson (1962) argues that a power relation must be defined in terms of the degree of dependency of each actor in the network. Furthermore, Emerson says that there is a close relationship between the types of connection and the distribution of power in an exchange network.

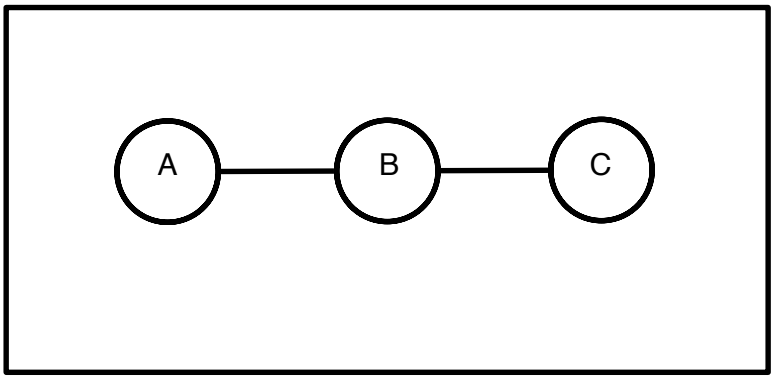


Figure 3.3: Three-way connections

Following Emerson's ideas, Yamagishi et al. (1988) stress the type of network connection as the main factor that determines the locus of power in a network. The authors argue that both negative and positive connections involve different exchange processes. In this context, relations among members of a network are not only determined by the dyadic relations A;B or B;C, but also by relations that imply A-B-C structures (See Figure 3.3).

In Figure 3.3 A is connected to C only trough B. We say that a positive connection exists if B allows properly the connection between A and C. In this case, however, B can benefit from the fact that it is in the way between A and C and charge a communication fee. We say in that case that B is not offering facilities for the relation between A and C so that B is generating a negative connection between A and C (Yamagishi et al., 1988). If there are negative connections alone, negative links determine the distribution of power in the network. On the contrary, if there are positive connections alone, local scarcity of resources determines the distribution of power in the network — where local scarcity is determined by the whole amount of resources in the network and the distance of each node from one another in the network. Finally, in a mixed network the distribution of power is a joint function of network position and local scarcity (Yamagishi et al., 1988).

Stevenson and Greenberg (2000) agree that type of link determines relative power in a network. Moreover, the authors, consider that an actor's position can affect her power and generate power imbalance in the network. For instance, an actor that is centrally located can be more successful than peripheral actors because actors centrally located have high influence. In contrast, peripheral actors can be powerless due to their dependent position and the difficulty to access to the resources of the

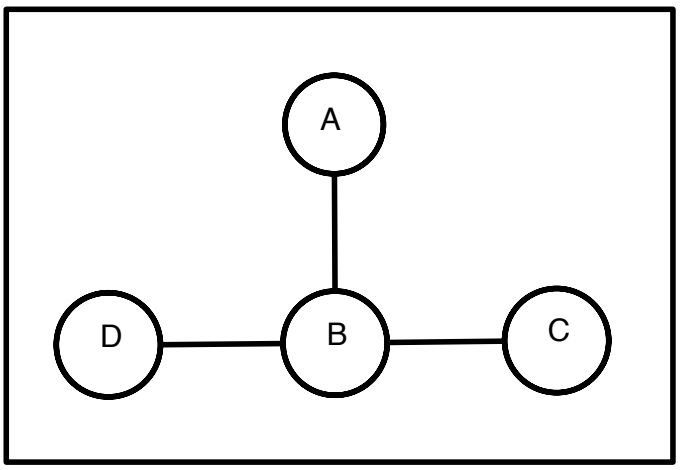


Figure 3.4: Central and peripheral connections

network (Stevenson and Greenberg, 2000). Figure 3.4 shows an example of the relationship between central and peripheral actors, where B is central and A, C and D are peripheral.

Furthermore, Marsden (1983) says that the existence of weak actors, with few possibilities of contact exchange, can lead to price-making behaviour or brokerage. In this context, individuals who intend to establish a weak relationship may be required to pay an entry fee before they are allowed to benefit from membership. In the case of Figure 3.4, B has a central position because B is the only network member who can facilitate the exchange of information and/or resources from D to C, D to A, and C to A. If C and D have no chance to find an exchange partner capable of connecting them, and the benefits of exchanging are high, B may possibly ask a fee to C and D for its connection services.

Diani (2003b) agrees with Stevenson and Greenberg (2000) and Marsden (1983) views. However Diani points out that position can affect the chances and forms of participation. For instance, strong positions can block the exchange (of information and/or resources) in the network. In contrast, weak positions may facilitate, moderate, or allow the diversification of exchange. Granovetter (1973) stresses the idea that weak links can generate more cohesion in the network (See Figure 3.5).

In this context, Figure 3.5 gives and example of how weak links may erode the power of a strong link. In Figure 3.5 A has a strong link with B. Given the strong nature of the link, A may extract a rent from its relation with B. Now if B creates a weak link with C this is not enough to challenge the power of A in its relation with

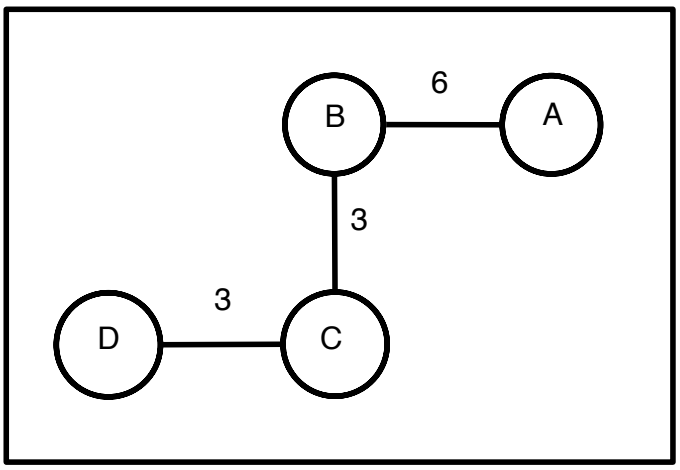


Figure 3.5: Strength of weak links

B. But if C is connected with a weak link to a third node, D, then the polling of the weak links between B and C and C and D may be enough to reduce the power of A in its relation with B. In other words, the power of weak links may help to discipline A in its relationship with B.

Emerson (1972b) considers, on the other side, that power balancing operations in a network can create changes in the balance of power. In this context Emerson identifies at least four main types of balancing operations: (1) withdrawal, (2) coalition, (3) role differentiation, and (4) division of labour.

Balancing power operations occur when, for instance, an actor withdraws from a exchange network when the costs that an actor have to pay for participating in the network exceed the maximum she/he is willing to bear. Power balancing also occurs when new actors join/enter an established group and induce new relationships or new coalitions among old and new members — which may ultimately induce the split of the group/network. In this context, a coalition can be thought as two different effects. One effect comes as the consequence of actors behaving as independent units but *taking coherent actions* that allow them achieve an aim that eventually helps all to fulfil their own individualistic interests (i.e. they behave as a *cartel*). Clearly, this kind of coalition tends to debilitate the power of strong actors because the number of actors behaving in the same way in a coalition can outweight the power of the strong actor. The other, is the consequence of the formal union of two or more actors into a single group with the explicit propose of behaving as a single entity with well defined aims in terms of the group. In that case, the power of weak actors

increases through the collectivisation of their actions.

Role differentiation is also a form of withdrawal, however, instead of quitting the network the actor changes domain within it. This balancing operation implies a process where an non-powerful actor in a unilateral monopoly spreads out his/her domain options and withdraws from the domain in which he/she is more dependent. This changes the power structure of the network and adds value to the initially weak actor, making him more powerful with respect to the monopolist and other potential competitors.

For example, consider again the carbon sequestration project but now, besides the original community C_1, there is a second community C_2 entering the network. As before $C = (C_1, C_2)$ have a relation with N (the NGO) and N has a relationship with B (the buyer or entity who brings financial capital to the project). Hence, in this context the relation C_1;N belongs to the same domain as the relation $C_2; N$. Clearly, in this context it is likely that all local communities C will be less powerful than B or N in this exchange network.

Suppose that C_1 would like to perform a balancing power operation. Various things can be done. First, C_1 can give up its relation with N and provide coaching to its former competitors C_2 using its technical and practical knowledge necessary to establish a carbon sequestration project. This is role differentiation because now the relation between $C_1; N$ does not share the same domain than the former relation $C_2; N$. Instead of giving up the relation with N and give advice to its competitors C_2, C_1 can offer advice to N on how to build up a relation with new communities. Here C_1 remains in the same domain as a provider of carbon sequestration but add more value to its resource by giving advice on how to build up relationships with communities similar to it. A division of labour emerges.

For Emerson (1972b) both role differentiation and the division of labour are balancing operations that may bring cohesion to a network. This is because the former generates new connections among actors in the network while the latter modifies current functional connections among actors in the network.

Summarising, we can say that, given a social structure, social exchange theory tries to identify mechanisms/strategies that change individual behaviour and outcomes in imbalanced relationships. In this context, power implies dependency

relationships between two or more actors. The theory shows that the use of power can, and in most cases does, change the degree of mutual dependency through cost reduction and/or balancing operations. For more details of power structure see section 11.2.

Chapter 4

Methodology

4.1 Introduction

As noted earlier, this thesis focuses on the implementation of a tree plantation project called the *Scolel Te* project. This case study will utilise both qualitative and quantitative research tools, and use social exchange theory as well as social network analysis (SNA) as a main theoretical framework.

I use social exchange theory (SET) and social network analysis (SNA) as a main theoretical approach because network theories can help to identify the problems of coordination that emerge in the implementation of the *Scolel Te* project. Specifically, these methodologies can help us to understand the principal constrains upon the local carbon projects participating in the international environmental agenda established by the Kyoto protocol. According to network theory, a network is a set of nodes linked by some kind of relationship which operates in an embedded logic of exchange that promotes a better performance for actors through resource pooling, cooperation, and coordination (Uzzi, 1996; Diani, 2003a).

In this context, we argue that the *Scolel Te* project can be seen as an exchange network for various reasons. On the one hand, the carbon sequestration project involves a collective effort to create an ecological project to reduce carbon emissions through reforestation and afforestation activities in local communities in Mexico. The different stages involved allow the participation of a broad range of public and private actors — including transnational actors such as environmental NGOs — to achieve the coordination of many interests in the pursue of a common aim: reverting

global climate change. On the other hand, the *Scolel Te* project can be viewed as a social structure in which actors are embedded and have access to exchange of information, resources, and influence. In this context, the success of the project depends of the conditions of exchange and the flow of resources among actors at the local, national, and international level.

This thesis analyses two dimensions of the *Scolel Te* network: (1) the dyadic relationships among actors and, (2) the structural properties of the whole network. The former focuses on the relationship between local communities and AMBIO. Here, SET can help to identify coordination problems that emerge at local level given the intrinsic characteristics of an actor and its main concerns. SNA, on the other hand, can help to identify the consequences of a given network structure on an individual's behaviour and influence. In particular, the analysis focuses in understanding the power structure of the whole network and describing how this affects the main dyadic relationship at local level. Clearly, this double dimension approach intends to give a deeper account of the problems of coordination in environmental networks from a local perspective and its interactions with the international dimension.

4.2 Data and research design

The present thesis collected relational data following a Social Network Analysis design. Relational data collects information about ties, contacts, and other kind of attachments that one individual has with others (Scott, 1991). Two main considerations were taken into account when deciding the data collection method. First, we identified that the target population is the set of all actors who participate in the *Scolel Te* project. This is a finite and relatively small population, with around 50 participant communities. Hence, it was decided that collecting a *census* rather than a representative random sample was the correct data collection approach (I come back to this in the next paragraphs). Second, it was decided that the thesis should try to perform a *whole-network* rather than a *egocentric network* analysis because the main research questions concerned a set of interweaving relationships embedded in a specific space rather than following a focal actor/node and its relationships with others (Marsden, 2005). Besides, whole-networks analysis is related with studies of

network structure and network process, which usually involve different types of relational ties (i.e., multiple relation analysis, see Koehly and Pattison (2005)). For all these reasons, and following DeVaus (1991), it was decided that the researcher should work with a census rather than studying a representative sample.

Collecting information of a whole-network can be difficult, specially because it requires the identification of a network's extent and its density. According to Scott (1991) the establishment of boundaries can help to delimit the extent of a network. Also Scott (1991) points out that most of the time boundaries are artificially constructed for practical reasons and that those boundaries should be related to the specific research questions that the researcher tries to address.

In this research the boundaries are established in the most conventional way. That is, boundaries of the network were delimited by strict participation in the *Scolel Te* project at the moment of the data collection. However, the structure of the *Scolel Te* project shows that the location of participants vary dramatically. Hence, interviews had to be done in different regions in Mexico and the UK. Obviously, the existence of unknown actors located in different locations created monetary and time costs. For that reason this thesis established three main restrictions in the collection of data.

First, this research considers each community as a single member/node even when communities are involving by many members, for two fundamental reasons. On one hand, the cost in terms of time and money could be very high if we considered sampling all community members. Moreover, most individual participants concentrate or cluster in a small set of local communities. As a consequence, it was decided that not much information would be lost if one considered each participant community in the *Scolel Te* project as a single actor regardless the number of affiliated individual members. This approach ensured that, within the budget constraints, the researcher could obtain a general overview of each local community in the network rather than concentrating the analysis in just a small subset of the participant communities and surveying all its individual members. For these reasons, this thesis chose the community's representative to the carbon project as the main respondent. Second, generally the land tenure in Chiapas and Oaxaca is communal and all people in a community have to reach an agreement before individuals can

take any action. In the case where a community has no communal land tenure and an individual can in general act alone, they also need the agreement of the community authority to take any action. In any case, the *Scolel Te* project is under the public scrutiny of the whole community. This means that there is always someone who takes the role of representing the community in the *Scolel Te* and takes the lead role. If the project is established on a communal basis the community authority is the principal manager of the project. By contrast, if the project is established on an individual basis, the participants have to chose a representative to the project who may speak on behalf of the group within the communal institutions or authority. Clearly the political structure of local communities facilitates the acquisition of relevant information about participants because it centralises the information in a few hands. Hence, interviewing individuals besides the community representative is unlikely to bring much additional information. It was felt then that community representatives were the most convenient respondents. Clearly this decision can affect the accuracy of the research, because some participants are under-represented. However, this thesis considers that this strategy is the most effective way to have a balance between the size of the sample, the accuracy of the information, and the data collection costs.

Third, given that this thesis is interested in the exchange relationships among actors in the network, participation in the network is defined according to the SET approach. According to Emerson (1972b) social exchange happens exclusively in a context of repeated interactions among actors. Because, actors who engage in a series of interactions can have more chances to generate relationships of reciprocity, friendship or trust that are difficult (if not impossible) to emerge in a context of a single transaction. Indeed, for Emerson (1972b), single transactions among actors do not create incentives to engage in a social exchange because no relation or tie can exist. For that reason, this thesis considers that an actor is participating in the network when it has been participating constantly in the process of exchange in the *Scolel Te* project. As a result, the analysis does not include carbon buyers because this thesis considers that firms only access to the *Scolel Te* network when they need to buy carbon certificates. So, we consider that buying/selling transactions are not relationships by itself and therefore buyers are not considered relevant for

the analysis.

4.3 The analysis of the data

The study collected Cognitive Social Structure (CSS) data, which consist of collecting the set of beliefs/judgements that each participant of a network has about all other participants (Marsden, 2005). Specifically, these data identify the different ties and interdependencies among actors in the network. Clearly, the use of 'CSS data' can help to handle the collection of multiple relational data within a whole network. The collection of CSS data is done following three steps: (1) the establishment of a preliminary fixed-list of the possible cases, (2) the application of a questionnaire, and (3) semi-structured interviews with key participants. In order to determine membership key respondents were asked to recognize participants from the fixed-list and invited them to add members who were not included in the list. This technique allows to establish who are the participants involved in the network. One fundamental problem related with this technique is to choose the correct informant, especially in the beginning of the research. This is because there are actors/nodes that are more informed than others and who can help to collect information more quickly and efficiently. According to Marsden (2005), centrally located actors can provide major accuracy in the list because their chances to exchange information are larger than peripheral ones. In this study case, I chose AMBIO as the principal informant. Indeed, I assumed that AMBIO was more likely to have a central position than others participants for two reasons: first, AMBIO is in charge of the *Scolel Te* project at local level. It provides assistance to the local farmers for entering the project and establishing their tree plantations. Second, given that AMBIO is the principal representative of the carbon project at local level, AMBIO has contacts with international actors as well as with other national organisations. Later on, as the process of data collection advanced, it was found that AMBIO was indeed the best-informed and more connected actor at both international and local level.

Through CSS technique, this study collect 49 cases that represent the principal participants of the process of exchange in *Scolel Te* network. Specifically, I collected information on thirty five local communities in the regions of Chiapas and Oaxaca,

six environmental NGOs in Mexico and UK, and five governmental organizations in Chiapas, Oaxaca, and Mexico city. The implementation of the fixed-list instrument was followed by the administering of the questionnaire and the semi-structured interviews among the 49 cases. It is important to clarify that even though we intended to collect a whole census of actors in the network, some interviews were not achieved because of refusal (1 community and 1 NGO (Reforestemos México)) or because of social conflict (1 community). Hence there is some missing data.

4.3.1 The questionnaire and interviews

The thesis intends to shed light around two main topics or questions. First I am interested in enquiring how it is possible to create an effective institutional environmental framework where a large number of decision takers deal with a broad range of interests and issues. So, it is necessary to identify the principal coordination problems in the implementation of the *Scolel Te* project at a local level. Second, we wish to learn how differences in the control of valuable resources in the *Scolel Te* project affect the distribution of power relationships in the whole network. As a consequence, the relationships among actors are analysed in two different dimensions: (i) the process of exchange among dyadic relationships at local level, and (iii) the structural positions of actors in the network.

In this context, the questionnaire is divided into two sets of questions. The first part is intended to analyse the structural characteristics of the network through a SNA perspective. Here, the questions try to identify the ties and the position of actors/node in the whole network. Specifically, the questionnaire determines the existence of relations and theirs strength — strong, weak, or null — among actors in the *Scolel Te* project (see Appendix B). The second part of the questionnaire tries to identify the process and the conditions of exchange among actors such as (1) the interactions of actors in the network; (2) the type of events (domains) which each participant is involved with; and (3) the number of alternatives available in the same domain. For instance, the *Scolel Te* project involves different kinds of events such as distribution of financial resources, broadcasting of information, transmission of knowledge, and cooperation. Here respondents are asked to mark pairs linked by

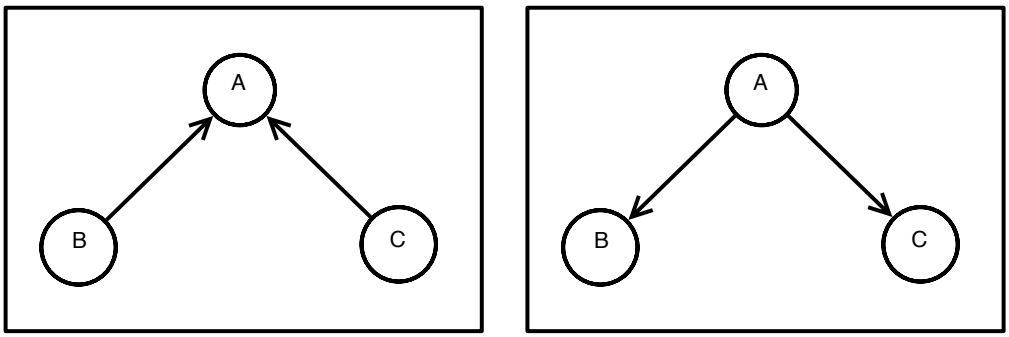
direct ties and answer specific questions to establish the type of event in which they participate (Faust, 2005; Koehly and Pattison, 2005) (see Appendix B).

Finally, the questionnaires are complemented with a semi-structured interview which explores the intrinsic properties of actors in the process of exchange through an ethnographic and discourse research (see Appendix A). This includes the analysis of the perceptions of dyadic relationship value's among actors. In general, I collected a set of judgements that each informant has about each tie/dyadic relationship and how each participant interacts in the process of exchange in the *Scolel Te* project. The information was codified in *TAMS analyse*. The next section will discuss the principal methodology aspect of the thesis.

4.3.2 The network structure

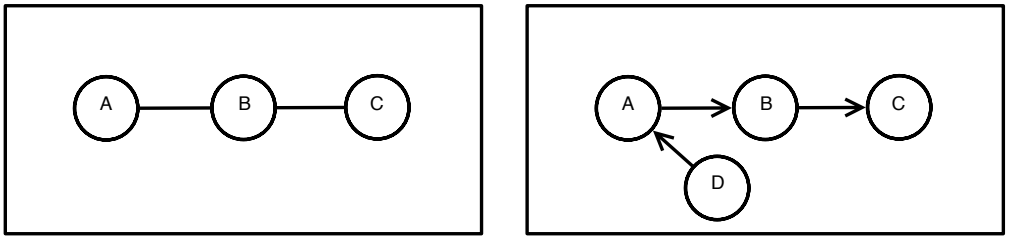
In general this thesis uses SNA to determine the structural characteristics of the *Scolel Te* network. In specific, this thesis will use centrality and centrality measure as the principal tool of analysis. Centrality refers to how well an actors is connected in the network. Meanwhile centralisation refers to the extent to which a given network has a centre. These measures play a central role in the present thesis because the analysis tries to see how individual actors are connected with others actors in order to determine the most important actors in the transmission of resources and their relative power in the network.

For Diani (2003a) centrality measures are very important because they help us to observe differences in terms of influence and power. For instance actors more centrally located in the network can engage in better exchanges of resources and/or information than peripheral actors. There are many forms to measure centrality. However, in terms of SNA three measures of centrality are the most important: degree, closeness, and betweeness. Degree is also know as local point centrality and is defined as the number of directed or undirected connections that a node has in the network (Nooy et al., 2005). In this context, it is important to notice that directed and undirected links imply different qualitative properties of links (see section 3.5). As a consequence, two different kinds of degree can be defined in undirected networks: in-degree and out-degree. The former refers to the total



(a) Indegree (b) Outdegree

Figure 4.1: Degree centrality. In panel (a) A has a indegree measure of 2 because there are two arrows pointing towards A. In panel (b) has a outdegree measure of 2 because there are two arrows pointing out from A. In an undirected network in and out degree are the same. Degree centrality of a node is a *standirised* measure of its degree and the maximum degree of the network. (Nooy et al., 2005, p. 126.).



(a) Undirected networks (b) Directed networks

Figure 4.2: Closeness centrality. In panel (a) the path A;B;C has a distance of 2 and between the *path* A;B has distance 1. In panel (b) the path A;B;C has in-distance 2 and out-distance 0, whereas the path A;D has in-distance 1 and out-distance 0. Closeness centrality of a node is a *standardised* measure of the total distance between itself and all other nodes in the network (Nooy et al., 2005, p. 127.).

numbers of links that are originated elsewhere in the network and directed towards one actor, whereas the latter refers to the total number of links that are originated in an actor and directed elsewhere in the network (see Figure 4.1).

Closeness, also known as global centrality, is a measure that determines the distance among various points. If each link represents a path, distance between A and B is defined as the number of steps or paths that A (or B) must cover to reach B (or A). An actor is globally centralised if his/her position in the network is a shorter distance from everyone else (see Figure 4.3). It is important to consider that in undirected connections, distance is measure in terms of the lines that run in the same direction (in-distance and out-distance, see Figure 4.3 panel (b))

Betweeness refers to the point that lies between others points. An actor that is in a betweness position can be more relevant in the network for its capacity to

act as a intermediator or broker among other actors. For instance, an actor with a betweeness position can allow or prevent the flow of resources or information in the network (see Figure 4.3). The characteristics of betweenness should be described with more details in the chapter on power. This thesis will consider an actor´s betweeness as a key property that allows them to coordinate actions.

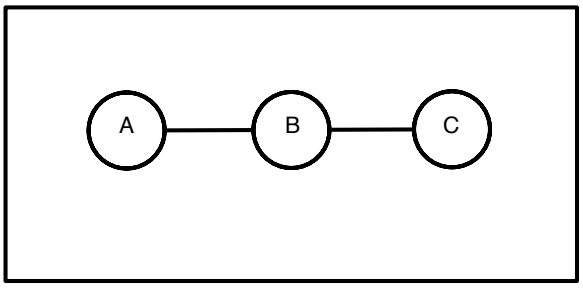


Figure 4.3: Betweenness centrality. B is between A and C in path A;B;C, whereas A and B are between none in path A;B;C. Betweeness centrality of a node is a the proportion of all *shortest* paths between nodes that includes it. (Nooy et al., 2005, p. 131.).

It is important to notice that the measure of centrality and centralisation are only a partial explanation of the power relationships in the network, where power derives from an actor's position in the network. That is, network structure determines power in SNA. This view of power, however, has limitations. In particular, SNA does not account for the dyadic interdependencies among actors and its dynamics. This is where social exchange theory is useful.

4.3.3 Resources and values

According to the social exchange theory, actors have personal or interpersonal characteristics that are intrinsic to each individual such as intelligence, beauty or material resources such as goods or money. In any case, those intrinsic characteristic are only important in terms of social exchange if they are considered as a valuable resources for other actors. In this context, actors engage in a relationship in the expectation of gaining access to such valuable resources that are intrinsic to his/her exchange partner.

In particular, the intrinsic properties of actors are important because they allow us not only to determine the principal motivations that an actor has to engage in a relationships but also to determine the value of the relationships by itself. As I have

said before, an actor's value is contingent to each relationship. And this contingent value is the principal determinant of power among actors. The higher the value of an actor give to the resources of her/his exchange partner, the most dependent of the resources of his/her exchange parter and the lower the power that has in the relationship.

Initially, this thesis identifies the principal values among local communities in the *Scoelel Te* project taking in account the most important aspect that each community assign to the project. On the basis of the interview, this thesis identified three principal values among local communities: (i) environmental reasons, (ii) economic reasons, and (iii) access to wood resources. Then, this thesis explores the perception that the same community has about the three main motivations in the project in order to determine the most important value of each community. Table 4.1 consider the principal values of local communities to enter to the project: 1 stands for the higher value assigned, 2 stands for the second value assigned, and 3 is written when a community does not express any interest or value. In this context, each community was tagged according to the higher value. As a result, this thesis divided the communities into three groups: the environmentalist, the resource seekers, and the income seekers (for more detail on actor's information value see section 8.2.3).

4.3.4 The domains in the Scoelel Te project

As we have seen before, *The Scolel Te* project works as a productive exchange network. Here, actors have to contribute with different resources to generate a carbon sequestration project which in turn will bring benefits for all the participants through the selling of carbon certificates. Clearly, the lack of resources or co-operation among actors can affect the development of the project and jeopardise the generation of mutual benefits among participants. In this context, the implementation of the project not only involves a diversity of tasks and obligations but also involves different types of interactions among members. For instance, the conditions of exchange, the power relationships, and the social mechanisms that safeguard the exchange can differ according to the type of exchange in the network. It is not the same to exchange knowledge as to exchange economic resources. For that rea-

Table 4.1: Motives of the communities

Community name	**Environment**	**Resources**	**Income**
Agua Azul	1	3	2
Los Angeles	1	3	2
Tierra y Libertad	1	3	2
Nueva Argentina	1	3	2
Naha	1	3	2
Rincon Chamula	1	3	3
Nuevo San Isidro	1	3	3
Plan de Rio Azul	1	3	3
Emiliano Zapata	-	-	-
Zaragoza	2	1	2
Alamkantajal	3	1	2
Cololte	3	1	3
Frontera Corozal	3	1	2
Yaluma	2	1	2
Mukenal	2	1	3
San Juan Metaltepec	3	1	3
Santiago Teotlasco	3	1	3
Babilonia	3	1	2
Punta Brava	2	1	3
San Luis	2	1	3
Tehuacan	3	1	3
Cololil	3	1	3
Hidalgo	3	1	3
Villa las Rosas	3	1	2
Samaria Kantajal	3	1	3
Arroyo Palenque	3	1	2
Rio Jordan	3	1	3
La Tronconada	3	1	3
Nueva Rudolfo	3	1	2
San Felipe Jatate	3	1	3
Quexil	3	3	1
Juznajab	3	3	1
Horizonte	2	3	1
Metzabok	-	-	-

Note. 1=higher Value; 2=Lower Value; 3=No value; (-) no information.

son, it is important to analyse not only the general overview of the network but also to identify the different process of exchange that can occur in the *The Scolel Te* project. In particular, this thesis established three types of events in which actors are involved as the principal domain of analysis: (a) the general exchange of carbon sequestration, (b) the exchange of economic resources, and (c) the exchange of human capital.

4.3.5 *The dynamic process in the Scolel Te project*

According to Hardcastle (2004) the process of exchange by itself entails a dynamic process that necessarily modifies the relationships among actors and therefore the structure of the network. In this context, this thesis tries to identify the changes of the dyadic relations at local level across times and the changes in the power structure of the whole network over time. Initially, the establishment of the preliminary fixed-list of the possible ties/dyadic relationships embedded in the network provided clear information on the current dyadic relationships and therefore of the current power structure of the network. However, problems arise when one tries to analyse the *Scolel Te* project across time. Here the analysis must include the changes of the dyadic relationships from the initial configuration to its current state in order to see its structural changes over time. In this scenario, the analysis of the network has not only a 'spatial' dimension but also a time feature. Due to the fact that the fixed-list of the ties/dyadic relationships only include the current actors/node but not the previous ones, especially because some of them are no longer part of the *Scolel Te* project, this thesis determined to build up theoretically a series of time dimension to represent the dynamic process of exchange in the *Scolel Te* project.

The first time dimension is related with the process of exchange at dyadic level. That is, exchange process between the local communities and AMBIO. This time dimension is focused in the change of perceptions about the value of the project among local communities in the process of exchange in the *Scolel Te* project. In particular, this thesis take into account the perceptions and the experience of the current actors during the different phases of the life cycle of the *Scolel Te* project.

In general communities/farmers commit themselves to plant and give maintenance to the trees for a 25 year period. This thesis divided this period of time in four phases: (i) the enrolment stage, here actors initiate the establishment of the relationship; (ii) the payment stage, here actors receive the economic payments; (iii) the commitment period, here actors have middle aged trees; and (IV) the final stage, where actors receive a collateral payment and the relationship with the project comes to an end. Each phase has a time dimension according to the institutional design of the project (see Table 4.2): (i) Phase I has an unspecified time —-it depends of

how long it takes for a community to enter to the project; (ii) Phase II, goes from year one to year eight and is the period in which actors receive economic payments; (iii) Phase III, from year 8 until year 25, where actors have already middle aged trees and they don't receive any economic compensation; (iv) Phase IV, year 25, the project finishes.

After defining each phase and the time dimension of each phase, this thesis collected the perceptions of each community according to the years that each community has been in the project: (i) Phase I-c, we collected the perception of all community members when they entered to the project; (ii) Phase II-c, we collected the perception of each community which has been in the project from year one to year eight; (iii) Phase III-c, we collected the perceptions of each community which have participated in the project from year 9 to year 25; and (iv) Phase IV-c, we collect the perception of the communities in the last stage (none has reached the final phase). In this taxonomy, the letter *c* stands for 'cycle'. In this context we split the communities in four groups (see Table 4.5).

Table 4.2: *Scolel Te* time dimension according to the plantation's life-cycle

Phase I-c	**Phase II-c**
Enrolment	Payments
All members	1-8 years members
Phase III-c	**Phase IV-c**
No payment	Collateral payment
9 years-24	at 25 years

Table 4.3: *Scolel Te* time dimension according to institutional changes

Phase I-i	**Phase II-i**	**Phase III-i**
Formation phase	Expansion phase	Consolidation phase

Table 4.4: *Scolel Te* exchange domains

Carbon network	**Financial network**	**Human Capital network**

Furthermore, this time dimension approach is also supported by the interviews to each community about the exchange process and their experience in the project. This thesis collected retrospective information on the initial values that each actor

Table 4.5: Communities organised according to the plantation's life-cycle time dimension

Phase I-c	**Phase II-c**	**Phase III-c**	**Phase IV-c**
all	Agua Azul	Alamkantajal	
	Cololil	Arroyo Palenque	
	Emiliano Zapata	Babilonia 2da	
	Hidalgo	Cololtel 2da	
	Horizonte	Frontera Corozal	
	La Tronconada	Juznajab	
	Los Angeles	Los Laureles	
	Nueva Rudulfo	Mukenal	
	Punta Brava	Naha	
	Rio Jordan	Nueva Argentina	
	Nuevo San Isidro	Plan de Rio Azul	
	San Luis	Quexil	
	Tehuacan	Rincon Chamula	
	Tierra y Libertad	San Felipe Jatate	
	Villa las Rosas	San Juan Metaltepec.	
	Zaragoza	Santiago Teotlasco	
		Samaria Kantajal	
		Yaluma	

assigned to the project at the moment of entering along the values assigned at the moment of collecting the data. I asked each actor about the principal motives and problems they faced upon entering the project. Then I asked whether they fulfilled their initial aims and whether they have changed their main motivations/perceptions about the project over time and why.

The second time dimension is related with the structural changes of the *Scolel Te* project. In specific, this thesis tries to determine how the power structure among actors has changed over time. This second time dimension is determined according to the main institutional changes of the *Scolel Te* project. In this context, this thesis identified three critical moments: (i) the formation phase (i) the expansion phase, and (iii) the consolidation phase (see Table 4.3). Then, this thesis studies the main power relationships within each period according to the three domains of analysis: (i) the exchange of carbon sequestration, (ii) the financial network, and (iii) the human capital network (see Table 4.4). Finally, the power relationships were analysed using SNA as the principal tool with support of documentary research and interviews with members of AMBIO Montoya (1995); Klooster and Masera (2000);

Nelson and Jong (2003).

4.4 Geographic and ethical considerations

Regarding geographic and ethical considerations, Chiapas is a large and diverse territory that goes from mountains to valleys and from tropical land to temperate forest highlands with high degree of rainfall and humidity. In general, Chiapas is considered one of the richest States in Mexico as far as natural resources are concerned due to its large flora and fauna diversity. However, notwithstanding its natural resources, Chiapas is one of the poorest states of Mexico where the majority of people are indigenous who speak many different languages and depend on natural resources such as water and forest for performing their economic activity (Boyd et al., 2005).

These geographic and social characteristics imply that some communities are settled in areas of difficult access, have unpaved roads and lack of the basic infrastructure. Cultural differences may also create important difficulties and must be treated in an ethically correct manner to avoid unintended conflict and damage. There are more than 13 indigenous groups in the area and each of them has its own language and their own political organisation. Many of the indigenous communities refuse to speak in Spanish and it was necessary to use a translator. Also, sometimes not all members of the communities were allowed to speak with outsiders or to give permission to work within the community. Hence, it was crucial to respect the local hierarchy and to approach the correct individuals to avoid conflict. Also, many communities are located within the territory of the Zapatista movement. This territory is not under Mexican jurisdiction and it is treated for many instances as an autonomous territory. Working with the Zapatistas groups represented an ethical issue especially because they want to be treated as a nation different from Mexico. In terms of the political aspects of doing research in the Zapatista region, I was requested to avoid talked about political issues to prevent conflict. So, all my question were focused in the implementation of the *Scolel Te* project.

In order to cope with all this practical and ethical consideration I took in account the customs of local people and received advice from experienced people. For

this purpose I spent three months in the local research centre in Chiapas called South Frontier College (ECOSUR) before I started my PhD. Some people from the ECOSUR are involved in the *Scolel Te* project and have experience working with the local communities. For instance, during my staying with ECOSUR in 2007, I had the opportunity to visit six of the communities that are involved in the *Scolel Te* project, three of them were mostly indigenous and one of them was located in the Zapatista territory. The local knowledge of the researchers and my previous experiences with local communities made it easy to conduct my fieldwork in 2009. Also, the help of AMBIO and specially the facilities of the National Commission of Natural Protected Areas made it possible for me to enter the indigenous communities and have direct contact with the relevant people for my research, a process which would have been difficult to do by myself. It is important to mention that before entering the communities I received advice on the manner of how to approach authorities, how to talk, and even what to wear.

Also it is important to highlight that even when this thesis chose the community's representative to the carbon project as the main respondent. Most of the interviews have a collective nature. Indeed, most interviews were taken in the presence of all the participants of each community in the *Scolel Te* project. In some communities, the interviews were taken in the presence of the Ejidal assembly. Clearly, the collective nature of interviews provide more accuracy in the information than the individual interviews because community representatives have more incentives to provide the general perception of all participants.

Chapter 5

The elements of the social exchange

5.1 Element of the in the *Scolel Te* network

The idea of establishing the *Scolel Te* project was an initiative of Richard Tipper, a member of the Edinburgh Centre for Carbon Management (ECCM) who was working in that time as an adviser of a coffee producer organisation called *Pajal Yakac-Tick* (PAJAL) in Chiapas, Mexico. The idea of the project was trying to link different actors from the local to the international sphere in order to implement a tree planting scheme with the objective of participating in the Clean Development Mechanism (CDMs) scheme established by the Kyoto Protocol. In this context, Richard Tipper with the ECCM and the Forest Department of the University of Edinburgh developed a forestry and agroforestry system for reforesting and afforesting activities, which they called the *Plan Vivo System* . The *Plan Vivo System* is the base under which the *Scolel Te* project was designed. The project started working in Chiapas between 1994-1995 when the University of Edinburg and the ECCM, in partnership with INE (Mexico) and IHN (Chiapas), provided a joint budget for a feasibility study of the potential of carbon sequestration in terms of the capacity production, the price per ton, and the estimation of social participation. The first *Scolel Te*' output was estimated to be around five tons of carbon sequestration and was sold to the FIAT car company in the UK.

The initial composition of the*Scolel Te* project was configured as follows: a) A

credit union PAJAL which was a local coffee producing co-operative integrated by eight communities. *Pajal Yakac-Tic* had the commitment to give credit, improve technology, manage production and marketing; b) A scientific committee from the South Frontier College (ECOSUR), a local think tank. Scientists evaluated carbon sequestration potential in farming land and the feasibility of a carbon sequestration project. Also, both ECOSUR and PAJAL had to provide technical advise to farmers; c) A local trust fund called *Scolel Te*, which depended upon PAJAL and was in charge of the administration of the funds raised for the project. From this trust, companies wishing to offset greenhouse emissions can purchase and pay sequestered carbon; and finally d) A fundraising body based at the University of Edinburgh which was in charge of promoting the project at international level. (Klooster and Masera, 2000; Nelson and Jong, 2003)

In this initial organization, the resources of each actor determined the nature of the relationships in the *Scolel Te* project. In this context, PAJAL, who started with the initiative of carbon sequestration, provided the social capital necessary to set up the Scolel Te project. In others words PAJAL provided the labour force for planting trees to the project. At that moment of the project, the social capital of Pajal was an essential factor for the formation of the network, even when Pajal had not other resources to bring to the scheme. In this scenario, the initial PAJAL alliance with ECOSUR and ECCM provided the labour, knowledge, and financial capital needed to start the *Scolel Te* project. The ECOSUR link with PAJAL allowed the development of social capital and organisational skills within communities. Similarly, the local knowledge of ECOSUR and its connection with ECCM allowed the attraction of resources at an international level. As a result, the Scolel Te network successfully connected the local activities of planting trees with the financial capital from industries.

Between 1997-2001 a major organizational restructuring of the *Scolel Te* project occurred to fulfil the CDM requirements and to generate major accountability in the project. Even with a great potential for participating in the carbon market, the project failed to register under the CDMs scheme because it could not fulfil the eligibility criteria according to the Marrakech Accord. The assessment document highlighted many problems and recommended some important changes that needed

to be addressed in order to successfully enter the CDM scheme (Phillips et al., 2002):

- *Communities commitment.* The project had to ensure a long-term commitment of rural communities that allowed for a permanent carbon sequestration supply. It was suggested that the project needed to evaluate the social and environmental impacts that the project will have in local communities.

- *Permanence of trees.* Once the carbon certificates have been sold, the project had to ensure that the trees will remain alive to allow the sequestration of carbon in the long run. If there is no guarantee that trees planted will survive the project activities will then fail to produce a positive impact on the climate change.

- *High transaction cost.* The assessment document pointed out that even if the project had stable communities, high transaction cost could prevent participation due to the existence of marginal or no economic benefits at all. Hence, it was considered that the project needed to expand its activities and ensure the system of payments.

- *Leakage.* The number of carbon credits was unlikely to fulfil the demand in the compliance market if the project did not ensure that farmers retained adequate extensions of land for the project. Besides, the project had to verify that communities do not use land allocated for family provision or cleared up forest land to participate in the project.

The *Scolel Te* project introduced a series of changes in order to fulfil the requirements of the CDMs. First, it was necessary to improve the accountability in the distribution of economic resources in the project in order to ensure that communities could safely receive the payments. This meant that the dependency of the local trust and PAJAL was broken and substituted by the Bio-Cambio Climatico Fund (FBCC) — a fiduciary managed by a private bank (BANKSEFY). Initially the carbon sequestration sales, the management of the local trust, and the distribution of credit in the project was in control of PAJAL. However, PAJAL was facing economic problems and there was fear that the project's funds could be used to pay

PAJAL's debt. This was the reason why the control of the project was taken away from PAJAL .

Fernando Lopez Aguilar (*the regional technician of the project and an ex-meber of PAJAL*) refers to the role of PAJAL at the beginning of the project. Mr Lopez, said that PAJAL was a very important organisation at that time. Many governmental projects were established in the region through PAJAL, one of them was the *Scolel Te* project. For Mr Lopez, It was thanks to the PAJAL, and its relation with local communities that it was possible to initiate the carbon sequestration project in the region. This is because PAJAL was formed by a union of many coffee producer communities that intended to break the abusive inter-mediation between coffee producer and buyers by establishing a bartering system among local agriculture producers. In this contex, the bartered systems worked as follow: people brought their products to the region and in exchange PAJAL provided coffee. It was a very intensive trade system during many years. However, It was not a simple system of exchange. PAJAL worked as an inter-mediator and negotiator among local producers to avoid the abuse of external brokers (coyotes). For instance, if the coyote (broker) paid six pesos for a kilo of maize, the PAJAL increased the offer to the producer, so that the coyotes have to increase the price if they wanted to buy maize in the region. The price increased even more if the community was a formal member of PAJAL. All the people from the communities got benefits either if they were members or non members of PAJAL because they obtained a better price for their product. However, the prices of coffee dropped and PAJAL started to face financial problems to sustain the bartering system and, eventually, lost its constituency.

Second, the scientific committee from ECOSUR and some members of PAJAL formed AMBIO, a NGO in charge of managing the project at local level. According to the head of AMBIO:

> "...It was necessary to create an organisation in order to give legal support to the project and to protect it for mismanagement...this was an important step because the success of the project depends on its reputation and any problem can affect the perception of local communities

and prevent participation... Running the *Scolel Te project* has been a difficult task because this project was the first project of carbon sequestration in Mexico, and one of the few projects of its kind in the the world. 'So people behind of project' had no previous experience from which one could learn. Some parts of the project had to be improvised, some others were learnt by experience, and many solutions came from the concern of the participants, especially communities. Then, the *Scolel Te* project has been re-adjusted and modified constantly. Some things have worked, others have been a complete failure. All this process of learning has had an impact in the project and its adoption in the region..."

Three, the *Scolel Te* project started in 2001 a process of expansion in other regions of Chiapas and some parts of Oaxaca. The aim was to bring more local communities into the scheme to increase the offer of carbon sequestration and, as a consequence, reduce transaction cost. Clearly, increasing the number of participants means to be more competitive in the carbon market by providing more carbon capacity. Also, a bigger project means more economic resources that allow 'major economic stability'.(Klooster and Masera, 2000) According to the head of AMBIO:

"...one of the mayor problems of the project has been the lack of economic resources that allow the proper implementation of the project. The prices of carbon sequestration are improving now but in the beginning of the project the prices were quite low, the resources were not enough for paying all the things necessary to run the project. For instance, the initial cost of bringing people to the project was a significant investment that most of the time has no return, specially if people quit the project. Besides, there are the direct cost such as administration expenses, salaries of technicians, and expenses for training and adoption of technology. So, the expansion of the project is a constant concern due the financial impact that it can represent for the development of the project..." Sotero Quechulpa is the manager of AMBIO.

Finally, the re-organisation implied that all the intellectual property of the *Plan Vivo* system was transferred from the Edinburgh Center for Carbon Management

(ECCM) to a non-profit organisation called the *Plan Vivo Foundation* (PVF) , which took over the ECCM's role of supporting the implementation of the *Plan Vivo* system and the issue of carbon certificates. According to the PVF "...the idea was to make more accessible the system to others countries". So it was necessary to create an organisation which work regularly for keeping and protecting the principles of the *Plan Vivo* system. Also it was necessary to establish a organisational platform for potentials buyers who were interested in the carbon projects.

Despite all the changes, the project could not fulfil the requirements to enter to the CDM project and carried on working in the voluntary market. Today, the *Scolel Te* project is part of a large list of rejected projects in the CDM scheme. It is well known that only few projects in the world (3 or 5) in the forestry sector has been approved under the CDM scheme. This fact has raised serious question about the effectiveness / viability of using a market approach in the implementation of international forest policy. According to the representative of AMBIO the problem of the CDM lies in two aspects: (1) the the difficulty to fulfil the CDM requirements without incurring in high costs and, (2) the problem that represents the need of a long term commitment among actors. He pointed out

> "...the norms are very complicated, strict, and rigourous. Applying those norms implies that participants have to invest a lot of resources on the implementation, the development, and the certification of the project. For instance, the certification is a special case, because it is monopolised by companies from developed countries. According to the CDM scheme only countries of annex A can certificate carbon projects. It means that small projects located in a developing countries like *Scolel Te* have to pay international prices to be certified. This is absurd, if you consider the problem of poverty in the local communities...implementing a carbon project under the CDM regime is too expensive and the benefits are not clear, especially if you consider the problem of uncertainty to maintain a tree plantation, to keep participants in the project, and to consolidate environmental and management processes in the long term..." Sotero Quechulpa is the manager of AMBIO.

5.2 The Type of Social Exchange in the *Scolel Te* project

This thesis assumes that the structural properties of the *Scolel Te* project are similar to those found in a productive exchange network because the project is designed to generate a series of interdependencies among the activities performed by its participants which, in turn, allow the implementation of a long term carbon sequestration project. In other words, this local-scale programme implies the organisation of an organic system of generalised exchange of resources and tasks among its different actors/participants.

The difference between a simple generalised exchange network and a productive exchange network is that the latter implies not only a flow of benefits and resources among two or more actors (generalised exchange) but also that these actors generate a single and socially produced output (Lawler and Thye, 2000). In this context, the *Scolel Te* project implies not only the exchange of resources in the network but also a division of labour (tasks) among actors that ensures the accomplishment of the carbon sequestration project where the output is the establishment of a carbon sequestration project that can issue carbon credit certificates to sell either in the voluntary market or in the compliance market.

According to Emerson (1972b) in a productive exchange network actors produce an output which is the single source of benefits for all actors. In the case of the Scolel Te project the tree itself (tree plantation) is clearly the single source of benefits for all participants. Planting the trees, for instance, is a prerequisite to the issue and sale of carbon credit certificates in the market. Once the certificates are issued and put in the voluntary or compliance market, governments and/or industries can buy them for a price and fulfil their commitments to reduce emissions under the Kyoto protocol at home. Similarly, the local communities benefit from the trees not only for the economic return they obtain with the sale of the carbon certificates but also from the fact that the tree itself is an asset for the community because it contributes to preserve the natural biodiversity of the land and contributes, indirectly, to improving the productivity and value of other activities such as agriculture, livestock, and fishery. Besides, the tree represents a stock of wood that, with time, will be used as fuel and/or timber. Finally, for the environmental NGOs the establishment of

a tree plantation represents not only the access to a salary or management fee but also an opportunity to build up its reputation as an entity capable of implementing a sustainable development initiative at local level that is economically viable.

For Ekeh (1974) the benefits in a productive exchange network are not generated by direct exchange between two actors but by the whole set of exchanges among members of the group. Following Ekeh ideas, it can be established that the relationship between actors and group has different dynamics in a productive exchange network than in a generalised exchange network. This is because the resources or the contribution flow from actor to group are different from the flow of rewards/benefits from group to actor. Indeed, each actor has an individual obligation to contribute to the production of a common output. Whereas, the benefits which embed all the productive resources of each actors, entail a collective obligation to the individual actor. Here, actors are rewarded not from their direct exchange partners but from the collective effort of all the actors in the network, once the benefits are distributed to each actor. In this context, the *Scolel Te* project assigns a series of roles in order to coordinate the contribution that each actor has to bring to the project. Furthermore this process of coordination in the Scolel Te project is embedded in a complex normative framework that regulates the exchange process among actors.

Lawler and Thye (2000) and Molm (1997) consider that a productive exchange network is the most cooperative type of network one can possibly have because it involves high interdependencies among actors. Actors have to comply with special arrangements that allow a fair division of labour, generate certainty in the exchange, and guarantee the distributions of benefits. All this implies a great deal of co-operation and trust that entails significant challenges for co-ordination. In this context, a high degree of coordination in a productive exchange can bring greater benefits to everybody but low degree of cooperation can lead to a loss for everybody because it prevents the social exchange in the network.

In this context, a good institutional design is essential for the accomplishment of a productive exchange network. The institutional design acquires relevance in the exchange process because this design sets the rules of the game and as such becomes the basis under which the actors co-ordinate actions. There are various reasons that make important the understanding of the institutional rules. First, the

operational rules usually involve a series of mechanisms that are *hard wired* into the social structure with the aim of generating incentives to promote good behaviour and establishing technical criteria that help the co-ordination of activities/domains. Second, the institutional design establishes normative rules that are the basis for the monitoring and policing of the project and, when needed, can ultimately be used to resolve conflicts. In other words, when all the means of bargaining and conciliation have been exhausted, the written rules are used to enforce compliance. Third, understanding the institutional design is essential not only to determine the fairness of the operational rules but also to detect instances of co-ordination failure that can be attributed to the existing norms. Finally, the institutional design can help the understanding of how interdependencies among actors generate power relationships.

Section 5.3 describes the actors' roles in the *Scolel Te* project and 5.4 describes the institutional design of the productive exchange network called *Scolel Te*.

5.3 Actors in the *Scolel Te* project

5.3.1 AMBIO

AMBIO is a local NGO located in San Cristobal de las Casas, Chiapas. In general AMBIO is in charge of the management of the Scolel Te project and looks after the Bio-Climatic Fund. The main activities of AMBIO include: (1) enrolling local communities/farmers to the project, (2) transmission of relevant information about the project and environmental information, and (3) provision of technical training, and advising to members. Also AMBIO is the link between local communities and local NGOs and as well international NGOs.

AMBIO has two main objectives as a local NGO. On the one side, AMBIO through the Scolel Te project tries fostering the conservation and management of communal forest areas in order to combat the climate change. One of the priority aims of the project is the promotion of sustainable management of forest through the use of agroforestry systems that allow the protection of ecosystems, biodiversity, and drinking fountains in local communities. The project not only covers a range of agroforestry systems but also establishes a series of productive activities that

aim at improving the local livelihood as a strategy to reduce the pressure over forestry resources. The Scolel Te project, in this context, intends the development of capacities through the strengthening of training and advising processes at the local level. It is expected that knowledge and information can help in the future to improve a community's livelihood either by changing its approach over the use of natural resources and/or bringing others resources from sustainable alternatives. On the other side, AMBIO intends to have an impact on the governmental programmes in order to influence the environmental policy. This latter objective is achieved mainly through AMBIO's active participation in forums and the share of experience with GOs and others NGOs.

5.3.2 Bio-Cambio Climatico Fund (FBCC)

The FBCC is a trust that helps in the intermediation between the selling and buying of carbon credit certificates. This trust ensures that deposit of money made by buyers is distributed among the beneficiaries (the communities/farmers and AMBIO).

The trust is integrated by the fiduciary (BANKSEFY bank), which has the responsibility of executing the obligations of the trust, chairing the monitoring committee, and ensuring a good use of the resources. The monitoring committee is integrated by two members -one of them is a part of AMBIO and the other one is an external person out of the Scolel Te project. The monitoring committee watch over that deposits will go to pay the services provided by communities/farmers and AMBIO. AMBIO is also a beneficiary of the trust, because they receive also economic resources for their services to the project.

5.3.3 Local Communities

The case study was carried out with the members of the *Scolel Te* project. The main activities of the local communities are planting trees and taking care of the plants during their whole process of growing. That is, the land and the labour force are the principal resources of the local communities. In this context, 36 communities are part of the project, two of them are missing in the interviews. The project is established mainly in the State of Chiapas and only two communities from the State of Oaxaca

are participating. The project is divided in 9 regions according to the geographical location of the local communities. Table 5.1 describes the characteristics of each community in the project. Each region also represents, approximately, one Mexican indigenous ethnic group. There are eight ethic groups with different languages and culture—Mestizo, Chol, Zeltal, Maya-Lacandon, Tojolabal, Tzotzil, Mixe, Zapoteco. Most regions are described below.

The Comitan region is located in the east-central part of Chiapas, near the border with Guatemala. In this region two communities participate, Yaluma and Los Laureles. Most of them have a mixed heritage or descent: mostly Spanish but some with indigenous element. They are traditionally called 'Mestizos'. Yaluma and Los Laureles are approximately at an altitude of $1,600$ meters above sea level. For that reason, this region has a sub-humid, subtropical, and temperate climate. In general, they have well-preserved extensions of the pine-oak forests that are exploited for agriculture and recollection of wood for fuel. The production is limited to maize and beans for household consumption.

Sierra Chiapas region is a mountain range which runs northwest-southeast from the state of Chiapas in Mexico across Guatemala and into El Salvador and Honduras. In this region there are three communities that participate in the *Scolel Te project*, Los Angeles, Tierra y Libertad, and Plan de la Libertad. All of them are located between the natural reserves of El Triunfo and La Sepultura and they are at $4,220$ meters of altitude above sea level. In general, vegetation ranges from humid rainforest and forests of oaks and pines. The main economic activities of communities are agriculture, specially the beans, maize, and courgette.

Chol region is located within the territory of three municipalities, Palenque, Salto de Agua and Tumbala, in the centre of Chipas. This region is the house of the ethic group called 'Choles', which belong to the ancient Maya culture. Maya culture dates from around the $1,800$ BC. Their main language is chol. The Chol goup is one of the largest indigenous group in Chiapas, they represent 12.5 percent of the whole indigenous population in the state. Its density can be seen reflected in the *Scolel Te* project. Indeed, nine communities from the carbon project belong to the chol region: Emiliano Zapata, Babilonia, Arroyo Palenque, La Tronconada, Punta Brava, Hidalgo, Cololil, Tehuacan, Horizonte. In terms of vegetation, the Chol region is

Table 5.1: Community level information

Region	Community	Municipality	Ethnic Group	Language	No of Farmers
Comitan	Yaluma	Comitán	Mestizo	Spanish	58
	Los Laureles	Comitán	Mestizo	Spanish	6
Sierra Chiapas	Los Angeles	Villa Flores	Mestizo	Spanish	17
	Tierra y Libertad	Villa Flores	Mestizo	Spanish	5
	Plan de la Libertad	Villa Corzo	Mestizo	Spanish	10
Chol	Emiliano Zapata	Salto de Agua	Chol	Chol	13
	Punta Brava 2da.Sec	Salto de Agua	Chol	Chol	10
	La Tronconada	Salto de Agua	Chol	Chol	6
	Arroyo Palenque	Salto de Agua	Chol	Chol	7
	Río Jordan	Salto de Agua	Tzeltal	Tzeltal	4
	Babilonia 2da. Sec.	Palenque	Chol	Chol	13
	Hidalgo	Tumbala	Chol	Chol	7
	Cololil	Tumbala	Chol/Tzeltal	Chol/Tzeltal	2
	Tehuacan	Tumbala	Chol	Chol	3
	Horizonte	Tumbala	Chol/Zeltal	Chol/Tzeltal	3
Tzeltal-Chilon	Alamkantajal	Chilon	Tzeltal	Tzeltal	20
	Somaria Kantajal	Chilon	Tzeltal	Tzeltal	12
	Mukenal	Chilon	Tzeltal	Tzeltal	10
	2da. Cololtel	Chilon	Tzeltal	Tzeltal	11
	Quexil	Chilon	Tzeltal	Tzeltal	6
Naha-Metzabok	Naha	Ocosingo	Maya-Lacandon	Maya	29
	Metzabok	Ocosingo	Maya-Lacandon	Maya	14
	Zaragoza	Ocosingo	Tzeltal	Tzeltal	29
	Villa las Rosas	Ocosingo	Tzeltal	Tzeltal	13
	San Luis	Ocosingo	Tzeltal	Tzeltal	16
	Agua Azul	Ocosingo	Tzeltal	Tzeltal	15
Frontera	San Felipe Jatate	Maravilla Tenejapa	Tzeltal/Mestizo	Tzeltal/Spanish	3
	Plan de Río Azúl	Maravilla Tenejapa	Mestizo	Spanish	6
	Nuevo Rudolfo	Maravilla Tenejapa	Tojolabal, Tzeltal, Mestizo	Tojolabal,Tzeltal, Spanish	17
	Nueva Argentina	Maravilla Tenejapa	Chol, Tojolabal	Chol, Tojolabal	15
	Frontera Corozal	Ocosingo	Chol	Chol	20
	San Isidro	Marquez de Comillas	Tzoltzil, Chol, Tzeltal	Tzotzil,Chol, Tzeltal	62
	Rincon Chamula	Pueblo Nuevo	Tzotzil	Tzoltzil	800
Oaxaca	San Juan Metaltepec	Santiago Zacatepec	Mixe	Mixe	330
	Santiago Teotlasco	Ixtlan de Juarez	Zapoteca	Zapoteca	118

spread through a mountain chain at average altitute of $1,500$ m. Also, this region is part of the rainforest of the Chiapas state, and it has borders with the Lacandon Jungle. Its climate is hot and humid with rain all year round. The Chol economy is mainly based on farming and on livestock. In specific, they produce maize, beans, coffee, sugar, and fruit trees.

Tzeltal region is located in the municipality of Chilon in the centre of Chiapas. They belong also to the ancient Maya culture. This is the largest ethnicity in the State and the fourth-largerst indigenous group in Mexico. There also descend of the Maya culture and speak Tzeltal, a language which has its roots in the Mayan language family. There are five communities in the Tzeltal region that participate in the *Scolel Te* project. Alamkantajal, Somaria Kantajal, Mukenal, Cololtel, and Quexil. These communities are at an average altitude of 800 meters over the sea level and for that reason the vegetation is sub-humid and subtropical rainforest. The traditional economic activity of the Tzeltal community is agriculture such as maize, beans, squash, and chili peppers.

Naha- Metzabok region is located in the north-east of Chiapas. This region form part of the Lacandon jungle, which is an ecosystem that covers an area of approximately 1.9 million hectares. The Lacandon jungle spans an area that includes part of Chiapas, Guatemala, and Belice. This contains a large diversity of species, which represent around the 25% of Mexico's total species diversity. It is a rainforest vegetation with subhumid and subtropical climate. The communities which participate in the *Scolel Te* project include two Maya lacandon communities, Naha and Metzabok, and four Tzeltal communities (Zaragoza, Villa las Rosas, San Luis, and Agua Azul). All of them are located within the natural reserve of Naha-Metzabok. In particular, the Maya Lacandon are one of the smallest native indigenous groups of the state with a population of less than $1,000$ individuals. They speak the Maya language. Also, the Lacandon are well know for their activism in the protection of the natural areas of Lacandon jungle. Their principal economic activity is related with the eco-turims, craft, and fishing. Activities that have low impact in the environment.

The Frontera (Frontera and Maravilla Tejejapa) region is located in the north part of Chiapas. The frontera is a subtropical rainforest that is at 400 meters

of altitude above the sea levels. The Frontera region include all the communities that are located in the border with Guatemala (San Felipe Jatate, Plan de Rio Azul, Nueva Rudolfo, Nueva Argentina, Frontera Corozal, San Isidro, and Rincon Chamula). Most of the communities in this region are integrated by families of different ethnic background such as Mestizo, Tzeltal, Chole, Tzolzil, and Tojolabales. This is because most of these communities were founded with indigenous families that migrated from their community of origin for religious and land scarcity conflicts. In general, agriculture is the main economic activity. Beans, maize, and coffee are the principal crops.

Finally, only two communities belong to the region of Oaxaca, a State that is located in south western Mexico. One one side, Santiago Teotlasco is a community located in the municipality of Ixtla de Juarez. Geographically Santiago Teotalsco is in the mountain chain of the Sierra Juarez at an altitude of $2,400$ meters above to the sea level. The main characteristic of the community is that it is surrounded by cloud forest, also called fog forest. This is a very rare ecosystem that only exists in tropical or subtropical montane forest. The cloud forest is characterised by a persistent low-level cloud cover. The ability of cloud forests to retain moisture from cloud and fogs is key to the water supplies in the atmosphere and the region. Santiago Toetlasco is inhabited by Zapotecas, which were part of the the Zapotec civilization, an indigenous pre-Columbian civilization that flourished in the Valley of Oaxaca in the late 6th Century BC. They speak Zapoteco, a language that has its roots in ancient Mesoamerican languages called Oto-manguean. In general, the principal economic activity of the community is the production of coffee and maize for self-consumpion. On the other side, San Juan Metaltepec is a indigenous community that is located in the municipality of Santiago Zacatepec at $1,200$ meters over the sea level and it is part of the mountain chain called Sierra Mixe. The vegetation is humid montane forest which is characterised by a cool temperature. Finally, the community of San Juan Metaltepec belongs to the ancient Mixe Kingdom ($2,500$ BC to $1,500$ AD). They speak the Mixe languages which are classified in the Mixe–Zoque family. Their principal economic activity is the agriculture of maize, beans, squash and potatoes. They have also some periods of hunting and fishing.

5.3.4 Regional technicians

Technicians have a high status in the project due to their great involvement in the activities of planting trees. They are responsible for promoting the project among local communities and enrolling new members to the scheme. Also, technicians receive special training about the management of the project to help communities deal with the administrative duties. Moreover, technicians have access to environmental information and technical training to support community members in the management of the tree plantations. Finally they are involved in the monitoring activities. It is important to notice that technicians usually act as the first point of contact between communities and AMBIO, especially in the presence of doubts and conflicts.

Technicians have special treatment in the project and in terms of the network they are considered as independent actors. This is because they are not employees of AMBIO even when they have high responsibilities in *Scolel Te* and receive a monthly salary from AMBIO. Instead, technicians are considered partners of AMBIO and the economic compensation is taken as a *reward* for their services and contributions. Usually, regional technician are farmers that participate in the project of planting trees. They are recruited to form part of the technical team in their own region. For that reason, technicians generally share the same language and the same culture of the communities they work with. However, not all regions have technicians and sometimes it is necessary to bring people from others regions to do the job.

5.3.5 The Plan Vivo Foundation (PVF)

The Plan Vivo Foundation (PVF) is an international NGO which has two main activities in the *Scolel Te* project. First, The PVF is in charge of promoting and facilitating the establishment of *Plan Vivo System* (PVS). The PVS is basically the tree plantation system that the *Scolel Te* project has adopted for the carbon sequestration. The system was developed by people at the Edinburgh Centre for Carbon Management, with people from the University of Edinburgh in partnership with ECOSUR. The *Plan Vivo System* has been applied not only in Mexico but in other countries such as Uganda and Mozambique. Second, the PVF also issues

the carbon credits certificates that are produced by *Scolel Te*. Each carbon credit certificate is called a *Plan Vivo Standard*. In this context, the PVF is an independent certification body that works as an umbrella organization that oversees the project to make sure that the *Plan Vivo Standards* meet the rules established by the Plan Vivo System. Finally the PVF manage directly the registration process for plan vivo projects, the marketing of the *Scolel Te* project as a *Plan Vivo System*, and the *Plan Vivo Standard*.

PVF works as inter-mediator between AMBIO and the buyers. According to the PVF, this inter-mediation does not mean that they act as brokers between sellers and buyers. They issue the plan vivo certificates but they do not buy or sell carbon. However, PVF help in the selling process because they have a infrastructure, such as a web site and office, that make Plan Vivo projects and certificates more available for people to look at. In general buyers contact the foundation to enquire about the plan vivo certificates, why they should buy them, what the costs are, and how it works. Normally, the PVF passes this information to the producers (communities). Another involvement of PVF is to provide scroll services. Buyers have the opportunity to put funds in an independent account for the payment of plan vivo certificates. They order plan vivo certificates for a project, put money in an independent account and when the certificates are delivered the money goes to the project. The idea is to increase certainty and transparency so the buyers know their money is safe until they receive their carbon credits, and the project knows that when they deliver the carbon credits the money is there for them. the Plan Vivo Foundation is funded largely by fees related to project registration and the issue of plan vivo certificates.

5.3.6 ECOSUR

A scientific committee from the College of the South Frontier (ECOSUR), a local think-tank. Scientists evaluated carbon sequestration potential in farming land and the feasibility of a carbon sequestration project. Also ECOSUR helped in the development of knowledge and information of the project.

5.3.7 National Commission of Natural Protected Areas (CONANP)

According the CONANP one of its policy objectives is the establishment of alliances among different levels of government at national, regional, and municipal (county) level. However, this objective is also extended to NGOs and the civil society. The formation of alliances are intended to strengthen public policy for natural protected areas and to co-ordinate actions when there is common interest on the conservation of natural resources. CONANP have co-ordinated actions with AMBIO concerning natural restoration, monitoring of national parks, combating forest fires, and establishing productive projects at local level.

It is important to notice that the relationship between CONANP and AMBIO has been very important for the Scolel Te project for two main reasons. First, because CONANP and AMBIO share mutual objectives and their activities are complementary. Second, CONANP works within the reserves where most of the *Scolel Te* projects has been established such as the Montes Azules Natural Reserve, Naha-Metzabok Natural Reserve, Bonampack and Yaxchilan Natural Reserve, and the Sepultura Natural Reserve.

In this context, CONANP has been the entry door for *Scolel Te*'s projects when afforestation and reforestation project has been required. This relationship has created great benefits for both organizations. First of all, CONANP has a very good reputation among local communities not only for being a governmental organization (which has public resources and technical support) but also because it works directly with the local communities in the design of productive projects. This infrastructure has been used by AMBIO to coordinate the project and to bring people to the project.

Also, CONANP takes advantage of the benefits that the *Scolel Te* project may bring to a governmentally lead productive project. For instance, CONANP can link afforestation projects with organic coffee projects, adding value to the governmentally managed projects of organic coffee. Similarly, AMBIO can benefit from its relation with CONAMP by gaining access to new communities that otherwise would hardly be willing to implement an afforestation project. Also, CONANP and AMBIO have generated an exchange of resources and technical operations. For instance,

both institutions have the common problem of finding plants and seeds for reforestation and conservation activities. In this case, CONANP together with AMBIO have committed voluntarily in the creation of plant nurseries, technical training for the management of nurseries, and operational co-operation for transporting plants and exchange of species and seeds.

5.3.8 National Institute of Ecology (INE)

The INE is a governmental organisation that is in charge of the Mexican government's commitments towards the United Nation Framework Convention on Climate Change (FCCC). In specific, the INE is responsible of producing information and research about mitigation, emission and reduction of carbon. Also, the INE tries to identify the main sectors that are vulnerable to climate change and to design public policies to cope with it. Initially the INE was involved in the pilot program of *Scolel Te* project jointly with AMBIO, ECOSUR, and US environmental organisations. Since the implementation of *Scolel Te* the INE has limited its participation to the exchange of information with AMBIO about the carbon sequestration activities in Chiapas.

5.3.9 National Commission of Forest (CONAFOR)

The CONAFOR is a governmental organisation, its main objective is to provide economic resources to rural areas in order to foster the conservation and recovery of forest areas, and as well as the formulation of plans and programs to promote sustainable development forestry. In terms of the*Scolel Te* project, CONAFOR does not have a formal relationship with the *Scolel Te* project. This is because CONAFOR does not provide any kind of economic resources to the project. However, CONAFOR has a similar project of carbon sequestration through planting tree scheme called *ProArbol*, that make possible the co-ordination of many activities with AMBIO.

According to AMBIO, the relation with CONAFOR is not formal, the relation is with the technicians who manage and implement the governmental projects at grass-root level. CONAFOR and AMBIO have co-ordinated training activities and

exchanged equipment in a very informal way. Only when it is necessary to formalise some activities with CONAFOR, AMBIO has to go directly with the head of CONAFOR (Estate office)

5.3.10 Natural History Institute of Chiapas (IHN)

IHN is a governmental organisation of the State of Chiapas. The IHN, in general, is in charge of promoting sustainable development policies in the State of Chiapas. In specific, the INH has as main activities the creation of programs and plans for the strengthened of conservation and improvement of the environment, ecologic ordinance, and the quality of housing. In specific, the IHN co-ordinate actions with AMBIO in the management of germ-plasm project (seeds nurseries) and help in the creation of communal tree nurseries. Also, IHN collaborate in the exchange of environmental information in the project.

5.3.11 Mexican Fund for Nature Conservation (FMCN)

The FMCN general objective is supporting initiatives of biodiversity conservation and climate change in Mexico. In specific, the FMCN finances conservation initiatives and give technical assistance and training. The FMCN participate in the *Scolel Te* project providing technical assistance to the reduction of catastrophic fires in the community land. The idea of FMCN is to generate local capabilities to protect the biodiversity and to manage the risk of fire. Also, The FMCN intends to foster the organisational and technical capacities at local level that can be reproduced in others parts of Mexico.

5.3.12 Reforestamos Mexico A.C. (RM)

Reforestamos Mexico is a civil organisation formed by Mexican private firms. The main objective of the organisation is to promote awareness and sustainable management of environmental resources. Recently, AMBIO has been promoting a coalition with Reforestemos Mexico. This initiative constitutes a strategy to explore new niches for business in the carbon market at national level. Given the difficulty of selling the carbon sequestration certificates at international level, AMBIO has been

fostering the insertion of the *Scolel Te* project in the internal market as a strategy to bring more potential buyers. According to AMBIO, the coalition with Reforestemos Mexico intends to create a carbon foot print project for firms or individuals which/who want to offset their emissions. The idea is to evaluate the specific needs of potential buyers and to neutralise their carbon emission through the *Scolel Te* project. In this context, Reforestemos Mexico is helping with the evaluation of the potential gains for accessing to the national carbon market.

5.3.13 Environmental Services of Oaxaca (SAO)

Servicios Ambientales de Oaxaca, A. C. (SAO) is a civil association with no lucrative aim. SAO was created in 1997 with the alliance between Union of Zapotecas Communities (from Chinateca and Ixtlan region) and Etla communities. The main objective of SAO is to support their members in the production of goods or to provide services that help to improve communities livelihoods in the region of Oaxaca. This includes fostering sustainable development initiatives at grassroot level to improve local capacities in poor communities settled in forestal areas.

Initially, the *Scolel Te* project was established between AMBIO and the Estatal Co-ordination of Coffee Producers of Oaxaca (CEPCO) in 1999. CEPCO initiated the pilot project of carbon sequestration in six communities of the region under the co-ordination of AMBIO. However, the 2000, CEPCO merged with five other regional organisation to form SAO. As part of the negotiation, SAO was committed to follow up the *Scolel Te* project in the three remaining communities: San Juan Metaltepec, Santiago Teotlasco, and Tepetotutla. This commitment was legally binding among AMBIO, CEPCO, and SAO. However, According to SAO "At that time, SAO had not a clear idea of the project of carbon sequestration, SAO accepted the project because CEPCO delegated its responsibility to us (SAO). At that moment, SAO acquired the responsibility of managing the project in the region even when the *Scolel Te* aims were completely different to the initial objectives established by our organisation". Nowadays, SAO has became an expert of carbon sequestration in the region of Oaxaca given its experience with the initial communities and the *Scolel Te* project. Also, SAO has become the principal promoter of

the carbon sequestration project in Oaxaca but as an independent organisation. At the moment, SAO is still following up the project in the remanning communities, as the agreement establishes.

5.4 The rules of the game in the *Scolel Te* project

The main activity of the *Scolel Te* project is to establish a series of afforestation and/or forestation projects in local communities. Here, the institutional design of the project revolves around the natural life cycle of trees and the fostering of commitment among planters through the whole life cycle of the tree. In particular, and of highest importance, a set of activities need to be done throughout key moments of a tree life-cycle so that it will develop properly to maturity. In terms of the productive exchange network, the life-cycle of the tree imposes the creation and clear distribution of roles and tasks so that everybody knows who is in charge of what, what it is expected from each one, and when it is expected that the task will be carried out. So, the very life-cycle of the tree obliges contributors to perform their role for the functioning of the project. If something goes wrong at any point of the life-cycle of the tree, then the chances are that it will die. With no tree there is no carbon certificates, no money, no biodiversity, and nobody receives payment for their services to the project even though there were not the ones who fail to perform their tasks.

In terms of the institutional design of the project, the first step for initiating a project is to enrol a local community. During enrolment communities receive information about how the *Scolel Te* project works and about climate change and its effects in the region. The idea behind the transmission of relevant information in this stage is to create *environmental consciousness* and not only binding business relationships. Moreover, the transmission of environmental information is intended to foster a moral commitment with the project that may be extended to future generations of farmers. The process of enrollment ends with the signal of a contract between AMBIO and the community/farmers. In general, the contract is the most important mechanism to coordinate actions in the *Scolel Te* project, especially among communities who do the main activity of the project: planting trees. This

initial contract establishes the rules under which planting activities have to be done within the project, the obligations that communities and AMBIO are subject to, the benefits for the communities, and other technical rules.

Communities/farmers commit themselves to plant and give maintenance to the trees for a 25 year period. On its side AMBIO commits to give a series of payments for the services provided by the communities/farmers and to give information and advise during the whole process of the life-cycle of the trees. The payment system/schedule, however, is the main economic incentive mechanism put in place to generate the relationship between the communities and the project. The contract specifies the system of payment where actors received five payments in a period of eight years and final payment in the 25 year:

- First payment: It consists in a commitment of eight years and five payments.
  - The 1st year to the 3rd year the communities receive a payment.
  - The 4th year the communities do not receive payment.
  - The 5th year the community receive a payment.
  - The 6th and 7th year the community does not receive payment.
  - The 8th year the community receive the last payment.
- Second payment: the collateral payment.
  - At year 25, each community receive the 10% deposit of each payment year.

The Scolel Te project creates a series of incentives that allow the communities/farmers to engage with the project. Those mechanism are thought in terms of the tree life cycle. In the first stage a payment is given in three consecutive years in order to create a clear signal so that the communities know that their initial investment will have a pay off. This is because in the beginning of the project the communities spend a lot of time and effort to initiate the tree plantation: looking for seeds, preparing the soil for planting, opening the furrows, and planting the trees. Without the initial payment the communities are hardly willing to participate given

the uncertainty of the gains. Furthermore, in this stage the direct cost for the communities are higher than in subsequent stages because farmers spend much more time in the maintenance of the trees given the small size of the trees and their high mortality rate at this age.

It is important to notice than in the first stage the communities transit through a very important phase where they learn the *"rules of the game"*. This is a key stage because it is during this time that the communities can learn the real costs and benefits of participating in the project. As a result, it is at this stage that most of the withdrawals are experienced. This learning and potential early withdraw of weakly committed and/or low benefiting communities is expected and considered part of the normal life of the project. This point will be discussed later on.

After three years of continuous payment the community/farmer does not receive any money for a year. Then, in the fourth year, it is expected that the plants have crossed the high risk threshold and are of a length that is large enough to survive. However, the trees still need some caring such as weeding and cutting of unwanted branches. The incentive for the communities in the fourth year to carry on their maintenance tasks are determined by two main things. First, the trees have reached a "decent length" and farmers can physically see the tree as an asset owned by the community/farmer. Visual contact with the trees is, apparently, the strongest incentive that the communities have to stay working with the project. Second, the payment in the fifth year is seen as rewarding the extra or marginal work on the trees during the gap year, especially if the farmer takes into account all the previous sunk costs and the relative reduction of the direct costs (marginal costs) for continuing giving maintenance to the trees.

The second stage goes from years 6 to 8 /10. Here, the trees are large enough and do not require too much care and/or investment. It is expected in the second stage that farmers/communities keep the trees not only for the economic payment that they receive from AMBIO but also because they already see that the trees are an asset for them. The community representative of Frontera Corozal said

> "...our trees are seven years old, they basically will grow alone hereafter and I do not have to spend too much time in cleaning and caring

> activities. They are so large, around seven or eight centimetres of diameter, and around five and ten meters high. My community no longer receives any payment for the tree program. However, I do not care, I do not want to abandon the trees, I prefer to take care of them by myself even the trees require extra money. I prefer to work two or three days for earning myself the money that will pay for the expenses that the tree will create, rather than leave them alone and risk they could die." Fernando Martínez López, representative from Frontera Corozal.

Finally, each actor has to pay a fee in advance of the 10% for each payment they received. This collateral payment is intended to incentivise actors to keep the trees alive until year 25. If actors comply with the obligations to keep the trees until the end of the contract they have their deposit back. In terms of the institutional design the collateral payment intends to guarantee the sequestration of carbon through the life span of the project.

Basically, the payment system is designed to protect the tree in the most vulnerable points of its life cycle, when farmers/communities have the largest costs of maintenance, bear the highest uncertainty about the potential death of the tree, and hence have the least incentives to take care of the trees. This payment system is also important for AMBIO to guarantee that the community will do the job. In this context, the establishment of a system of payments is complex because it is the main mechanism that will ensure a balance between the accomplishment of contracted tasks and the fulfilment of the benefits. For instance, one single payment at the beginning of the project will be more popular among communities because it can incentivise major participation. However, one single payment means a high risk for the project manager, in this case AMBIO, because it does not guarantee the fulfilment of communities' commitments in the years after the initial payment. Clearly, under a single initial payment scheme the communities will have incentives to receive the payment and do nothing else because there is no more money coming down the line and there is no credible threat to force them to comply with the terms of the contract. A single payment at the end of the project will not work either because in such a case all the planting and caring activities have to be done at the

community's own risk and that will create such a large uncertainty that probably none of them will be willing to participate. According to AMBIO, the *Scole Te project* finds an intermediate solution that is designed to resolve co-ordination problems and to align incentives at the point of highest risk for both the trees and the comunities/farmers.

5.5 The plan vivo document

After the communities sign the contract, they have to do their own plan vivo. A plan vivo is a document that each farmer/community has to do in order to enter the project. The plan vivo specifies:

- The size of the parcels or plots of land that are going to enter into the project. The measures of the plots in hectares. There is not a minimum or a maximum number of hectares necessary to enter the project, so the extension of land dedicated to the plan vivo depends on each farmer or community.
- The plan vivo includes a map of the location of the parcels.
- If the project will be carried out on a communal or individual basis. In the latter case, the obligations are considered to be acquired at community level.
- The planting system. The planting systems determine two main obligations for the community. First, it has to be established where the trees will be planted and, second, the density of trees that each community/farmer is committed to look after. Both decisions will shape the planting system.

There are four types of plantation system: (a) live fence system, (b) taungya life system, (c) improved fallow, and (d) shade coffee system. The live fence system is a mixture of trees with livestock activities. Here the arrangement of the trees is around the edge of arable fields or pasture areas. This is a useful system because it allows planting trees where land is scarce. Crops are planted around the field creating a natural fence for animals. In contrast, the farmer in the taungya system can plant trees with others chief crops such us maize, beans, and courgette. This system allows farmers to diversify the use of land during the initial years of tree plantation,

bringing extra income. The improved fallow system, which is the traditional form of working the land in Mexico, is through dividing the arable field in two parts. One part is set for working and the other part is set for resting. The last one is called the fallow or acahual sytem. The fallow/acahual consist in leaving the land to rest for two or three years when the nutrients in the land have been exhausted from the constant use. In this context, the fallow/acahual systems consist in preparing the soil and planting trees only in the areas where trees are going to be placed, leaving clear the rest of the fallow/acahual land. Finally, the farmers can plant trees in a shade coffee system. Coffee crops normally need a proper shade to grow up because the direct sunlight can damage the coffee. Here, trees are planted in rows and between where coffee plants are placed. Hence, the trees create a natural shade for the coffee.

It is important to notice that each system has specific rules in terms of the distance that must be left between trees. For instance, in the taungya system the distance between each tree is around three meters. In contrast, in the fallow/acahual system the distance between each trees is four meters. The number of trees, also, varies according to each system. For example, the taungya and fallow/acahual system allows 600 trees per hectare. In contrast, the coffee system allows only for 183 plants per hectare, and the live fence system allows only for 133 trees per hectare.

According to the farmers, the economic benefits, also, vary according to number of trees in each system. For example, planting trees in fallow/acahual brings a total benefit of around 1,600 mexican pesos per hectare. In contrast with live fence and coffee system the economic benefits only represent 700 mexican pesos per hectare.

The idea behind the plan is to take into account the main economic activity of farmers/communities in choosing the best suited plantation system. In others words, the project intends to make efficient use of the available space within parcels in order to plant trees without affecting the main economic activities of peasants or even improve the environmental management of the land. Following this idea, the regional technician of the Totzil area said: “the plan vivo allows farmers to use spare space during the entire life of the trees. For instance, when the trees are little, the farmer can use the fallow/achual system because in this system the trees do not compete in terms of space and light with other crops. But when the trees grow and

the foliage covers part of the planting area the farmers can move to the coffee system, because the trees are big enough to create a proper shade for the coffee production. Finally, when the trees become adults farmers can change to livestock production." As a result, the regional technician considers that farmers can take advantage of different types of systems during the development of the tree plantation.

5.5.1 The technical rules

Once the contract is signed and the plan vivo is done, AMBIO have the obligation to provide technical advice to the community in order to help farmers in the maintenance of the trees during their growing process. This training is focused in the different stages of the planting process:

1. Looking for the trees. In order to initiate the plantation communities need to have different species of plants. To find the trees is a duty of the community. However, given the difficulty to obtain diverse kinds of plants and in huge quantities, it is necessary for AMBIO and other organisations to help in the search of seed and to establish plant nurseries. Not all the communities have the same access to plants and their access depends on the kind of relationship that they have created with other organisations and communities.

2. Preparing the soil, open the furrows considering the planting depths and spaces.

3. Planting the trees. The main commitment of the communities/farmers is planting the trees and protecting them for their whole life cycle. The communities bear all the cost of the loss of a tree even if the loss is due to natural causes such as droughts, tornados, or any other kind of climate disruption. So communities have to pay attention to all those factors that can put in risk or compromise the viability of trees in order to be able to obtain the rewards.

   Also, It is important to notice that the highest risks are at early stages of a tree's life. In early stages plantations are vulnerable to external factors and there is a high likelihood that a certain amount will die. For instance, little plants are very vulnerable to the climatic changes and very susceptible to

disease. In this context, part of the obligation of the farmer/community is to plant the trees and *replace them* with new plants when they die in order to maintain a constant density, which is the one contracted in the plan vivo.

4. Caring for the trees. Another obligation of the farmers/communities is caring for the tree throughout their growing process. It implies that farmers have to weed out other plants that threaten the life of the trees. Also farmers must cut unwanted branches and foliage to allow trees grow healthy and, very importantly, strait so that future wood will be valuable.

   The decision of how many plants and which kind of species are planted is left to the communities. AMBIO usually give some recommendations but the ultimate decision is in hands of the communities/farmers.

5.5.2 The monitoring process

The monitoring process is a fundamental tool for the regulation of the obligations of local communities. Monitoring takes place each year. The communities receive a payment only when they comply with the operative rules around the process of planting trees. The regional technician and AMBIO are in charge of doing the monitoring.

The monitoring consist in checking that trees comply with the operative rules such as the density of the plantation (the number of plants that each community/farmer commit to plant according to their own plan vivo system), the distance between trees, the date of planting, the caring process (cleaning and cutting), and when it is necessary, the replanting trees activities. However, the most important operational rule is that trees should be alive. If some trees have died for any reason, the obligation of the farmer/community is to replace them for new plants. In this case, AMBIO has to do the monitoring again to check that all the dead trees have been replaced, giving enough time to the community/farmer to plant new trees.

In addition, a community representative usually supervises the work and the activities of all other members of the community. This representative is in charge of negotiating with AMBIO the date when monitoring will take place and the extensions where trees will be replanted. Once the community believes that all the job

has been done the representative will call AMBIO to start the monitoring.

If AMBIO considers that all the work is done, following all technical rules, the community has the right to receive the payment. The work is per hectare following the rules of the specific plan vivo. However, the price is estimated in terms of the carbon sequestration tons (tCO2) according to the number of alive trees and strict fullfilment of the technical rules. For instance, if a community chooses a live fence system, they have the obligation to plant 183 trees in each hectare. However, if during the monitoring process only 180 trees are accounted for, the missing trees are discounted. Further, if, say, four trees were planting without respecting the correct distance between them, this four trees will be discounted. At the end of the monitoring the community/farmer will receive the quantity of money that corresponds to the number of alive plants.

AMBIO sell each ton of carbon sequestration (tCO2) at 12 dollars. For each tCO2 sold, AMBIO keeps two dollars as a management fee and gives the remaining 8 dollars as a payment to the community/farmer. Also communities have to leave 10% of the total of tCO2 sequestrated as collateral that will be paid in the final payment in year 25. Also AMBIO has to pay to Plan Vivo foundation for the issue of carbon credits certificates. Payment also depends on the availability of buyers in the voluntary/compliance market.

Chapter 6

Uncertainty and the generation of commitment

6.1 Introduction

As we have seen in the previous chapter, the implementation of the tree plantation scheme in Chiapas has been difficult because *Scolel Te* depends for its own development on the establishment of a long term commitment among actors, especially with the local communities, and the expansion of this commitment in the region to increase the economic viability of the project . The need to establish enduring relationships at a local level seems to be the key factor for the formation and continuity of the project. Especially if we consider that all the activities of local actors are linked to the maintenance process of trees during their whole life cycle. In this context, it is necessary to identify the sources of uncertainty in the *Scolel Te* project as the main factors that can prevent the long term participation at local level in the network. Also, identifying the main source of uncertainty can help us to understand the problems of the generation of commitment in the project.

The main difficulty of the implementation of the *Scolel Te* project is that commitment at a local level cannot be guaranteed. Even when communities agree to participate it is difficult to predict whether they will be reliable at each stage of the project. Clearly, changes in the perception of net benefits, cost, and social context can prevent participation at local level.

Uncertainty over the possibility of obtaining desirable outcomes in a given rela-

tionship has been considered by exchange theorist before. Emerson (1972b) points it out that uncertainty is an intrinsic property to the exchange relationship. For Emerson, the existence of a exchange relationship by itself represents a problem of uncertainty because it is impossible to know if each actor will be repaid and uphold their obligations over time and therefore it is impossible to ensure the conclusion of a satisfactory transaction with any partner. Following Emerson, Cook et al. (2004) argue that uncertainty stems from the impossibility of enforcing obligations in exchange. However, for her, uncertainty is more likely to affect the formation of relationships in the context of weak or lack of institutions. Weak institutions, according to Cook, imply necessarily the existence of an enforcement problem because there are no credible formal punishment mechanisms that can sanction actors' misbehaviour. In this context, Cook points out that uncertainty is greater in a generalised exchange network (open networks) than in closed exchange networks. Clearly, in generalised exchange uncertainty is higher because actors do not observe — at least, not at all times — the actions of their exchange partners. As a consequence, it is difficult to identify deviators who misbehave. In contrast, closed networks provide the opportunity of close scrutiny because actors know each other. So, any deviation is more visible. In this vain Kollock (1994) defines uncertainty in social exchange as "... precisely the probability of suffering from acts of opportunism (exploitation, corruption) by an exchange partner that can result in undesired outcomes or significant losses."

The *Scolel Te* project is in itself a source of uncertainty because it depends on the formation of relationships among local, regional, national, and international actors. Uncertainly is also generated by *Scolel Te*'s specific institutional design — i.e., a productive exchange network with the need of long term commitment. The following aspects are considered to be the main sources of uncertainty in the project:

- *Long term contract.* A 25 year period to the end of the project implies a huge risk in itself. Any economic, social, political or even ecological disruption at the local level can have catastrophic effects on the tree plantations and prevent the orderly conclusion of exchange among actors. This need of long term commitment has created problems for bringing people to the project, especially among

communities/farmers. According to AMBIO, bringing committed participants is a difficult task, because people expect short term benefits. A representative of AMBIO said "Long term commitment is difficult thing to sell to the communities/farmers". This difficulty arises because, from the point of view of most communities/farmers, a tree plantation is a long term commitment that takes too much of their effort and time and where the risk of losing the benefits is difficult to anticipate, given the likelihood that an extraordinary event would happen (lost of trees) over a period of 25 years. There is no possibility that the project can guarantee any aspect surrounding the life cycle of trees. Communities, farmers, and AMBIO know that. According to a farmer, "their commitment to the project will carry as long as it is possible".

- *The project is an organic system. Scolel Te* is an open network where actors participate voluntarily through bringing resources to the project and/or performing a set of activities. There is no binding obligation for actors to participate in the project. That means that each actors can enter or quit the project without incurring in any economic or legal cost. For instance, in the exchange between AMBIO and communities/farmers, AMBIO has the obligation to reciprocate the effort of communities/farmers only if the trees are planted in the form, time, and quantity that is specified by the *Plan Vivo* signed by each community/farmer. So the contract is only binding if the communities/farmers discharge their obligations and the expected output is realised —i.e., it does not suffice that the work is done, the work must bare fruit. In the case that a community/farmer decides to quit the project at any stage of the project, AMBIO cannot oblige the community/farmer to remain in the project nor to reciprocate their obligations, even if AMBIO incurs in economic cost such as giving advise or training to the farmers. A similar case occur with GOs such as CONANP and CONAFOR. The participation of most GOs is not based on institutional agreements. Instead co-operation is based on the possibility of addressing common problems that each organisation faces everyday. For instance, The scarcity of tree seeds in the region and the need of establishing a seed supply in the region makes the participation of CONANP

and CONAFOR in the project possible, where both organisations engage in an exchange of skills and technical support with AMBIO in order to develop the necessary knowledge (human capital) among communities/farmers for the collection of seeds. Here, actors participate in an informal way, however, AMBIO cannot obligate CONANP or CONAFOR to participate in the project if they decide to quit. As a result, there is no contractual commitment that guarantees participation in the project, there is only an expectation that actors will generate certain interdependencies that can keep them in the project.

- *Lack of a central authority.* Another factor of uncertainty in the *Scolel Te* project is the lack of a central authority that can oversee the project. This factor has affected the perception of the project among local communities. This is because, historically, communities (especially indigenous) have suffered from abuse by mix people or even by authorities who take advantage of their cultural background — most communities have their own language, governance system (base on uses and costumes), and few of them speak Spanish. One of the strategies that communities use to avoid abuses is restricting the access of unknowing people to the communities. Here, governmental organisations (GOs) have more opportunities to interact with local communities than any other type of organisations (civil or private). This is because, public servants are supported by an institutions and they usually are more accountable respect other kind of organisations, if something wrong happens there are more possibilities that an institution will be held accountable for acts of corruption. This social context creates a disadvantage for the *Scolel Te* project. The lack of legal mechanisms and the null existence of a central authority creates problems of uncertainty because it is unclear to what extent an obligation is enforceable and how one could punish someone for acts of corruption. The problem gets more intricate when local communities realise that they are part of a wide network that includes international actors. The representative of Nuevo San Isidro community commented about why community members where initially reluctant to participate in the project:

  "... because we are located so close to the natural reserve that many

> people come to work in this area from abroad, because they know that we still have forest, they know they can obtain some benefits from it. However, some people come here only to take advantage of our generosity and to exploit us... we (the community) used to participated in a project of Ecoturism with PRODESI (Projects for Rural Development of Indigenous Groups) . However, the people who came to help us with the project did not work well, they imitated our signatures and went to the institution to collect our loan for the project, 19 people were defrauded. We lost our money because PRODESI did not believe us and never came to the community to investigate the problem." Efrain Lopez Martinez representative from Nuevo San Isidro in the Scolel Te project.

In this context, it is necessary to identify how commitment is generating in the *Scolel Te* project given the presence of uncertainty . Which kind of mechanisms emerge to keep social exchange going among actors in the long term and which kind of norms are established to create a fair exchange and avoid exploitation and corruption in the network. Clearly, there are some problems of uncertainty that depend more upon the perception of actors and their specific interest rather than problems of co-ordination due the legal contracts. For instance, change in actors' perceptions about the positive benefits of the project can lead to their withdrawal from the project. Hence, commitment is not only a matter of good institutional design and legal contracts but also depends upon the generation of trustworthiness among actors and within the project. Perception and beliefs about actors reliability and project reputation can have a significant impact on the development of the project and long term commitment.

6.2 Trust and the generation of commitment in the *Scolel Te* project

6.2.1 Theoretical considerations

The need for generating long term commitment in the project necessarily involves the reduction of uncertainty. Uncertainty has the consequence of reducing the incentives that communities have to engage in the tree planting scheme. In this context, AMBIO has developed a series of strategies to reduce the risk associated with the actual process of planting trees and fostering commitment, especially among local communities.

According to AMBIO commitment implies that communities/farmers should generate a type of personal attachment to the tree plantation. This commitment goes to the point of considering the tree as part of their well being. From the point of view of AMBIO, communities are not committed to participation in the project as long as the trees are not considered as a valuable resource. This perception has its origins in the traditional farm system. For most communities clearing trees and bushes is part of the traditional agriculture system of 'slash, burn, and plant.' This deforestation process has been intensified with the introduction of cattle to the jungle. In order to change perceptions about the value of tree plantations, communities have to modify their relationship with trees (nature) that they have adopted historically. This change of attitude over nature implies indispensably a reconstruction of the trees' role and delineating of a new relationship with them. Moreover, the communities have to evaluate how this new role of the trees can affect the socio-economic context in which they live. Clearly, changes in the perception of nature and the adoption of new ideas can be difficult and involve a process of learning that can be tested only through empirical experience over time.

In this context, AMBIO offers an insight about how commitment can be generated among local communities in the Scolel Te project: commitment can be possible at local level only through a process of learning. This process of learning means that communities have to learn not only the important role that trees play in the natural balance of the earth — like in climate change — but also the economic value that

trees represent to their own lives (housing, fuel, and other economic advantage.) If the communities can internalise this value, AMBIO expects the communities to engage in the project in a long term basis.

In terms of social exchange theory we can say that, if the tree plantation is perceived as a valuable resource, intrinsically value (ecologic/economic), this value is expected to overcome the degree of risk that each actor is willing to bear. That is, the benefit of having the trees should pay off for the cost that each actor bears for participating into the project in the long term. The learning idea has also implications on how the commitment can be generated:

a) If commitment depends on the learning of each community/farmer over time, then the dynamic process of learning implies that commitment evolves as well over time. Hence, communities can transit from lack of commitment, trough engagement, to commitment.

b) The value of trees is contingent. That is, the real value of trees is not something that can be learnt at the moment of entering in the project, but something that is acquired through a cognitive and empirical process. Then, the tree plantation value varies according the degree of commitment.

AMBIO in some sense recognises that commitment can be generated only over time. So, it is expected that communities can not have any kind of attachment to the tree plantation in the initial part of the project. To solve this problem, AMBIO establishes a regulatory mechanism that substitutes the lack of commitment in the initial phases of the tree plantation — the initial contract and the system of payments. This regulatory mechanism has three functions. First, to give some sense of 'certainty' to the project. Local communities can feel 'more secure' because there is a legal document which can be used in the case obligations are not reciprocated by AMBIO. Second, the contract has the function of substituting the absent of initial trust and to incentive the formation of a relationships between AMBIO and the communities. That is, the initial payment provides the 'kick off' for the communities to participate. Finally, the system of payments as a whole substitutes the lack of commitment in the initial phases of the project (see the role of payments, discussed in section 5.4). As a result, the lack of commitment is associated directly with

the problem of uncertainty. So reducing uncertainty is precisely the role played by the contract and the system of payments. If we merge the two strategies that AMBIO considers for the generation of commitment, social learning and regulatory mechanisms, we can see the dynamic process in the generation of commitment among local communities in the *Scolel Te* project. Clearly, the lower is the commitment among communities the more often is the amount of economic resource than a community receives, and vice verse, the higher the commitment among communities the lower the payment that each community receive per year (see Table 6.1).

Table 6.1: Contractual commitment and Learning

Phase I	**Phase II**
Enrolment: Free access	High Risk/more payments
Initiation of relation	No commitment
Phase III	**Phase IV**
Medium Risk/ less payments	Low Risk/No payment
Engagement	Commitment

The 'model' of commitment suggested by the *Scolel Te* project provides an initial framework to understand the process of generation of commitment-learning and the associated regulatory mechanism. This thesis, however, considers that this model is still incomplete and does not consider all the factors that influence the generation of commitment among local communities. In this context, this thesis suggests inclusion of two additional factors to the model. First, it is necessary to expand the model of learning to take into account the cost of implementing the tree plantation. Second, it is important to consider a relational mechanism approach (interdependencies among actors) in the generation of commitment as an alternative of the regulatory mechanisms (See Table 6.2)

Learning the costs in the Scolel Te project

The *Scolel Te* project infers that the learning process can foster changes in attitudes with respect to 'nature', because the communities can learn the benefits of maintaining a tree plantation. This change in attitudes over nature can have great influence in the degree of engagement because communities which attach a high value to the trees for their ecologic attributes are more willing to participate in the

Table 6.2: Contractual commitment and Learning

Phase I	**Phase II**
Enrolment: Free access	High Risk/more payments
Initiation of relation	No commitment
No interdependencies	Low Interdependencies
Initial conditions	Learning
Task	
Process	
Skills	
Goals	
Context	
Phase III	**Phase IV**
Medium Risk/ less payments	Low Risk/No payment
Engagement	Commitment
Medium interdependencies	High interdependencies
Revaluation Readjustment	Commitment
Efficiency	
Equity	
Adaptability	

project in the long term. However, this thesis considers that the intrinsic value of tree plantation *per se* can not determine commitment in the *Scolel Te* project. In order to have a more complex view of the generation of commitment it is important to include the cost of implementing the Plan Vivo system at local level. For instance, what happens if a local community successfully changes its attitude over nature but fails to link the tree plantation to their overall economic / development strategy? Keeping trees implies a set of opportunity cost for the community as the trees compete for land and labour with other potentially profitable activities that they could do. Clearly these costs may be key determinants that can prevent either a change of attitudes over nature, or the establishment of a long term commitment given "environmentalist" attitudes over nature.

Communities are widely different among each other in terms of culture, natural resources, population, available infrastructure, distance from large cities, and social organisation. Therefore, though they communicate with each other, a given community can not determine the real costs of planting trees prior to their participation in the *Scolel Te* project. Experience from other communities is always a good guide to have an initial assessment of the cost. However, given its own specificity, a com-

munity can only learn the cost of implementing a tree plantation by *praxis*. How costly will co-ordinating actions among exchange partners be? How difficult would they find adapting to the rules of the game? How much effort will they have to put in performing each task? How difficult will it be to learn new skills? What is the community's flexibility / adaptability for changing individual goals and modifing the social context? Clearly, these questions can only be answered by direct experience. Accumulating such experience takes time. And only with time, investment, and effort, will a community gather enough empirical information to know what the real costs are that it will pay for participating in the *Scolel Te* project. Then, once the costs are learned, communities are in a better position of re-evaluating how 'profitable' their continued participation in the project will be (i.e., how high are the costs with respect to the benefits).

In order to expand the model of commitment in the *Scolel Te* project, we consider the framework of the 'process dynamic of collaboration' established by Doz (1996). This framework is relevant for this thesis because it allows the analysis of a productive exchange network where actors co-ordinate actions to produce a single output and where there is a negotiated framework which determines the conditions of the exchange. These conditions include: (1)goals of each actor; (2) division of tasks; (3) procedures; (4) adoption and sharing of skills; and (5) the context of exchange. Using this framework one can determine how learning occurs among exchange partners, and how these conditions evolve over time in the process of interaction among actors. However, this framework has to be modified to include commitment as suggested by the *Scolel Te* project (See Table 6.2).

The conditions of exchange pass through four main phases. In Phase I actors determine if they want to participate and those communities which enter to the project in some sense accept the initial rules of exchanges among actors. In the Phase II, communities start to learn the complexities of the project. Here actors start understanding the tasks, the possibilities to adopt processes and information, and their own capacity to learn and share skills. At this time , actors face the main problems related to their own performance and their own context. Also, in this second phase, communities and other actors also start learning about the behaviour of exchange partners, their reliability, and disposition to collaborate and coordinate

actions.

This thesis considers that actors start to re-evaluate and readjust their expectations in Phase III, when the payments end. At this stage communities need to take relevant decisions about their continuation in the project in the light of a lack of further economic incentives. According to Doz (1996), it is expected that at this stage actors will re-assess the exchange relationship in terms of three factors: (1) efficiency, (2) equity, and (3) adaptability. In others words, the process of exchange among actors will be re-evaluated in terms of the net benefits that each community can get. If benefits overcome the cost of implementing the tree plantation scheme (efficiency), communities will then turn to evaluate the fairness of the exchange relationship among all relevant exchange partners (equity). Finally, they will assess the possibilities to adjust the initial expectations to their local context (adaptability).

The second aspect that this thesis suggests is the expansion of the model of commitment in the *Scolel Te* project to include a relational approach as an alternative to the regulatory mechanism in the generation of commitment (see Table 6.2).

Relational Mechanisms

According to exchange theorists, relational mechanisms are more likely to develop in the presence of uncertainty, i.e., when exchange among actors cannot be guaranteed by regulatory mechanisms. The lack or weakness of regulatory mechanisms that allows enforcement of obligations among exchange actors increases the risk of deviation in the network. In this uncertain environment, trust relationships are more likely to emerge because actors tend to associate with people who show more reliability. For Molm et al. (2000), uncertainty creates the conditions for the emergency of relational mechanisms. They point out that an uncertain environment creates the conditions to demonstrate actors trustworthiness. In contrast, mechanisms that are established to reduce risk such as contracts can help to reduce uncertainty. However, if formal ways of enforcing exchange are in place, actors have no chance of showing their reliability and trust relationships never develop. The system of payments established by the *Scolel Te* project does not guarantee commitment among actors due to the flexibility of the contract, the impossibility of enforcing obligations among

actors, and the voluntary aspect of the project. Clearly, the degree of uncertainty around the regulatory mechanisms plays an important role for generating engagement among communities. So if the perception of uncertainty about the payments is high it is expected that trust relationships will drive the process of commitment.

This implies that the generation of commitment in the *Scolel Te* project is established through relational mechanisms based on trust relationships. These relational mechanisms are based on the idea that actors who engage in a new relationship start with few interactions in the very begging, given the lack of trust among actors. Eventually, actors show their trustworthiness, relationships evolve, and actors increase the frequency of interactions. Finally, the relation become so deeply embedded that actors can be said to be 'committed'.

Trust relations emerge as a mechanism to safeguard the process of exchange among actors by mitigating the risk associated to the formation of the relationship. Trust-based networks tend to reduce the risk associated with the relationship, because the frequency of interactions over time necessarily increases knowledge and predictability of exchange partners. So, by keeping in a trust relationship actors can guarantee reciprocity in exchange relations and avoid acts of opportunism. This is, in fact, a social mechanism that is designed to reward good behaviour and sanction bad behaviour in the network (Emerson, 1972a) (Cook and Emerson, 1978).

According to Kelly and Thibaut (1978), trust-based networks are relational mechanism that work by creating stable interdependencies, where dependency is understood as linking two or more actors in such a way that one's outcomes are contingent to other's outcomes. According to social exchange theory, the degree of interdependency among actors determine the degree of engagement among actors. In this token, Cook et al. (2004) and Kollock (1994) define 'commitment' as the final outcome of an exchange relationship where the degree of embbededness is so high that an actor is willing to forgo all other exchange alternatives for maintaining this particular relationship. Commitment can be costly, as it implies not trying exchange alternatives that could be potentially more profitable. This theory has many implications for the analysis of the model of commitment in the *Scolel Te* project.

- The higher the uncertainty around the regulatory mechanism the higher the

emergency of relational mechanisms for the generation of commitment.

- The higher the dependency among actors, the higher the degree of embeddedness of communities within the project. So the higher the commitment.
- The higher the contingency value that each community gives to the trees the higher the dependency with the project, and therefore with AMBIO.

In the next chapter I analyse the initial phase in the process of generating commitment among actors according to the model of Table 6.2.

Chapter 7

Phase I: The enrolment process in the Scolel Te project

7.1 Introduction

The main objective of this phase is bringing people to the project. Here communities can not generate any sense of engagement or dependency because they are not yet in a relationship with AMBIO or other members of the project. The priority of AMBIO at this stage is to establish initial contact with potential participants. This contact has to be face to face.

In this stage, the cognitive process of learning is initiated. So information is provided to persuade potential participants about the benefits of tree plantation in terms of their economic and environmental relevance. It is important to notice that AMBIO "imposes" at this time their view about what are the benefits that communities can obtain for participating and under which conditions they will get the advertised benefits. However, it is expected that the real value of the tree plantation will be assessed by each community over time and according to their specific needs.

AMBIO also provides information about the project itself, how it works, how it is organised. AMBIO is very clear about the rules of the game and make it clear to the communities that people who enter to the project have to follow strict rules for planting the trees. People are warned that they must fulfil all the requirements according to their *Plan Vivo* in order to receive the payments. AMBIO defines the

initial conditions of the exchange such as tasks, rights and obligations among actors. Despite this, however, people cannot know with precision the costs and benefits of implementing the plan vivo system. It is still too early for communities to test the project in praxis.

As a result, even when the information provided by AMBIO can foster positive feelings about the project, the formation of association between local communities will be done on basis of their expectation of obtaining an economic reward. So, it is expected that the possibility of obtaining a monetary reward plays the most relevant role in bringing communities to the scheme. However, this thesis considers that relational mechanisms among actors will be relevant if uncertainty around the project is higher among communities.

The next section will discuss the process of enrolment in the project and analyse the effectiveness of regulatory mechanics in the establishment of a relationshiop between AMBIO and communities.

7.2 The enrolment Process

AMBIO establishes a very easy enrolment process in terms of procedures. Here, potential participants who wants to be part of the project only have to provide a copy of their official identity card. This easy process of enrolment is motivated by two main reasons. First, to create an open access of the project trough the simplification of bureaucratic process. This strategy not only makes more available the project among potential participants but also compensates in some sense the strict rules within the project such as the monitoring system. In others words, the enrolment system is an important factor of the project especially if we take in account that a high proportion of the participants quit in phase II of the project due to the strict rules around the planting system. So, the only way to guarantee a constant flux of potential participants in the project is through a free access system and therefore to guarantee a certain level of participation in the project.

Furthermore, open network access makes the *Scolel Te* project more competitive with respect to other similar programs like *ProArbol* – a governmental carbon sequestration project. According to AMBIO, the governmental programs are the

principal competitors of the *Scolel Te* project. Many people prefer to work with governmental projects because they are less demanding. It is well known among farmers that governmental programs are less accountable in terms of monitoring. People who enter this kind of project can receive the payment without too much effort. However, governmental projects are more difficult to access because of the complexity of procedures.

The community of Rio Azul talks about the advantage of the Scolel Te project respect the governmental ones

> "...initially we wanted to enter to the *ProArbol* project. However, it was difficult to enter because the program asks for many requirements such as copy of land title, official map of the plot, and other official documents. Because it was so difficult to fulfil all the requirements of the *ProArbol* project people from the community decided not to enter it. Instead, the community preferred the *Scolel Te* project because it was easy to access. People from the community only need a copy of their official identity card and that is it. So, people feel that it was a better option..." Gonzalo Perez Perez representative from Plan de Rio Azul in the Scolel Te project.

In the same vain, CONANP, a governmental institution talks about the advantage of the *Scolel Te* project with respect the governmental projects

> "...the advantage of the *Scolel Te* project is not only that it is a long term project, but also that the methodology used includes an easy procedure of enrolment, a good environmental management, and a strict monitoring process. In contrast, the governmental projects are different. They imply many bureaucratic procedures, many documents are required. Furthermore, governmental programmes are not long-term projects that can guarantee the development of the tree plantation..." Jose Feliciano representative of CONANP in Chiapas, Mexico.

However, the institutional design of the process of enrolment system established by AMBIO has been not as successful as they expected. AMBIO faces a drastic

problem to enrol people. The establishment of a free access rule has helped but has not been the best way to bring people to the scheme. Apparently, the process of enrolment at local level suffers a major, deeper problem relating to the generation of initial trust among participants. This problem suggests that the regulatory mechanisms are not as important as the generation of relational mechanisms.

Bringing people to the project is a difficult task, especially because the *Scoel Te* project intends bringing people to the scheme under the basis of free access, no matter where people come from or to which community they belong. Free access maximises potential social capital from which the project has the possibility to initiate a relationship that eventually can evolve through the process of interaction among actors. However, this network association clashes with community based relationships. That is, communities are already embedded within a network of ongoing social relations. These relationships are limited to people who know each other either because they are associated in the form of social organization (ejido) or because they belong to determined indigenous groups — groups that have the same ethnic background. In both cases, group boundaries are well determined among local communities where membership is also well defined. Moreover, community based associations are closed systems, unlike the open network system of the *Scolel Te*.

This divergence of association between the project and communities has many implications in terms of the formation of a relationship. On the one side, the priority of AMBIO as an NGO is the generation of commitment in the network. Here the minimum of interest that one actor shows in the project is enough to initiate a relationship with AMBIO, even when there is no trust on AMBIO and AMBIO has no information about the reliability of the actor. Obviously, this is a risk that AMBIO would like not to bear but taking it is part of the normal process of enrolment. On the other side, relationships of individuals within communities are very strong. Members are already committed to the group to which they belong. Outsiders generally have a restricted access, or in the worst case scenarios, they are completely banned from the community. This social bond creates cohesion in the group and safeguards social values. Also, these social bonds reduce the risk from external threats and reduce their vulnerability. So the initiation of a relationship

with a local community implies necessarily the capability of AMBIO to penetrate those social boundaries of the communities. Here, the rule of minimum trust does not work, because communities have a complex system to determined the trustworthiness of outsiders. As a consequence, AMBIO has no option but to bear the risk of letting anyone who expresses interest enter the project. The technician of Yaluma comments about the problem of bringing communities to the project

> "...communities do not want to participate in the project for two main reasons. On the one side, many communities live without too much contact with the exterior world... It is difficult to persuade a community like that because they are strong in their perceptions, opinions, and internal rules. It is a tough situation, because some of them do not leave you even to enter to the community to explain the project... On the other side, problems can occur because of wrong information, misunderstanding of the project, and in the worst of the cases because of gossip in the community that can affect participation..." Fernando Lopez Aguilar is the regional technician of AMBIO and community representative of Yaluma.

Following this idea, this thesis suggests that communities determine the degree of trustworthiness of an actor through a complex reputation system. Communities tend to collect information about unknown actors from their networks. This information can involve a series of positive and negative perceptions about actors or events that are transmitted from community to community. This system of transmitting information can include rumours and gossip. The transmission of information through this relational mechanism seems to affect the form of how local communities interact with outsiders.

In this context, the *Scolel Te* project and AMBIO as a manager have passed through a process of screening among local communities. Here local communities obtain relevant information not only about the reliability of AMBIO but also of the possible effects that the project can have in their social context. According to AMBIO this process of screening on the part of the communities has been very slow. The collection of information have not been easy, specially because the *Scolel Te*

project has no previous antecedents, the project was for many years the first and unique project of carbon sequestration established in the region of Chiapas and in the whole country. So, the generation of a reputation among communities has taken a long time. This fact has been aggravated by communication problems among communities. Although the project has been working in some areas of Chiapas, information about the project is not always easy to transmit given the distance among communities and the lack of communication forms such as roads, telephone, radio, and so on. Clearly, communities which are located in remote areas have less information available than the communities which are closer to urban centres and roads. Moreover, even though communities who are working in the project have relevant information to transmit to others, the degree of contact with other communities may help or reduce the speed in which such information flows. For instance, communities which have direct links with communities who are participating in the project obtain information about the project much more quickly than those who are not well connected. However, connection among communities is also complex because most of the time it depends on the strength of social bonds among them. This happens especially among indigenous groups that tend to communicate more easily when actors belong to the same ethnic group. So, cultural similarities such as language, religion and other forms of ties can affect the transmission of information among communities.

Another problem is the existence of noise in the network. The difficulty for local communities of obtaining reliable information from trusted people within their closed networks tend to foster speculation about the project in the form of rumours and gossips. Fears can emerge around the project because communities feel that the degree of exposure to external actors could compromise their own well-being. In this context, the emergence of rumours and gossip acquire great relevance to the extend that it may prevent participation in the *Scolel Te* project.

According to the exchange network theory, rumours and gossip that are spreading in the network have different purposes and have distinct effects upon the reputation of actors. Rumours have an unknown source and usually emerge around a relevant event whose effects are not known. So rumours usually spread under conditions of uncertainty when information is not available from a formal source, or when available

information is not trusted. Rumours work as a system by gathering information from different sources and by creating a public dialogue about the consequences or effects of a given event over the life of people (Bordia and DiFonzo, 2004). In contrast, gossip tends to be used as mechanism for influencing the behaviour of others. The influence is larger when the quality of gossip is high, i.e. when the gossip contains relevant information and the trust between the gossiper and the recipient is high. Under those conditions spreading positive or negative gossip can strength or weaken the reputation of others. And the control over the reputation of others can bring a power advantage to the gossiper, in the form of respect from other actors in the network (Kurland and Pelled, 2000; Michelson et al., 2010)

Following social exchange ideas, this thesis suggest that the *Scolel Te* project is surrounded by rumours which amplify doubts about the type of risk that the project could represent for the communities. Specifically, the spread of rumours reflects the anxiety of local communities about the global context under which the project works, especially because it involves the participation of international actors such as NGOs and industries from developed countries. Here the idea that such strong actors are willing to create fair exchange relationships with poor communities is seen with scepticism. In particular, rumours are spread around how the project may affect the property rights and the use of community land. Besides these rumours, this thesis found the existence of one piece of gossip that was created deliberately to negatively affect the reputation of the *Scolel Te* project. This gossip was created by the Zapatismo movement.

Rummors in The Scolel Te project

The representative of Zaragoza expressed how rumours around land tenure can generate internal conflict in the community

> "...the ejidal authority (community authority) was worried about the potential risk that the community gets for participating in the project... He started telling to the whole community that the people who has enter in the project were selling their land to foreign people. So if the rest of the community followed their example the entire community could loose

> their land and eventually the whole community will be starving. Some community members who were already working with the project tried to explain to the ejidal authority why the project cannot be a threat to the property rights of community members... however, the ejidal authority was not convinced at all and asked to see the contract signed between the community member and AMBIO. Also he wanted confirmation of the identity of those people who were already part of the project, and that they did not gave any land title nor signed any kind of document that transmitted land property to AMBIO... After checking everything the authority allowed AMBIO to come to the community under the condition that everything they do was scrutinised first by the 'ejidal authority' (community authority) and that AMBIO could not negotiate any terms directly with the farmers..." Cristobal Cruz Lopez is the community representative of Zaragoza in the Scolel Te project.

Why do communities fear for the loss of their land to foreign people? These fears appear to have no objective ground. However, the fear obeys to a recent change in the land tenure in Mexico. In 1992, the Agrarian law deregulated the special protection that the communal tenancy had for decades, allowing local communities to celebrate legal contracts involving the use of their land. The possibility of changing the use and property of land have created a climate of uncertainty among local communities which are more aware of situations that can affect their property tenure.

The modification of the land law in 1992 is an initiative of the Mexican State intended to open the ejido structure in order to bring private and foreign investment to the agriculture sectors, especially to the communal one. The legal changes not only affected how local communities interacted with outsiders but also modified the traditional form of authority that existed at community level for decades. From the point of view of social exchange, the flexibility of rules around the ejido that the 1992 land reform brought about made it possible to move from an closed-base network to a open-base network where communities can establish alliances with non traditional actors like mercantile organisations and foreign actors. Opening new opportunities to form association between communities and another actors implied

necessarily the removal of restrictive norms that regulated the access of outsiders to communities. Clearly, this situation has created constant confrontation between traditional sectors within communities that perceive this new rules as a threat to the ejidal systems and those members who see this legal changes as a form to create new economic opportunities that can bring more benefits to the communities.

In this context, the *Scolel Te* project can be seen as an example of how communities are responding to the new challenges that represent the 1992 land reform, in specific the formation of new associations with different and non traditional actors. This experience is relevant at local level especially because the project is immersed in a global context. The formation of exchange relations among private and international actors such as AMBIO and international NGOs is a concern among local communities that deserves special attention, especially when the security of local resources can be jeopardised. It has involved not only a reinforcement of the power of the ejidal authority to restrict access to the community and to regulate the formation of association between community members and outsiders; but also has fostered a public debate about the effects of the *Scolel Te* project in the communal system. This debate has been done mainly through the spread of rumours given the absence or the impossibility of formal channels to discuss ideas, doubts, and fears about the project among communities. There are three major rumours that go round community networks.

First, even when privatization has not been pursued among most communities in Chipas and Oaxaca the most common rumour among communities is related to the possible effects that the *Scolel Te* project can have over the land tenancy of communities. Fear of losing the land in hands of outsiders or 'foreign' people appears to be the major concern among communities. Rumours under this local context, necessary lead a sense making of local actors to consider the potential risks of the association. In particular, local authorities and community members are keen to understand if establishing contractual relationships with international actors means, under some / any circumstances, the transferring of property rights over communal land and to what extend this rumours represent a real risk. On this topic the representative of Agua Azul community said:

"... The representative of AMBIO and the technician of Arroyo Palenque came to the community to invite us to form part of the reforestation project. However some people did not believe in the project because they thought that AMBIO tried to deceive the community in order to take our the land..." Antonio Ruiz Hernandez is the community representative of Agua Azul in the Scolel Te project.

The technician of Yaluma talk about the negative rumours spreading about *Scolel Te* in the region of Commitan

"... There were misunderstanding, there were wrong and contradicted ideas in the community like we were organised with foreign people to sell ours land. That created problems in the community and the project suffers to be accepted in the community..." Fernando Lopez Aguilar is the regional technician of AMBIO and the community representative of Yaluma in the Scolel Te project.

The second rumour among communities is that given that the project cannot affect the property rights of land, communities consider necessarily to discuss how the establishment of association between international actors and local communities could represent a loss of control in the management of communities' natural resources. Clearly, the contract of planting trees generates obligations that communities have to meet. So it is important to evaluate how these contractual obligations could prevent the use of natural resources for part of their owners, and how the intervention of foreign actors could restrict the use of trees for their local needs.

The representative of community Plan Rio Azul talks about the rumours spreading in the region about how local communities could lose their rights to exploit and use the resources derived from the trees plantations such as access to derived wood resources

"... one of the community doubts was about the ownership of trees, in specific the wood. We asked to AMBIO to clarify this issue, because many people told us that the wood will not be our, there were rumours that foreign people will come to take our trees, that foreign people will

> decide about our natural resources, our plots... We asked many questions, and we said to AMBIO, if we have no full control of our wood and natural resource we will not enter to the project. All the people who were there signed the contract, the contract established that farmers are only obligated to buy the carbon sequestration but that the trees and wood is for us and our children..." Gonzalo Perez Perez is the representative of the community of Plan de Rio Azul in the Scolel Te project.

The last most common rumour among communities is about the payments, many people fear that the payments are a type of fraud orchestrated between AMBIO and foreign actors that could compromise their property rights over land. The regional technician of the Chol region said

> "...many people were suspicious about the origin of the economic resources, specially because they come from other countries. Some people do not understand where the money comes from. People fear that accepting the money may compromise their land. However, later on, AMBIO explained what is a carbon sequestration project. Then people could identify that money came from the capture of carbon by trees, because trees help to absorb the pollution and to clean the air..." Nicolas Rodriguez Lopez is the regional technician of AMBIO and the representative of the community of Arroyo Palenque in the Scolel Te project.

The representative of the community of San Luis talked about the rumours of fraud that were spreading in the region, rumours that talk about the economic resources provided by foreign people through the Scolel Te project,

> "...We receive a salary for planting the trees, however we did not know where it came from, the only thing we knew at that moment is that AMBIO distributed it to the communities... the representative and personal of AMBIO came to the communities in 2007. In 2008, AMBIO visited us again, and we ask directly if the money that we will receive for planting the trees was Mexican money or foreign money..." Mario Diaz Perez is the regional technician of AMBIO and the representative of the community of San Luis in the Scolel Te project.

As I discussed earlier, the 1992 land reform introduced new forms of legal association in the ejidal system. Given that access is more flexible, the 1992 land reforms have led ejidal authorities to increase their monitoring of any association formed between community members and outsiders. There is a special interest in assessing the potential consequences of new associations in the community as a whole, and this assessment is done through informal public debate. The lack of formal channels among communities in the region have made necessary the use of a system of rumours, which spread through local networks and communicate ideas, fears, and information. Clearly, communities perceive that the formation of new relationships that involve contractual obligations with an unknown exchange partner may imply bearing a catastrophic cost and communities wish to evaluate the risks that they run by making such arrangements. Keeping aware of the possible effects of the *Scolel Te* project through the spread of rumours appear to work as a prevention mechanism that helps to identify possible acts of opportunism by unknown actors. This screening process is inevitable and *Scolel Te* must allow it to occur even when it takes time and can have negative effects on its reputation. Otherwise, the project has no hope of expanding in the region. Obviously, the spread of negative rumours has obligated AMBIO to establish a constant dialogue with the communities in order to clarify doubts and generate reliable knowledge about the project. However, the lack of presence of the project in the region and problems of communication among communities prevents the easy formation of a good reputation and, therefore, the fast expansion of the project.

Gossip in the Scolel Te project

In the zapatista areas rumour has become gossip. That is, the misinforming stories are spread by an identifiable source or gossiper: the Zapatista movement. According to the representative of the community of Naha it seems that the Zapatista movement has been the main opposition to the project in the region. He said

> "...Zapatista members usually assist to the 'ejidal' (community) meetings and talk with people about the carbon projects and give wrong or false information about the project. For instance, Zapatistas said that

this project has the intention to take the farmers' land or that people who participate in the project are selling their land to foreign people. . . " Miguel Garcia Cruz is the regional technician of AMBIO and the representative of the community of Naha in the Scolel Te project.

The intervention of the Zapatista movement in the process of *Scolel Te* is perceived as an strategy to persuade communities not to participate in the project. For regional technicians of the project, the spread of gossip is a direct attack on the project. However, it seems that this gossip is related more to the political context under which the movement has been developing rather than related to the actual functioning of the project. In particular, it can obey the strategy of the movement to maintain cohesion among the Zapatista' constituency. The Zapatismo considers itself as an autonomous authority that works independently of the Mexican State. Even when the movement talks about a Zapatista territory, this does not necessarily refer to a geographical space. Indeed, Zapatista cells are spread across the region. In this context, the Zapatista movement works more like a network than as a jurisdiction. In order to maintain cohesion within the movement, Zapatistas do not allow their communities, or members of their communities, to receive any resource from the government or to participate in any project sponsored by the government. Breaking this rule can be sanctioned.

Zapatista supporters said that bringing public resources/programmes to the region has been the main strategy of the government to reduce zapatista constituency. Since the conflict began in 1994, the government has strongly invested in infrastructure, education, and public programs in Chiapas. This has created conflict within Zapatista communities to the extent that many communities have quitted, or were invited to quit, from the movement if they wanted to benefit from public programmes. Others have had internal conflict between those who want to receive public resources and those who reject the idea as a means of maintaining their political position.

This has a logic from the point of view social exchange theory. Communities are perceived as a valuable resource from the point of view of both the Mexican State and the Zapatista movement. For the Zapatista movement the participation

and support of communities in the region represents the main political capital of the organization. This political capital is also disputed by the Mexican Sate. If communities from the movement accept public resources, it signals somehow that the government is recovering its authority and control of the region. So bringing communities to participate in governmentally sponsored programmes reduces the social capital of the Zapatismo. The opposite is also true. If the Zapatism succeeds in keeping communities away from governmental projects, then the perception is that the Mexican State is loosing control of the region. Even though the *Scolel Te* project is not a governmental project, it seems that the project can effect the constituency of the Zapatista movement as well — or at least that is how the Zapatistas see the issue. The argument is similar. Bringing communities to the *Scolel Te* project can generate a reduction in the influence of the Zapatism movement, given that both share the same domain. In other words, the establishment of non governmental projects has also created divisions among Zapatista members in the communities. The technician from the community of Naha comments about problems that the *Scolel Te* project has faced in one major Zapatista's region.

> "...there are some Zapatista communities participating in the project and some ex-Zapatista communities as well, well we do not know exactly if they are still Zapatistas because we do not ask for political affiliation. However, the project has to face some problems within the Zapatista communities, especially in Villa las Rosas, because some members accept the project even when the community is still Zapatista..." Miguel Garcia Cruz is the regional technician of AMBIO and the representative of the community of Naha in the Scolel Te project.

The constituency of the Zapatista movement is integrated by local communities which come from diverse ethnic backgrounds. That fact makes it possible for the Zapatista movement access to local networks not only to transmit information but also to be a recipient. In addition, even when many communities are not part of the movement, the Zapatismo movement is considered a moral authority in the region and enjoys a high reputation. The movement enjoys much sympathy at local, national, and international level, and specially among indigenous groups. So the

Zapatismo can exert great influence on the perception of local communities about persons, events, and things through spreading positive or negative information in the local networks. This information acquires relevance given the interpersonal relationship among the communities themselves because the Zapatista movement is considered a trusted actor among communities. Under these conditions, negative gossip spreading against *Scolel Te* clearly can damage its reputation. AMBIO recognises that gossip around *Scolel Te* results in anxiety among communities. AMBIO said.

> "... communities have fear because they do not know all the participants of the project, they do not know the role of foreign actors, the name and locations of the buyers. They have fear to enter to the project because they feel it can compromise their land..." Sotero Quechulpa Montalvo is the representative of AMBIO.

This fear can be a real problem when spread by gossip in the community network. However, for AMBIO, gossip only can stop when people can see their work. For AMBIO the strategy is maintaining a strong presence in the region when possible. This is the only way that people can be convinced to participate because they can see the experience of other communities with the Scolel Te project. The representative of AMBIO, said how the project also influences local networks

> "... logically, the communities who are participating in the project, are the only ones that can talk about the project. Despite that we (AMBIO) are not part of the community because we have not a permanent base into the communities, the people who participate in the project are part of the communities. So, we (AMBIO) have in some sense some influence at local level through their own members..." Sotero Quechulpa Montalvo is the representative of AMBIO.

The only way for AMBIO to counter negative gossip is to keep participating in the reputation system. Bad gossip can only be counteracted by spreading good gossip. If AMBIO succeed in generating a good perception of the project among communities, communities can spread positive information through their local networks. Obviously, this process can be difficult especially when the generation of

positive information about the project depends on the formation of relationships with local communities. Here, the contact with key actors can play a important role for the generation of trustworthiness in the project.

The next section will discus the strategies for the establishment of relationships between AMBIO and communities given the lack of trust in the *Scolel Te* project.

7.2.1 Bringing people to the Scolel Te project

The presence of AMBIO varies in the regions of Chiapas and Oaxaca. It seems that AMBIO has more presence in the regions where the project is making good progress, where people generally have good sized trees. In contrast, there are some others regions where AMBIO has little presence. In fact, "The *Scolel Te* project is not growing as it expected"... says the head of AMBIO. The NGO considers that the process of implementing a solid project in the region has been slow because it has involved working more directly and closer with the communities, not only to promote the project, but also to gain presence in the region. The physical presence of a tree plantation in the region has a very positive effect in the perception of local communities. Communities that have entry to the project enter because they have witnessed the experience of other communities. For instance, one of the first communities which started with the *Scolel Te* project was from the municipality of Salto de Agua: merely Arroyo Palenque community. After many years in the project this community was the first one to own good sized trees in the region and it become an example for others. The representative of community Hidalgo said:

> "... many communities around Arroyo Palenque enter to the project because they have seen the trees in Arroyo Palenque, how healthy the trees are, how large they are, how convenient is the lay out of trees (very straight and in the correct position), and how good the trees look after they have been weeded and bad branches have been cut. People can see how beautiful the trees are. So that they want to do the same..." Miguel Guzman Sanchez is the the representative of the community of Hidalgo in the Scolel Te project.

The representative of the community Emiliano Zapata also commented

"...people were interested in project because they want to run a reforestation project in the community and when they knew the experience of Arroyo Palenque they decided to participate with AMBIO..." Mateo Velazco Vazquez is the representative of the community of Emiliano Zapata in the Scolel Te project.

The Arroyo Palenque experience can seen as an example of how a good implementation of the project at local level can allow the spread of positive messages to others communities. In particular, the implementation of the tree plantation by itself talks a lot about of the reliability of AMBIO as a NGO in the Chol region, a perception that increased the good reputation of *Scolel Te*. The only problem of this social mechanism is that a reputation can take time to build up, especially if this reputation is linked to the size of trees. In this context, because of the physical absence of the trees, the lack of previous experience with the implementation of tree plantation in a region constitutes a major problem for the expansion of the project. Hence, once AMBIO has successfully brought a community to the scheme, they must wait until the trees are tall so that other people in the region can see the positive results with their own eyes. Only then will new communities join. Obviously, things can go sour and a bad experience may be very harmful to AMBIOS's reputation.

As important as it is, the physical presence of the trees is not the only factor that shapes AMBIO's reputation. The relationship between AMBIO and other important actors is equally important. Indeed, the relationship between AMBIO and Arroyo Palenque has been key for the expansion of the project in the Chol region. This story of success gives potential entrants a wealth of information about the possibilities for working with AMBIO, how strong this relationship can be, and how reliable AMBIO is. This information is relevant if we consider that communities are embedded in closed networks that restrict the access of unknowing actors and limit their contact with any outsider. The representative of Emiliano Zapata commented about the importance of the community representative in Arroyo Palenque:

"...some people from our community know about the planting trees in the area of Arrollo Palenque, and some people identify the technician from Arrollo Palenque as a member of AMBIO. So, people wanted

> to participate because they thought that if the community of Arroyo Palenque has been participating for so long time in the project, it has to be something good... So the representatives of our community went to talk directly with the representative of Arroyo Palenque about the interest we had to enter to the the project..." Mateo Velazco Vazquez is the representative of the community of Emiliano Zapata in the Scolel Te project.

In the long run AMBIO expects to gain *presence* in the region to the extent that people will see AMBIO as a companion, as another member of the neighbourhood.

The use of commitment at local level

As we saw in the last subsection, the *Scolel Te* project has evolved mostly on the basis of recommendations / referrals and the relationships that their own technicians develop with new communities. In order to expand the project, including performing tasks of enrolment, some community members who have been in the project since its pilot phase in 1997 have taken up the role of regional technicians. The establishment of strong relationships between AMBIO and local members (technician) has been possible only through constant and direct interaction. This means, on the one side, that AMBIO has already invested resources (economic and human capital) and time to establish local relationships. On the other side, local technicians are well known members in the project and have shown their reliability for at least one decade. This means that technicians are already committed to the project. They participate in the project even when they do not receive any economic payment for maintaining their own tree plantations. This initial investment appears to be paying off because the inter-mediation that regional technicians do on behalf of AMBIO with local communities has proved to be a good solution for the lack of trust in the project for many reasons. In particular, AMBIO says

> "...For instance, the regional technicians, who have already a good level of training, can go to talk directly with communities, because they share the same language, they can understand much better the social context of the groups. So that, they can facilitate the understanding of the project

at local level ...” Sotero Quechulpa Montalvo is the representative of AMBIO.

That is, cultural background in the region of Chiapas and Oaxaca is an important factor because each indigenous group identifies themselves as a unique and well defined social group. People who were born in a specific social group share a cultural background involving language, beliefs, ideas, costume, social norms, and customs. In addition, the social ties among community members necessarily involve an individual commitment to the group. This cultural attachment eases communication between technicians and community members.

Besides social commitment among technicians and communities, the existing commitment between technicians and AMBIO is used to extend AMBIO's reputation. Technicians usually bring people to the project through the use of ethnic, family, and other social ties that they have with communities which AMBIO has no contact with. This is the case of the regional technician of Arroyo Palenque who has used not only his ethnic background to bring people to the project but also his family bonds. All the communities that Arroyo Palenque has brought to the project belong to the same ethnic group, the Chole group, where most of local technicians of this region belong to the same family. It appears that the Rodriguez surname has been the main factor to be a member of the scheme. Another example is the community of Yaluma, which used its religion to bring people to the project. Only catholics in this community are part of the project. This form of associations reflects the closure of the networks at a local level, and the important role of trust among actors to bring people to the project. These sort of relationships are depicted in Figure 7.1.

AMBIO → Technician → Communities

AMBIO ← Technician ← Communities

Figure 7.1: Commitment path

AMBIO also has used its relationship with others organisations to bring communities to the project. Here, the trust generated by governmental organisations and NGOs with communities which AMBIO has not close contact with has been exploited. The community of San Luis talks about how they enter to the project

"...We have contact with AMBIO through CONANP. This is because our community San Luis belong to an organic coffee producer organization called ESPOSEL and CONANP has helped us for the establishment of the project. Due that the coffee project needed a reforestation program, CONANP highly recommend *Scolel Te* for that purpose. So the project started in the community of San Luis for initiative of CONANP..." Jose Hermenegildo Valdominos Agala representative of CONANP.

Nueva Argentina community added:

"...the community wanted some project for conservation, it was not easy to find a project like that, it was the CONANP which put AMBIO in contact with the community...AMBIO came to visit us, and talked about the *Scolel Te* project, how it works, which activities involve, how to do the plantation. AMBIO explained all the details..." Manuel Gomez Juarez is the representative of the community of Nueva Argentina in the Scolel Te project.

Naha community also said

"...The project was an initiative of CONANP, there was a farmer working in a reforestation project with AMBIO, then CONANP made the contact with AMBIO, through this person. This was the form of how the project started. In the beginning the project had only 10 members, eventually it increased to 28 farmers, nowadays are 32 farmers, practically all the community is in the project..." Miguel Garcia Cruz is the regional technician of AMBIO and the representative of the community of Naha in the Scolel Te project.

Even when the use of social ties between local technicians and GOs has been an important mechanism to bring people to the project in the region, AMBIO considers that this is not the most efficient way to expand the project. For AMBIO, the *Scolel Te* project should work more as a brand, where communities associate immediately the name *Scolel Te* with AMBIO. However, this is still far from being true. The

project is still at a stage where people identify the role of technicians as a local actors more than the role of AMBIO. The head of AMBIO said:

> "...in the communities where AMBIO has no influence the relationship is mainly through the contact between regional technicians and the community that they belong to...However there is some variation in the perceptions that communities have about technicians. There are some communities for which the technician represents *the project* and do not believe to have any tie with AMBIO. In other communities the technician is more clearly identified as an AMBIO member..." Sotero Quechulpa Montalvo is the head of AMBIO.

All the above evidence suggests that the use of social ties or relational mechanisms of local actors are key for AMBIO because it helps to bring people to the scheme. However, the story does not end there. Social ties are also important because they are instrumental in creating links between two kinds of network structures, closed and open networks. The *Scolel Te* project is as a open network that intends to bring people to the scheme. This formal association, however, has not appealed among local communities because they are themselves closed networks of social relationships where access is tightly restricted. Strict membership and strong social ties prevent the formation of association with AMBIO. In this context, AMBIO has established indirect links with local communities through the use of key local actors. These *bridges* facilitate permanent communication among the two structures, AMBIO and the communities, without modifying their nature. Relational mechanisms also allow the transmission of knowledge and the flow of resources in local networks, minimising social disruption. Local communities are willing to participate in the project because they feels that behind the association are people committed to the community rather than to external actors. This fosters interaction among cohesive groups and will, eventually, lead to a transition from a closed-network to an open one. In other words, the generation of new associations at local level eventually will lead to an openness of communities and a broader network.

Chapter 8

Phase IIa: The process of exchange among environmentalist and income seekers

8.1 Introduction

In this phase, AMBIO and the local communities start the process of exchanging in the *Scolel Te* project. On one side, AMBIO has developed the minimum trust among some local communities to bring participants to the planting tree scheme. On the other side, the communities, which took the decision of participating in the tree plantation project, had already accepted a certain degree of risk as a vote of trust to AMBIO and to the project. Now, the principal aim is to keep a constant level of local participation in the long run. This *constant* participation implies necessarily that the communities should accomplish their obligations in the form and time established by their *Plan Vivo* and that such actions are sustained over time. Yet, maintaining participation is not an easy task, because in this initial phase the communities have to do the hardest part — i.e. planting the trees and keeping them alive until they grow tall enough so that they can survive on their own. In this context, maintaining participation depends critically on the ability of the project to compensate in some way the efforts of the communities in keeping the trees alive. Here, the system of payments is the main mechanism to incentive participation, especially in the initial stage when the trees are little and the communities have less

incentive to participate. In addition, the transmission of environmental information to the local communities in order to influence their decisions begins in this phase. It is expected that at the end of this stage, the communities will have acquired a relevant knowledge of the intrinsic values of trees (environment value) to the point that they will decide to remain in the project, even if the economic incentive has come to an end. As a result, the phase II is an exploration period where AMBIO has the opportunity to test the relationship with the communities in terms of their reliability, their possibilities to adopt new ideas, and ability to co-ordinate actions.

It is not clear to what extent the economic mechanism succeeds in producing the correct incentives to keep the communities in the project. The economic payments are thought of as a compensation for the initial efforts of the participants. However, the problem lies in determining the real benefits and cost of the project at the local level. Indeed, one fundamental problem of the tree planting scheme is that the local communities can incur a series of costs that are not easy to estimate in monetary terms. The time, the effort, and the alternatives foregone for participating in the project can considerably vary across communities. And, given the nature of the project, communities may be unable to estimate accurately the cost and the benefits at the beginning of the project — i.e. there is high uncertainty at the start of the project. Clearly, the communities are in the position to compare their actual gains and costs only after they have already done some investment and have spent some time and effort in the implementation of the project. In this context, the fieldwork shows that communities are constantly re-evaluating their costs through the process of exchange. If at any point communities get to the conclusion that they either badly overestimated the gains or underestimated the costs, then they change the value of the *Scolel Te* project in the exchange network. As a consequence, a wrong estimation of the cost can have negative effects upon the expected benefits of each community and therefore discourage participation among local communities.

Clearly, if the communities are really convinced of the benefits of the *Scolel Te* project they will be willing to bear higher costs in the implementation of the project. However, the emergence of *affective commitment* is usually an effect of relationships among actors rather than economic incentives. Especially, because effective commitment involves the development of personal feelings that many times

go beyond strict rationality.

The next section analyses the process of exchange in phase II. In particular, this section examines the role of the regulatory mechanisms in the generation of commitment and identifies which kind of relational mechanisms emerge in the process of achieving commitment at the local level. In order to discuss that, however, it is important to understand two factors that affect the evaluation of benefits and cost: (1) the attributes of the resources; and (2) the contingent value of the relationship between AMBIO and the local communities.

8.2 The attributes of the resources

According to the social exchange theory, the unit of analysis is the relationship itself. In a given relationship each actor is perceived as a resource that has a set of particular attributes such as possessions, skills, and/or personal characteristics — say, leadership or beauty. The principal condition to consider an actor as a resource in the social exchange theory is that his/her intrinsic attributes are perceived as valuable by other person(s) (Emerson, 1976). The way of accessing the resources of an actor is through the establishment of a relationship with her / him and maintaining constant interaction over time. It is important to notice that access to a resource does not necessarily involve a physical exchange. The exchange may involve the flow of valuable behaviour between actors, such as social acceptance, love, respect, or commitment. For that reason, in many cases, physical exchanges of things/services are simply done as a symbolic representation of the value of a relation. Clearly, actors who give a higher value to the attributes of another actor invest more in the establishment of the relationship with her / him, and are more willing to spent resources in its maintenance.

Following these ideas, the local communities in Chiapas and Oaxaca are perceived as the principal resources of the *Scolel Te* project. At the moment that AMBIO establishes a relationship with a given community, AMBIO has access to the resources that are intrinsic to that community. Initially, the communities are valuable because they represent the source of labour and land for establishing a tree plantation scheme. However, the attributes of those resources can change dramat-

ically according to the form in which labour and land are actually delivered. For instance, the labour provided by independent individuals is not the same as the labour provided by a group of co-ordinated actors.

8.2.1 The Ejido

The resources of a community cannot be seen as unrelated to the social context, specially because local communities in Mexico are embedded in closed networks that go around an institutional structure called the *Ejido*. The Ejido is a form of land tenure which was established by the Mexican government between 1931-1991 during the implementation of a broad reaching land reform that included the redistribution of 90% of land in Mexico. The Ejido was created as a way of holding land communally.[1]. The Ejido is, in its own right, a sovereign jurisdiction which goes around its land areas and a well defined population which is subject to the ejidal authority. The *Ejido* system has three main governing bodies: (1) the ejido assembly called the *Ejidal* House, which involves by all members of the community; (2) the ejidal authority, which is a democratically elected representative authority; and (3) a surveillance council. Each community member has a voting right at the *Ejidal House*, which is the maximum authority and can take decisions not only on internal affairs but also about the relationships between the community (every single member of the community) and the outside world. The land of the *Ejido* is divided in three different areas: (a) individual parcels; (b) common land; (c) urban areas. The individual parcels are plots of land given by the *Ejidal House* to each family in the community for their individual use but only enjoying an usufruct right (that is, they cannot sell the land). However individual, this is not private property in any way as the *Ejidal House* can take land from individuals at anytime and, beyond that, may expel them from the community with no right to compensation. Common land areas are exploited communally by all members. Here we have areas for grazing,

[1]In fact Ejido is a form of *social property* that embeds the communal property and the ejido property. Both are forms of holding land by a group of people in a communal fashion. The difference between communities and ejidos is the type of their shareholders. While communities are formed and organised accordingly to indigenous people's traditions, the ejido has a similar structure but it is integrated by non-indigenous farmers (Gutierrez and Rives, 1994). Nowadays the term *Ejido* refers to the whole social property (indigenous and non-indigenous) and its constituency are called communities (Lewis, 2002)

communal enterprises such as production of coffee or maize in a large scale, natural reserves, rivers and lakes, woodlands, wild flora and fauna suitable for hunting and gathering, stone for construction, and so on. Finally, the urban area is the *town* where public buildings are, such as schools, hospitals, the *Ejidal House*, workshops, and individual housing. At anytime the *Ejidal House* has the power of changing the composition of all the land, even when it means affecting individual plots. In this sense the *Ejido* is like a State.[2]

The ejido system is a common characteristic of all rural communities in Mexico. Obviously, the institutional framework of the *Ejido* influences the intrinsic properties of the resources that local communities bring to the *Scolel Te* project and therefore influences the process of exchange.

8.2.2 Individual vs communal system

After discussion and a vote at the *Ejidal House*, communities may decide to enter the *Scolel Te* project either as a collective unit or to allow willing members to participate in on individual basis. I say in the first case that a community adopted the *communal system* whereas in the second case I say that the *individual system* was adopted. Depending on the which type of system a particular community adopts (collective vs individual), the attributes of the land and labour force that it brings to the *Scolel Te* project will be different. Three aspects are the main differences between the communal and individual system: a) the type of land available for *Scolel Te*; b) the exploitation rights, and c) the social norms.

Table 8.1: Characteristics of the *Ejido system*

	Communal system	**Individual system**
Ownership	Share	Individual
Exploitation	Collective	Individual
Social Norms	Collective	Collective/Individual

The collective system involves the whole community entering as a single unit

[2]Since 1992 the *Ejidal House* can even decide to disintegrate the Ejido and allow individuals to transform their social property into private land. In general a community can opt between keep their ejidal system or privatize it. Despite the 1992 reform, most communities have not taken steps for privatization beyond clearly delimiting the individual parcels and the communal land (Bank, 2001).

and the use of *communal land* for implementing the project (see Table 8.1). This involves access to large extensions of land and others resources that are held in common. Also, in terms of exploitation rights, the communal system entails that every member of the community shares, willingly or unwillingly, obligations towards the project. This has at least three implications. First, the decision of entering and staying in the project will always be the result of a collective agreement that is shared by all community members. Second, each member has the same rights of usufruct and exploitation of the common areas and hence of the tree plantation. As a consequence, the obligations towards its maintenance are distributed among all community members. In others words, all members share the cost and benefits of the tree plantation because of the simple fact that the trees are located in communal land. Finally, the communal system implies that the individual decisions of each and every single member in the *Scolel Te* project are subject to collective scrutiny and obedience of all already established internal noms of behaviour within the communities. As a consequence, traditions and customs linked to the social group become a specific attribute of the resources that the community brings to the project and play an important role in its workings. Obviously, the strictness or flexibility of the communal system can vary from community to community and therefore its impact in the project can also vary.

The individual system, on the other hand, entails that after discussion and a vote the *Ejidal House* allows community members who wish to enter the *Scolel Te* project to do so on an individual basis using their individual plots and at their own cost and benefit. No collective commitment is done and no common land may be used in the enterprise. The individual system has three main implications for the implementation of the *Scolel Te* project. First, the land available for the project is a proportion of the individual plot that each participant holds individually. And individual plots are relatively small. Never larger than 10 hectares per family which is the maximum extension that the law allows for individual ownership.[3] Moreover, it is well known that population growth over the last 50 years has lead to extreme over fragmentation of the land within the *ejido*. This over fragmentation of the

[3]Any farmer/community member in Mexico can not surpass the maximum of the so-called *small property*. Initially the size of small property is 10 hectares of good quality land. However, the worst of the quality of land the largest the maximum property size of land (Rocha, 1986).

land, known as *minifundismo*, has lead rural families in Mexico to exploit their small plots hoping to produce nothing more than food for self-subsistence. Hence, there is very limited space in the individual plot to accommodate tree plantation. Second, given that the individual system is based on the individual plot, the cost and the benefits of planting the trees are borne individually. Each individual has his/her own *Plan Vivo* and needs to accomplish a set of tasks to fulfil his/her obligations towards the *Scolel Te* project. Obviously, the capacity to cope with the obligations of the project is going to depend on the personal capabilities and material resources available to each individual participant. The representative of the community of Horizonte talked about the diversity of capacities among member of his community:

> "...Some people feel easy the work, others very difficult. The people who live far away from roads have to carry the plants for many hours, have to carry the seed for long way to their houses. So, It takes more time and effort for some communities than others..." Manuel Lopez Guzman is a memeber of the community of Horizonte, and representative of the community Horizonte in the Scolel Te project.

Third, individual farmers who enter the *Scolel Te* under the individual system can only take decisions that involve their individual plots. They cannot take broad decisions that affect the whole community and are subject to the authority of the *Ejidal House*. In this context, it is expected that the implementation of the tree plantation will be under the scrutiny of the community. As a consequence, the internal social structure of power and authority in the community could mediate the relationship between the project and the community participants. For instance, as I said before, community members cannot decide individually to enter to the *Scolel Te* project without permission of the *Ejidal House*. This social norm implies that AMBIO needs a communal agreement to introduce the *Scolel Te* project into the community, even if the communal agreement only allows individual participation of some community members and their individual parcels.

We have seen then how the type of system, individual vs communal, that a community adopts for implementing the tree plantation scheme determines the properties of the resources brought to the project and the characteristics of the process

of exchange. Each system involves different kinds of resources and human capital. And, as a consequence, it determines the costs of the tree plantation and the ability of participants for learning new ideas, skills, and technology. In summary, the type of system adopted will affect the net benefits in the process of exchange.

8.2.3 The value of the relationships

According to the social exchange theory each partner in a relationship expects to obtain some benefits/rewards from his exchange partner. These benefits, the *value* of the relationship, can be motivated by economic factors such as access to resources or might entail the satisfaction of psychological needs: the fulfilment of personal feelings, reputation, social acceptance, or power.[4] Here, the magnitude of the value that each actor gives to the other determines the degree of the reward or the benefit that they can obtain in the establishment of a given relationship. Clearly, the higher the value that an actor assigns to a given relationship the stronger is her / his commitment to it, and vice versa. Moreover, the value is individually determined, contingent, and independent of the value that his/her partners give to the same relationship (Emerson, 1962). To put it in other words, each actor determines how valuable is her / his exchange partner.

Following these ideas, AMBIO, the communities, and other participants seek to form an association in order to have access to some valuable resources within the *Scolel Te* project. Each participant who enters in the project determines a priori their aims and potential benefits from participating in the tree plantation scheme. These initial expectations are the base upon which each participant establishes not only the value of his/her exchange partner but also their strategies of association in the project. Clearly, these initial values and expectations can also evolve over time in the process of exchange, transforming the perception that each participant has about his/her exchange partners. The contingent value that each actor assigns to her / his relationship with the *Scolel Te* project can increase or decrease over time as the process of exchange is materialised. Such change in the value of the relationship

[4]The value does not only reflects the initial force that fosters the formation of a relationship but also, over time, the *contingent* motivation that an individual has to carry on in the social exchange.

can be so extensive that at some point it may lead to long-term commitment or withdrawal from the project.

By definition the main aim of the the *Scolel Te* project is reverting climate change through the reduction of carbon emission in the Earth. In this context, AMBIO aims to establish a series of projects of reforestation and afforestation in local areas in Chiapas and Oaxaca, Mexico. As a consequence, the initial motive of AMBIO for establishing any relationship with the local communities is precisely enrolling and fostering commitment among local farmers in order to run the afforestation tree plantation projects. For this simple reason, AMBIO considers the establishment of relationships with the local communities valuable.

For various reasons, the value that AMBIO assigns to its relationship with the communities is larger than the value that the communities assign to their relationship with AMBIO. First, the local communities themselves represent the principal resource of the project, not only because 80% of the total forest areas in Mexico are under their control but also because local communities represent human capital that is needed to fulfil the aims of AMBIO (Kosoy et al., 2008). In others words, if AMBIO wants to establish any kind of forest project in Mexico it has no other option than to interact with the local communities because they "own" the forest and because they own the labour force and the human capital that are needed by the project. Second, given the difficulties of attracting local communities to the scheme, participating communities are a resource that in some sense is scarce. Clearly, this increases the value that AMBIO assigns to participant (or potentially participant) communities. Finally, given that local communities are embedded in closed networks, they are more reluctant to commit to enforceable contractual obligations with unknown actors such as AMBIO. As a consequence, the establishment of a social relationship involves the emergency of a trust relationship between AMBIO and the communities. In this trust relationship AMBIO is the weak partner: the one that needs to invest more not only in the establishing of the relationship with the communities but also the one that needs to build up a reputation in the region.

In contrast, the contingent value that communities give to their relationship with AMBIO is much more complex to determine. According to the *Scolel Te* project, it is expected that each community will assign certain value to the trees. The higher the

value that communities give to the trees the higher the value that the communities will assign to their relationship with AMBIO and the higher their commitment to the project. Unfortunately, in practice, one of the major problems that AMBIO faces at ground level is the relatively widespread *misalignment* or disagreement between the the value that the communities assign to the trees and a minimum value that is required for the project to be successful. The desired outcome for AMBIO is that the value that each community gives to the tree plantation will somehow converge over time with what is required. However, this is difficult to achieve. Each community has its own perceptions and such perceptions are independent of AMBIO's views and desires. As a consequence, this tree-value misalignment between AMBIO and the communities is difficult to avoid.

During the field work and the process of analysis of the interviews I have found that communities assign value to the project according to the following three dimensions: (1) because its environmental benefits; (2) because of the resources derived directly from the trees, such as the wood; (3) because of the money that actors obtain by participating in the tree plantation scheme. These motivations have lead me to develop a parallel set of analytical categories. Namely, I suggest that one could define three types of community (actors): (i) environmentalists, (ii) resource seekers, and (iii) income seekers. Rather than an strict taxonomy, these analytical categories are intended to help the analyst to understand the process of exchange in the *Scolel Te* project.

Obviously, each community is to certain degree an environmentalist, a resource seeker, and a rent seeker. Its initial and subsequent motivations are a mixture of the three above mentioned analytical categories (or pure / ideal types). However, there is variation and the *mixture* changes from one community to the other. Some put more weight to the environmental motivation, others put more weight to the search for resources. So, one should think of these three categories rather as *analytical dimensions* that span a whole three dimensional space (see figure 8.1). A real life community is then represented as a point in this three dimensional space. So, it is possible to use the suggested typology as an analytical tool and intend a taxonomy of the communities.

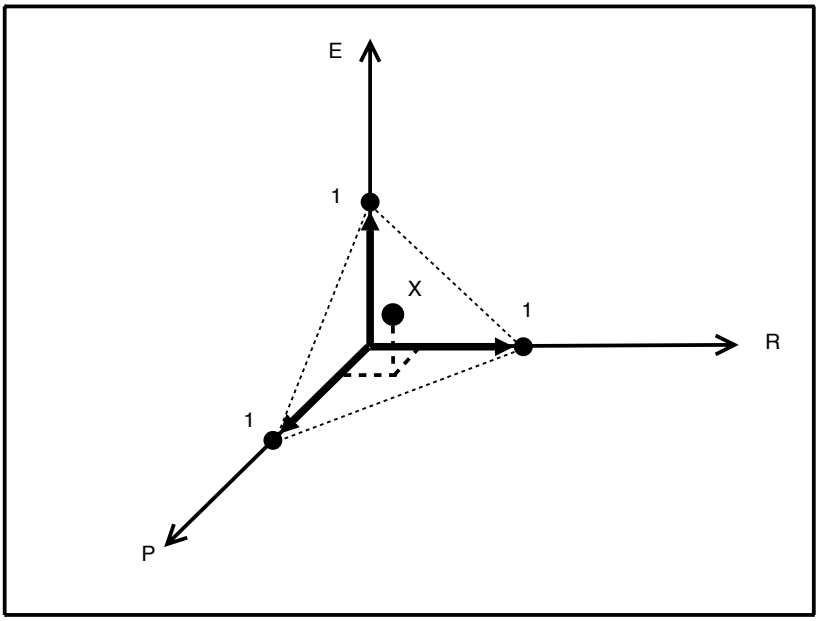


Figure 8.1: Typological space. E = Environment ; P= Payments; R= Wood resources; and X=Community location in the typological space.

8.2.4 Defining the value of the trees from the communities point of view

On the basis of the interviews, I identify the principal initial aim / type of each community. Next, I explore the perceptions that the same community has along the two other dimensions of analysis to try validating its main motivation and to explore its peculiarities with respect to other communities who share the same principal motivation. This allows me to keep a complex view of the real motivations of the communities in the project and to identify the role that each aspect plays in the fulfilment of the initial motivations of each community (Table 8.2). I find that most local communities have a very clear idea of their principal motivations for entering to the project. That the values assigned to the project depend on the aims of the community and, more importantly, that the local communities tend to generate a discourse around their main aim and according to that they build up a justification of the different aspects of the project.

For instance, the principal aims and motives of environmentalists communities are in line with those of AMBIO. For these communities the trees are valuable mainly because of their environmental benefits: cleaner air, beautiful landscape, biodiversity. In this context, most of the communities in this category have generated

Table 8.2: Motives of the communities

Community name	Environment	Resources	Income
Agua Azul	X	-	XX Compensation for reforestation
Los Angeles	X	-	XX Economic help for reforestation
Tierra y Libertad	X	-	XX Help for labour force and reforestation
Nueva Argentina	X	-	-
Naha	X	-	XX Compensation for reforestation
Rincon Chamula	X	-	-
San Isidro	X	-	-
Plan de Rio Azul	X	-	-
Emiliano Zapata	-	-	-
Zaragoza	XX Side effect	X	XX Incentive
Alamkantajal	-	X	XX Help for labour force
Cololte	-	X	-
Frontera Corozal	-	X	XX Help for labour force
Yaluma	XX Side effect	X	XX Help for planting trees
Mukenal	XX Side effect	X	-
San Juan Metaltepec	-	X	-
Santiago Teotlasco	-	X	-
Babilonia	-	X-	XX Help for planting trees
Punta Brava	XX Side effect	X	-
San Luis	XX Side effect	X	-
Tehuacan	-	X	-
Cololil	-	X	-
Hidalgo	-	X	-
Villa las Rosas	-	X	XX Help for labour force
Samaria Kantajal	-	X	-
Arroyo Palenque	-	X	XX Help for labour force
Rio Jordan	-	X	-
La Tronconada	-	X	-
Nueva Rudolfo	-	X	XX Help for labour force
San Felipe Jatate	-	X	-
Quexil	-	-	X
Horizonte	XX Side effect	-	X
Metzabok	-	-	-

Note. (X)=Most important ; (XX)= Less important; (-)= No important

a discourse around the environment where economic resources play an instrumental role. Indeed, the economic benefits obtained through the project are perceived for the environmental communities as a kind of recognition or reward for their efforts in the protection of the biodiversity. They are clear that conservation is their principal interest in the project. The perception of the trees as a resource does not play a fundamental part on their discourse and almost none talks about the trees in these terms.

Resource seekers enter to the project to obtain a benefit that is directly linked to the trees but their ultimate motivation is not necessarily environmentalist. Their principal discourse is that the project has value because it will ensure the availability of wood to fulfil local demand in the future. In contrast, the communities for which

their principal economic activity is linked to the production of organic products, such as the coffee producers, see the tree plantation project as a form of adding value to their production — because the trees play the role of protecting the coffee beans from solar radiation, and 'shade coffee' is sold in the international market as a product that helps to protect the jungle in the developing world. For the coffee producers the environmental benefits of the trees are perceived as a side effect, as something that comes by chance and not necessarily as something that is consciously pursued.

Communities interpret the role of the economic payments in different ways according to their own conditions, aims, and experience. Resource seekers perceive the payments as a compensation for the labour they contribute to the tree plantation project. For instance, among resource seekers, the organic coffee producers see the payments for the trees as a plus that is related to their main economic activity. That is, an extra payment that they receive for doing something that they have to do anyway in order to produce their shade coffee. Similarly, income seekers are communities who enter to the project not for the benefits that the tree plantation may bring itself but because they would like to secure the income flow that the *Scolel Te* project promises. Here, the tree plantation is secondary and the value of AMBIO from the point of view of the community is directly linked to the money they receive through the scheme. In this category there are only three communities, and only one among them recognizes the positive effects in the environment for planting the trees. However, they are clear that when the payments end they will need to 'rethink' their participation in the project. Finally, only one community understands the role of the economic payments as an economic incentive. That is as a mechanism that helps fostering initial and middle term participation in the project.

It is important to notice that communities can change their perception of the value of the project over time. Indeed, the interwoven relationships among the value of the project (environment, resources, and rents) and the dynamism of the social exchange among actors make it possible for the communities to move through the three different dimensions. For instance, if rent seeker communities are able to recognise the value of trees for their environmental benefits in some sense the communities are getting away from the rent dimension and they are leaning to the

environmental one.

The divergence or misalignment between the value that communities and AMBIO assign to the tree plantation may not be a problem if the value that the community assigns to the tree plantation is high enough to maintain its exchange relationship with AMBIO. However, a large divergence of motives and aims between the communities and AMBIO can create problems of coordination and prevent commitment. Nevertheless, it is expected that such divergences may disappear or diminish over the process of exchange as AMBIO starts transmitting relevant information to the communities about the environmental benefits of tree plantation for their livelihood. If AMBIO is able to communicate successfully with the communities, the communities may change their perceptions and give more weight to the environmental dimension of the project and, as a consequence, foster commitment.

The next section is going to analyse the dynamic process of exchange through the comparison of the initial aims and motives that each community has at the moment of entering to the project and any subsequent changes an increase in commitment. In this context, phase two deals with three aspects of the social exchange within the *Scolel Te* project: (a) determining the real cost of implementing the tree plantation scheme by comparing the initial expected benefits with the real outcomes to identify the diverse costs (investment cost, opportunity cost, and direct cost) that each community incurs in the process of exchange and how this cost can change the perception of the value around the project among communities; b) identifying the principal mechanisms (regulatory,relational) that foster commitment among actors; and c) assesing the role of learning in the generation of commitment among actors. In order to address these aims we are going to take into account the classification of communities according to their main values (environmentalist, resource seekers, and income seekers) and the properties of the resources (communal and individual resources) that each community has to develop the project.

8.3 Environmentalist communities

> "...Most of the communities which enter to the *Scolel Te* project want to enter to the reforestation projects because they are looking for timber

> that eventually they can sell. But in the community of Naha people did not want to do that. Actually when the farmers from Naha were establishing their own *Plan Vivo*, AMBIO asked them if the community wanted to enter to the project to sell the wood or to use the trees for other purpose. The people from Naha answered that they wanted the trees only for conservation..." Oficial Representative of CONANP, and Representative of the Scolel Te project in Naha, and also Regional Technician of AMBIO in of Reserve of Naha-Metzabok.

According to the data obtained in the fieldwork, only eight communities from the 35 member communities claimed to be part of the project because they considered themselves conservationists. It is important to notice that eight of the communities are located within the most important protected natural areas in Mexico. For instance the communities of Tierra y Libertad and Los Angeles are located in the natural reserve of La Sepultura. Nueva Argentina, and Plan de Rio Azul are into the natural reserve of Montes Azules, San Isidro is into the natural reserve of Yaxila, and Naha and Agua Azul are settled in the Reserve of Naha-Metzabok. The only community which is not placed in a natural reserve is Rincon Chamula.

Hence, the initial motivation of the environmentalist communities to participate in the project was preserving their already existent natural resources and their livelihood. For they perceive the trees as an important part of a complex biodiversity system and cultural identity. Notice, however, that one of the main objectives of the environmentalist communities in the project is to seek economic compensation for their conservation efforts:

> "...We entered to the project to obtain many benefits. In part because we wanted to do some reforestation in the community. Also, for the benefit that the alive fence brings to us, and last to obtain some economic benefits for an activity that we already do as a community..." Olirio Santos Gutierres is a memeber of the community of Los Angeles, and representative of the community Los Angeles in the *Scolel Te* project.

This economic approach of the environmentalist communities seems to be evident, even when it appears contrary to their conservation principles. Conservation is a

common activity among the environmentalist communities because they value biodiversity by itself. Hence, from the point of view of AMBIO the environmentalist communities are committed to the project from the start because they "already understand" the value of natural resources. However, the data shows that things are not happening like that. Interviews in the field show that four out of the five environmentalist communities consider that the project does not generate correct incentives for fostering commitment due to the insufficiency of the economic resources. This suggests that people are unhappy because payments for planting trees are not enough to compensate them for their efforts in conservation. This dissatisfaction hardly represents a threat for the trees in these communities given their conservationist approach. They will maintain the trees even if there are no economic rewards. However, it is not clear whether the environmentalist communities consider themselves as committed participants to the *Scolel Te* project and what repercussions this may have to the viability of the scheme.

In terms of social exchange, the environmentalist communities can offer a high social capital for the project for many reasons. First, the environmentalist communities tend to be more cohesive than other communities given their capacity for achieving agreement within their members and enforcing social norms through their local authority. The *ejido* system represents a traditional form of social organization at local level that represents a valuable resource for the project. For instance, the *ejido* system, in its more traditional form, works like a sovereign jurisdiction which goes around its communal land areas and a well defined constituency which is subject to the ejidal authority.

Even when the cohesion within ejidos vary, environmentalist groups usually have a strong sense of community that is clearly perceived in the way they safeguard their common resources. The *ejido* structure regulates the economic activities of the community and the establishment and enforcement of social norms that regulate and discipline the behavior of their members. Obviously, this institutional framework eases the generation of consensus among their members about the protection and use of natural resources within the *ejido* and has lead them to adopt an environmentalist approach.

"...We have more than 13 years without the slash and burn system. These areas (the communal forest areas) are the ones we want to preserve, for ourselves...No one can come and teach us anything useful about how to plant and grow trees because we have always done so. Our knowledge about tree plantations remained the same, before and after AMBIO's project. The *ejido* itself started to discuss about the preservation of the communal areas a long time ago. These areas are owned by our people and are preserved for our children...So, we established restrictions through the *Ejidal* House for the use of timber per family, the management of the reforestation system, and the prohibitions for haunting. We only use the wood for building up our houses, we do not use the trees for other purposes..." Manuel Gomez Juarez is a memeber of the community of Nueva Argentina, and representative of the community Nueva Argentina in the Scolel Te project.

Also, the environmentalist group, through their social norms, has established clearly the areas of conservation that are managed in a communal way. They have strict control and division over the use of land held by their members. In this context land is divided in three types according to the way they are managed: (1) parcelled arable land, held and worked individually by recognized members; (2) common land, used exclusively for conservation purposes and worked by the whole community; and (3) urban zone, which is integrated by housing and public services such as school and workshops areas.

"...We have a system of reforestation of the communal areas...At the moment we have a project to plant one or two hectares of trees in front of a spring that the community owns close here. Every place without trees is planned for reforestation by the whole community..." Manuel Gomez Juarez is a memeber of the community of Nueva Argentina, and representative of the community Nueva Argentina in the Scolel Te project.

The environmentalist groups seem to have more accumulated knowledge in comparison to others communities. This knowledge allows the understanding of the importance of environmental protection, the learning of technical processes linked

to the conservation effort, and the generation of values around the conservation of natural resources. This knowledge has been acquired not only through their relationships with governmental and non governmental environmental organisations but also through a process of social learning.

The environmentalist communities consider that their particular approach to the environment has been their traditional practice, and that it is part of their traditional values and idiosyncrasy. Local knowledge that has been transmitted from generation to generation. According to the director of the local NGO SAO in Oaxaca, the concept of conservation differs between the environmentalist groups and other local communities. Environmental communities engage in conservation because people have a strong relationship with nature, either because the forest represents the access to valuable natural resources or because the forest has a special meaning in their culture. For instance, the protection of a spring of water or medicinal plants may lead to the protection of some forestal areas. Similarly, the worship of some animals like the jaguar or the racoon can be the main reason why communities protect some other areas. He points out that communities for whom the forest has a "special meaning" tend to be more active in the protection of natural areas than those who do not share this intimate relationship with nature (Director of the NGO, SAO).

Also, local knowledge has been increased by the constant interaction between the communities and other environmentalist organisations. In this context, The National Commission of Natural Areas (CONANP) has been one of the main partners of the environmentalist communities. They consider that the work of CONANP in the natural reserves has facilitated by the traditional knowledge of the forestal areas that these communities have:

> "...they know (the communities) how to sow a seed, how to plant a tree, we only provide innovative technical advice like how to elaborate organic fertilizer and how to control plagues and diseases with natural products to avoid the use of pesticides that can damage their health and the ecosystem. We (CONANP) only tried to complement the knowledge that they already have..." Jose Dominguez Hernandez is a project head

of CONANP in the Protected Natural Area of Naha-Metzabok.

For those reasons the environmentalist communities can be perceived as a valuable member in a tree plantation scheme. They are well organised, recognise the value of nature, and have much experience in the management of natural areas. Because of this, from the point of view of the environmentalist communities, the *Scolel Te* project is not as valuable as AMBIO would wish / expect. Apparently, there is a clash between the conservation aims of the environmentalist communities and the aims of AMBIO. AMBIO is more focused in the establishment of afforestation and deforestation projects rather than conservation projects. Indeed, the *Scolel Te* project is designed to recover deforested areas, or to create new ones. According to the technical definitions, afforestation is the plantation of seeds or trees to make a forest on land which has not been a forest recently or has never been a forest. Similarly, reforestation implies the re-establishment of a forest after removal. In contrast, conservation implies the protection and maintenance of well established of species, their habitats, and ecosystems. Despite these differences in aims, environmentalist communities engage in the project as a way of seeking compensation for the conservation efforts that they already do.

In practice most of the communities start to face problems at some point with the *Scolel Te* project for two main reasons. First, communal areas that could potentially be used for afforestation / reforestation activities are already long established conservation areas with mature trees, jungle, and untouched biodiversity. In these areas there is no spare land for entering *Scolel Te*. The only available land is within the boundaries of individual plots, which are normally used as arable land by each farmer for self-production and consumption (corn, vegetables, small scale farm animals). Each individual plot is small, and by the community's design, it should suffice to feed only one family. In fact, in their conservation effort, environmentalist communities have over the years consciously and aggressively reduced the extension of the individual plots and increased the size of the communal land dedicated to conservation areas. As a consequence, the capacity of these plots to accommodate large extension of trees is very limited.

"...Is our reserve, you can see from here, you can see how each mem-

ber has taking care of they parcels, we do not burn the forest to avoid stretching out the agriculture areas..." Jose Ton Alvarez is a memeber of the community of Nuevo Rodulfo, and representative of the community Nuevo Rodulfo in the Scolel Te project.

"...We have only 60 hectares for agricultural purposes and 1400 hectares in natural reserve..." Gilberto Bautista Lopez is a memeber of the community of Rincon Chamula, and representative of the community Rincon Chamula in the Scolel Te project.

Clearly, in communities where members only have their individual parcels to generate their income the tree plantation becomes a *perfect substitute* or direct competitor to other productive activities like sowing beans or maize. So, there is very limited scope for producing trees without displacing other agricultural products even though the *Plan Vivo* system was specially designed so that this would not happen. However, environmentalist communities have reduced so aggressively the individual plot that in practice it is impossible that the trees will not compete for land with the arable land. Obviously this increases the opportunity cost of the trees relative to others uses of the arable land. Furthermore, even when the competition for land use is not so strong and *Plan Vivo* successfully integrates tree plantation and other agriculture activities the main opportunity cost that farmers face is not necessarily space but time. Time dedicated to the trees in some way competes with the time that farmers spend doing other activities which may be more productive. This is true not only in the environmentalist communities but in all communities that belong to the scheme. However, in the environmentalist communities this problem is exacerbated because the trees cannot be planted in communal land where all members of the community share responsibilities upon the project and therefore cannot spread out the cost across all community members.

However, the story does not end there. For communities for which their main income generating activity of their members is not agriculture the trees may not represent such a high opportunity cost for individuals to bear and the *Scolel Te* may work. For instance, in the community of Naha the main economic activity has been traditionally craftsmanship and recently eco-tourism. For the people of

Naha, the trees in individual plots increase the scenic beauty and value of their eco-tourism project. In other words, the tree plantation in individual plots does not compete with the main economic activities in the community, even when the plot is really small. On the contrary, the trees are complementary to their main economic activity: eco-tourism. Beside, eco-tourism is exploited communally and therefore the line between what is communal and what is private has become ambiguous and the communal commitments are extended in a limited degree to trees located in individual plots. They do not become communal land because eco-tourism is a sessional activity, with the high sessions happening around the Easter, summer, and Christmas holidays. Within session most people work in activities related to the eco-tourism and craftsmanship. However, outside season people farm their individual plots. So, the individual plot cannot disappear all together. Notice, however, the case of Naha is an exception. Most of the environmentalist communities are in a constant struggle between fulfillment of their basic needs and the preservation of their natural reserves.

There is another implication of planting trees in individual rather than communal land. Indeed, when the trees are planted in individual plots the success of the project is more vulnerable or sensitive to the prices of the carbon sequestration certificates in the international market. If the income that each farmer can generate through the tree plantation is high with respect to other substitute activities, then the incentive of individual farmers to plant trees is high. However, if the prices are low and the income generated is low with respect to other activities, then the individual farmers have strong incentives to replace the trees for more productive alternatives. Obviously, if the trees are planted in communal land then the price of the carbon sequestration certificates plays a much lesser role in the maintaining of the plantation.

A second problem is related to the social capital that the community brings, or is supposed to bring, to the *Scolel Te*. Given that the project has been implemented in individual parcels rather than in communal land, the community's social capital is not actually engaged to the project. Indeed, the moment that the trees are planted in the parcels of each farmer, the efforts to maintain the trees become an individual's effort as well. This is because, by definition, individual plots escape

from any communal commitment. This also means that the costs and benefits of planting the trees will necessarily depend on each individual's capacity and ability to interact with others members and outsiders. To put it in other words, planting the trees in individual parcels dissolves the cohesion and links of the group that are used in the management of the communal natural resources. Unfortunately. the social norms established at the *ejido* level cannot be transferred to the individual parcels and as a consequence there is not a social mechanism that may regulate and discipline an actors' behaviour.

As a result, the experience of environmentalist communities shows that if the tree plantations established by the *Scolel Te* project are linked to the communal land the trees themselves have a larger value than those lined to individual plots. In most of the environmentalist communities, despite the fact that the whole community has an environmentalist approach, the trees under the *Scolel Te* scheme are not as valuable as the trees located in the community reserve. This is because the *Scolel Te* trees are not integrated to the conservation areas not only in physical terms but also in terms of their meaning. These are isolated trees that are not part of the main conservation effort of the community. The role of the tree changes, they become just a community's opportunity to access an income flow and are no longer the resource that mediates the exchange relationship between AMBIO and the communities. The moment the payments become the principal benefit for the environmental communities the relationship between AMBIO and the community is expected to go as long as the communities received the payments or as long as the trees do not compete with others alternatives more profitable activities. When the money runs out the trees in individual plots are immediately at risk of being cut and the value of AMBIO, from the point of view of the community, ends.

8.4 Income seeker communities

> "...We (the community) decided to participate in the *Scolel Te* project because the community needs the money, We need to fulfil our needs. That is why we decided to participate in the project.. We (the community) discussed with the engineer (AMBIO) about the importance of

> planting the trees, we know that we need to support the tree plantations projects. We want to do it but we need more money, something that can represent a real income for our family... but AMBIO does not understand that we need to eat." Pablo Cruz Jimenez, representative of the community of Quexil.

The many needs of the local communities and *Scolel Te*'s inability to know the reliability of actors in early stages of the project has fostered the emergence of communities that participate in the carbon sequestration scheme with the only aim of accessing the economic resources. These communities are *income seekers* and their main characteristic is that they withdraw from the project once *Scolel Te*'s payments come to an end. The data obtained in the fieldwork shows that only 2 out of 35 communities are income seekers. However, the interviews with community representatives and AMBIO suggests that income seekers represent a large proportion in the project. However, because income seekers leave the project relatively soon, their size is heavily underrepresented in the data.

Income seekers are difficult to observe for many main reasons. First, as we mentioned before, income seekers withdraw form the project at early stages and they don't notify. Second, income seekers are not easy to identify because most actors enter the project without knowing its real costs and benefits. It is during the process of exchange when local actors realise that they cannot cope with the project in the long-run. And upon realising this the communities/farmers adopt a short-run strategy of remaining in the project until the economic payments come to an end. This way they can rip short-term gains, pay their entry costs, and avoid long-term losses. Obviously this behaviour causes high costs to AMBIO and to the project, as *Scolel Te* invest a lot of resources in the communities. AMBIO describes the problem of the income seekers as follows:

> "...the participants withdraw from the project for many reasons. Because they cannot cope with the tree plantations, because they are not convinced of the project, or the commitment is too long. We (AMBIO) understand their situation, even when it represents a high cost for the project in terms of resources — such as training and infrastructure. We

> prefer the communities/ farmers to leave the project in the initial stages because that way the sunk cost is relatively small. However, we are in a real trouble if communities leave the project just after the payments end because by that time we have contractual agreements with the buyers that are difficult to not to honour." Sotero Quechulpa is the manager of AMBIO.

The third factor, is that actors don't reveal their real intentions at the moment they enter the project. They show interest and they keep in the project in order to exploit the economic advantages of the *Scolel Te* project. Once the communities obtain the benefits they leave the project. Even when this situation has moral implications, this behaviour obeys more to the communities' traditional forms integrating their annual income. In general, the communities' main source of income comes from the direct exploitation of their land or parcel. They harvest grain and products which can be self-consumed, sold, or bartered in the market or among other peasants. Usually, farmers face wide fluctuations of their disposable income. They receive large amounts of money during the harvest season and none in off-seasson periods. For that reason, farmers spread their income over the whole year to guarantee their subsistence in non-harvest seasons. Because of this, local farmers take any opportunity for complementing their income.

Taking part in governmental projects that pay subsidies is, by far, one of the main ways farmers gain some extra money. In this context, government's generous subsidies and a widespread lack of monitoring (and accountability) give farmers/communities incentives to engage in as many governmental initiatives as possible with the only aim of obtaining the subsidy. Once they are in the project, they explore the possibility of exploiting the system to reduce their cost in terms of time and effort. Many times farmers do not fulfil, or partially fulfil, the tasks and engagements that the government's initiatives pay the subsidy for. This culture of *cheating the system* is possible because the government's initiatives have little monitoring and farmers/communities have their way more often than not. The probability of sanction is near to null. Clearly, the result of all this is that communities are always more than happy to participate in governmental projects, even if they know that

they cannot cope with the project or that the project does not suit their specific needs.

In terms of social exchange, the *Scolel Te* project is not alien to the traditional system of exchange among the communities and the government. So, if the communities have no interest in *Scolel Te* for its intrinsic benefits, they still see an opportunity to abuse of the system and try to get the most of it. This is the traditional way they engage with the government's programmes and a culture that has been reinforced for many decades since the end of the Mexican revolution. Why should farmers/communities see *Scolel Te* and AMBIO in a different manner? Clearly, within the *Scolel Te* network, this income seeking culture (and the objective opportunity to profit from it) generates an unbalance in the relationship between the communities and AMBIO.

Indeed, the communities assign a low value to AMBIO because there are other governmental projects they can take part of to gain some extra income. In contrast, AMBIO assign a high value to the communities. First, because there is a large information asymmetry. AMBIO does not know the real value that communities assign to the *Scolel Te* project and has to treat everyone as a highly valuable partner as long as that information is not learned. And, as we seen before, that learning process may take years. Second, and more importantly, the communities are the main resource of the project because they bring the land and the labour to the project. And the communities know that. Further, from the point of view of AMBIO, the communities are a scarce resource given the low interest that the communities show at first contact — i.e. enrolment is difficult. As a result, income seekers use their power advantage to inflict a higher cost of connection to AMBIO. This turns to be reflected in the degree of risk than AMBIO is willing to bear to initiate a relationship at local level. Indeed, even if AMBIO is not sure of the reliability of the local communities and their real commitment to the project, AMBIO has no option but to trust in the word of local communities.

The imbalance between local communities and AMBIO makes it likely that the aims of the *Scolel Te* project will be twisted or derailed to fulfil the short-term interests of the local communities. This is unfortunate. The payments are meant to help generating positive interdependencies between *Scolel Te*'s environmental aims

and the needs the local communities. However, this mechanism is distorted at the moment that the local communities focus on gaining access to the money to complement their annual income without feeling any obligation with the environmental part of the project. The only defence for AMBIO is trying to change the communities' perceptions about the environmental benefits of the trees. That way they will assign some value to the project when the payments come to an end.

Obviously, this situation can lead to conflict. From the point of view of the income seekers, they cannot be obligated to take care of the trees in the long-run if AMBIO does not pay the full cost of maintaining the tree plantations and guarantee a fair surplus.[5] In contrast, from the point of view of AMBIO, the income seekers are people who act deliberately to abuse the system to obtain economic benefits without working.

For Jones et al. (1997) safeguarding the process of exchange implies generating social mechanisms that sanction bad behaviour among actors in a network, such as reputation or access lockout. Following these ideas we find that the emergence of income seekers are the result of AMBIO's inability to discipline actors in the *Scolel Te* network. First, AMBIO cannot restrict the access of actors because the network requires a constant supply of participants. And the communities' lack of interest in the project means that AMBIO faces substantial problems in bringing people to the carbon scheme. Also, AMBIO suffers from a serious problem of asymmetric information as it is unable to distinguish between cheaters and actors with a real interest in the project before it is too late. Moreover, in most cases, even the participants do not know whether or not they have interest in the project because the cost and benefits of the project are only learned over time; often too late to change course without imposing harm to AMBIO and themselves. Clearly the use of reputation plays an important role in reducing the risk, especially if the communities working with AMBIO have contact and knowledge of potential newcomers. However, in regions where *Scolel Te* has little penetration, AMBIO has to bet for the good intentions of people. As a result, the lack of mechanisms to punish bad behaviour makes the *Scolel Te* project particularly vulnerable to abuse.

[5]Representative of the community of Quexil.

Chapter 9

Phase IIb: The process of exchange among resource seekers

9.1 The Resource Seekers

The process of deforestation has increased substantially in the resent times in Mexico, especially in the areas of Chiapas where most of the rain forest has been depleted in the last 30 years. This process of deforestation has been intensified by the grow of the population in rural areas and the expansion of agriculture activities in the region. These factors have put pressure over natural resources.

The over-exploitation of forestal areas has led to a shortcut of natural resources which are essential to fulfil domestic needs in local communities, especially the scarcity of wood. Most of communities depend on wood as the principal source of fuel in the elaboration of food. Also the timber from local species is the principal material for housing, fences, bridges, and other uses in the communities. This situation has not only fostered social disruption among communities for accessing to natural resources. But also, has created a social division between the communities who have and those who don't have wood. On the one hand, for the ones who do not have wood, the lack of the resource necessarily means a high cost for rural communities who have to compromise part of their income in the acquisition of fuel and timber. On the other hand, for those who do have the wood, the scarcity of the resource in the region means an important economic advantage because they sell at high prices.

In this context and according to the data collected in the fieldwork, most of the local communities who enter to the Scolel Te project are resource seekers. Indeed, there are twenty one communities who enter to the project to obtain a benefit that is directly linked to the tree plantation but their ultimate motivation is not necessarily environmentalist. There are three types of resource seekers. First, there are the ones who decide to interact with the *Scolel Te* project because they intend to develop a large scale plantation and are really interested not in the environmental part of trees but in a by-product of them: they wish to sell fuel and timber in the future. Second, there are the ones who enter the *Scolel Te* project in order to implement projects that are focused in satisfying their own needs of fuel and timber. In others words, they enter to the tree plantation scheme to recover their forest areas because they miss the wood. Third, there are the ones who enter to the project because the trees provide a value to their economic activity. This is the case of organic products producers.

In the two former cases, these communities are not so much worried about the biodiversity. Instead they generally prefer planting species that are highly priced in the local and international market such as mahogany, cedar, ash, and other good quality woods.

> "...the project brings many benefits, first it brings to us the wages that is a support for our expenses in the planting process. Then we got the tree and eventually I can obtain permission to cut the trees. Because the trees belong to me, then I can have timber to sell. Of course I do not get the trees from the day to the night, it takes around ten to twenty years to see the benefits..." Manuel Hernandez Giron is a memeber of the community of Villa las Rosas, and representative of the community Villa las Rosas in the Scolel Te project.

In the latter case, the project is part of the economic strategies of the communities to gain access in the organic market. Even when these communities are more aware of the environment, they perceive the protection of the environment as a side effect of their principal economic activity: the production of an organic product. In this context, the protection of the biodiversity around their parcels forms part of

the intrinsic properties of their products. A *Scolel Te* member and an organic coffee producer talk about the importance of the project in the fulfilment of their aims as a community and the positives side effects of their activities in the environment.

> "...We (the community) need to diversify our environment because we are shade coffee growers. We have to fulfil very strict rules to compete in the organic market. One of this rules is to diversify our environment. For that reason we have to plant different kinds of trees such as timber trees, citrus trees, and fruit trees. We also know that a tree not only helps the coffee plantation but also it can benefit the environment..." Mario Diaz Perez is a memeber of the community of San Luis, and representative of the community San Luis in the Scolel Te project.

This thesis suggest that even when the three types of resource seeker communities differs in terms of their benefits in the project, the process of social exchange is similar in all the groups and generates similar interdependencies among actors. On one side, all resource seekers see the *Scolel Te* project as an opportunity to obtain economic resources during the growing process. Here, the payments are perceived as a kind of insurance/help that covers the risk of planting trees in the more vulnerable stage of the plants, when the trees are little and when people can face more problems in the establishment of the tree plantation.

> "...We had an organic coffee course in 1989, in this course we talked about the importance of reforestation but nobody was interested. Only my brother decided to plant cedar trees. Nowadays the trees are 15 metres high and my brothers' children can see the mountain full of tress and enjoy them. However, I could not plant trees because at that time the farmers did not receive any economic payment for planting trees. The only economic support available was for agriculture..." Antonio Ruiz Hernandez is a memeber of the community of Agua Azul, and representative of the community Agua Azul.

Also the *Scolel Te* project means, for the rent seeker, access to technical knowledge and relevant information for the establishment of timber production. In this

context, it is expected that communities should assign a high value to their relationship with AMBIO because there is scope for generating long-term dependencies. On the other side, for AMBIO the process of exchange with the resource seekers brings to the project people who have real needs and henceforth should become committed to the tree plantations. This is because resource seekers have an interest in establishing and maintaining a tree plantation in the long-run, especially if they want to obtain a constant income flow or benefit derived from the trees or the sale of wood for fuel and timber.

However, from AMBIO's point of view resource seekers represent a higher investment cost than environmentalist communities. First, most of resource seeker do not recognize the importance of trees in terms of their pure environmental benefits. Then if AMBIO wants to fulfil its aims, it needs to ensure that some proportion of trees will be kept alive in the long-term. Otherwise the carbon sequestration component of the project will not be fulfilled. In others words, AMBIO is under pressure to convince resource seekers of the need to adjust their initial motivations and *align* the value of the trees with those required by the project. As a result, the challenge of AMBIO with respect to the resource seeker is generating a sustainable management of the tree plantation.

If AMBIO fails in the effort of *aligning* the value that communities give to the trees and those required by the carbon sequestration project, then there is the risk that the resource seeker will commit herself / himself to the production of the wood but not necessarily to the project. As a consequence, it will arrive at the point where the resource seeker will take the decision to withdraw from the project because once the trees are in place they will find that their exchange relation with AMBIO has no more value to them. Hence, unless the resource seeker develops other kinds of ties with AMBIO, AMBIO will eventually lose its value from the point of view of the communities and they will withdraw from the exchange relationship. In this context, AMBIO's main strategy to increase its value is "re-educating" resource seekers so that they become environmentalist communities in the future. This is done through the transmission of information and the fostering of learning among resource seekers.

The possibilities of changing the value that resource seekers assign to the trees

depends on each community/farmer's capacity to learn the positive impacts that the trees have over the environment and biodiversity in their local context. Following this idea AMBIO makes a substantial investment in the transmission of environmental information and ideology to the communities as part of its training activities. The idea is that if the communities can understand the concepts they will embrace the key environmental concepts. "Re-education" aims to ensure that each farmer has a clear idea about climate change, the effects that climate change has on their local livelihood, and the role of carbon sequestration as a form of mitigating the effects of climate change. The idea is not necessarily that the community will understand all the technical details, but that they should understand the environmental interdependencies of their economic activities and their local environmental context. The hope is that if communities are able to embrace these environmental ideas they will increase the value that they assign to the trees and AMBIO as form of contributing towards the human struggle against climate change. To put in a phrase, AMBIO seeks to generate environmental citizenship among the communities.

In reality most resource seekers understand very clearly the environmental problem because they have first hand experience of environmental disasters. As a consequence, over the years and across generations, they have developed an idiosyncratic set of ideas, experiences, and cultural images that give 'meaning' to the concept of environmental crisis. This 'sense making' is endogenous to their own experience as a community. For instance, the concept of 'environmental crisis' is vivid rather than abstract because within the life-span of a generation they can see with their own eyes the direct effects of deforestation on their livelihoods, especially those who have over exploited the forest in the last few decades. They can see the raining seasons are changing and how this is affecting their crops. And they can see how the serious droughts they have experienced in recent years have led to the desertification of areas of land that was forest or jungle in the recent past. Besides, they are constantly threaten by natural disasters such as hurricanes, which not only put at risk their lives but also their assets. This learning process has helped the communities to identify the impact of their activities on the environment. And to reflect about their current consumption patterns and how that compromises their access to natural resources and their viability as a group, making them more vulnerable to

climate change.

> "...we have deceived ourselves by blaming to the government and by thinking that God is taking away our food. In the community we already come to a conclusion: we are responsible for the scarcity of our resources..." Manuel Hernandez Giron is a memeber of the community of Villa las Rosas, and representative of the community Villa las Rosas in the Scolel Te project.

> "...It is a shame that people in the communities do not care for the trees. It is not the right of humans to deplete everything. We (farmers) have to learn how to use the natural resources. It does not mean to forbid the work of the people, but people have to learn how to classify their activities, where is possible to work. For instance, if I have cattle, I put them in a flat area, where they can live happily, I do not need to burn an entirely high land in order to put the cattle, they are not going to grow up properly there because they are not goats or deer to live in such conditions...But the people do not have this awareness. They discover it when they have already depleted everything. Manuel Hernandez Giron is a memeber of the community of Villa las Rosas, and representative of the community Villa las Rosas in the Scolel Te project.

Also, in the process of learning local communities start to internalize complex concepts such as the idea of the inter-generational responsibility in the protection of the environment. According to this concept, people have to behave in such a way that they do not affect the welfare of futures generations. Natural resources should be seen as something that each generation 'borrows,' and which only comes with a 'temporary usufruct right' that lasts for their life span (Ballesteros, 1996). In this context, the communities are understanding their responsibility to preserve natural resources for future generations. These responsibilities obey a principle of inter-genrational justice: if present generations destroy natural resources now, they are destroying as well the wealth of the future generations and will impoverish their children as a consequence.

"... people usually do not understand why it is important to take care of the trees. I was like them. I remember that my father had plenty of trees in his plot of land. He did an irresponsible use of the resource... cut these trees to make a fence and used only partially of the wood. The rest was left to rot in the ground. I still remember the gum trees rotten on the parcel. But now, he sees his son having to recover the trees, having to do reforestation activities. Even if I work hard, I will never have as many and as beautiful trees as my father used to have..." Manuel Gomez Juarez is a memeber of the community of Nueva Argentina, and representative of the community Nueva Argentina in the Scolel Te project.

"... When I arrived to the community, when I talked to the people, I realised people understood that they had a problem. That they need to think in their children. That their children are growing and in a few years, when they are grown ups, they will have a real problem. Because the elders never thought about us, they had their homes, they were happy. But we have to think in our children..." Nicolas Rodriguez Lopez is a memeber of the community of Arroyo Palenque, representative of the community Arroyo Palenque in the Scolel Te project, and regional technician of AMBIO.

Local communities intend to create 'environmental consciousness' among new generations. Many community members believe in transmission of environmental values to the young so that they internalise from very early ages their own inter-generational responsibilities to protect the natural resources of the group. In others words, they think children should grow up with new values around nature.

"... I am talking to my young child because he is old enough to understand what is going to happen, what must be done now, and why I am doing what I do. I said to him: these trees are for you when you are grown up, and shall be treated with respect..." Jose Ton Alvarez is a memeber of the community of Nuevo Rodulfo, and representative of the community Nuevo Rodulfo in the Scolel Te project.

However, for the resource seeker communities the problems associated with the environmental degradation are not only a matter of ideology, but also a problem of lack of access to the information. Community farmers consider that the principal obstacle they face to understand the environmental value of natural resources is the lack of information. People in local areas are not aware of the effects of climate change, they do not understand why it is happening, they only understand the importance of natural resources when they face problems of scarcity, when they have already depleted their natural resources.

> "...We expect that all farmers can follow our example as a solution to this problem (climate change). That they can see our vision, how to take care of our woodland areas, our jungle. However, if people have no interest in the project, they do not get the information and nobody will understand. Like we said here, 'nobody was born knowing.' So, it is important to transmit this information to our family members and friends so that they get to see the problem and how to solve it (the Scolel Te project)..." Manuel Hernandez Giron is a memeber of the community of Villa las Rosas, and representative of the community Villa las Rosas in the Scolel Te project.

In this regard, community members who participate in the *Scolel Te* project are the principal promoters of new environmental values at the local level. Most of them tend to use their own social networks to transmit information and awareness about climate change. Even when many of them consider that their efforts are not sufficient to produce a change in people's perceptions, they 'feel happy' to be associated with the tree planting scheme because they feel that they are doing something important for the environment, the community, and the world.

It is interesting to see how the resource seeker has given meaning to the tree plantations through their learning process; how the local communities have linked the economic benefits of the trees with their positive environmental impacts. However, it is not clear how the environmentalist ideology / discourse is generating the emergence of commitment to the project.

Most resource seekers believe that the creation of an 'environmental culture'

around nature can foster long-term commitments. This is because the new cultural principles encourage people to grow trees not only because they produce wood and fulfil their current-day needs for fuel and timber, but also because by planting the trees people are creating an 'intergenerational asset.' Wealth that they will pass on to the next generation. However, many communities also agree that the cost of producing or recovering the trees also has a deep impact upon their ability to successfully implement the project. In others words, they think that the problem of establishing a tree plantation is not only a matter of ideology but also a problem of capacity. Many of them say that at the beginning they were completely unaware of the challenges they would face during the implementation of the project. The obstacles only became apparent in the praxis, once the process of exchange was well established. In this context, and according to the information obtained in the fieldwork, from the point of view of the resource seekers, there are three factors that can be decisive in the emergence of commitment: (1) the availability of material resources such as land, seeds, plants, and infrastructure; (2) the availability of knowledge, technical information and new skills, and (3) the organisational skills to cope with process and tasks. Also, this thesis considers that those factors can have an effect on the formation of commitment depending on the organisation of the community. Clearly, the form of how the project is organized determines not only the resources available for the project but also the conditions under which the social exchange occur.

The internal context under which the project is organised influences the process of exchange by imposing social norms that discipline/constrain the actions of actors. Therefore it can determine the form of how actors interact with the project. Following this idea, there are three forms of organizing the project among the rents seekers: (i) in a collective form ; (ii) in a cooperative form; and (iii) in an individual form.

9.1.1 The collective system of the Scolel Te project

The only two communities that organize the *Scolel Te* project in a collective way is San Juan Metaltepec and Santiago Teotlasco, both located in Oaxaca, Mexico.

These two communities decided to establish the *Scolel Te* project with the aim of recovering a specific species of tree, the so called *Chapensi* pine. The *Chapensi* pine is not only one of the most important trees for timber production in the region, but also, it is one of the trees that are in the list of species in danger of extinction. For both communities the *Chapensi* pine was the main wood resource in the past for domestic use such as cooking, heating, and housing. However, exploitation has depleted the resource and the lack of wood in the community has led their members to buy wood at high prices in the local market. Because of this the community decided to enter *Scolel Te* as a collective unit. The tree plantation scheme was therefore located in communal land areas and the work related to it organised through the *Tequio* system.

The *Tequio* is a traditional form of organisation that is still preserved in indigenous communities of Oaxaca. This is based on a system of obligations and rights. On one side, each community member has to comply with a series of obligations that must be discharged at some point during their lifespan if they want to live in the community. Most of the time the obligations involve activities that are organised in a collective form. However, the *Tequio* can also involve some individual obligations. The activities vary from simple tasks such as helping to open paths, providing a labour force for building infrastructure in the community, participating in the collection of public trash, and holding important roles in the *ejidal* system, such as being appointed for public office in the ejidal authority or being an *ejidal* representative (these post as held for a fixed term of tree years). On the other side, the *Tequio* involves the generation of rights that are transmitted from the community to individuals. For instance, when they become 18, each community member has the right to receive a piece of land for housing purposes and an individual parcel for his agriculture activities. Also, community members have the right to exploit, following certain rules, communal resources such as water and wood. Even if there is scarcity of land, the community has the obligation to accommodate 'new adults' and endow them. In this context, when a member refuses to discharge his / her obligations towards the community it is understood that the community can refuse its obligations towards him / her.

In this context, at the moment that the communities decide to establish the

Scolel Te project through the *Tequio system*, the project becomes part of the system of obligations and rights of the communiy. In terms of social exchange theory, this means that the specific institutional structure embedded in the *Tequio system* are going to mediate the process of exchange between the community members and AMBIO. Clearly, this institutional structure, at the local level, can have effects on the form of how the process of exchange occurs (Jasanoff and Martello, 2004). Following this idea, the inter-mediation of the *Tequio system* in the process of exchange has many implications.

First, at the moment that the *Tequio system* mediates the exchange relation between AMBIO and the community members, the *Scolel Te* project is assumed as a public good at a local level. Initially, because it is legally binding through the *ejido system*. Indeed, not all the activities in the community can be done in the form of *Tequio*. The *Tequio* can be only established by the Ejidal House (i.e. the community's Assembly) as the result of a democratic vote. Hence, it is the will and decision of the majority of the community's members that determine which activities deserve to be treated in a collective form. In second place, any motion that passes through the *Tequio* potentially generates obligations for all the community members. Then, once the *Scolel Te* project is assumed as a common good in the community, the whole community has to invest common resources and effort in the establishment of tree plantation. In return, each community member has the right to enjoy the benefits derived of the tree plantations. It is the community which generates a public good.

It is important to notice, that the discharge of *tequio* obligations by community members does not necessarily involve economic compensation. The *Tequio* represents a task that is given by the community to its members and the work is designed to give benefits to all. In the case of the *Scolel Te* project under the communal system, the reward is precisely the recovery of a scarce resource in the community —the *Chapensi* pine. Specifically, the reward implies the possibility of each actor receiving without any discrimination the necessary wood to fulfil his/her need for fuel and timber. In this context, the obligations are performed by each community member without expecting any individual compensation. Although the community receives a payment for selling the carbon sequestration, the source of obligations

among the community members does not have anything to do with the economic benefits . Indeed, exchange in the project is mediated by the *Tequio system* such that the behaviour of community members is not driven by the regulatory mechanism of the project but by the system of obligations of the community. As a result, the economic payment looses its function as an individual reward and becomes part of a common pool. In this context, the community decides what to do with the money they get from the *Scolel Te* project through a democratic vote in the community assembly. They could decide to keep the money in the treasury, to use as a contingent budget in the case of any emergency, to provide cheap credit to some community's members at very low interest, or to finance the construction of infrastructure in the community such as building schools or workshops. Finally, the money can be equally divided among the community members. In this last option, each member receives a quantity of money that does not represent necessarily a reward for their work and, as such, it does not have to be proportional to the contributed effort. In any case, the money received is understood as a part of the common benefits generating by the project and not as an individual compensation.

Second, at the moment that the *Tequio system* mediates the process of exchange in the project, commitment is guarantee among community members. Co-operation at the local level is steered by the institutional structure of the *Tequi system* rather than the will of individual participants.

According to Molm et al. (2000) , any mechanisms that help to enforce obligations among actors in the process of exchange have the unintended consequence of reducing trust in relationships by reducing the risk associated with the actors behaviour. There is no basis for the development of trust relationships because actors are subject to the institutional structure of the situation (Kollock, 1994). Following those ideas, the establishment of a tree plantation under the *Tequio* guaranties from the onset a strong commitment among community members with the *Scole Te* project. The obligations are enforceable at any time by the social norms of the community and any type of misbehaviour by community members can be sanctioned through the local punish mechanisms.

Indeed, the institutional structure of the *Tequio* works as follows. Once an activity has been accepted though the *Tequio*, the *ejidal* representative becomes

responsible for organising the involved activities and for guaranteeing the enforcement of the obligations. The *ejidal* representative can impose sanctions (previously discussed and sanctioned by the community' Assembly) or punishment if an individual member fails to fulfil his / her *Tequio* obligations. For instance, in the case of the *Scolel Te project*, each community member has the obligation to participate in the planting activities. The *ejidal* representative determines the day and the hours when people must discharge their obligation. In the case that one community member cannot assist, she / he can negotiate either to discharge the obligation in other time or discharge the obligation in other form. However, if the community member does not comply again then she / he has to pay a fine that covers the expenses that the community incur for getting the job done in the tree plantation. If the fine is paid, the community accepts that the *Tequio* obligation has been honored (discharged). However, if the community member refuses to discharge her/his obligations, the community can impose a more serious penalty. In the extreme case defiant members can be expelled from the community.

As a consequence, work in the tree plantation is guaranteed even after the economic payments the project brings are gone, the obligations with AMBIO fulfilled, and the personal interest of individual members in the project is evaporated. Hence, the project runs with a logic that is different from the one *Scolel Te*'s regulatory mechanism is based upon. In this context, the payment system designed by AMBIO in order to generate the necessary economic incentives to foster commitment play no relevant role when the project is taken under the *Tequio* system.

For instance, SAO, the local environmental NGO of Oaxaca which is co-ordinating the activities of the *Scolel Te* project in the region of Oaxaca, claims that if they had influence in the design of the *Scolel Te* project, they would change the system of payment. During the fieldwork interview the representative of SAO claimed that the deferred payment system established by *Scolel Te* project does not provide the necessary resources to the communities of Oaxaca, especially in the busiest part of the project. Instead, a single payment would help more because it would provide more resources to the communities at the time they really need it. Then, the communities could decide upon the best use of such economic resources. For instance, they could use the money at the more difficult part of the project when they have to

do more activities and when they need to intensify the labour. For SAO the deferral of payments means that the economic incentive is dissolved, and become not enough to provide a real help to the communities that usually invest more in the project than the payments they received (Carlos Marcelo Perez is a technical co-ordinator of SAO)

For this thesis, this comment can only be understood once one takes into account the experience of SAO with the communities of Oaxaca. The principal strategy of SAO to guarantee commitment among local communities is through the use of the *Tequio* system. This strategy has helped them to establish not only the two carbon sequestration projects with AMBIO, but also to develop its own environmental projects in the region of Oaxaca. Because of the *Tequio*, SAO do not have to deal too much with the problems of lack of reliability of community members that the projects of AMBIO face in Chiapas. Because there is no risk there is not need to test community members behaviour. The *Tequio* system does the hardest part, i.e. it disciplines defiant community members and ensures the reciprocation of obligations in the project (see the role of sanction and authority in the social exchange (Baldwin, 1978). In this context, economic incentives to foster commitment are redundant.

To give an example of this consider the case of the community of Teotlasco. In this community there was an incident with the ejidal representative. Basically, the representative disappeared with all the public funds of the community, including the payments from the *Scolel Te* project. This act of fraud left the community with no public budget. The new authority had to deal with the problem and had to continue with all the projects and honour all the obligations acquired by the community during the previous administration, including the *Scolel Te* project. In others words, the money disappeared but the obligations remained intact thanks to the *Tequio*. The community members has to carry on with the activities of the tree plantation even after being defrauded.

As a result, the commitment of community's members with the *Scolel Te* project is socially binding at the moment that the *Ejidal Assembly* accepts to take the project as a *Tequio*. No situation can break the social pact among community members.

Third, at the moment that the project is mediated by *Tequio*, the value of the

local resources available to the project increase and the cost of implementation of the tree plantations tends to decrese. Indeed, SAO, the community of San Juan Metaltepec, and the community of Santiago Teotlasco claim that the implementation of the project through the *Tequio* has increased the value of the project for two main reasons.

On one side, the involvement of the communal areas for the establishment of the project represent large areas of land that can be used exclusively for tree plantation purpose. From the point of view of AMBIO, this means a substantial environment impact of the project in the region and a reduction of the opportunity cost of the project because it increases the economic gains for planting large extension of trees. From the point of view of local communities the use of the common areas for the establishment of the project has also meant a high impact upon their welfare for two reasons. Initially, because the local communities of Oaxaca can recover large areas of land of a scarce resource — the *Cheapensi* pine. This means that they are able to recover their self- sufficiency in the production of wood that is important to fulfil their local needs for fuel and timber. Also, the project does not represent a high cost for the community in terms of space, because the individual parcels of community members are not compromised by the project. This means that the tree plantations are not competing with other productive activities associated with the parcels, like in the individual system. In other words, there is no opportunity cost between the project and the farming activities of the community. For instance in the community of San Juan Metaltepec, they have 9 areas of reforestation of approximate 25 hectares each one where 215 households are participating in the tree activities. Here the principal aim of the community is planting 450 hectares available in the community to recover the Chapensi pine.

On the other side, the *Tequio* allows the disposition not only of a large supply of labour force available to the project but also the use of the social norms around collective work. Indeed, the *Tequio* offers great advantages for the project because some activities that are essential for the project can be organised more easy and with less cost at the community level. This means, that the project can benefit from the inter-mediation of *Tequio* in the process of exchange at the local level because it allows the co-ordination of complex tasks and activities related to

the project among community members by (i) providing explicit agreements about how the obligations has to discharge among community members (the form and the time of the activities); ii) generating discipline among actors; (iii) providing a more productive division of labour among community members; and finally (iv) distributing more easily the resources and information among actors. Here, the possibility of sanctioning actors through the punishment mechanism is the key element that facilitates regulation of actors' behaviours and prevents the deviance actions.

For instance, one of the most problematic issues in the project is access to seeds and young trees for reforestation. Collecting the seeds is a complex tasks that involves very specific skills. Reproducing the plants in greenhouses and to transplanting them in a plot are also relatively skilled activities. If these tasks are not properly done by the community, the project may fail altogether. In this context, the collective efforts in the communities of Oaxaca has meant that each member gets involved in the collection of seeds at some point. So, all community members learn how to collect the seed in a more efficient way and how reproduce the plants. Moreover, the establishment of a seed nursery was only possible thanks to the collective effort of the communities and the the advice of SAO. This is a very important point because establishing a nursery is a complex and expensive project, which can only be afforded as a public service. If communities are unable to produce the plants in their own community, they have to buy them and then bring them to their land. The transportation cost is in many cases prohibitive. So, having the nursery helps to save a significant amount of money.

Following the same idea, the division of labour among community members in the communities of San Juan Metaltepec and Santiago Teotlasco can be seen as another example of how the *Tequio* system facilitate the co-ordination of activities in the project. As we have seen one of the main opportunity costs that farmers usually face in the implementation of the tree plantation is time. That is, the time dedicated to tree plantation can compete with the time that farmers spend doing other activities which can be more productive. Tree plantation does not represent such a high opportunity cost within the collective system, however, because the trees do not threaten the main economic activities of the community. Here the inclusion of productive work of women and young children allow the emergency of

complementarities between the time dedicated to the project and the time dedicated to other activities.

Indeed, the participation of the whole community allows them to bring together their whole organizational capacities and take advantage of the natural division of labour within the community. For instance it appears that women have been decisive for the implementation of the *Scolel Te* project. Women were the initial promoters of the project in the communities and also have been the main labour force of the project.

> "...thanks to the group's women we initiative the project...because in the beginning nobody else gave importance to the project..." Maximo Manzano Martinez is the ejidal representative of the community Santiago Teotlasco, and representative of the community Santiago Teotlasco in the Scolel Te project.

The work provided by women creates complementarities between the Scolel Te project and other economic activities in the community. Traditionally, men are in charge of the agriculture activities. Women, instead, traditionally do housework and the care of children. These tasks are many and as demanding as those performed by the men, and demand a higher degree of flexibility with many periods of intense activity followed by 'waiting' periods between task and task. As a consequence, women have more chances to squeeze here and there an extra activity during their day than the man. In this context, when woman decided to put their labour force for the project, the trees became non weak competitors, in terms of time, with the agriculture.

At the beginning of the project the women were in charge of most of the activities, such as clearing the communal area, opening the furrows, planting the little trees, and weeding. Young children can also help doing these tasks. As the trees grow and get higher, men start to get involved, cutting the branches (activity that is less intensive in terms of time but is more risky). In San Juan Metaltepec, also, the project was an initiative of the women. Initially the work was done only by a group of woman and eventually the rest became involved.[1]

[1]Cirino Aragon Cortez, first secretary of the surveillance council of the community of San Juan Metaltepect , and representative of the community of San Juan Metaltepc.

The *Tequio* not only fosters commitment among community members but also offers an opportunity for the co-managment of the common resources of communities through the *Scolel Te* project. Indeed, the experience of the communities of San Juan Metaltepec and Santiago Teotlasco shows that the collective organisation of the *Scolel Te* project can be very effective in producing a positive outcomes in the establishment of market-based mechanisms projects. This is because the collective capacities of a community based on communal property and the *Tequio* system allow not only the use large areas of land available to the project but also a fair division of labour among community members without threatening the main economic activities of the community, and the farming activities. Also, the *Tequio* is more socially efficient because it allow to assume in a collectively form the implementation cost of the project by reducing the individual cost of community members. Costs that otherwise will be very difficult to incur by a single actor, especially if we take into account that most communities live in poverty. Finally, the two cases in Oaxaca show that traditional economic systems can be adapted easily to the requirements of a carbon market, especially, if the carbon projects take into account the advantage of the collective system. In this context, the ejido system can be seen as an opportunity to create interdependencies in the management of forest areas, where social norms and traditional forms of authority can help in the reciprocation of obligation and the generation of long term commitment.

9.1.2 The Co-operative system of the Scolel Te project

> "...We (the community) entered the project for the benefits that the *shaded coffee* system brings to our coffee plantations. The trees are important for us, in part because they provide the necessary shade for the coffee plants. Also, for the benefits that the environmental diversification bring to our coffee plantation. The main aim for us is the prosperity of our farming co-operative SPOSEL (Society of Organic Producers of the Lacandona Jungle)..." Cristobal Cruz Lopez is a member of the community of Zaragoza, representative of the community of Zaragoza in the Scolel Te project, and member of the co-operative of SPOSEL.

According to the data obtained in the field work, only three communities from the 35 members communities declare to be part of the project because they consider the tree plantation scheme to be a natural resource that adds value to their main economic activity. It is important to note that all the communities in this category are part of business organisations that produce organic products. For instance, the community of Zaragoza and San Luis are members of the co-operative called SPOSEL . SPOSEL is an organic coffee producer whose center is located in the community of Zaragoza, which is integrated by different communities located in the Lacandona jungle. Similarly, the community of San Felipe Jatate has a micro-business called *Processor of Traditional Organic Cacao*. The principal production of the community of San Felipe Jatate is the growth of organic cacao and the elaboration of hand made chocolate. All the communities in this category produce organic products that comply with international organic standards, like fair trade certification, which give them the right to sell their products in the international organic markets of Canada, United States and some parts of Europe.

The initial motivation of the communities for entering the project was to recover the natural environment surrounding the parcels in order to provide the conditions for the production of organic products. Indeed, the organic products not only have to be free of artificial additives, pesticides, or process that involve artificial methods, but also, organic products have to guarantee the diversity of their ecosystems in terms of plants, insects, and animals to produce natural products. In this context, trees are perceived as an important resource for the production of organic products because the variety of types of trees facilitates recovery of ecological diversity around the agriculture system and also because the trees add an environmental value to their products: value that is recognised in the organic market through the respective certification of the products. For that reason, the economic resources that the community receives for planting trees under the *Scolel Te project* are not as important as the recovery of tree diversity in the communities. Indeed, given that planting trees is a common activity among the organic co-operative members, the payments that communities receive for planting trees trough the *Scolel Te* project are perceived as a plus for an activity that they have to do anyway.

"...We do not care if we do not receive any payment for planting trees, because this is an activity that we have to do, even if do not have a compensation we have to plant trees for the benefit of the organic coffee plantation..." Mario Diaz Perez is a member of the community of San Luis, representative of the community of San Luis in the Scolel Te project, and member of the co-operative of SPOSEL.

In terms of social exchange, the resource seekers who belong to the organic co-operatives can offer a very valuable resource for the project for many reasons. First, the establishment of tree plantation does not represent an opportunity cost for community members. In part this is because tree plantation does not compete with the main economic activity of the communities. In some sense, resource seekers are captive participants given the interdependencies between their economic activities and the economic value of trees. Also, because the cost of establishing the planting scheme increases the value of the main economic activity of the communities. Even when the communities has still to incur costs for participating in the *Scolel Te* project, such as the time and effort dedicated to the tree plantations, these costs can not be separated from the total benefits of establishing the organic projects. Indeed, the cost for establishing the tree plantations are part of the total cost of implementing the organic plantation. As a result, community members can have more incentives to bear higher cost in the establishment of the project and therefore they can be more willing to sacrifice the necessary time and effort in the tree plantation scheme. Clearly, the complementarities among both activities is the main mechanism that can generate real incentives among community members to engage in the tree plantation scheme in the long term.

Second, the co-operative members, through their social ties, offer organisational capacities in the *Scolel Te* project that are not only limited to their links with other community members. Here, the social structures under which the co-operatives organise and co-ordinate their activities in the production of organic product are not de-linked at the moment of establishing the tree plantation. In this context, the social ties of the communities with other organisations are integrated in the implementation of the *Scolel Te* project to facilitate its development. In part this is

because the tree plantations are integrated organically within the joint effort of all the organisations involved in the production of organic products at local level. In addition, it is because the diversity of partners involved in organic production has a common aim and has more incentives for generating synergies between the tree plantation project according to their specific specialisation. It helps to minimise the cost of implementation of the organic project by making the resources of each partner more productive.

For instance, the National Commission of Natural Areas (CONANP), the Ministry of Environment and Natural Resources (SEMARNAT), and the National Commission for the Development of the Indigenous People (CDI) are the principal partners of the communities in the development of the activities in the *SPOSEL* organisation and the major promoters of the *Scolel Te* among organic producers. According to the representative of CONANP in Chiapas, one of the aims of the CONANP is precisely linked to its social programs with the different actors that can bring more support to its efforts. Initially, CONANP helps with the process of production of organic products to the co-operatives, from providing technical advice and training for the generation of high quality products to helping in the process of selling and exporting organic products in the national and international market. Beside these efforts, CONANP has provided part of the financial resources to the local co-operatives. However, the establishment of organic projects among community members requires them to link a series of activities together that are a fundamental part for the production of organic products such as the generation of environment diversity programs, water management programs, and embellishment of the natural landscape programs. Given the limited capacities of the CONANP to attend to all of the aspects of the organic projects, the institution has helped to link the local co-operatives with others governmental and non-guvernamental organisation that can provide support to their organic project. For instance, the CDI helped to provide finance support to the cacao project established in San Felipe Jatate community. Here, the joint effort of CONANP and CDI helped the community to obtain the organic certification of the cacao. Similarly, when the need for establishing a tree plantation projects among community members of SPOSEL emerged, AMBIO become part of the working agenda of CONANP.

> "... We (the community) are proud, as a coffee producer, as a SPOSEL organisation, for AMBIO, CONANP, and the SEMARNAT for putting their efforts together in benefits of the the communities, for working with the organic growers... for respecting our traditional forms of producing and cultural values inherited from our ancestry..." Mario Diaz Perez is a member of the community of San Luis, representative of the community of San Luis in the Scolel Te project, and member of the co-operative of SPOSEL.

For the communities of San Luis and Zaragoza, the experience of working with AMBIO within the *Scolel Te* project has been very positive, to the point that they decided to push the adoption of the tree plantation system in the board of the co-operative *SPOSEL*. The proposal was accepted by the majority of the co-operative members. The involvement of the whole co-operative meant a potential participation of around fifty hundred farmers/families in the establishment of the project of carbon sequestration. The important point of this case is to observe how the interdependencies among both activities, the production of organic products and the tree plantation, change the dynamism of the social exchange among local actors and their approach to the tree plantation scheme, from an activity that has been voluntary for the members to the consolidation of agreements through the formal mechanism of the co-operative SPOSEL.[2] Indeed, the experience of formal co-operative members in the *Scolel Te* project help to test the advantages of the tree systems, especially the use of the *shade coffee* system, which is specially designed for coffee production. After many years of exploring the tree system among some co-operative members, the co-operative decided to adopt tree plantation as a result of an empirical and palpable experience of some of its members. In other words, it seems that the adoption of the tree system among local communities usually passes through a slow process of evaluation. Actors tend to follow the development of the project in other communities / individuals as a way of obtaining relevant information about the reliability of the project. Through this system SPOSEL was able to assess whether the tree plantation project was difficult to adopt, if the project guaranteed the development

[2]The experience of the SPOSEL co-operative was not be considered in my research due to the fact that its agreement initiate one year later of my research interview.

of a tree plantation, and if the plantation brings the expected benefits. After getting assurances of the advantages of the project the rest of communities engaged in the project themselves.

In terms of social exchange, SPOSEL has to test the trustworthiness of the project. This means that the main strategy of SPOSEL to reduce the risk associated to the establishment of the tree plantation was monitoring the experience of some members who decide to take the risk of participating in the project. The experience of the risk taken by members of the project reveals, through the ongoing process of exchange, relevant information about the reliability of the project and the trustworthiness of AMBIO. Through this mechanism, SPOSEL not only reduced the cost of taking a bad decision that could compromise their resources but also could assure the expected benefits of the project . Clearly, the complementarities between the project and the aims of the organic producers create conditions for the generation of commitment in the *Scolel Te* project. However, empirical experience seems to play a fundamental role in the adoption of the project in the long term, especially for local business who may consider as too risky the adoption of a project that is not well known and tested.

9.1.3 The individual system in the Scolel Te project

According to the data obtaining in the fieldwork, 17 out of the 35 communities are resource seekers that established the project through the individual system. Even when many resource seekers consider their experience within the project to be positive, most of the communities in this category recognise that their participation has not been easy, not at least because the establishment of the project usually involves a series of hidden costs that individual farmers find it difficult to afford.

Indeed, most of the communities within the individual system of the *Scolel Te* project recognise that individual members usually incur in a series of costs that are not easy to determine in economic terms and that farmers tend to have a more clear idea of such costs only when they have made an initial investment. In this context, the decision to carry on or quit the project is not easy to take given that farmers run the risk to lose their initial investment. The majority of the farmers

minimise that risk, carrying on the project with the expectation of recovering some of the investment costs. Indeed, even when recovering the trees seems to be the principal drive among individual resource seekers — because it entails the access to a scarce resource to fulfil the individual or/and the local demand for fuel and timber —, individual resource seekers follow a short-run recovery strategy if they consider that the costs of establishing the project are too high and that they will not be able to bear them in the long run. In others words, if the implementation of the tree plantation project is not perceived as a realistic option, farmers can put more emphasis upon economic resources, adopting a rent seeker approach. That is, farmers remain in the project until they recover part of the investment or until the payments in the project come to an end. Clearly, from an individual's point of view, the worst case scenario is to withdraw from the project before receiving the economic payments because by doing so all his/her investment will be sunk. In this scenario, more than ever, the value that each actor assigns to the wood will determine the cost that each actors is willing to incur, and therefore, the degree of commitment that each actor is willing to accept.

Individuals are more susceptible to costs than communities as a whole, simply because communities pool the resources of all members to face common challenges. As we have seen, the establishment of the *Scoel Te* project under the individual system is restricted to the boundaries of the parcel. In this context, the principal problem that individual actors face to establish the tree plantations is the small space within their plot that they can offer to the project. The parcel represents for most individuals their principal mean of subsistence. There, farmers grow different kinds of plants and animals in a small scale to fulfil their basic alimentary needs. In other words, the main function of the parcel is to generate a food basket that contains the necessary nutriments needed for a family, such as proteins, cereals, vegetables, and fruit.

A tree plantation, in order to survive within the physical limits of the parcel, has to take into account and adapt to the parcel's main function: to feed the farmer. As a consequence, the trees have to play a similar role to the rest of the agriculture products within the parcel. They have to be another product that brings variety to the self-consumption food basket. More specifically, the trees have to fulfil the basic

needs for fuel and timber of the household. Clearly, this logic does not apply when an individual actor has another source of income that secures his/her subsistence. In such a case, farmers escape the subsistence system and the function of the parcel as the main source of food is weakened and in many cases broken. However, for the majority of local farmers in the project the individual parcel remains as their principal source of food.

Evidently, the individual system of the parcel has many implications for the *Scolel Te* project. First, tree production is limited within the physical boundaries of the parcel. The trees have to share the same plot of land with the other products that feed the farmer. Second, within a subsistence production system, some agricultural products are more important than others. So, high ranking products such as beans, maize, chilli, and coffee are more valuable and have a higher priority than low ranking products. This implies, in turn, that land for low ranking products is seriously limited. So, for instance, the yield of maize is threaten by the production of less valuable products (including the tree plantation), farmers will simply reduce the production of the less valuable item. Under pressure, farmers will abandon the production of less indispensable products.

In spite of this, in some cases farmers can integrate the tree plantation successfully within the parcel and create some benefits at local level. However, such successful integration of the trees to the parcel does not necessarily imply that this will have an impact in carbon reduction at an international level. Indeed, the establishment of complementarities between the function of the parcel and the *Scolel Te* project can generate gains for local communities not only because the trees can satisfy the self-demand for timber and fuel but, more importantly, because recovering the trees may generate widespread ecological benefits for land and increase the welfare of the farmer — for instance, it may help to recover water springs and the variety of flora and fauna. However, the production of trees for "self-subsistence" usually does not have the required scale to compete in the international carbon market because the amount of carbon sequestration that is possible within the boundaries of the individual parcel is far too low. That is, there is a serious scale problem and prices are far too low to support important increments in size. If an individual farmer increases the production of carbon sequestration (by planting more trees) she/he

can push the capacity of the parcel out of its limits and affect its main function of feeding the household (and, therefore, jeopardizing his alimentary security) because the price she/he will receive for the carbon certificates will be far too little to buy food in the market.

The cost of information in the individual system

In terms of social exchange, the ongoing process of interaction between community members and the project unveils the real costs of the tree plantation by exposing the economic and social impact of the *Scolel Te* project in the welfare of indigenous groups. In each interaction in the process of exchange community members gather more and more information allowing them to estimate with more accuracy the real cost of the project. So, at the moment that a farmer feels that the project is not producing the benefits he/she expected, she/he can change strategy. Clearly, farmers can always withdraw. But when is a good time to withdraw? If they go too early with little information they risk losing the initial investment and potentially throwing away good benefits. If they wait too long, however, then they will have a very accurate estimation of the costs and benefits but it will be too late to pull out. So, it is a balancing act from the point of view of individuals and communities. For AMBIO, on the other hand, a bad experience with the project among local farmers can affect the *Scolel Te* project altogether because it can generate a bad reputation of the tree plantation and discourage local participation.

Taking into account the hidden costs, the majority of farmers consider that the most difficult part of the project is not the activity of planting the trees but keeping the trees alive. The tree plantations are very sensitive to weather. Any variations in rainfall can have a direct impact because plants can die for excess or lack of water. Even though weather affects everybody, individuals who enter the project on their own believe that they are more vulnerable than communities that enter on a communal basis. Indeed, individual actors are less able to respond to environmental disruption because their capacities to recover depend exclusively on their own resources. This is because the individual parcel is disconnected from the common. Farmers cannot make use of community funds, free work, or institutional rules in

the case of an extraordinary event. They only have their own individual effort, their own time, and their own economic resources to face disruption. In contrast, the communal system pools together a large number of farmers that face different degrees of disruption risks and response capacities. And therefore, implicitly, it creates an insurance mechanism in the event of environmental disruption to its members.

There are various examples of how this lack of insurance may be catastrophic. For instance, individual actors need to make a major re-investment to recover a tree plantation in the event of environmental disruption. These eventualities can make demands that go beyond their individual capacity. Because of this re-planting after weather disruption is one of the principal causes of withdrawal from the project among individual members.

> "...the time dedicated to the tree plantation usually exceed my expectations. For instance, during heavy rainstorm there are floods and the plants die. So, I need to re-plant. For me, it means time that is not planned, then I have to adjust all my activities in order to re-plant the trees. Similarly, if there is not rain, the sun can dry the plants, then this means that I need to replace the death trees. Then, I need more time again..." Gazpar Sanchez Montejo is a member of the community of Punta Brava, representative of the community of Punta Brava in the Scolel Te project.

Another example where the lack of insurance is important as well is the problem of plagues and illness. All communities need to keep constant monitoring of the trees in order to avoid surprises that can lead to significant loss of trees. However, for an individual actor the management of tree plantation depends of how they organise their time to do activities such as monitoring, cutting branches, and fumigating. All these activities have to be balanced with their main agricultural activities. Sometimes a farmer struggles to co-ordinate their activities, especially if he considers that there are other agriculture activities that have priority. Then, he/she will tend to delay tree care activities or, in the worst of the scenarios, to stop maintenance altogether. As a result, careless farmers increase the risk of having plagues and illness in their plots. However, if all of his/her neighbours are clean

enough, a single cheat does not increase too much the risk (and not everybody is monitoring) and he can free ride upon the effort of his/her neighbours. However, a plague in one plot is difficult to keep insulated and there is a high likelihood that it will spread to neighbouring plots, affecting other farmers. So, there are two stories here. One is that plagues and illness can strike anyone even when they are careful. And in the individual system there is no insurance for disruption and so individual farmers suffer because of this. And second, there is a moral hazard problem because careless actors make careful farmers run unnecessary risks in order too free ride on the benefits.

Lack of insurance and free riding (moral hazard) are not the only problems caused by the lack of information about the benefits and cost of the project. There are also problems that are caused by the fact that different people have different knowledge / information and that the information does not flow from one actor to the other because of lack of communication, lack of trust, or plainly because people can exploit their information advantage to get benefits or rents.

One example of these informational problems concerns planting and re-planting decisions and the quality of land in the parcel. As with any other crop, the likelihood that a tree will survive in the long term depends on the quality of soil where it is planted. Here, the 'ranking-of-products' system within the parcel has a role that, if not carefully considered, can play against the tree plantations and the farmer. This is because farmers tend to leave the worst quality land for trees and keep the best land exclusively for their main crops. That is not a problem of itself but the right type of tree needs to be planted according in each type of land. So it becomes a problem when farmers do not have a clear idea of which kinds of tree species are more suitable for the properties of their land. After making an initial investment they have to re-plant again because the trees could not grow. Aspects like humidity, altitude, and exposure to sun light are factors that can be very important for the development of trees. If farmers do not take these factors into account, they will incur "hidden" costs.

> "... I spent two years and a half expecting to grow cedars in my parcels. However, none of them grew properly. Then I realise that my parcel

was too humid to grow cedars, so I decide to change for Makulis (Yellow Ipe). It was too difficult for me because I have to spend more time and money for this mistake..." Gazpar Sanches Montejo is a member of the community of Punta Brava, representative of the community of Punta Brava in the Scolel Te project.

Another hidden cost is the cost of acquiring the information itself. AMBIO is a central node in terms of knowledge and information. Because of the cost AMBIO only goes to the communities only once or twice a year (and not to all of them). Instead they organise training courses / events (two times a year) in San Cristobal de las Casas, Chiapas. There is an open door policy and anyone who wants to attend can do so. However, given the distance and the costs of travelling and accommodation, single participants find it hard to attend to these meetings. Instead the representative of each community or region are the ones who go to the meetings on the behalf of their constituencies. So, these technicians become key information / knowledge broker / inter-mediators between AMBIO and the communities. The representatives usually receive relevant information and training to establish the tree plantations that eventually they spread to other people in their communities or region. That is, most of the time individual members receive the necessary training and information in an indirect way through their representatives. In some cases, the meetings are organised by region, then community representatives have to move to the nearest regional centre. In any case, the representatives has to travel. The cost of travelling can be prohibitive for some members if they assume the cost on an individual basis even when AMBIO helps them with part of the fare. As a consequence, the common strategy is to assume such costs in a collective way. This system works well especially among communities which are under the communal system or where local participation is high. In both cases, co-operation of all participants in paying for the travelling expenses of their representatives allows them to acquire valuable human capital from AMBIO. However, communities with a low number of participants and located in remote areas face serious problems in accessing to the necessary training and information. As a consequence, community members who are isolated develop few ties with others communities and have no

access to information and training from AMBIO.

Following the same argument, access to seeds and plants in the project can be seen as another example of unknown costs for accessing the resources in the project. For many communities one fundamental problem of the *Scolel Te* project is that AMBIO do not guarantee access to seeds and plants for the establishment of the tree plantations. Accessing these basic resources is the responsibility of the participants. Actors can get seeds and plants in two ways: (a) establishing tree nurseries, or (b) buying seeds in the local market. Initially, actors can collect seeds in the surrounding areas, then they can plant the seeds and grow them in their nurseries. Even if this is cheaper than buying the seeds in the local market, however, the development of a nursery requires certain technical knowledge that is not easy to acquire, especially for those community members who have not previous training. The lack of this technical knowledge may prevent farmers creating their nurseries. Furthermore, even if actors have the necessary training, there are economic cost to the enterprise as one needs to buy materials and tools to start and maintain the nursery. Also, the time required to run the nursery has to be included as a cost. Obviously, these costs are more prohibitive when they are borne by a single member. For that reason, the few plant nurseries that have been established came about as joint ventures of a number of individuals or as project undertaken by farmers that entered the project under the communal system.

The cost of connexion and the value of social ties within the individual system

In general, the majority of community members who enter the project under the individual system struggle for access to a minimum of resources for establishing the project, including acquisition of the necessary training, information, and material resources. The cost of access to such resources can be prohibitive for an individual actor, especially if he/she cannot co-ordinate his/her activities with other members, communities, and/or organisations. Moreover, according to AMBIO, this cost depends on the degree of development of a particular project. Indeed, local capacities are more developed in communities where the project has more progress. So, participants pay a lower cost for accessing the project's resources in regions with a

developed project than in regions where the project has little advance.

One key factor for the development of local capacities is the role of non-project-related social ties among local communities. These ties help the emergence of relational mechanisms that facilitate co-ordination of actions among actors in the absence of a formal co-ordination mechanism such as those present in the *Tequio* system. An important example of this is the case of the *Chol* region where the real asset has been the relative high ability of the *Chol* people for building up a broad social network with strong and far reaching ties. This can be seen in how the the *Chol* established their plant / seed nursery. Because it is a large scale enterprise that involves a lot of economic and human resources, the establishment of a plant nursery within the individual system depends heavily on the activism of individual members and the number of contacts that they have with people in other communities and/or organisations. The more active and better connected, the easier they find to co-ordinate their efforts for starting a a plant nursery project. For instance, in the community of Arroyo Palenque. Mr. Domingo is a very active member who has created a local network among many communities in the *Chol* region. His principal partners in the nursery project have been members of his own family. Thanks to this social ties, that go down to kinship, Mr. Domingo was able to put together the people and the resources that were needed for starting the nursery. Family solidarity plays such an important role here, that without these social ties Mr. Domingo may have found it impossible to carry on this project. In other words, the family 'network' of Arroyo Palenque facilitated the co-ordination of actions and efforts of many individual members from many communities in the region. In turn, this helped bring people to the nursery venture from communities that have only a few *Scolel Te* participants and that otherwise would be isolated. Because family ties played such an important role in the establishment of the nursery in the Chol region, their experience has not been easy to replicate within the context of the individual system.

In terms of social exchange, we can say from this example that a key problem for people seeking to access the resources of the *Scolel Te* project stem more from a lack of horizontal links among local communities than to their economic weaknesses. A lack of non-project-related social contacts / links makes the formation of

project-related social relations / links more difficult, and leaves participants of the *Scolel Te* project de-linked and with less capacities to cope with the challenges of the project. Because of this, a common concern among participants is related to the few opportunities that the project offers them to share their experiences among members in other communities. This is particularly important because few chances of interaction with others members means less possibilities to share common problems and knowledge, and therefore, less possibilities of exchanging capacities with the rest of actors.

Generation of commitment within the individual system

According to Lawler and Thye (2000) frequent interactions among actors not only help to increase the intensity of the exchange, but also help to develop positive emotions in the relationships among actors. Lawler argues that actors who develop special feelings with their exchange partners are not only more willing to increase the frequency of exchange with them but also tend to invest more in maintaining the relation. In this context, actors develop *affective commitment* to the other, *feelings of attachment* and a *sense of obligation*.

The emergence of affective commitment is not rare in the *Scolel Te* project and actually, as we discussed in subsection 9.1.3, personal feelings among actors have been paramount in various aspects of the project. This can be seen through the experience among the regional representatives of the project. For instance, the regional representatives of the *Zeltal* region in Chiapas, who belong to the community of Alamkantajal and Somaria Alamkantajal describe their experience in the project as something positive. Both representatives have been participating in the project since its pilot phase and they has been the major promoters of the project in the region among the Tzeltal indigenous region. Even when they consider that the sequestration project in the region does not represent a real economic alternative for local people, they consider that the project is important not only because it helps to recover the wood resources in the communities, but also because the project helps them to develop their capacities. In the case of the the representative of Alamkantajal, he decided to increase his involvement with the project not because of the trees

but because he enjoys the experience of being part of the technical group of AMBIO. This experience, according to him, has been a great opportunity to meet new people, to learn new things, and to know new places. He highlights how the contact with people from many parts of Mexico and beyond has encouraged him to learn Spanish. And he believes that Spanish is important in his personal development. In turn, learning Spanish, has brought many benefits to his community because now he plays the role of interpreter.

Moreover, the representative of Somaria Kantajal feels proud that AMBIO consider him as a valuable asset to the point that he was invited to become part of *Scolel Te*'s technical team. He does not receive a formal salary. However, the positive personal feelings, or a sensation of self-importance and relevance, is his real pay for participating in the *Scolel Te* project. His experience is not an isolated case. A lot of people feel like him. So, participants seem to develop feelings of attachment and obligations to the project. This enthusiasm is susceptible of being transmitted from community representatives to their constituency. Hence, despite most of community members having little contact with AMBIO, the activism of their community representative injects them with enthusiasm and makes them feel that they belong to the *Scolel Te* project.

The majority of regional representatives have been collaborating with AMBIO from the beginning, when it was small and people find it easy to interact. Nowadays, the size of the project has increased substantially and with it the the cost that AMBIO has to pay to foster interactions among local actors has increased as well. Because of this, AMBIO has delegated many of the activities of promotion in new communities to old representatives. However, contrary to the expectations, old representatives have not been able to link new community members to the project. The main reason for this failure, it appears, is that creating new links implies that representatives must work with people that do not share any close relationship with them. In this context, the reduction of direct contact of AMBIO with new community members and the high cost that old representatives have pay to maintain relatively weak links with new members seems to reduce the frequency of interaction among actors. As a consequence, the emergence of personal feelings as valuable relational mechanisms to sustain co-operation is difficult to develop. On contrary,

bad feelings towards AMBIO and *Scolel Te* project may develop, as new members feel neglected.

> "...I am very disappointed because the technicians only arrive on time when they want to do the monitoring, besides of that they do not care about us...we (the community) have been waiting for weeks to see them, our people have to leave to work to be here and they arrive when they want... then when the technician arrive to the community they get angry with us because we are not gathering..." Manuel Hernandez Giron is a member of the community of Villa las Rosas, representative of the community of Villa las Rosas in the Scolel Te project.

> "...The people from AMBIO...only came to see us the first time, when they were trying to convince us of participating in the project. After that, the technician is the only one who comes to the community, two or tree times a year. However, the last time the technician came I had a problem with him. I decide not talk about the issue with him but to discuss the problem directly with the boss from San Cristobal. However, the boss never came..." Jose Lauro Ton Alvarez is a member of the community of Nueva Rodulfo, representative of the community of Nueva Rodulfo in the Scolel Te project.

Feelings can also play against commitment. In fact, a farmer is more likely to withdraw from the project if she/he starts facing unexpected costs before developing any personal feeling of attachment towards *Scolel Te* and/or AMBIO. So, negative feelings may have catastrophic consequences in terms of commitment and withdrawal when farmers go through acute periods of stress and the survival of an individual's tree platation requires extra effort. Clearly, in the face of increased costs in terms of time and effort, sore feelings towards AMBIO play a key role because in such case actors are not willing to invest more to maintain their relationship with AMBIO.

Furthermore, the lack of contact among actors can have very negative effects in the adoption of new skills. Unless actors act together, the individual system by itself is not able to produce common co-operation agreements. This decreases the ability of influencing the most traditional sectors of a community and, as a consequence,

makes it difficult to adopt new ideas and skills. That is, the rate of adoption of new knowledge, ideas, and skills depends on the development of social ties among actors. For instance, resistance to the adoption of new forms of land management is quite common among local actors. This resistance is stronger among people who have little contact with the exterior. They are conservatives, ruled by long-lasting traditions, and reluctant to change. Usually these groups act on the basis of their own beliefs even if their traditional techniques clash with the new practices of the *Scolel Te* project. Unfortunately, the technical rules around the *Scolel Te* project are not subject to negotiation because the tree plantations must comply with international standards. If actors do not comply with their obligations in the form and the time established in their *plan vivo*, AMBIO may retaliate by holding back payments until farmers re-plant the trees according to the technical rules. Obviously, this situation generates conflict between the communities and AMBIO.

> "...Even when we have received training, some people do not take it into account and they plant the tree in an incorrect way. It happened to one member in the *Tronconada* community. The son took the training but his father decided to plant the trees in his own way. AMBIO did not recognised this work and he had to take out the trees and re-plant. This was tough and the father failed to understand why AMBIO took such decision. However, after many meetings he finally agreed to remove the trees and re-plant part of the tress as a condition for receiving the payment ..." Gazpar Sanchez Montejo is a member of the community of Punta Brava, representative of the community of Punta Brava in the Scolel Te project.

> "...part of the technical group of AMBIO were jailed in the community because of a misunderstanding about the technical rules of the tree plantations and the payments..." Fernando Lopez Garcia is a member of the community of Yaluma, representative of the community of Yaluma in the Scolel Te project.

For AMBIO these kinds of problems emerge because there are communication problems that lead to serious misunderstandings among local actors. However, AM-

BIO does not take in account that part of the problem of communication is because farmers have far too little contact with *Scolel Te*'s technical team. As we have seen before, AMBIOS's ability to change attitudes and perceptions among farmers depends critically upon the existence of vivid success stories about the project in the local area. It does not suffice to show that the project has been successful somewhere abstract for the farmers, they need evidence from neighbouring communities. If the project can not provide clear examples in the local area individual members are reluctant to change their practices because they have few opportunities to observe, compare, and clarify doubts about the advantages of the new techniques and the cost of adoption. In other words, the process of adoption of new ideas is benefitted by a constant interaction among actors.

Problems of communication between AMBIO and the local communities generate another problem. If AMBIO punishes a farmer for breaking the rules, the affected farmer and everybody around him/her should be able to understand clearly what rule was broken, how to repair the damage, and how the sanctions where decided. Otherwise members can feel that the rules of the game of the project are not fair and have high incentives to withdraw because they will perceive that an injustice has been committed. Such situations can affect the reputation of AMBIO dramatically, especially if news of them spreads through local networks. So, AMBIO needs to be careful with punishment. Too much, too early, and little contact with the farmers will damage AMBIO's reputation and the long-term possibilities of the project. However, AMBIO does need to sanction shirkers otherwise nobody will take seriously the technical rules and the tree plantation will not achieve the expected returns.

This last point introduces a new problem. Farmers are always testing AMBIO's wiliness / ability to sanction them when the rules are broken. They do this for two different reasons. One is that the farmers do not know the true value that AMBIO assigns to them, and so they do not know whether AMBIO pays them what they are truly worth. In this context, in order to learn their own value in the network, they keep cheating just for the sake of observing how AMBIO will behave under pressure and how willing AMBIO is to break the rules. If they manage to get away with shirking, that means that AMBIO was underpaying them and that their value in the relationship is so high that AMBIO is willing to accept misbehaviour. Second,

historically the Mexican government has run social projects where farmers get some economic resources and are supposed to give something in return. However, in most cases the Mexican government does not monitor whether farmers do what they promise to do. This means that farmers expect to receive money in exchange for no effort. AMBIO has to fight this culture. All of this creates conflict between farmers and AMBIO.

As we have seen, the success of the *Scolel Te* project under the individual system critically depends on the ability of its individual members to pool together their capacities and co-operate. Forming exchange networks at the local level is important not only to reduce individuals' risks associated with the establishment of the project but also to help in the distribution of resources among actors. Low frequency of interactions among individual actors seems to be the main factor preventing the generation of commitment in the individual system. Indeed, a lack of contact increases individuals' implementation costs as well as slows down the emergence of relational mechanisms — i.e. feelings of attachment and obligation among actors — that foster co-operation and commitment. Moreover, lack of contact leaves actors isolated and with few possibilities of sharing and coordinating their activities within the project. As a result, participants become vulnerable to the contingencies of the project. Next chapter will analyse the revaluation process in the *Scolel Te* project.

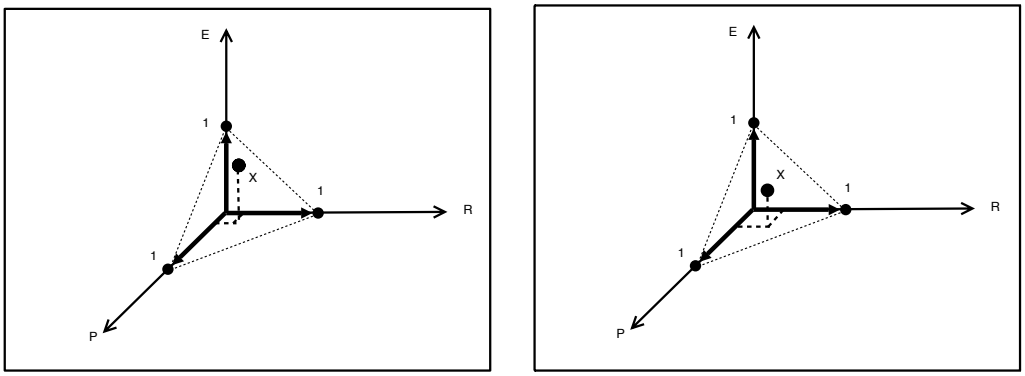
Chapter 10

Phase III: The revaluation process in the Scolel Te project

10.1 Introduction

In this stage and after many years of exchange between AMBIO and the local communities/farmers, it is expected that local participants have changed their attitude over nature and that they will remain in the project in the long term even in the absent of economic rewards. Clearly if AMBIO fails to influence actors' attitudes over nature, the lack of economic rewards will cause withdrawal. It is important to notice that chages of perceptions among local communities necessarily involves a change in the value of the project *(VP)*. This dynamic in the value of the project is accurately perceived during phase III. Indeed, the moment the payments end the project starts a new phase where communities are obligated to re-evaluate their initial values about the project. Clearly, this process of re-evaluation can have many outcomes depending on how much values have changed over time.

The change of the value of the project may be described as happening between two times. At time one, at the beginning of the project, each community assigns a specific value (VP_1) to the tree plantations which depends upon: 1) the environment benefits (E); 2) the wood resources directly associated to the trees (R); and 3) the payments (P). In this typology, the communities are to some extent a mixture of an environmentalist, a resource seeker, and a rent seeker. The specific weight that each community give to each aspect of the project determine their position in the space



(a) Time 1 (b) Time 2

Figure 10.1: Typological space over time where E = Environment; P= Payments; R= Wood resources; and X=Community location in the typological space.

of values (see equation 10.2)

$$\mathrm{VP}_1 = \mathrm{CP}_1(\mathrm{E}, \mathrm{R}, \mathrm{P}) \tag{10.1}$$

where CP_1 represents community perception at time 1. As we saw in the last section, the environmentalist communities (denoted by e) assign the highest value to the environmental aspect of the project E, and the second highest value to R (for them the payments were perceived as a kind of recognition or reward for their efforts in the protection of the biodiversity). Instead, the resource seekers communities (denoted by r) assign the highest value to R, the highest value to P, and the less valuable aspect of the project to E. Finally, the rent seekers (denoted by p) assign the highest value to P.

Following these ideas, at time two, in the third stage, communities change their perception about the project because of the process of exchange (VP_2). This change of perception imply necessarily that the priorities of communities have changed and so the expected benefits. Figure 10.1 shows how communities move through the typological space over time. This, in turn, changes the value of the project over time.

$$\mathrm{VP}_2 = \mathrm{CP}_2(\mathrm{E}, \mathrm{R}, \mathrm{P}) \tag{10.2}$$

I found that most of the environmental communities e, in this stage, change their mixture of values about the project by giving less priority to the environmental

aspect of the project while they increase the value of economic resources (see Figure 10.1). In contrast, we find that the resource seekers communities r move towards the centre of the typological space. That is, even when resource seeker still holds a high value for the wood resources derived from the tree plantations, most of them give more weight than before to the environmental aspect of the project. In the case of the rent seekers p it is difficult to say what happens in stage III because none of these communities have reached stage III.

As described before, in stage III the communities re-asses and re-adjust the exchange relationship with AMBIO. This re-assestment is done in terms of three factors: (1) efficiency, (2) equity, and (3) adaptability. In the next subsections, we discuss in detail how the re-assesment is done.

10.2 Re-evaluation factors

In phase III the exchange relationship is re-evaluated in terms of the net benefits that each community/farmer gets. If the benefits overcome the cost of implementing the tree plantation they remain in the project, otherwise they leave. In others words, once the payments are gone the value of the project depends exclusively on the perception that each community has about the tree plantations. This value is a function of the benefits the communities expect for continuing in the *Scolel Te* project, which are themselves function of the intrinsic properties of the trees (ecologic benefits and wood resources) and their needs. If communities believe that the benefits are larger than the associated costs their participation in the programme is said to be 'economically efficient' or rational. From the point of view of AMBIO, however, community participation at this stage represent a reward only if local communities have been able to align their initial values with the aims of the project. The more environmentalist communities become, the higher the reward for AMBIO. Also, it is expected that communities will evaluate the fairness of the exchange relationship (equity) in the project. This evaluation involves the generation of a "narrative" that allows them to make sense of and justify their decisions with respect to *Scolel Te*. In others words, actors explain why they take the decision to keep in or quit from the project. Finally, the communities/farmers will assess the possibilities

of adjusting their expectations to their own context (adaptability). Clearly, the re-assessment process involve the re-adjustment of the initial values that communities assign to the *Scolel Te* project and the capacity of local communities/farmers to generate commitment to the tree plantations.

10.3 Efficiency and equity among environmental communities

In terms of efficiency, this thesis finds that environmental communities which are in the phase III did not manage to integrate *Scolel Te*'s tree plantations into their usual conservation efforts. It seems that the cost of moving the trees from the communal areas to the parcel is too high that only a few environmental communities are able to afford it. As a consequence, once they become conscious of the limitations on expanding the conservation area into the parcel, they experience a change in attitude and reduce the value they assign to the environmental benefits E, increasing the relative weight they give to the payments P. This change in attitude about the project is clearly perceived in the discourse of the environmentalist communities at this stage. Indeed, by this time they have come to the conclusion that the *Scolel Te* project does not offer them a fair exchange relationship because it do not recognise their current and historical effort of conservation of forest / jungle areas in the region. In this context, environmental communities cast doubts about the real environmental value of the project by questioning the carbon sequestration market idea. For instance, the representative of the community of San Isidro said that communal conservation areas in the community, the untouched virgin jungle that they own, have a much higher value and impact in terms of carbon sequestration. He adds that the jungle has more capacity to absorb carbon and generate a real impact in the global warning than the tree plantations.

> "...We (the community) changed our mind, we are not going to plant trees anymore. We have conservation areas, we have forested mountains, we do not have space in the parcel... where are we going to plant trees? What does AMBIO want? That we cut the trees in the mountain to make space for *Scolel Te*'s trees? We can not do that. It is better if AMBIO

could create a project for conservation to safeguard the woodlands..." Fernando Martinez Lopez is a member of the community of Frontera Corozal, representative of the community of Frontera Corozal in the Scolel Te project.

Moreover, for the environmentalist people, the impossibility of AMBIO and other national or international authorities to include the conservation areas within their environmental policies both makes the preservation of natural areas difficult, and makes them more vulnerable. Indeed, for the environmentalist communities the problem of the carbon sequestration projects in the region is not only that the conservation areas are not included, but also that the carbon sequestration projects can distort the real value of the environment among community members. For instance, the community of Nueva Argentina considers that the carbon sequestration projects in Chiapas are generating incentives for community members to deplete their natural reserves. For Nueva Argentina, the lack of economic resources for conservation has created a constant battle between traditional sectors who see the natural areas as a heritage that is important to preserve and those members who consider that the communal areas have to be more profitable. In the latter case the *Scolel Te* project, like other carbon sequestration projects in the regions, is perceived as a way of accessing economic resources even in detriment to the rainforest.

"...In this community we have two thousand hectares of conservation. However, we (the community) can not get any benefit from AMBIO or any other institution, they do not recognise our work and effort to keep the environment...We are afraid that one day the community members will vote against the natural reserve and burn the jungle to plant new trees ..." Manuel Gomez Juarez is a member of the community of Nueva Argentina, representative of the community of Nueva Argentina in the Scolel Te project.

In this context of conflict, the environmentalist communities still keep their decision in favour of their conservation efforts. As a result, environmentalist communities have high incentives to withdraw from the project at the moment the payments end. In terms of social exchange, the environmentalist communities become more like a

rent seekers giving less environmental value of the project (i.e. they go from an attitude $CP_1(.)$ that gives more weight to E and less weight to P, to an attitude $CP_2(.)$ that gives more weight to P than to E) . Indeed, according to the data, we find that two of the four environmental communities which are in the third phase no longer work in the project, even though they are officially still part of it. It seems that many communities have problems retaining their members in the absence of economic resources. For instance, the communities of Nueva Argentina and Plan de Rio Azul recognise that they no longer monitor the project in their communities.

> "... we definitely leave the project since now ... not long ago the regional technician came to the community. I talk to him, he said that we need to keep the trees until the last payment (the collateral payment of 10 percent..." The regional technician reminded us that we have a commitment to keep the trees alive until the year 20, but I told him that the members no longer have the trees, that the people have already cleared the land to plant others things , that they already threw away all the trees..." Manuel Gomez Juarez is a member of the community of Nueva Argentina, representative of the community of Nueva Argentina in the Scolel Te project.

The only environmental community that has expressed their commitment to the project at the end of the economic payments has been the community of Naha. In terms of efficiency, it seems that the interdependencies between the eco-tourist activity of the community and the tree plantations has strengthened the project. First, because the community can not offer an environmental service without maintaining the scenic beauty of the community. Second, because the trees are not competing with their main economic activity as in the others environmentalist communities.

10.4 Efficiency and equity among resource seekers

Phase III, resource seekers communities have moved to a more central position in their perceptions about the value of project. Specifically, the majority of resource seekers put more weight to E and less weight to R in Phase III than at the beginning

of the project. However, R is still the most valued aspect of the project. Because E has increased its relevance, the total value of the *Scolel Te* project increases rather than decreases. And even though they are more aware of the environmental value of the trees, the absence of economic incentives (payments P) puts pressure on resource seekers to cut the trees in order to meet their energy needs.

In this context, resources seekers have questioned the equity of the *Scolel Te* project in terms of its aims. According to them, the project tends to put more weight to the international aims rather than the local ones. For local farmers, the principal problem of carbon sequestration projects is that they are designed to meet the standards of the carbon sequestration market and do not take into account local conditions and needs. Indeed, the international market dictates that tree plantations must be kept running for a long period of time so that carbon is captured in sufficient amounts to generate truly international environmental benefits. However, from the point of view of resource seeker communities, this logic is difficult to reconcile with their most pressing need: their local demand for timber and wood for ernegy.

This problem is understood better if we consider the role of the trees in the *Scolel Te* project and the time required to accomplish the aims of the project. According to AMBIO, at the end of the project, the trees should be seen as an asset with a high environmental value. A mature tree can help to improve the welfare of local communities not only for its environmental benefits but also for its own value. AMBIO's idea is that high priced trees not only provide high volumes of carbon sequestration but also can generate more incentive among actors to participate in the project. High value trees can work better because farmers can exploit the wood without affecting the environment, especially if farmers learn to manage the tree plantations in a sustainable way. For that reason, AMBIO tends to foster the plantation of trees that give good quality timber and are well priced in the market, such as mahogany and cedars. However, fine wood trees take longer to grow than cheap wood trees such as pine.

Time to maturity plays a key role in the *Scolel Te* project. On one side, the time that is required to produce a fine tree help to ensure the supply of carbon sequestration for at least 20 years. This period of time is enough to guarantee the fulfilment of carbon contracts to the buyers. On the other side, local communities

who engage in the project cannot make use of the trees until they are mature enough. That is, if local communities want to see the benefits from the trees they need to wait. For AMBIO, this maturity period helps to maintain the discipline among actors because farmers have more incentives to wait until the trees are grown.

The production of high value tree plantations seems to be an alternative for actors who see the project as a business or own large areas of land for tree plantations. For them the time dedicated to produce good quality wood is perceived as a cost of production that eventually will be paid off once the the timber is sold. However, for a resource seeker who has only his/her own parcel to survive, the production of such quality timber is seen as an unnecessary luxury that is difficult to afford. The need for timber and energy is pressing and, while waiting to cut the tree, the farmer must pay for the wood he/she consumes at market prices. Waiting is, therefore, expensive. So, the moment the payments end, the temptation to cut the trees is an everyday issue.

Because the project does not include species of trees that may allow them to grow affordable wood in less time, resource seekers consider their exchange relationship with AMBIO as unfair. Indeed, the terms of the project are dictated by the international carbon sequestration market and do not allow them to plant the species of trees that suit their own needs. From their point of view there are species such as Momo Cacao, the Mata Raton, and the Guanaca that require less investment, grow fast, and can potentially produce the same benefits for the environment in terms of carbon sequestration. For them, producing wood that is relatively low priced in national or international markets is not that important. They need the wood for timber and fuel, and they need it soon.

AMBIO has refused to include this species of trees as part of the project, even though resource seekers consider that cheap trees could be a better alternative to fulfil their self-demand for wood. In terms of social exchange, AMBIO can not modify the cycle of time of the *Scolel Te* project because it has a direct impact on the distribution of benefits among actors. Indeed, if the time of the project is reduced AMBIO may find it difficult to guarantee a supply of carbon sequestration in quantities large enough to justify that the project generates real environmental benefits at a global scale. This would reduce the value of the project in the carbon

market and therefore its economic potential.

Even when the environmental arguments put forward by resource seekers are debatable, the inability to bargain over the terms of a *Scolel Te* project has undesired effects for AMBIO. Clearly, local actors may reduce their interaction with AMBIO if they can not succeed in adapting the logic of a *Plan Vivo* and change the plantations for trees that grow faster and produce lower quality wood. This, in turn, is likely to induce the communities to terminate their relationship with AMBIO.

> "I want to plant more trees but I am not sure if I want to do it with AMBIO... last year I planted Momo Cacao trees under a live fence system in my parcel. They are growing very fast and I can show them as proof this species can work within the *plan vivo* system... I expect to see the benefits soon. Then I will have no need to buy timber in the market..." Fernando Aguilar Torrez is a member of the community of San Felipe Jatate, representative of the community of San Felipe Jatate in the Scolel Te project.

Resource seekers argue that these problems would be solved if AMBIO covered the costs they pay for buying wood to satisfy their needs for timber and energy while the trees grow. They believe that a carbon sequestration project generates enough economic resources to pay for this but that the money gets diverted to other participants, including AMBIO and *Plan Vivo fundation*. Moreover, resource seekers argue that farmers are at the bottom of the chain in the flow of benefits even though they do the hardest part.

> "...we (the community members) do not get nothing, nothing, we are losing our time...yes, we received the payments in dollars but we think that the benefits for planting the trees are higher and the money goes elsewhere. This is why people in the community are angry. Our effort is paying other persons' salaries and high living standards. For instance, an agronomist engineer working in the project was paid thirty thousand pesos per month (around £1500). This is a lot of money. In exchange, we only receive 8 dollar for ton of captured carbon a year..." Fernando

> Martiz Lopez is a member of the community of Frontera Corozal, representative of the community of Frontera Corozal in the Scolel Te project.

It is important to notice that the perception of inequity in the project among resource seekers do not necessarily affect the viability of a tree plantation. For local actors the value of trees is so high that even if they withdraw they have incentives to keep the trees.

> "...I can manage by myself the tree plantation even without money and without help from AMBIO..." Manuel Gomez Juarez is a member of the community of Nueva Argentina, representative of the community of Nueva Argentina in the Scolel Te project.

In contrast, for the communities/farmers who want the trees to do business or/and have large areas of land available for the project the relationship with AMBIO is very important. For this group of resource seekers, time is not a problem. On the contrary, they undestand that waiting for the trees to reach their commercial diameter or maturity is important because only then will they get a good profit. While the trees are growing they see themselves as being in the middle of the project.

According to AMBIO, farmers should see the first matured trees by the fifth year of the project. Because of this, and foreseeing potential exits, AMBIO works in conjunction with others institutions and NGOs to develop the skills of local communities in the management of forestal areas. The idea is that once a *plan vivo* achieves cetain development threshold, farmers will maintain the reforestation and restoration cycle of the forest to keep the value of their plantations even if they decide to go for an exploitation logic. While this threshold is reached, AMBIO offers training to ensure that farmers learn how to succesfully manage their plantations, including how to log the trees, treat the wood for different uses, and use equipment. Moreover, AMBIO teaches farmers how to deal with the legal and logistic parts of the exploitation to guarantee that communities/farmers can get benefits according to the legal requirements for commercial use.

10.5 The adaptability of local communities in the project

The ability of local communities to adjust their expectations to the aims of the *Scolel Te* project makes possible the emergence of commitment in the process of exchange. Interaction among actors during the process of exchange not only helps to determine the real cost and benefits for participating in the project but also to define the existing interdependencies between them. Clearly, the strength of such interdependencies determines the degree of commitment.

This thesis found that communities generated different forms of interdependencies depending on their specific social context and the availability of resources. In other words, there are different forms of commitment. Four types of mechanism that generate commitment between communities and the project were identified: 1) complementary dependency; 2) institutional structures; 3) relational dependencies; and 4) instrumental dependencies (see Table 10.1). Each type of dependency entails a different degree of commitment and has different properties. Obviously, this typology of dependencies only aims at an analytical account of the different mechanisms that encourage the emergence of commitment in the *Scolel Te* project and is by no means fixed or comprenhensive.

Complementarity dependencies emerge when actors depend on the resources and actions of their exchange partner to produce mutual benefits. That is, one actor can not produce a benefit without the co-operation of his/her exchange partner. Here the principal commitment mechanism that guarantees the exchange is the expectation of the benefit. As a consequence, commitment emerges as a rational decision. This kind of dependence is easy to develop when actors have mutual interests and few alternatives of exchange. Clearly, the lack of alternative partners that may bring similar benefits will help to generate stable and long term relationships among two exchange partners. Similarly, the problem with complementarity dependencies is that the relations may easily finish at the moment actors fulfil their interests. Examples of complementarity dependencies in the *Scolel Te* project are the communities for whom their main economic activity depends critically on the trees, such as producers of organic products, communities with eco-tourism, and some resource seekers.

Table 10.1: Dependencies in the *Scolel Te* project

Type Dependency	**Mechanism**	**Commitment**	**Cost**	**Example**
Complementary	Rational	Long-term	Low	Organic producers
Institutional	Normative	Long-term	Low	Tequio/communal system
Relational	social ties	short to long term	High	Individual system
Instrumental	Incentives	short term	High	Income seekers

Communities' institutional arrangements are a second mechanism capable of generating commitment. As we saw before in some communities the establishment of associations are regulated by their internal social norms. These institutional arrangements can generate long term commitment because actors are subject to the actions of the local authority, which becomes guarantor that the obligations undertaken by community members will be discharged. In others words, the exchange relationship is secured and sustained over time because pre-existing normative mechanisms that exert power and discipline among actors is involved. Obviously, a problem of this kind of dependencies is that weak institutional structures may prevent the enforcement of agreements and the discharge of obligations among actors and therefore weaken the formation of commitment in the long run. The principal examples of institutional dependencies in the *Scolel Te* project are the communities who participate under the *Tequio system.*

The third type of mechanism that foster commitment in the *Scolel Te* project are the network of social relations. Here, in the absence of a regulatory mechanism capable of safeguard the process of exchange, the structure of social relationships emerge as the mechanism that fosters co-ordination and co-operation among actors. In this context, an actor's commitment depend on the quality of the relationship with his/her exchange partner. The stronger the relationship, the safer it is and the higher the likelihood that mutual feelings of attachment and obligation will emerge over time. The main problem with this kind of dependence is that it requires a high initial investment to establish and sustain the relationship. Hence, a lack of contact among actors may weaken the relationship and reduce the incentives of actors to co-operate. Clearly, bad behaviour can damage the relationship. In the *Scolel Te* project, this dependencies are more likely to emerge among actors who enter to the project on an individual rather than a collective basis because under the individual system people need to co-ordinate in order to carry on key activities

of the project and have no access to institutional mechanisms that may guarantee trust and discharge of obligations.

Finally, instrumental commitment is when actors' commitment depends exclusively on the flow of economic incentives or payments. Once, payments stop, commitments disappear as well. In terms of the *Scolel Te* project, this form of commitment is the most common among local actors.

In general, relationships that are based on complementary dependencies tend to be the most stable because actors have a *true* interest in the success of the project. Sadly not all the communities who participate in the project have the same interests and it is important to identify when a communities can really adopt the project given their context and capabilities.

Chapter 11

Power in the *Scolel Te* network

11.1 Introduction

Previous chapters analysed the *Scolel Te* project from a dyadic perspective. We saw how the institutional design, the policy instruments, and the characteristics of participants affect the implementation of the carbon sequestration project and have contributed to the rejection of the project from the CDMs scheme. The present chapter, in contrast, analyses how structural factors affect the distribution of power in the network and lead to the failure of the project to participate in the CDMs. Specifically, I will look at how individual interest and strategic alliances in the carbon market may derail the aims of the environmental project. To understand the problem it is necessary to explain how the carbon market works and what the role of carbon sequestration projects is from the point of view of the international environmental policy.

Carbon sequestration projects are one of the main mechanisms created by global environmental institutions, such as the OECD and the UN, to solve the problem of climate change. The main idea is to build a system that adopts the "Polluter Pays Principle (PPP)". This economic approach considers that market prices do not reflect the true social cost of producing a commodity because it does not take into account the pollution costs that its production generates to society as a whole. This, in turn, gives private firms an incentive to produce more pollutants that is socially optimum. The "PPP" avoids that market failure by compelling firms to pay, and internalise, the full social cost of their actions Baldwin (1978). The idea

of internalising pollution costs has lead to the establishment of many international agreements that oblige or incentivise governments, industries, and the society as a whole, to comply with the PPP. The principal mechanism has been the creation of an environmental market where polluters are compelled to buy pollution rights if they surpass their given allowance. The implementation of PPP has fostered the emergence of an environmental service sector dedicated to the establishment of tree plantation projects that supply carbon sequestration certificates.

A major problem in the economic implementation of the PPP is the lack of a single market that can standardise the rules around the carbon sequestration projects and guarantee a real environmental impact. Indeed, there are three types of market: (i) the compliance market; (ii) the semi-regulated market; and (iii) the unregulated market.

As we have seen, the compliance carbon market was established through the Kyoto protocol and generated legally binding obligations among actors. Here, carbon projects that wish to be validated must comply with a baseline and a monitoring methodology that has been approved and registered by the CDM executive board. The baseline methodology specifies parameters for performing monitoring and quality assurance, and the equipment that shall be used to calculate measurements of emission reductions. Then each carbon project has to be validated by a third party agency, called the Designated Operational Entity (DOE), to ensure that the project attains a real impact, that the impact is measurable, and that it delivers long-term emission reductions.

The semi-regulated carbon market is an option for polluters who wish to reduce their carbon foot print voluntarily or need to fulfil in part their obligation under the Kyoto Protocol. Under the semi-regulated market, the environmental value of the carbon certificates vary and their quality depends on the regulation that each tree plantation project achieves. In this context, carbon sequestration organizations dedicated to the carbon sequestration have to comply with a set of international standards and be certificated by international auditors in order to guarantee that carbon projects are real and that the reductions of carbon in the atmosphere will occur in the time and amount described in the certificate. Moreover, under the semi-regulated market, the certificate and standards system signals the quality of

the service. Clearly, the fulfilment of international standards increases the value of the carbon sequestration projects because in some sense the environmental benefits are guaranteed. It is important to notice that the certificates issued under the semi-regulated market are not fully recognised in the compliance market because their regulation is softer than the rules established by the Kyoto protocol. Indeed, even when such certificates can be sold in the compliance market their price and value are lower than the formal certificates. This is because buyers consider such certificates to be riskier as it are more difficult to sell in the secondary market. In this context, the firms who are obligated to reduce their emissions usually acquire these kind of certificates when they have problems complying with their obligations under the Kyoto protocol and there are no alternatives available. Then, voluntary certificates are bought as a complement to environmental obligations and the buyer assumes a higher cost and risk.

Finally, there is a market that works without any kind of regulation. This market has emerged to fulfil the local demand of carbon sequestration among firms / organisations that want to voluntarily reduce their emission without assuming any formal commitment. Evidently, the issue of such certificates has no value in the regulated market or semi-regulated market because they do not comply with any standard. There is only a promise that such certificates finance the work of environmental organizations dedicated to the carbon sequestration.

Each market offers different benefits and costs for actors who participate in them. Clearly, the voluntary markets (semi and unregulated) are more flexible than the formal one. This is because these options allow actors to consider their degree of responsibility for the environment and the cost that each actors is willing and able to pay. However, in terms of the environment, the benefits depend on market conditions. Indeed, the diversity of exchange conditions in the carbon market has raised concerns from environmentalist groups and authorities about the negative impacts of the lack of transparency and governance behind the carbon projects, specially in the voluntary market. One of the principal criticisms is that the lack of accountability encourages people to work for the benefit of their clients/buyers rather than for the benefit of the climate (Bumpus, 2008). The less regulated the carbon market is, the smaller the possibility of knowing what the real environmental impact

of such projects are(Sterk and Bunse, 2004; Taiyab, 2006). In contrast, some specialists consider that the problem is that the costs of compliance generates high incentives to move to the unregulated market. Following this idea, Wara and David (2008) consider that the principal problem of international environmental governance has been maintaining an equilibrium between the cost of compliance and the environmental benefits. For Wara and David (2008) the international environmental mechanisms have failed to encourage developing countries to perform serious efforts to limit their emissions, especially because of the lack of low cost alternatives to the regulated carbon market.

This thesis considers that the lack of accountability and the high cost of compliance in the carbon sequestration market can lead firms, governments, and society as a whole, to the illusion that everybody is working to improve the environment. However, in real terms, there are no such benefits. This gives raise to what I call 'the carbon market delusion', the extreme example of which is where local people pretend to plant trees, NGOs pretend to ensure the production of carbon sequestration, and organisations and buyers pretend to reduce their environmental impact. As a result, with exception of the environment, everybody profits from the carbon market.

In this context, it is important to analyse the carbon sequestration projects from two perspectives. On one side, it is important to study how market rules and concurrency in the carbon sequestration market influence the actions of actors and lead them to invest in the cheapest and less environmentally beneficial carbon projects. On the other side, it is important to analyse how the interest of actors can influence the environmental aims of the *Scolel Te* carbon project in an exchange network. Clearly, inequalities of power among actors in terms of the control over valuable resources, the position to access to those resources, and the influence that one actor can exert on others can affect the strategies and aims of other actors. And this, in turn, changes the environmental outcomes in the carbon sequestration project. In other words, this thesis tries to determine how endogenous and exogenous factors affect the principal environmental aims of the *Scolel Te* project in a network of exchange.

11.2 Building environmental networks

The literature on environmental governance has highlighted the key role of environmental networks as a mechanism to create coordination opportunities from the local, through the national, to the international level. For Lipschutz (1999), social networks can create great possibilities of communication and participation among actors in environmental governance. However, one of the main concerns in building environmental networks is fostering a fair exchange, especially when there are significant power inequalities among actors. For Yamagishi et al. (1988), the interwoven relationships among actors in a exchange network necessarily involve power relationships. This is because actors are linked to one another and the events that occur in a given location in the network can have predictable effects in others parts of the network.

In the *Scolel Te* project the actions of two actors are institutionally designed to generate positive impacts beyond the dyadic relationships. Indeed, the *Scole Te* project is designed to generate a series of interdependencies that make possible generating a single and socially produced outcome: the issue of a carbon sequestration certificate. The certificate, in turn, generates direct benefits for all the participants and society as a whole.

In regulatory terms, interdependencies in the *Scolel Te* project emerge by two mechanism. First, the *Scolel Te* framework establishes formal regulation and legally binding contracts that determine the rules of the game for each actor under the scheme. The rules establish a clear product specification, sets the carbon sequestration methods and measures, the price, form, and time of issue of carbon certificates. Members are given specific obligations and rights as buyers or sellers and any violation of the code is sanctioned according to the specific contractual law. Second, the *Scolel Te* project is embedded in an informal social system of exchange that generates a flexible form of coordination. Specifically, if we consider the *Scolel Te* project as a productive exchange system, we can say that actors are embedded in a system that lacks of a central authority which can coordinate and control the behaviour of actors in the network. In this context, actors are interwoven in a diffuse 'regulatory' structure that works more in terms of social ties, trust, and norms of

reciprocity among actors than in terms of contractual law. The present thesis is primarily concerned with the second mechanism. That is, the exchange network.

In a social exchange network actors depend on the reliability and resources of others to pursue and achieve their own goals. Such interdependencies are the principal mechanism for the emergence of coordination and cooperation (Gulati and Gargiulo, 1999). However, cooperation and coordination does not always lead to outcomes where everybody gains an equal share, especially in a decentralised system which includes a large numbers of actors. Many actors taking decisions, each one with their own views and interests, means more scope for the emergence of inequalities of power among actors. For Marsden (1983) such disparities in power impose limits and conditions on social exchange. Emerson (1972b) goes further and says that power is an intrinsic characteristic of an exchange relationship. For him, dependence is the level of cost that one actor is willing to accept in an exchange relationship. Power, on the other hand, is the level of cost that an actor is capable of inflicting on his/her exchange partners. In this context, power is the capacity of actors to increase his/her rewards or decreasing his/her cost by increasing the cost paid by his/her exchange partner. As a result, the use of power is a function of the relative dependence of actors in the exchange network, a situation that does not always result in fair exchange.

For instance, we can think that the desired outcome in the *Scolel Te* project is the protection of the environment and the main drive of actors should be in line with the achievement of this aim. However, what happens when the interest of some actors differ from the goals of the project? What happens if the farmer communities prefer to invest and participate in the unregulated carbon market because it is cheaper and offers more gains? Finally, what happens if the control of essential resources such as financial capital are in the hands of actors who have little commitment to the environmental goal of project? Evidently, the capacity to exert power among actors in the network can modify not only the the benefits of actors but also derail the aims of an environmental network.

11.3 Measuring power

This thesis will determine the power relationships in the *Scoelel Te* network by taking in account two power theories: Social Exchange Theory (SET) and Social Network Analysis (SNA). Even when both theories differ in their methodologies, this thesis will try to critically bring together both frameworks to describe the power relationships in the *Scolel Te* network. Also it is important to clarify that the use of SNA is methodological rather than theoretical. First, SNA intends to complement the concept of centrality according to SET. Here, SNA not only provide a centrality measure in the analysis of the *Scolel Te* network but also provide a graphic idea of the network to facilitate the reading of this thesis.

11.3.1 Power according to SNA

Social network analysis supposes that power relationships depend on the type of network structure in which actors are embedded. Here an actor's position defines not only the set of available opportunities that he/she has available (such as the access to information, flow of resources, and influence) but also,her/his power (Bala and Gogal, 2000). Indeed, according to SNA an actor's position can affect the access and distribution of resources among other actors. That is, according to SNA, a source of power in the network. From this point of view, an actor that is centrally located is more successful than peripheral actors because she/he has access to more contacts. In contrast, peripheral actors can be powerless due to the independent position and the difficulty of access to the resources of the network. In contrast, Social Exchange Theory tries to analyse the a dynamism of power relationships among actors. Rather than assuming structure as a given fact, SET intends to explain how dyadic power relationship emerge and why they change. In this context, SET considers that structural features of a network, such as centrality, do not necessarily determine power among actors in an exchange relationship. For SET it is necessary to look at the relative dependencies of actors in a network to really understand the distribution of power (Cook et al., 1983).

Next, I will study the power relationships in the *Scoelel Te* network using the tools of SNA and the working hypothesis that the position of an actor in the network

determines her/his power. I will try to identify the centrality of actors through three different measures (see section 4.3):

(i) Degree, which is a measure of how well connected an actor is in the network. Degree score determines the degree of variation in the number of connections among actors — this measure ranges from 0 to 1, where 0 means that an actor is a singleton (no connection at all) and 1 than an actor is connected to everyone in the network.

(ii) Closeness, which is a measure of distance among actors. That is, it measures how many *steps* an actor is from others' in the neteork. Again, the closeness score goes from 0 to 1 with a high score representing a short distance to others.

(iii) Betweenness, which is a measure of how important an actor is in the transmission of resources in the network. That is, how many times an actor is in the middle of a path between two others. As usual, the betweenness score goes from 0 to 1 with a high score representing that the individual plays an important role in the transmission of information or other resources.

It is important to notice that SNA is not a theory that facilitates a dynamic analysis of power because, as we said before, power emerges from the structure and the structure is taken as given. One possibility, however, is *comparative statics*, which allow comparison of power distribution in the network at various points of time. I do not have enough data to analyse the formation phase. As a consequence, we have no option but to limit the analysis according to SNA to the expansion and consolidation phases.

11.3.2 Power according to SET

According to Cook and Emerson (1978), power is a structural phenomena that goes beyond the dyad. This is because if the exchange is limited to two actors without possibilities of alternative exchange the parties will tend to reach an equilibrium over time. That is, actors reach a balance in terms of power. For instance, in the *Scolel Te* project, the Yaluma community decided to form an alliance with AMBIO taking into account the benefits that such association could bring to them. In

terms of social exchange theory, the association of two actors can generate a dyadic relationship only if actors are able to interact with the same exchange partner over a period of time. Here, access to resources of the exchange partner is the main drive in the formation of the association between AMBIO and Yaluma. However, if we consider that such association is a bilateral monopoly (i.e. there are no alternatives available) we can say that if AMBIO increases the cost of exchange to Yaluma, then Yaluma can also increase the cost of exchange to AMBIO. Eventually, through a process of exchanging threats and offers, actors achieve a balance that keeps costs to either partner at its current levels.

However, the moment that a given dyadic relationship is linked with other actors in a productive network (such as the *Scolel Te*), the link among three and more actors not only allows the flow of resources beyond a single exchange partner but also creates the opportunity to exercise power. For Yamagishi et al. (1988), the connection of new partners necessarily affects the already existing dyadic relationships because it can modify the ongoing dependence relationships and therefore the distribution of power in the network. That is, the entry of a new exchange partner changes the nature of the existing relationships. In this context, it is important to analyse how connections among actors determine the distribution of power in the network and how such power structures can influence the collective goals in the *Scolel Te* project.

According to Emerson (1972b) the distribution of power among actors can be measured in the following dimensions: (a) the type of network connections that link the dyadic relationships in a single network structure; (b) the type of resources exchanged among actors (domain); (c) the number of exchange partners; and (d) the potential opportunities to initiate a new exchange. In particular, Emerson says that an exchange "network is a set of two or more connected exchange relationships to the degree that exchange in one relation is contingent upon exchange or non exchange in other relationship" (Emerson, 1972b, p.50). In other words, a connection exists only if the magnitude (frequency of interactions) of a transaction in one relation is a function of the transactions in other relations. Consider, for instance, the case of an environmental network exchange where three NGOs A, B, and C, exchange two different kinds of resources: information and financial capital. In this case if A;B

exchange information and B;C exchange financial capital, we can say that there is not a relation B-A-C. This is because both relations, A;B and B;C, provide a different resource to A. In other words, the exchange relation A;B and A;C are not in the same domain so the relation between B and C does not exist. In contrast, if B and C exchange only information to A, then B and C are connected because they share the same domain with A.

This initial idea implies that there are two different type of connections, positive and negative. Positive connection occurs if an exchange relationship is contingent upon exchange in other relationship, whereas negative connections occur if exchange in one relationship is contingent to a non exchange in the other relationship (see Chapter 3). Consider, for instance, the case of a firm A that buys certificates of carbon reduction from an environmental organisation B, where B is a local NGO that establishes a tree planting project to capture carbon in order to sell carbon reduction certificates to the industry. Suppose further that, due to a bidding contract, A should buy all its carbon reduction certificates from a single source. Now imagine another local NGO C that starts imitating B and also offers carbon reduction certificates to A. In this case, A can fulfil its needs of carbon reduction by acquiring carbon certificates from either A or B, but not from both. Then we can say that C is an alternative exchange actor to A. So if A buys the carbon certificates from C, C obtains a benefit that represents a loss to B. Hence we can say that the relation C;A is negative connected to the relation B;A because C introduces a negative or competitive factor to the exchange network. Figure 11.1 shows examples of positive and negative connections. Here for simplicity we use a continuous line to refer to positive connections and a dashed line to refer negative connections.

According to Stevenson and Greenberg (2000) the type of connections (positive and negative) determines the structural distribution of power in the network. This is because, an actor's position can affect the distribution of resources among third actors and generate power imbalances. As we mentioned before, Cook et al. (1983) challenges these ideas and says that the structure does not necessarily determine power, and that it is important to look at the the relative dependencies to really study the source and use of power in a network. Emerson (1972b) adds to this discussion pointing out that an actor's power is an inverse function of his/her dependence

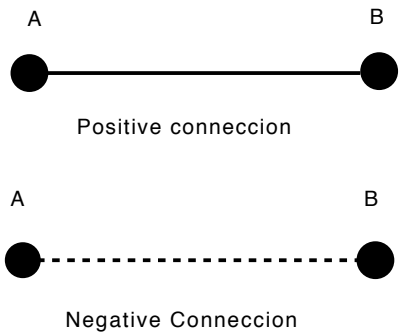


Figure 11.1: Positive vs negative links

with respect to others and that the degree of dependency should be measured in two main dimensions: (i) domain preference, and (ii) number of alternatives available in the same domain and cost of initiating the exchange with the alternative partners.

First, actors domain preference measures the local scarcity of a given resource in the network. Here, the value of an outcome is a decreasing function of the units received. This principle of "local satiation/deprivation" or ''diminishing marginal utility" implies that the value of a resource depends on its relative scarcity and the actor's needs. For instance, local participation in the *Scolel Te* project is more valuable for AMBIO than for a catholic organisation. 60% of indigenous people in the region are catholics, so a new church attendant does not carry too much value from the point of view of the Catholic Church. For AMBIO, in contrast, a single new participant is highly valuable given the its small constituency and the difficulties it faces in bringing people to the scheme.

Second, the number of alternatives available in the same domain measures the degree of dependency of an actor to his/her exchange partner. In terms of social exchange theory, the number of alternatives available for an actor is one of the principal elements of dependence. This is because actors with few alternatives of exchange are more dependent on the resources of his/her exchange partner. In contrast, actors with many alternatives of exchange can increase the value of their resources and generate a reduction in the value of the resources of his/her exchange partner when they share the same domain. Consider, for instance, the case of an industry A that buys carbon sequestration from B but can potentially buy from C. In such a case both B and C fulfil the needs of A for carbon sequestration. However, the investment that A does with B reduces the value of the investment

that A does with C and vice versa. In such a case, B and C share the same domain in their relation with A because they compete with each other to provide carbon sequestration to A.

How valuable each alternative is depends upon the cost that A must pay to initiate an exchange with either B or C. Even when there are alternatives, the possibility to cement a given relationship may fail because of the costs of connection. According to Marsden (1983) actors can limit/restrict the opportunities to initiate the exchange for may reasons. For instance, actors who act as brokers between two actors can increase the value of their resources by increasing the cost of connection to others actors in the network exchange. Another example refers when actors establish a mutual trust rule as a precondition for the exchange. Clearly, membership restriction emerge in a network exchange to safeguard or increase the gains during the process of exchange. However, it is important to say that when the cost of connection becomes too high then there is no real alternative available.

Taking into account these two measures, Yamagishi et al. (1988) determines the distribution of power in the network according to the relative dependence of actors:

(a) in a network of only negative connections, where resources do not flow beyond an immediate exchange partner, access to resources from alternative exchange relationships determines the distribution of power.

(b) in a network of only positive connections, the local scarcity of resources and the distance of each point from the resource source determine the distribution of power.

(c) in a mix network the distribution of power is a joint function of (a) and (b).

11.4 Determining the dynamism of the exchange

Thinking of the *Scolel Te* project as a productive network exchange, we can say that the principal aim of the network is contributing to the reduction of greenhouse gas emissions as a part of the international effort to control climate change. In this context, this thesis will consider the principal aim of the network as an environmental one. Also, I will consider that the *Scolel Te* project fulfils its environmental aims

if the collective actions of actors in the network lead the project to participate in the compliance market. The more regulated the tree plantation project is, the more it is committed to the environmental aims. In contrast, if the collective action of actors lead to the *Scolel Te* project to participate in the unregulated market, this thesis will argue that the project is not reaching its initial environmental aims. As a result, the environmental aims of the project are *derailed*.

This thesis considers the dyadic relationship of AMBIO and the local communities as the principal relationship of analysis for two main reasons. First, AMBIO is the principal decision maker in the network. The course of the project and the formation of strategic alliances depend on AMBIO's decisions. Clearly, the actions of AMBIO can be influenced by others actors in the network to the degree that can affect the aims of the project. However, we initially consider that AMBIO is the main representative of the aims of the project. Second, the local communities are the principal resource of the project and the principal strategic alliance of AMBIO. There is no AMBIO without the participation of local communities in the carbon project. This is because the communities represent the access to the labour force of the project and to the land to plant the trees. In this context, any decision of AMBIO that affects negatively the interest of the local communities can jeopardise the aims of the project and the viability of the productive network. As a result, this thesis will follows the dyadic relation AMBIO-Communities and its interaction with other actors in the network.

Following this idea, to capture the dynamic process of exchange in the *Scolel Te* project, this thesis will consider the dyadic relation AMBIO-Communities in three historical moments of the project: a) the formation of *Scolel Te* project; b) the expansion of the *Scolel Te* project; and c) the consolidation of the *Scolel Te* project. The dynamic process of the project will be analysed in the context of the carbon market. It is important to notice, that the analysis of the structural position of actors according to SNA will be considered only in the expansion and consolidation phases given the lack of information during the formation phase.

I will determine the distribution of power in the network exchange according to Emerson (1972b) approach. Three relevant domains are identified: (a) the exchange of financial capital; (b) the exchange of human capital; and (c) the exchange of

carbon certificates. The idea is to determine the local scarcity of resources in the network according to each phase of the project and identify where an imbalance of power exist. Next, I will analyse the number of alternatives of the dyadic relationships AMBIO-Communities in each domain to determine to determine the relative dependence of actors in the project. Finally, I will describe strategic alliances among actors that represent changes of power in the network (balancing operations). That is, I will look at the possibilities that actors have to initiate new relationships with others partners to modify their current dependencies.

11.5 Analysis of power in the *Scolel Te* project

The *Scolel Te* project has gone through three different phases: (1) formation, (2) expansion, and (3) consolidation. Similarly, three different domains of exchange have been identified: (a) the exchange of financial capital; (b) the exchange of human capital; and (c) the exchange of carbon certificates. This section presents the analysis of the power relationships that are embedded in the *Scolel Te* project using SNA and SET as analytical tools. The overall idea is to give a detailed account of the power relationships in the process of exchange and determine if the the use of power can influence the environmental aims of the *Scolel Te* project.

11.5.1 The formation phase

The pilot project of the *Scolel Te* started in 1998 with the association of four main relationships: a) PAJAL, a coffee producer organization located in Chiapas; b) ECOSUR, a local think thank located in San Cristobal de las Casas, Chiapas; c) the Scolel Te fund managed by PAJAL; and d) Edinburgh Center for Carbon Management (ECCM) located in the UK. Clearly, each actor in this case is composed by a set of individuals itself given that all are organizations.

In the initial organization, the resources of each actor determined the type of links in the network. The need to bring together different resources to establish a tree plantation project allowed the existence of positive connection among actors in the pilot phase. In this context, PAJAL, who started with the initiative of carbon sequestration, provided the labour force, the land, and its organizational capacity

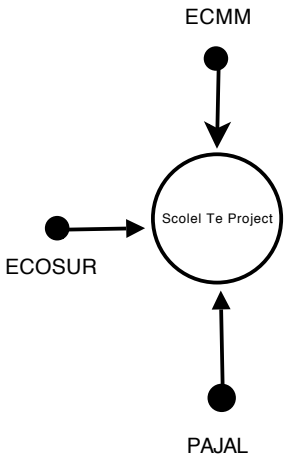


Figure 11.2: Productive network

as a coffee producer to set up the *Scolel Te* project. At that moment of the project, the resources of PAJAL were the essential factor for the formation of the network.

The initial PAJAL alliance with ECOSUR and ECCM provided knowledge (human capital) and financial capital to the *Scolel Te* project. Even though ECCM and ECOSUR brought all financial resources to the project, which could strengthen their position in the network, the initial resources of PAJAL were strong enough to establish an equal position in the network and create a power balance among all organizations. In terms of social exchange, the positive links and the mutual dependence among actors in terms of resources allowed actors to be equally empowered (See Figure 11.2). Within this initial structure, all organizations had a direct role in the project, each actor collaborated equally on every issue and all of them benefited from the collective actions and resources. As a consequence, each organization, especially local communities, were able to channel theirs needs and to take decisions in the project. For instance, in the initial organization, PAJAL had the power to take decisions in the allocation of financial resources due to the fact that they managed the Fund of the project.

Given that the *Scoel Te* project was the first carbon project in the region and in Mexico, there were no alternatives available for the participant actors. For that reason, the relative scarcity of resources in the network and the distance of each actor from the resource source determined the distribution of power. That is, the initial configuration of the network was a decentralised power-dependency structure

(see Figure 11.2). Indeed, the establishment of the project needed a diversity of resources and the heterogeneity among actors had a high value. For that reason, the structural position of actors in the network was not as important as the need for bringing different kinds of resources to the project. As a consequence, the possibility of creating partnerships and synergies among actors was the main concern. For instance, the relationship between ECOSUR and PAJAL allowed the integration of the organisational capital of *Scolel Te*. Clearly, at the moment that the assembly of PAJAL passed the motion to participate in the *Scolel Te* project, all its members were obligated to align with the project's objectives. As a result, the pilot phase of the *Scolel Te* project had no problems enrolling participants because the alliance with PAJAL brought in eight communities. Also, the local knowledge of ECOSUR and its connection with ECCM allowed the connection of the project with the international carbon market. This partnership could attract economic resources by allowing the sale of carbon certificates in the international market. As a result, the *Scolel Te* network successfully connected the local communities with the international organization to start its activities. Initially, the carbon project worked in the voluntary market. But the idea was to consolidate the project to participate in the formal market as part of the international environmental agenda of the Kyoto Protocol.

The initial success of PAJAL as part of the carbon project and its strong position in the *Scolel Te* network due its control of essential resources (land, farmers, labour) in the formation of the project gave PAJAL a role in many aspects of the project. PAJAL had control of the local fund, the distribution of credit and technology, and the management of production and marketing. In this scenario, PAJAL could control what the *Scolel Te* network did and who participated in it. This strategic position allowed PAJAL to establish a project where the major priority was the strengthening of its coffee production organisation. The success of the project also generated the initiative to extend the *Scolel Te* project to others parts of Chiapas. Here, PAJAL was in charge of the entry process and PAJAL had a strong position with respect to new participants. This started generating negative connections in the network between the local communities and the rest of actors (See Figure 11.3).

In others words, the central position of PAJAL in the network and the lack of

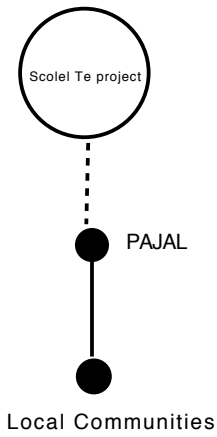


Figure 11.3: Brokerage

links between newcomers (local communities) and other members increased PAJAL's power in the network. Indeed, other actors in the network had little chance of accessing the project's resources from exchange relationships other than through their relationship with PAJAL. This fact weakened the position of non-PAJAL farmers because the information and resources brought in by ECOSUR and ECCM could not reach newcomers unless PAJAL agreed to it. The restrictions also applied the other way around. ECOSUR and ECCM faced problems to initiate relationships with new local communities because PAJAL restricted access.

At this stage PAJAL had a strong reputation not only among its constituency but also among other local communities in the region. And that made it difficult to replace PAJAL's role in the project. Indeed, PAJAL was born as a local initiative to brake the abusive intermediation between coffee producers and wholesale buyers through the establishing of a bartering system in the region among local farmers. PAJAL provided coffee to others communities in exchange for other products of the region such as maize, courgettes, and beans. Hence, the major role of PAJAL was to act as a mediator between local producers and external brokers (*coyotes*) to safeguard the price of local production by giving a higher price for the products if the offer of external brokers was too low or unfair. Obviously, this close relationship between PAJAL and the local communities was difficult to replace.

PAJAL's ability to enroll new members to the *Scolel Te* project had more to do with its good reputation among local communities than communities' conviction with the environmental benefits of the carbon project per se. Local communities felt

obliged to collaborate with PAJAL in return for its role in the bartering system. This loyalty to PAJAL led local communities to engage in a series of projects suggested by the coffee organisation, such as the case of the *Scolel Te* project, that otherwise they would have not done. Farmers participated in such projects because they wanted to strengthened their relationship with PAJAL and access the benefits that the organisation could bring them. In other words, PAJAL had enough power to impose costs on the local farmers.

Obviously, this system of reciprocity between PAJAL and local communities was impossible to reproduce with others members of the carbon project. First, local communities perceived that their relationship with the carbon project was a result of their agreements with PAJAL. Most farmers did not have a clear idea of the role of the project and its environmental benefits. Second, farmers did not feel a share of responsibility with the rest of the carbon sequestration group. So, they could not act as a single unit because their relationship did not emerged from any interaction over time. Actually most of the farmers did not know their exchange partners in the carbon project. So, local farmers felt obliged to cooperate with the project as long as PAJAL dictated it. As a result, *Scolel Te* had no control over the basic resources of the project. That is, the labour force and the land of local communities. The representative of Yaluma talk about the dependencies between farmers and the *Scolel Te* project.

> "... local communities used to participate in all the initiatives of PAJAL, most of the time farmers participate without a real conviction. They only gave support to the organization... when PAJAL broke its relationship with the *Scolel Te* only a few farmers carried on with *Scolel Te*, the rest left the project..." Fernando Lopez Aguilar is representative of the community of Yaluma in the Scolel Te project and regional representative of AMBIO.

The prevalence of PAJAL over other actors created a perverse incentive for PAJAL to increase the cost of connection in the network if others actors wished access to local communities. Moreover, PAJAL started to exploit its strategic position at the moment that the system of bartering fail. Indeed, when the prices of coffee

dropped, PAJAL started to have economic problems and used resources from the *Scolel Te* fund to support the organization. At that moment It was clear to PAJAL and its constituency that their main objective was the security of the coffee organisation not the success of the carbon sequestration initiative. At the end the pressure of local actors for the control of the economic resources of the carbon fund was so high that ECOSUR and ECCM decided to break their relationships with PAJAL.

In terms of social exchange, PAJAL wanted to use its power advantage to oblige the rest of actors in the network to pay the cost for maintaining the relationship with the local communities. Given that the cost was to subsidise part of the losses in the coffee market, the cost was too high and ECOSUR and ECCM decided to withdraw. Clearly, the diversion of resources could do little to alleviate the economic situation of PAJAL but jeopardised the viability of the *Scolel Te* project and its aims. Obviously, the decision to break the relationship with PAJAL had a high cost as *Scolel Te* lost most of its participants at the local level.

> "... When the *Scolel Te* project was improving divisions started to emerge between AMBIO and PAJAL... The representatives of PAJAL wanted to use the resources of AMBIO to help the coffee organisation... the conflict increased to the point that the carbon project was split. Now AMBIO is a single organisation..." Jeronimo Gomez Perez is representative of the community of Samaria kantajal.

> "... PAJAL is not anymore a member of the carbon project, PAJAL started fighting with AMBIO because they wanted the payments of the farmers who belong to the organisation. The argument of PAJAL was that AMBIO had control of the money that come from the effort of the farmers from PAJAL. So, PAJAL start asking who was feeding AMBIO and asked its constituency stop working..." Miguel Cruz Mendez is representative of the community of Alamkantajal.

This thesis considers, however, that the withdrawal of the local communities from the carbon project was mainly a consequence of the kind of relationships that emerged in the network. Specifically, the lack of trust between the local communities and ECOSUR/ECCM prevented the emergence of long-lasting relationships

with them. The relationships between the communities and ECOSUR/ECCM were exclusively based on contractual terms (negotiated exchange). In contrast, communities have a reciprocal and continuous exchange with PAJAL. And the strength of their relation with PAJAL was mediated by personal feelings — as they felt obliged to provide benefits to PAJAL in return for its services in the process of bartering.

According to Lawler and Thye (2008) direct and reciprocal exchange generate different types of obligations among actors. Direct exchange involves negotiated obligations. For instance, at the moment that PAJAL broke their relationship with the carbon project, the contractual arrangement among communities and *Scolel Te* came to an end as well. Without a legally binding contract, the communities simply stopped all dealings with ECOSUR/ECCM. In contrast, reciprocal exchange creates obligations that are not previously negotiated. Instead, actors are involved in a process of giving and receiving without an explicit time for discharging obligations and they engaging in the exchange voluntarily. The relationship between PAJAL and the communities was of this second type. That is, it was based on trust and built over a long period of constant and continuous interaction. Because of this, and to show their support and commitment, the communities exited *Scolel Te* at the same time that PAJAL did. There were, however, some who decided to stay on. With this diminished constituency the *Scolel Te* project entered a new phase of development. Breaking with PAJAL made it possible for ECOSUR/ECCM to take control of the financial resources and build up a reciprocal exchange relation with the remaining communities. So, the break-up was a strategic decision that not only guaranteed the viability of the *Scolel Te* project but also avoided derailing of its environmental aims. This experience makes it clear that the main asset of the project was the relationship with the local communities.

11.5.2 The expansion phase

In 2001 *Scolel Te* was restructured to fulfill the requirements established for the CDM as part of the climate change policy of the Kyoto protocol. Three recommendations from the CDM panel were addressed: (i) ensure the long-term participation of local communities; (ii) guarantee the long term permanence of the tree plantations and

the availability of land; and (iii) increase the number of participants at the local level to reduce the transaction costs of the project.

The changes involved an internal re-organization. First, the *PAJAL* local trust was dissolved and replaced by the *Bio-Cambio Climatico Fund* (FBCC), a fiduciary managed by a private bank (BANKSEFIN). Second, the scientific committee from ECOSUR in partnership with ex members of PAJAL formed AMBIO, NGO in charge of managing the project at local level. Third, the intellectual property of Plan Vivo system was transferred from the Edinburgh Center for Carbon Management (ECCM) to a non profit organization called *Plan Vivo Foundation* (PVF). Finally, the project started a process of expansion in Chiapas and Oaxaca.

The present subsection analyses how the power relationships changed with the new configuration, given that actors, roles, and terms of exchange were modified. Following the discussion in previous sections, the study of power in the network should be done in terms of its main three domains: a) the carbon exchange, b) economic resources exchange, and c) human capital exchange.

I start analysing the carbon exchange domain. Initially, the new configuration changed drastically the nature of the links among organizations/nodes, from a network composed exclusively of positive links to a network where there were negative links present. This very fact triggered the reconfiguration of power in the *Scolel Te* network.

For a start, in the dyadic relation AMBIO-communities, AMBIO restricted the participation of the local communities in the decision making process of the carbon sequestration project. As we have seen, in the beginning PAJAL had organisational capital that was essential for the formation of the project. Later on PAJAL acted as a broker between the carbon project and the local communities because PAJAL had the ability to bring local communities to the project without too much difficulty. This situation allowed PAJAL to increase its value respect others member in the network to the point that could increase its benefits by increasing the cost of other actors in the network. Indeed, PAJAL could and did make use of its power to influence the decision making process of the carbon sequestration project. When PAJAL left the project, AMBIO had to deal directly with enrolling local communities. Taking up enrolment tasks implied, with out a doubt, accepting a large cost. However,

it also gave AMBIO a new position in the network and the possibility of new strategic alliances. The first alliance was creating a relationship with ex-PAJAL members who were willing to carry with the carbon sequestration project. Given than AMBIO wanted to secure the control of financial aspects of the project to avoid the previous experience with PAJAL, the new relationship with the local farmers was heavily restricted. First, AMBIO invited ex-PAJAL members to become *communal representatives* under the concept of *partnership*. That is, community members were allowed to act in representation of *AMBIO* without having a formal staff contract, salary, or labour rights. This implied that community representatives could not take decisions or have control of strategic resources in the project. In exchange, community representatives were given economic compensation (and/or other benefits) according to their performance in the field. The more they committed to the project, the higher the pay they had. Also, in this flexible partnership, local actors could decide the time and the form of collaboration and to what extent they wanted to be involved with the project. Contrary to expectation, many ex-PAJAL members accepted the conditions and decided to participate.

AMBIO initiated a second strategic alliance with a local organization called The State Coordinator of Coffee Producers of Oaxaca (CEPCO). This alliance was formed to expand the carbon project in the Oaxaca region. This partnership had a similar framework to that used with the communities in Chiapas. That is, AMBIO signed a collaboration agreement with CEPCO that allowed the latter to promote the carbon sequestration project in Oaxaca as well as enrol and overview the new tree plantations so established. In exchange, AMBIO would help CEPCO and the new communities by providing human capital and transferring the technical and operational rules of the *Plan vivo* system. This collaboration agreement was voted in the ejidal assembly of the communities which, at the time, already worked with CEPCO in other projects.

The initial alliance between ECOSUR and ECCM came to an end when Plan Vivo Foundation (PVF) was born. In this context, PVF become an international organization dedicated to provide carbon sequestration services to local projects in a global scale. The core activities of PVF include managing the intellectual property rights of the *Plan Vivo* system and issuing carbon sequestration certificates.

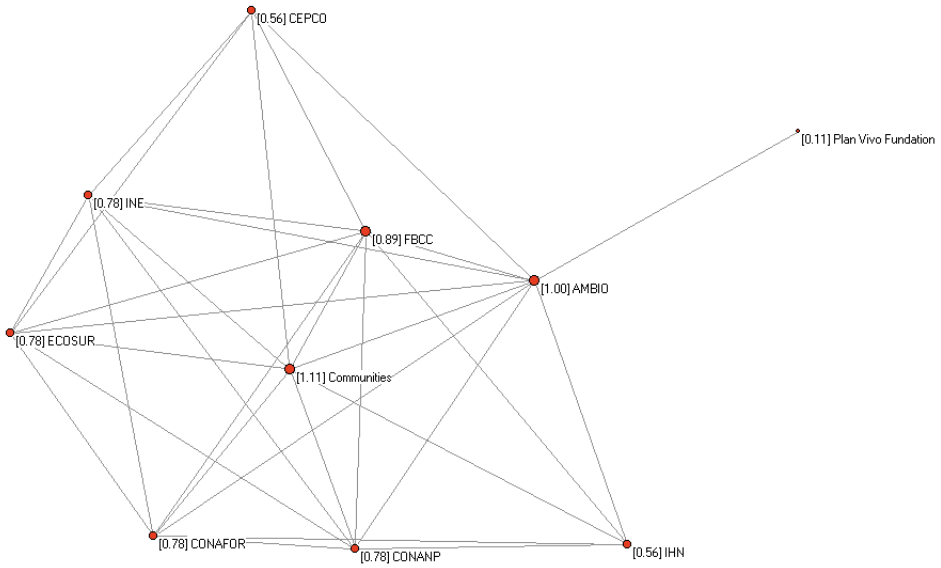


Figure 11.4: Expansion phase — Degree in the Carbon Network

Moreover, PVF kept the commercial platform for the *Scolel Te* project. In this new configuration, AMBIO become a client of PVF and had to pay for the services provided.

In terms of SNA, the configuration of the new structure of the network (Figure 11.4) shows that AMBIO, is the most central organisation — AMBIO has the maximum degree score in the network 1. This means, that AMBIO is the most connected actor in the network. In contrast, PVF is the node that has least connections in the network as its degree score is 0.11. Also, AMBIO is the most important actor in the transmission of resources in the network according to its betweenness score of .25. Indeed, as Figure 11.5 shows, most of the resources in the network pass through AMBIO. Specifically, AMBIO is the actor which allows the flow of resources among local communities and PVF . In other words, AMBIO mediates the relationships between the local and global levels. Finally, the closeness measure shows that AMBIO is the actor who can most easily the resources from the the network at local and international levels (see Figure 11.6). Notice that AMBIO's closeness score is the maximum possible 1. As a result, in the structural analysis AMBIO is the most powerful actor in terms of its location in the productive exchange network of the *Scolel Te* project.

For SET, however, AMBIO is not the most powerful actor even though it is the most centrally located node in the network. In the process of exchange AMBIO has

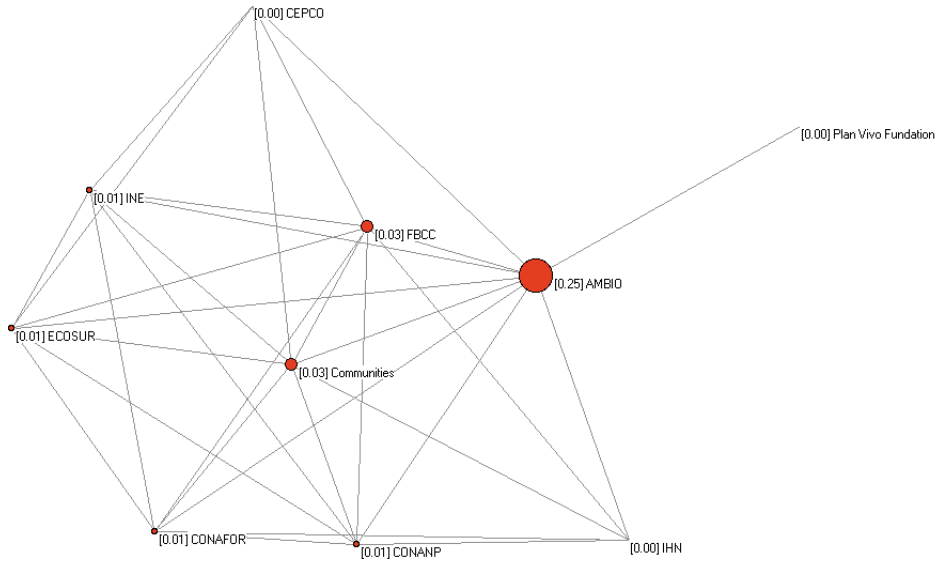


Figure 11.5: Expansion phase — Betweenness in the Carbon Network

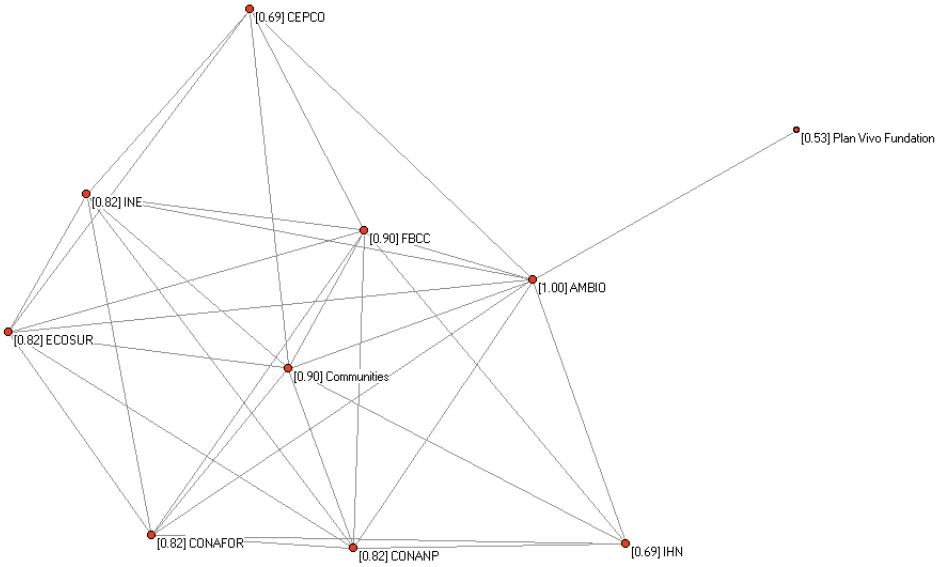


Figure 11.6: Expansion phase — Closeness in the Carbon Network

two negative connections at local level (CEPCO and the communities representatives). Similarly, at International level, AMBIO has one negative connection with PVF. As a result, even though AMBIO is the more centrally located node it is also less powerful because it depends on the inter-mediation of other actors to access the resources of the local communities and buyers.

Changes in actors' mutual interdependencies during the expansion phase led to important rearrangement in the distribution of power in the network. Clearly, the new role of PVF increased its power advantage with respect to AMBIO. The previous experience of ECCM with the *Scolel Te* gave PVF the building blocks for consolidating *Plan Vivo* and to open a business niche at a global scale in the environmental sector. This allowed PVF to expand its operations and commercial platform. A larger scale meant, in turn, the ability to attract contracts from large firms who needed to buy carbon sequestration certificates in the international market. PVF broke the nature of the partnership between ECCM and AMBIO and the reciprocal exchange between these two latter organisations came to an end. Now, ECCM was left to one a side and all dealings between AMBIO and PVF became contractual (i.e. based on direct exchanges). From that point on, AMBIO paid a fee to PVF for issuing internationally accepted documents which certified the existence of *truly captured* carbon in the plantations *managed* by AMBIO. This fee could not be avoided if AMBIO wished to "sell its carbon" in the international carbon market. Furthermore, AMBIO had to pay a license to use the *Plan Vivo* system, which became a patent, in the plantations under its supervision. In terms of social exchange, the intermediation of FPV between buyers and AMBIO, made AMBIO more dependent on FPV's services. Given that AMBIO had no alternative exchange partner at the international level such dependency put AMBIO in a difficult position.

> "... the way the Foundation is funded is largely by income from the registration and issue of plan vivo certificates. So when a company comes alone and buys carbon, say for example 10,000 plan vivo certificates, the project needs to allocate that carbon within a project. So, we allocate 2 thousand tons from this community, 5 thousand tons from that community... there is a certification issue fee, for every ton of CO2 there

a US$30, and that is the financial exchange between the Foundation and the registered project..." Representative of Plan Vivo Fundation, Edinburgh.

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The bad news for AMBIO did not end there. Despite its efforts for hedging its dependence on the local communities and a contract that gave no formal rights to local representatives — and no access to the decision making process — AMBIO learned soon enough that the only way of having contact with local actors (communities and individual farmers) was through the community representatives. In other words, local representatives became brokers between AMBIO and the peripheral actors in the exchange network. Indeed, most local communities do not allow visits from unknown people in their lands and villages. They have well enforced entry rules and the general attitude is not to trust strangers, which leads to the creation of a negative link between AMBIO and the communities. Indeed, from the point of view of the communities, AMBIO was a stranger, hardly known in the region. So, soon AMBIO learned that it could not access the resources of local communities on its own and had to pay a brokerage fee to the community representatives, especially to those who were successful in bringing new participants to the *Scolel Te* project. This is why ex-PAJAL members decided to stay on after the break-up with PAJAL. They knew that the written contract meant nothing: they held the only key in their hands that allowed AMBIO access to their communities. They knew better.

Even when the *Scolel Te* project remains the unique carbon sequestration project in the region and there is a large potential to expand the project, AMBIO had not been able to initiate many new relationships at the local level. Why is that? One thing is certainly true. AMBIO's monopolistic advantage did not guarantee a large base of secure 'clients' with no choice other than complying with AMBIO's terms of exchange. On the contrary. Reality seems to suggest that AMBIO carries little value from the point of view of the local communities and farmers in the region.

Few communities at this stage considered the environmental impact of the tree plantations as a benefit. Clearly, the negative perceptions that local actors have about the project not only jeopardises the supply of local resources (labour force

and land) to the project but also makes AMBIO more dependent of them. If AMBIO wishes to initiate a relationship with a community, it has first to win a battle of perceptions. Namely, it must convince the community that the tree plantation project will bring them valuable benefits. However, how can one win such a (perceptions) battle when one's interlocutor does not engage in dialogue? Clearly, there are many communities in Chiapas and, from that point of view, AMBIO has many potential exchange alternatives. The problem is that AMBIO did not have the ability to initiate, by itself, an exchange relationship — its success is extremely unlikely. This fact hugely reduces AMBIO's power advantage. This is why giving a payment to the communities is important and why the payments had to be spread over a long period of time to incentivise long-term participation. However, as we have seen previously, the payments are a rather weak tool to initiate and maintain exchange relationships with valuable exchange partners.

Up to now we have seen that the overall distribution of power among actors in the carbon network (in the *Scolel Te* productive network) is determined by the existence of negative connections among actors. That is, power is determined by an actor's ability to access resources from alternative exchange relationships rather than by her/his strategic location in the network. Indeed, the centrality of AMBIO in the network does not necessarily increase its power advantage with respect to their exchange partners. On contrary, we have seen that AMBIO is the most dependent actor in the *Scolel Te* network at both the local and the international level. In other words, AMBIO has to pay access fees to everyone. Clearly, this result is at odds with the predictions of SNA in terms of the distribution of power in the network.

In terms of the exchange of economic resources the distribution of power in the network changed slightly in expansion phase. According to SNA, AMBIO is the actor most connected in the network—AMBIO's degree score is 1. Similarly, the local communities are well connected at the local level, as their own degree score is 0.80. However, the communities have no connection to PVF. This means that local communities have no connections at international level. PVF, on its side, is the actor with least connections in the network — PVF's degree score is 0.20 (see Figure 11.7). Also, the betweenness graph (see Figure 11.8) shows that AMBIO is the most important actor in the distribution of economic resources in the network.

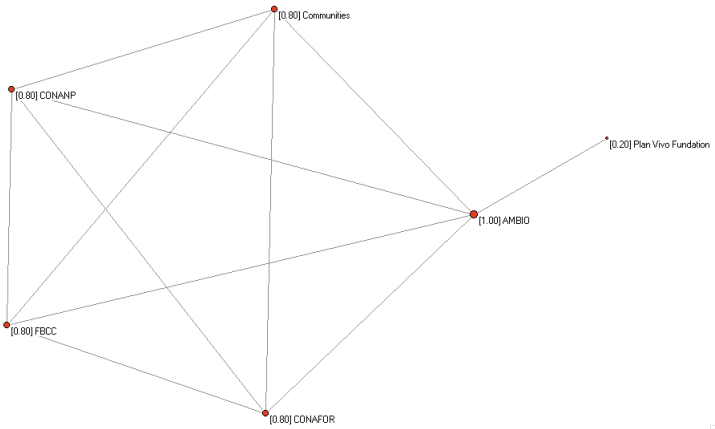

Figure 11.7: Expansion phase — Degree in the Financial Network

Specifically, AMBIO is the only actor that allows the flow of economic resources between the local communities and PVF. It is, therefore, a broker between the local and international level of the project. Notice here that CONAFOR, CONANP, and others organisations who participate in the finance network bring their own resources to support the project. However, in terms of the carbon business, PVF is the only actor that has its own commercial platform at international level to bring in potential buyers. In contrast, the local communities play no important role in the distribution of resources — their betweenness score is 0. This does not imply, however, that the communities have problems in accessing the economic resources in the network. Their distance with respect to AMBIO is short. Indeed, the local communities have a closeness score which is high (0.78) with respect to other actors. This means that the local communities have no problems to reach the economic resources from AMBIO (see Figure 11.9). In general, according to SNA, the network structure shows a highly centralised network (i.e. a star), where AMBIO seems to be the most important actor in the network and therefore the most powerful.

In terms of SET, the story is different in various aspects. PVF is an important actor because is the only node that facilitates the flow of economic resources between international buyers/clients and the project. For AMBIO, the lack of a carbon market at local level and its inability to establish its own commercial platform at the international level implied that it could not build direct links with the buyers. As a result, AMBIO became highly dependent on its the relationship with PVF in the expansion phase. PVF became an inter-mediator/broker between AMBIO and

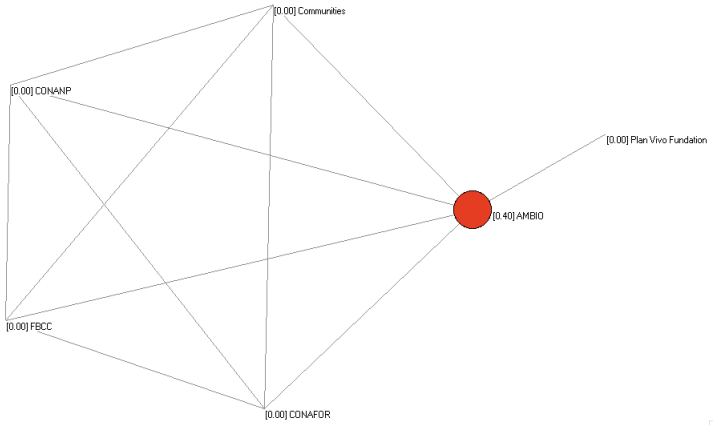

Figure 11.8: Expansion phase — Betweenness in the Financial Network

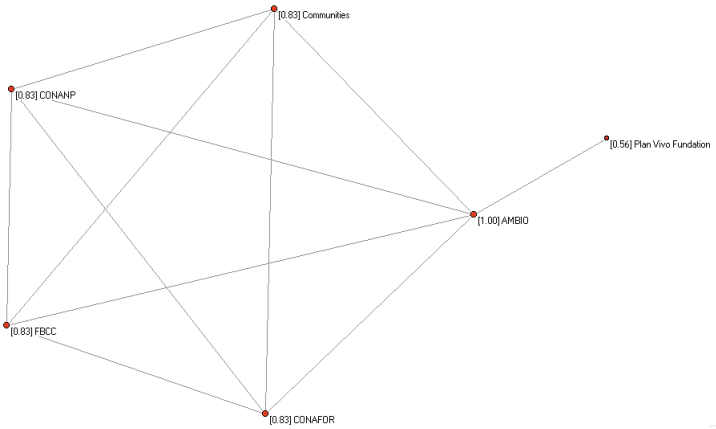

Figure 11.9: Expansion phase — Closeness in the Financial Network

the buyers of carbon sequestration certificates.

In this context, the flow of economic resources can be described as follow: given the supply and demand in the international carbon market, if clients want to buy carbon certificates from *Scolel Te*, they only can do it through PVF. Once the certificates are sold, the resources go directly to AMBIO through the Bio-Cambio Climatico Fund (FBCC). It is important to clarify that PVF never has contact with the economic resources. It is the role of the FBCC to distribute the resources among members. Initially, the FBCC pays local communities for the carbon sequestration and PVF for its services (the issue of certificates). Finally, the FBCC has to cover management expenses for running the project and salary/compensation to the technical group of AMBIO including engineers, biologists, and regional and local representatives. The manager of the FBCC talks about the difficulties bringing economic resources to the project during the expansion phase:

> "...bringing economic resources has been always the principal concern of the project. However, it was more difficult in the past given the low prices of carbon in the international market and the small size of the project...sometimes, the scarcity of economic resources made it impossible to pay for essential services to run the *Scolel Te* project ..." Elsa Esquivel, manager of the FBCC and member of AMBIO (See Figures 11.7-11.9).

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Clearly, the central position of PVF in the flow of economic resources in the *Scolel Te* project has advantages and disadvantages in the use power in the network. One of the principal advantages is that the power of FPV over AMBIO and the rest of participants helps keep discipline in the network and maintaining the environmental aims of the project. Indeed, PVF will only issue carbon certificates if AMBIO is successful in making the local communities comply with the rules and conditions of the *Plan Vivo* system. For that reason, PVF considers the fulfilment of the *Plan Vivo* rules as a precondition of promoting the *Scolel Te* project at international level and the main way to allow the flow of economic resources at local level.

In this context, if AMBIO and the local communities wish to access the interna-

tional carbon sequestration market, they must comply strictly with the *Plan Vivo* System. Misbehaviour in the network can have a high cost because FPV can credibly punish indiscipline by denying the issue of carbon sequestration certificates. In this context, not only PVF but also local actors have incentives to enforce the *Plan Vivo* rules and to prevent the derailing of the environmental aims of the project. One of the key mechanism to enforce the obligations is through the monitoring of tree plantations. This verification ensures that farmers plant the trees according to the technical rules stipulated by the *Plan Vivo* system and that the trees are generating the environmental benefits that they are meant to produce. The representative of PVF talked about the importance of the monitoring process in the *Scolel Te* project:

> "...Plan Vivo Fundation reviews the projects every year to make sure that the project has captured carbon and to ensure it is monitored...if we check and we say it is ok, we stamp it and issue the certificates...The idea of the Plan Vivo system, the standard, is the traceability of carbon projects. So if the buyers come here and say, listen, where is my carbon? You have to be able to say: it is there. This is a very important part of the verification, companies reinforce the lines and make sure all the carbons is kept in certain area, not double sold...I mean, everything is transparent..." (PVF representative, Edinburgh).

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Similarly, AMBIO keeps a strict control of the monitoring process as they know that the economic rewards depend crucially on the results of the verification process. The monitoring is done every year between September and December. The regional representative of the Chol region talks about the importance of the monitoring process of the project.

> "...farmers have obligations and one of this is keeping the trees alive according to the technical rules. So, when a technician passes through the community to do the monitoring, the technician has to verify that everything is done. We (the technicians) keep a record of each farmer/community, of how may trees are planted in their parcel, the species, and the system

> of planting. This record goes directly to AMBIO. And if everything is well, the farmers/communities receive their payment... So if the farmers did not work or they did not put in too much effort they cannot expect gains..." (Domingo Rodriguez, Arroyo Palenque representative).

As a result, the monitoring process allows maintenance of a certain degree of accountability in the delivering the services in the *Scolel Te* project. It is important to notice that the verification system works as a mechanism that restricts the exchange at international level if local actors do not fulfil their obligations. So, thanks to this mechanism it is possible to inflict economic cost to cheats in the network given that PVF restricts the flow of resources from the carbon buyers to carbon producers. As a result, if local communities-farmers do not comply with the *Plan Vivo* standards they cannot access the economic benefits. Clearly, the power advantage of PVF guarantees the quality of the carbon services and the fulfilment of the environmental benefits of the tree plantation projects. However, one disadvantage of the central position of PVF in the network is that there is little room to influence the terms of the *Plan Vivo* system. And this, in turn, has slowed down the process of expansion of the *Scolel Te* project given that local actors find it difficult to accept the rules. The inflexibility of the rules upsets participation among communities/farmers especially because it go against their traditional forms of social exchange at local level.

Indeed, historically, local communities have worked with governmental projects at the local, regional, or national level. Usually, these kinds of social programs have been used as a political tool (a kind of bribery) to buy votes or support within the Mexican political context. There are few institutional programs that are really committed to the development of local capacities. For that reason, most of the time governmental programs tend to change constantly according to the political cycles and have little accountability. So, local actors tend to participate in this kind of social programs because they know that they can access to economic resources without any commitment or effort. This perverse system of exchange is difficult to replace. In this context, most local actors tend to participate in the *Scolel Te* project thinking that they do not need to comply with their obligations. However,

when they realise that economic resources do depend of their effort, local actors tend to resist.

For AMBIO, who is in charge of the project at local level, keeping the disciplinary rules among local actors is a constant battle because local groups usually generate a lot of pressure to modify the rules of the game of the project in order to make it more flexible. For Burns (1977) this 'subversive behaviour' among actors is part of the normal process of exchange. Given that the exchange is a dynamic process, actors are constantly manipulating the conditions of exchange to modify the distribution of resources and the action of other actors. So, actors who are able to control the process of exchange can shape the condition of exchange and therefore increase their payoffs. In other words, actors are able to exert power over other actors to increase their gains. When local actors refuse to participate in the project or threaten withdrawal they intend to exert their power. This behaviour among local actors has been the principal way of modifying, or attempting to modify, the conditions of exchange and the influence AMBIO's behaviour.

Despite the pressure at local level, the rules of the *Scolel Te* project are kept intact at least in the expansion phase. In terms of social exchange, given that AMBIO had no exchange alternatives in the international carbon market, AMBIO could not override the power of PVF. So, PVF remained the principal node and the one who monopolised the economic resources in the network. This power advantage allows maintaining discipline in the network. So, AMBIO had little chance to influence the conditions of exchange to please local actors. This means that the environmental aims of the project were safeguarded successfully at this time. In turn, it is important to notice that the inflexibility to modify the standards of the *Plan Vivo* system has always been the principal reason for withdrawals among local actors and the principal cost to AMBIO.

In contrast to the exchange of carbon sequestration and economic resources, the exchange of knowledge and information in the network shows a different pattern in the distribution of power. Initially, the SNA shows that AMBIO is the best connected actor in the network—its degree score is the highest in the network (1). Similarly, local communities and the rest of organisations are well connected in the network of human knowledge, except for PVF who has a degree score of 0.13.

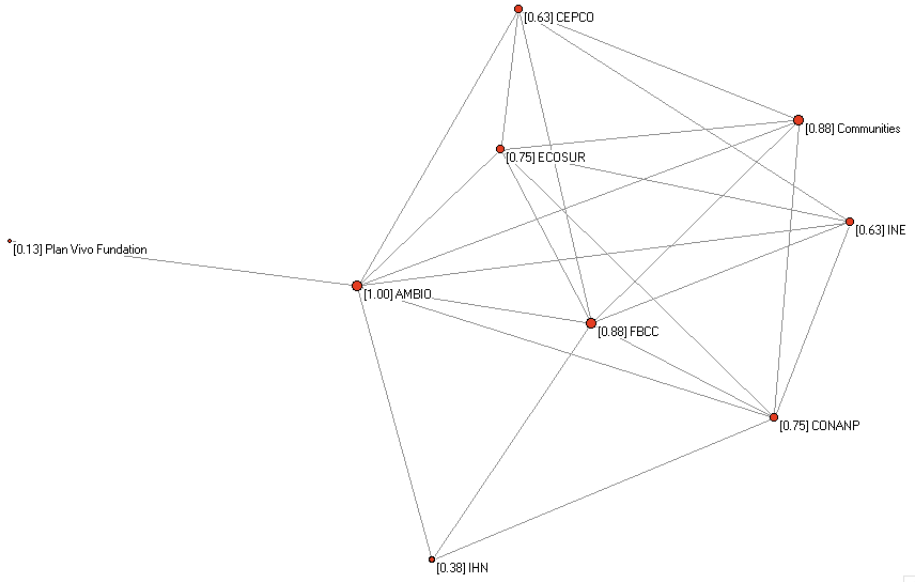

Figure 11.10: Expansion phase — Degree in the H. Capital network

FPV has only one connection in the network (see Figure 11.10). In terms of the betweenness measure, AMBIO has the highest score (0.32) in the network. Whereas most of members (NGOs and GOs) seems to have a small role in the distribution of human capital, except the local communities and PVF that have no role in the distribution of human capital (see Figure 11.11). However, local communities have high possibility to access human capital in the network. Their closeness score of 0.73 is high. They can access human capital with ease. As a result, the overall structure of the network shows a less decentralised system at local level. However AMBIO is still the most central node in the network (see Figure 11.12).

In terms of SET, the exchange of human capital shows findings that are at odds with those of SNA. Indeed, during the expansion phase of the *Scolel Te* project, human capital was exchanged in the network through both types of connections: positive and negative. This means that actors participate in the exchange of information and knowledge under different premisses and exchange types.

On the one side, negative connections are established to access to human capital that is located at international level. Indeed, the principal way of accessing to the necessary human capital for the project is through a negotiated exchange between AMBIO and PVF. Here AMBIO and FPV established a contractual agreement where PVF allows the flow of human capital at local level in exchange for a payment

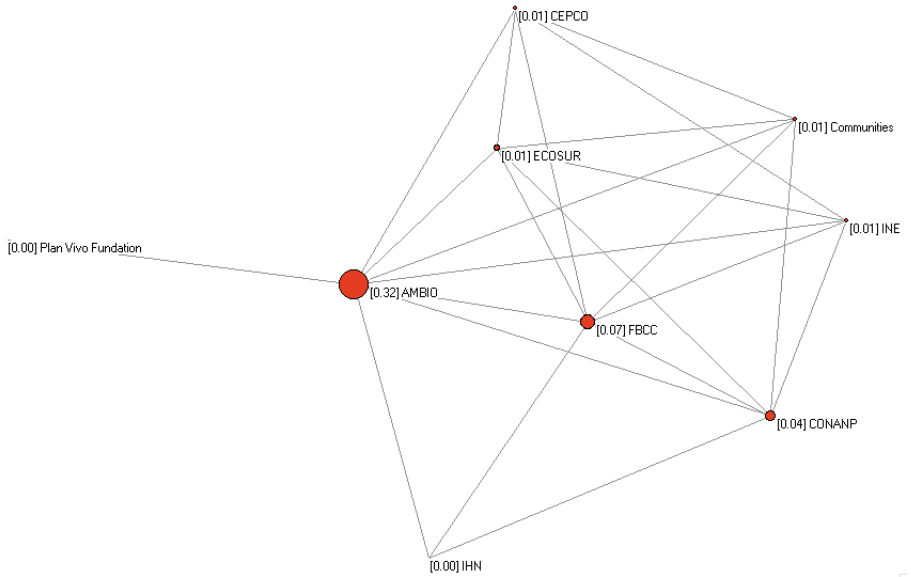

Figure 11.11: Expansion phase — Betweenness in the H. Capital Network

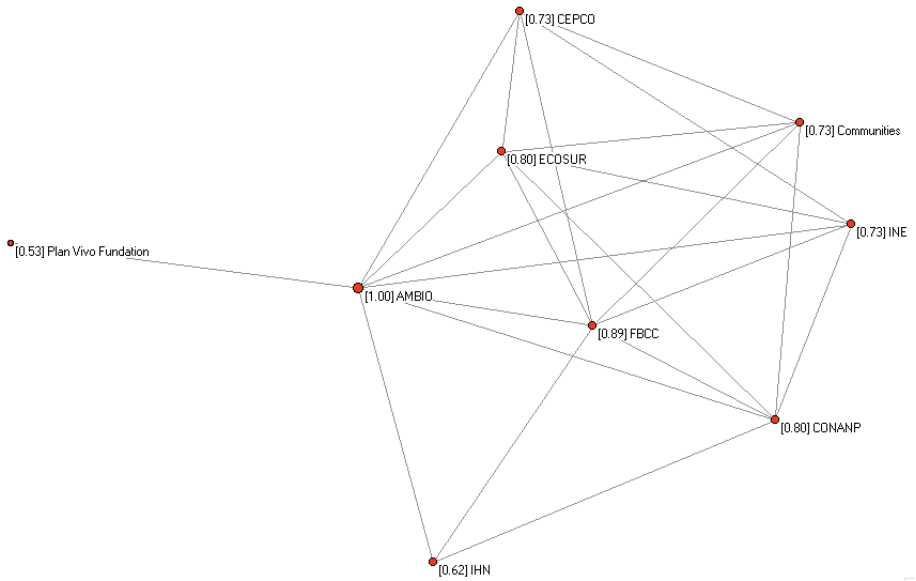

Figure 11.12: Expansion phase — Closeness in the H. Capital Network

from the *Scolel Te* project. In other words, AMBIO has a negative connection with FPV. That is, AMBIO has to pay a fee to PVF if AMBIO wishes to use the *Plan Vivo* system. The acquisition of the property rights of the *Plan Vivo* system allows AMBIO to exploit the methodology in benefit of the *Scolel Te* project.

On the other side, positive connections are needed to spread knowledge among local communities. Indeed, the implementation of the *Plan Vivo* system is just one part of the process of establishing the tree plantation. This is because participants need to learn and develop specific skills to manage the tree plantations during the whole life cycle of trees. The more information and knowledge local actors have the higher the chances of success. For that reason, the establishment of tree plantations require the transmission of specific skills and knowledge from the technical group of AMBIO to the local communities who perform the tree planting activities in theirs landholdings. In this context, AMBIO has generated different forms of partnerships to fulfil the needs of the project and provide the necessary human capital to the local communities. One of the principal partnerships of AMBIO is with the community members who are invited to be part of the technical group in the project. This partnership involves AMBIO transferring specific skills to the community/regional representatives at the local level. In exchange, the community representatives are committed to transmit and spread the information and skills to rest of community members. In other words, the community representatives intermediate the transmission of human capital between AMBIO and the communities.

In terms of power relationships among actors in the *Scolel Te* network, this thesis found that AMBIO is one of the principal nodes in the exchange of human capital, especially because AMBIO has access to the property rights of the *Plan Vivo* system. Clearly, AMBIO could try to exploit its knowledge advantage to get more benefits for itself. However, AMBIO's difficulty in attracting communities to the scheme dilutes completely any power advantage that knowledge may give. So, AMBIO finds it more effective to give free access to knowledge as a way to make initial contact and long run commitment more attractive. In this context, the exchange of human capital between AMBIO and community representative works under a voluntary basis where representatives do not need to pay anything for the training. For the local communities the training is valuable for itself because it generates

skills and capabilities that may be useful not only in the carbon project but also in other affairs. In this context, the flow of human capital between AMBIO and local communities is determined by positive links. Both AMBIO and communities co-operate intensively in the transmission of human knowledge through a direct exchange where the responsibilities are jointly shared between AMBIO and the participants. Clearly, it is a win-win solution for both parties.

Similarly, there are organisations who participate in the project in an informal way. That is the case of governmental and non governmental organisations who participate *Scolel Te*'s flow of human capital under the principle of a reciprocal exchange. This means that some actors who participate in the exchange contribute to the network without an explicit agreement about the terms of the exchange such as type, time and form of discharging of obligations. Actors perform unilateral acts of giving and receiving that do not necessarily involve reciprocity. Most of the time such organisations do not share the same aims of the carbon project. Their interest is, for instance, to support the economic development of the local communities or to protect natural reserves. This is the case of CONANP and CONAFOR, which usually work in natural reserves for research and implementation of government's social programs. Given that they are not part of the *Scolel Te* structure they can decide whether to participate or not, as well as whether to extend their participation in the *Scoele Te* project.

For example, some local communities which are settled in protected areas are under the supervision and authority of CONANP and participate in the *Scolel Te* project. In such a case CONANP and AMBIO work in the same communities. So when both organisations are in the position to co-operate and co-ordinate actions, they do. In this context, co-operation emerges as a way to reduce the cost of both organisations and to increase their efficiency in the delivery of human capital at local level. It is important to notice that the activities of CONANP are not subordinated to AMBIO. On the contrary, CONANP only shares relevant information and activities with AMBIO because it pursues similar goals. Figure 11.10 shows how the links of the governmental institutions are connected in the network. ECOSUR (a think thank organization/node located in Chiapas) has a similar position. Indeed, ECOSUR's contribution to the network also depends on the extent to which ECOSUR

and AMBIO share similar objectives in the transmission of environmental education, skills, and information to the communities. For instance, ECOSUR usually helps in the consolidation of training programs as part of their research agenda. It is common that agronomists, veterinarians, biologists and other research staff and students help in the consolidation of activities in *Scolel Te* as part of their own research activities.

Others participants see AMBIO as a partner that can contribute to their own activities. For instance, CEPCO was a local coffee organisation in Oaxaca who were interested in the shade coffee system. So, co-operating in the implementation of the project allowed them to acquire specific skills that benefited their organisation.

In terms of power relationships this thesis found that there is no competition in the transmission of human capital among organisations who participate in the exchange of human capital in the *Scolel Te* project. Even when some organisations are in a more central position in the network of knowledge or have better access to resources, organisations tend to co-operate in the transmission of human capital. This thesis considers that this co-operative behaviour emerges because the human capital is not an end but a means for AMBIO and other organisations which have as a main goal to make the local communities more productive and environmentally friendly, so that the forest and the jungle survive.

Local communities, on the other hand, do have power in the network of human capital. Indeed, despite the fact that the local communities had no human capital to provide to the network, their role in the projects is essential to achieve the aims of each organisation. For example, human activity is the main factor of deforestation. In this case, if AMBIO wishes to avoid deforestation it can only achieve such an objective by modifying the behaviour of the local communities. Then the decision of local communities to keep their current environmental management behavior or to adopt innovative environmental management behaviour is a key factor. Because of this power advantage NGOs and GOs have taken many steps to cater to the needs of local communities. In other words, local communities had more power because they had indirect control of the natural resource in the region due to their potential capacity of deforestation.

As we have just discussed, social exchange theory (dependency relationships)

cannot explain the power advantage of the local communities in the network of knowledge. Neither can SNA (centrality measures) offer a satisfactory explanation. This thesis considers, that the distribution of power can be better understood if we consider the hypothesis that the communities are increasingly valuable to GOs and NGOs as they increase their ability to produce an environmental benefit. Clearly, if communities have the necessary skills and knowledge to run a reforestation project in their landholding in some way they are an asset for the *Scolel Te project* project. In this context, the exchange of human capital cannot be set apart from the its principal function in the network: increase the local capacities of communities/farmers in the management of forestal areas. So, human capital is a essential resource in the productive network. The aims of the project are achievable only if knowledge flows and is adopted by communities/actors . This is why the communities are the most powerful actors in the network. Human capital is important as long it is adopted by the local communities.

11.5.3 The consolidation phase

The exchange of resources within the *Scolel Te* project remains almost intact. However, in 2007 a major change occurred in the distribution of power in the *Scolel Te* carbon network; this happened for two main reasons. First, the *Scolel Te* project could not expand in the region at the expected rate. As a result *the Scolel Te* project could not participate in the Kyoto protocol due to the fact that the project did not fulfil the recommendations of the CDMs panel: (i) ensure the long-term participation of local communities; (ii) guarantee the long term permanence of the tree plantations and the availability of land; and (iii) increase the number of participants at local level to reduce the transaction costs of the project. Indeed, even when AMBIO consolidated the carbon project in many communities in Chiapas and Oaxaca, the effort of AMBIO to bring new participants failed to guarantee the expansion of the project. This situation reduced the possibilities of the project to participate in the compliance market. As a result, the project kept working in the voluntary market. This situation affected the economic viability of the project for one single reason: the voluntary certificates are not fully recognised in the compliance market.

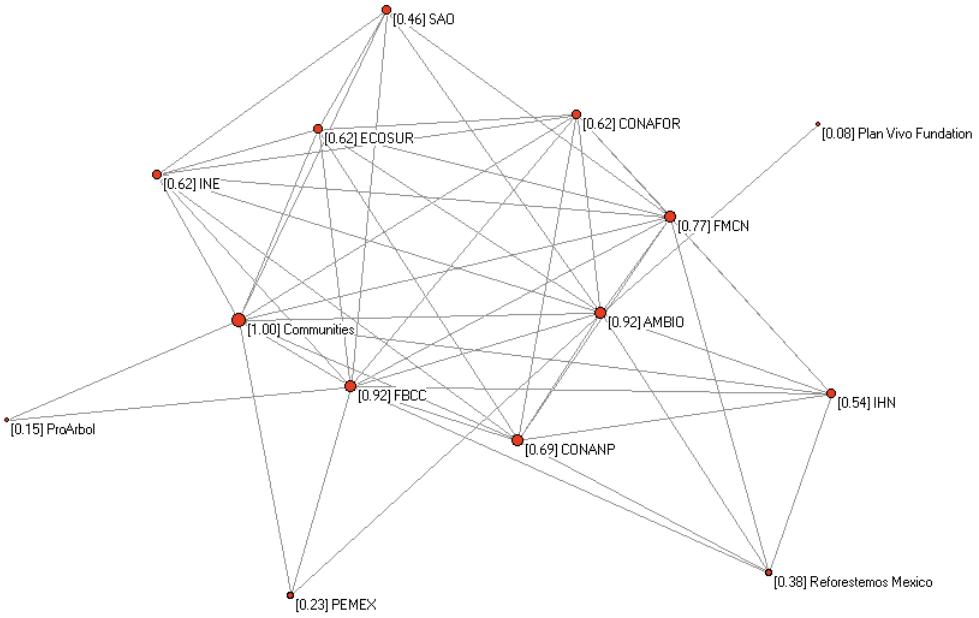

Figure 11.13: Consolidation phase — Degree in the exchange network

So potential buyers tend to offer lower prices for the voluntary certificates given the few possibilities to re-sell them in the secondary market. Clearly, this situation reduced the possibility of allocating *Scolel Te*' certificates in the international carbon market on good terms.

The second fact that changed the distribution of power in the exchange network is that the monopolistic position of the *Scolel Te* project as the unique carbon sequestration project in Mexico come to an end the moment that local competitors emerged: (a) ProArbol, a national carbon program, was launched by the federal government; and (b) SAO (Environmental Services of Oaxaca), an environmental NGO, started running carbon projects in the region of Oaxaca.

In terms of SNA this thesis finds that the network structure is slightly less centralised. In terms of the degree score, the local communities are now the most connected actors in the network. They have the highest score degree of 1. Now AMBIO is the second best connected actor in the network (degree 0.92). However, even when some actors have improved their position in the network, AMBIO's betweenness and closeness score are still the highest in the network (0.22 and 0.93, respectively). In general, the network structure does not show substantial changes in the distribution of power among actors even in the presence of competition (see Figures 11.16 and 11.18).

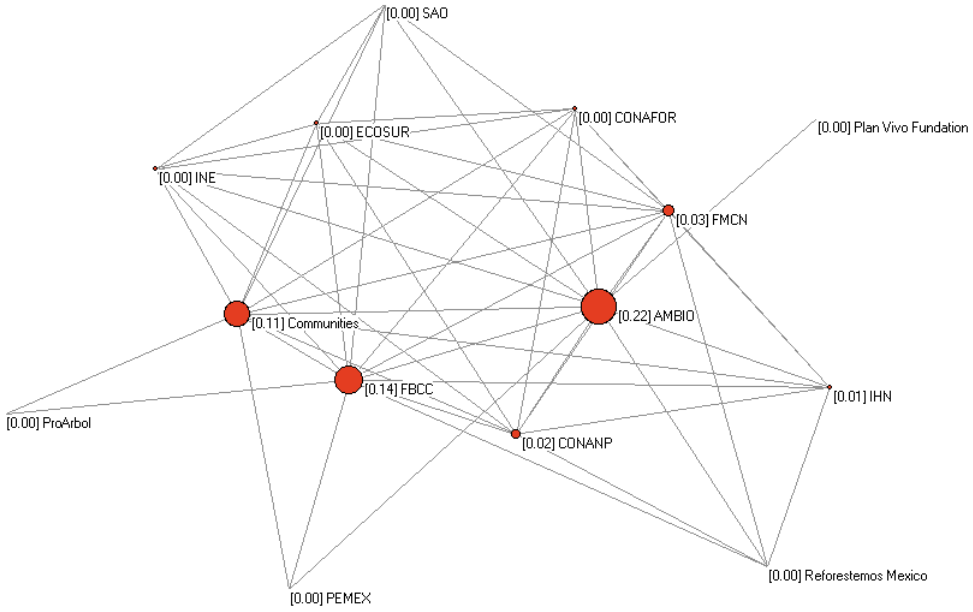

Figure 11.14: Consolidation phase — Betweenness in the exchange network

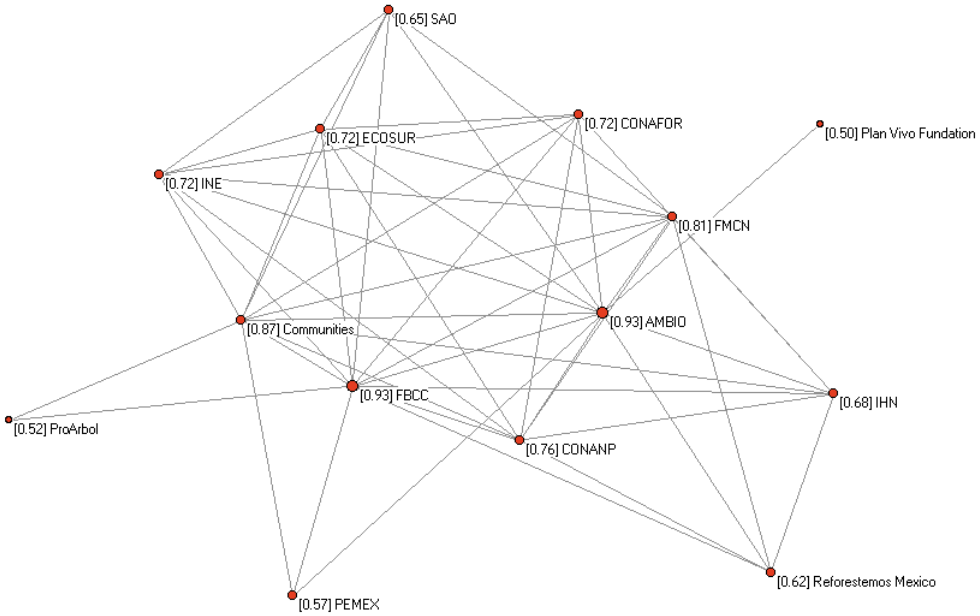

Figure 11.15: Consolidation phase — Closeness in the exchange network

Hence, according to SNA, competition in the local market does not seems to affect the structural positions of actors in the the *Scolel Te* network. SET suggests otherwise. Indeed, the competition in the network has generated a change in the distribution of power between AMBIO and the local communities. Here, the possibilities of local communities/farmers to establish new partnerships with ProArbol and SAO reduces the power advantage of AMBIO in the carbon market. The fact that SNA does not reflect this in the structural analysis is remarkable. As we have seen in the expansion phase, AMBIO was the most centrally located actor because it was the only organisation who could offer local communities a project of reforestation and afosretation in their landholdings. Given that local communities had no other alternatives in the carbon market, they had to accept the conditions of the *Plan Vivo* system. That situation allowed AMBIO to keep discipline among local actors and maintain the quality of the carbon sequestration service. This fact help strengthen the establishment of the PV system at local level and gave AMBIO incentives to maintain the quality of its environmental services at the local level.

The emergence of competition in the local carbon market, however, modified the conditions of exchange. Now AMBIO has to be more competitive if it wishes to attract participants. AMBIO realised it had a huge competitive disadvantage with respect to the newcomers which work, all of them, in the unregulated market. This implies that ProArbol and SAO are in position to offer a higher pay-off to the local communities than AMBIO does.

Because it does not have to comply with PV rules, ProArbol does not have the same pressures than AMBIO to obtain economic resources from the carbon sequestration, especially because it has direct access to public funds to run the projects in the local communities in exchange for nothing but a promise to do the work. In contrast, AMBIO has to invest part of its resources to bring clients to the *Scolel Te* project and to do the monitoring. Moreover, AMBIO has to pay a fee to PVF to maintain an international commercial platform to sell the carbon certificates. Clearly, such fixed costs imply less profits for everybody in the *Scolel Te* project, including local communities.

Similarly, SAO is a new environmental organisation that was created when CEPCO decided to offer environmental services in the region of Oaxaca. As we

have seen before, CEPCO was the principal partner of AMBIO in the establishment of the tree plantation in the region of Oaxaca. However, after many years of working as a broker for AMBIO, CEPCO learned the necessary knowledge and expertise to run the sequestration projects in Oaxaca on its own. And so CEPCO decided to perform a balancing operation in the carbon market and create a new environmental organisation called SAO to take over the carbon sequestration business in the region. Even though SAO still looked after the carbon projects from AMBIO in Oaxaca (Santiago Teotlasco and San Juan Metaltepec), the expansion of the *Scolel Te* project stoped in the region because AMBIO lost its principal partnership in Oaxaca. In terms of social exchange, SAO could change the degree of dependence with respect to AMBIO for two main factors: (1) SAO had control of the local communities and (2) SAO had accumulated the human capital for a carbon sequestration project. Indeed, the proximity of CEPCO to the local communities/farmers in Oaxaca had been always its principal asset. So, at the moment that AMBIO started transferring the necessary knowledge to CEPCO for the establishment of the *Plan Vivo* sytem in the communities of Oaxaca, the power of CEPCO increased. This generated a decrease in the value of AMBIO with respect of CEPCO, changing the degree of mutual dependency among them to the point that CEPCO decided to run its own business. Nowadays SAO is more concerned with bringing communities to their own scheme than in expanding the *Scolel Te* project. Furthermore, given the difficulties for SAO to establish a carbon sequestration project with the characteristics of the *Scolel Te* project, the strategy of SAO has been to launch a footprint carbon project taking the advantage of the environmental services boom fostered by the Mexican government. This means that SAO is working in the unregulated market with the advantage that it does not have to fulfil the requirements to compete in the international market like AMBIO. In this context, the establishment of a carbon project for SAO is less costly with respect the cost of participating in the international carbon market.

This thesis found that the unequal market conditions in the local and international carbon markets created perversive incentives among local actors that jeopardise the protection of the environment in the region. Indeed, the emergence of an expanding, profitable, and unregulated carbon market at local level not only offers

advantages for local organisations to profit from the environment but also gives a "better deal" to the local communities. Indeed, it is well known among governmental technicians that the the monitoring process in ProArbol is not as strict as the one in the *Scolel Te* project. In this context, many communities/farmers prefer participating in ProArbol's or SAO's tree schemes than in *Scolel Te* because they are more interested in the economic resources than in the environmental benefits of the reforestation activities. Clearly, the low level of accountability in the local carbon market offers incentives to cheat the system and represent a good cost-benefit activity for income seekers. So, local communities have high incentives to look for carbon projects that offer a cheap option because they can invest less work and effort.

> "...not all farmers work at the beginning of the project, many people think that AMBIO is not going to do the monitoring, that AMBIO is going to pay them even if they don't work. Farmers think that the *Scolel Te* is like ProArbol. For instance in the governmental program the technician only check one parcel and the rest parcels are not monitored, but the people don't care because the payment does not depend on the work, farmers receive the payment working or not working...then farmers realise that AMBIO is different that they need to work if they want to receive the payment..." Domingo Rodriguez, representative of the community of Arroyo Palenque and regional technician of AMBIO.

> "...the governmental projects are our principal competition... because they give more resources to the farmers than the *Scolel Te* project, but the paternalism has induced farmers to participate in the governmental projects without any commitment. Also the government is not interested in monitoring the projects, they do not have the intention to fulfil aims and processes, this is because the government see the project as as direct subsidy to people in rural areas..." Sotero Quechulpa, head manager of AMBIO.

In terms of social exchange I found that the disparity in terms of costs between participants in the compliance market and participants in voluntary market gener-

ate negative incentives for AMBIO, which is the most disciplined actor. Indeed, the unequal competition in the carbon market has the potential to derail the environmental aims of actors. This is because the unfair competition in the carbon marked erodes the social mechanism that generates commitment in the *Scolel Te* project, specifically the relationship between AMBIO and local communities.

According to the exchange theory, the local communities are the principal resource of the *Scolel Te* project. However, as we have seen before, the possibilities of maintaining discipline among actors in the project is linked to the ability to punish misbehaviour in the network. In other words, the mechanism of AMBIO to make enforceable the rules of the *Plan Vivo* system has been the restriction of the flow of economic resources to cheats. Even when this strategy is not very popular among communities, it has been very effective in maintaining discipline among actors and keep the quality of the carbon sequestration service. Clearly, this social mechanism could only work in a scenario when local communities-farmes have no other alternatives of exchange in the same domain (economic resources). When ProArbol and SAO came along, they shared the same domain as AMBIO as a source of economic resources and became direct competitors. Now the local communities can have access to economic resources from three sources: ProArbol, SAO, and AMBIO. Under the new arrangements, it is logical to think that the carbon project which offer better rewards and less costs for the same activities (planting trees) is the one who will attract more participants. And, clearly, carbon projects with low levels of accountability are more attractive for local communities. In this context, even when *AMBIO* is the most disciplined actor in the carbon market in Mexico, AMBIO is less competitive actor in the market.

In terms of the SNA, even when competition brings pressure to the *Scolel Te* project, the structural position of actors in the carbon network suffered no substantial changes. In the consolidation phase AMBIO is still the most central actor in the carbon network (see Figures 11.16 to11.18). This thesis considers that concurrency had no effects in the structure of the carbon network because competitors are outside *Scolel Te*. In this context, the structure of the carbon network remains intact because competitors are not part of the relationships within *Scolel Te*.

However, in terms of the flow of financial capital in the process of exchange

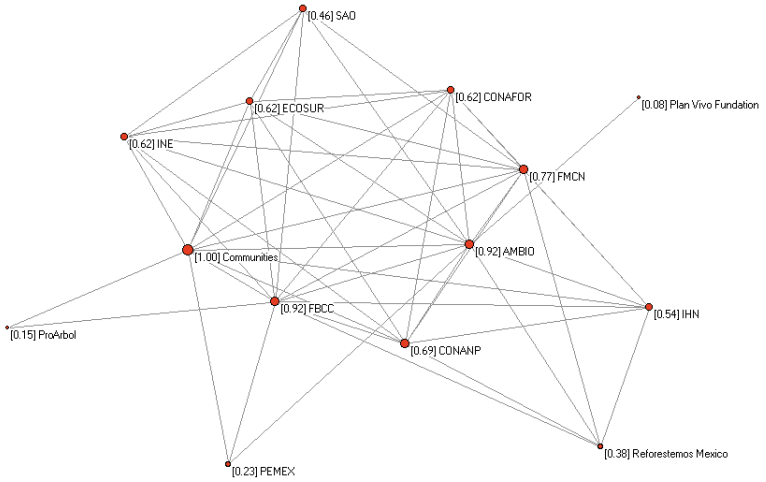

Figure 11.16: Consolidation phase — Degree in the Carbon Network

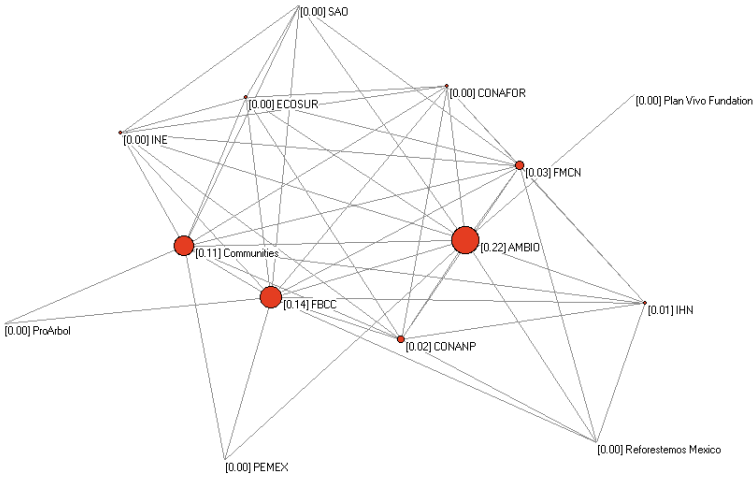

Figure 11.17: Consolidation phase — Betweenness in the Carbon Network

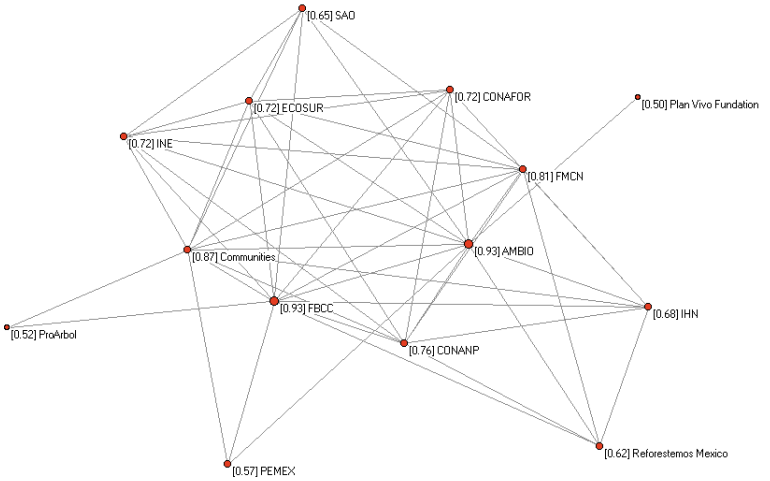

Figure 11.18: Consolidation phase — Closeness in the Carbon Network

in the *Scolel Te* project, the competition in the carbon market at local level also fostered a change in the distribution of power in the flow of financial capital. In the phase of expansion, even though AMBIO was the most central node in the flow of economic resources, PVF was the most important node because it allowed the connection of AMBIO with potential buyers at international level. That is, AMBIO had to pay a fee to PVF to access the international economic resources and PVF had a power advantage over AMBIO. However, the emergence of competitors in the carbon market at the local level and the high cost of connection at international level, led AMBIO to start looking for new alliances and reducing its fixed costs. Unfortunately, the result was that AMBIO decided to enter the unregulated market.

The story is as follows. Finding the cost of participation in the compliance market so high, AMBIO saw the need to change its strategies to be more competitive. It was recognised that if AMBIO wished to bring more participants to the *Scolel Te* project scheme it needed to increase the benefits for participation from the local communities' point of view. However, bringing people is not ease, specially because AMBIO faced an unfair competition in the local market. Initially AMBIO opted for a drastic simplification of the bureaucratic process to enter to the project. Under the new rule AMBIO requires a copy of the official identity card as the only entry requirement. This policy put *Scolel Te* in a clear advantage compared with entry requirements concerns with ProArbol. So, when communities/farmers cannot satisfy ProArbol bureaucratic process they can chose to enrol in the *Scolel Te* project. Even though this free entry policy has been quite successful, this was not enough to motivate participation in the *Scolel Te* proyect. Hence, AMBIO went further and decided to establish a strategic alliance with Reforestemos Mexico (RM). RM is a a fundraising organisation that intends promoting environmental activities among Mexican firms. Here, the strategic alliance between AMBIO and RM was the launching of the *Scolel Te* project in the carbon market at local level with the aim of increasing economic rewards for local communities and being more competitive in the carbon project.

In terms of social exchange, the new position of AMBIO in the flow of economic resources led to a reduction of the power advantage of PVF in the distribution of economic resources. In other words, AMBIO is no longer dependent on the resources

Figure 11.19: Consolidation phase — Degree in the Financial Network

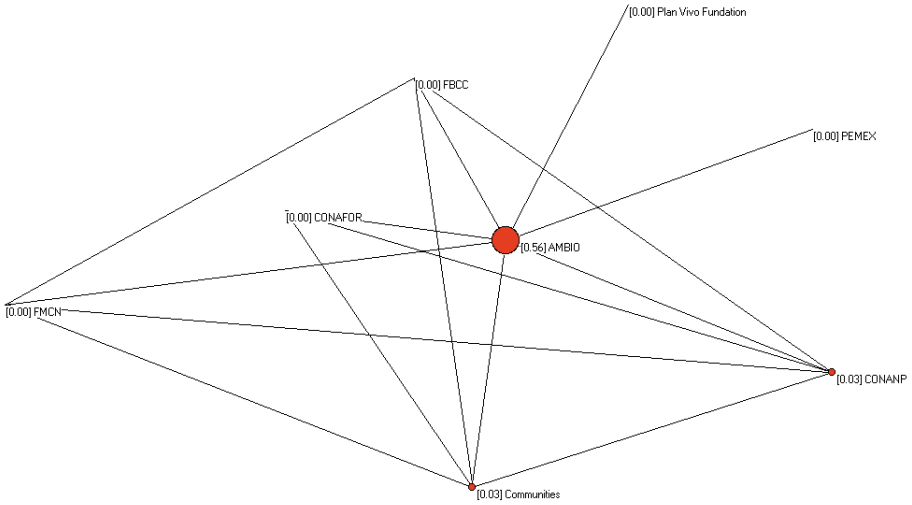

Figure 11.20: Consolidation phase — Betweenness in the Financial Network

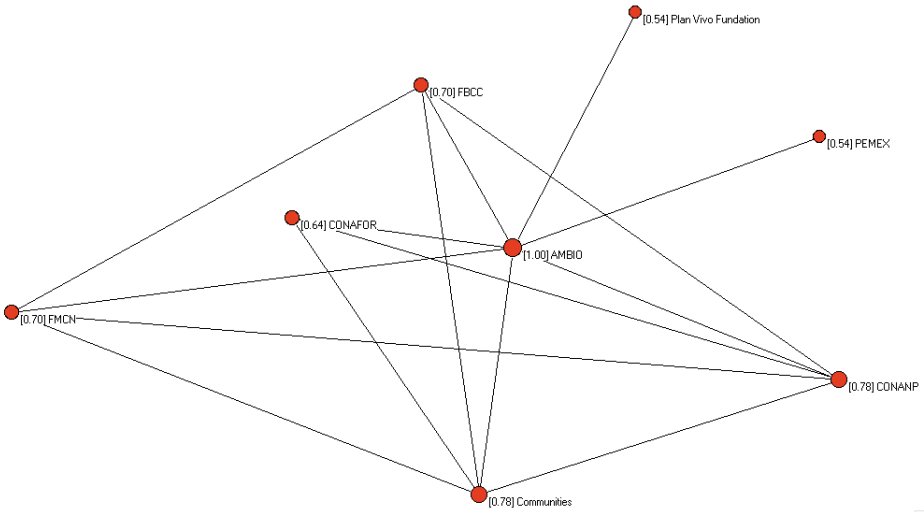

Figure 11.21: Consolidation phase — Closeness in the Financial Network

of PVF because RM offers an alternative way of bringing economic resources to the project. Indeed, the moment that AMBIO started its own commercial platform to sell directly the benefits in the local carbon sequestration market PVF lost its power over AMBIO. According to AMBIO the main motivation to work in the unregulated market is the difficulty in promoting the project in the international market, especially because the *Scolel Te* project can not work fully in the compliance market. So, AMBIO considered that it had more chances to boost the project in the local market where they can be more competitive. Because of this AMBIO is now looking to consolidate its carbon footprint project. AMBIO's idea is that they can evaluate and establish specific programs of carbon reduction according to the specific needs of their new local clients. In this context, the *Scolel Te* project will be the principal program to neutralise the emissions for local clients.

Despite AMBIO's intention to use the new commercial platform to improve the competitive edge of the *Scolel Te* project and the *Plan Vivo* system, the real risk is that AMBIO will fall into the inertia of the unregulated market. Indeed, maintaining discipline among actors and the quality of the services runs against the now ever more pressing need to reduce certification costs. This is very likely to occur if we take in account that local interest are constantly pressing to make the rules of the *Plan Vivo* system more flexible. In this context, the flexibility of the local carbon market and the lack of a local regulation body that can overseen the degree of acountability in the carbon sector in Mexico can create incentives to reduce the quality of the services in the *Scolel Te* project.

In the human capital network, this thesis found that the exchange of human capital in the *Scolel Te* project remained almost intact in terms of SNA and SET (see Figure 11.22, 11.23, and 11.24). Here, the power advantage of FPV over AMBIO has not suffered any modification, given that the *Plan Vivo* sistem is the principal methodology that defines the rules of the tree plantations and the measures of the carbon sequestration. In this context, AMBIO has to pay a fee to PVF for the property rights of the system. At local level, the distribution of human capital also remain unchanged. That is, all participants co-operate in the distribution of human capital with the aim of increasing the capabilities of the local communities.

In overall, the structural analysis of the *Scolel Te* network project shows that the

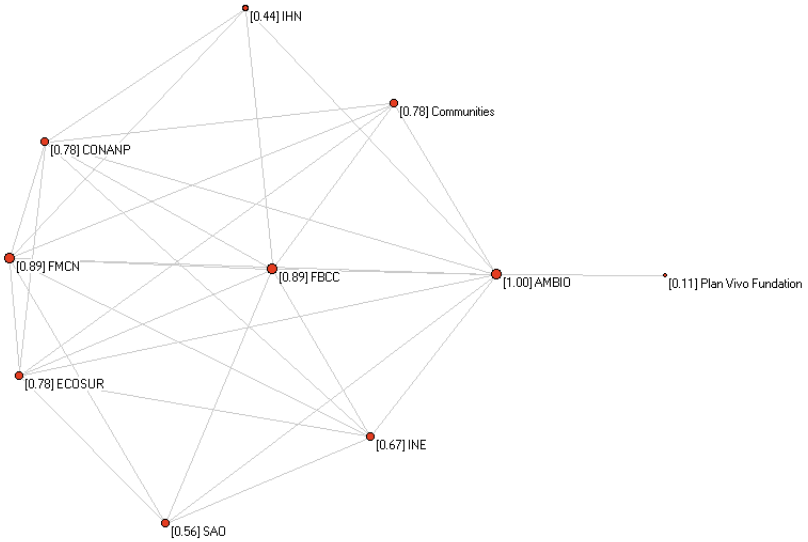

Figure 11.22: Consolidation phase — Degree in the H. Capital Network

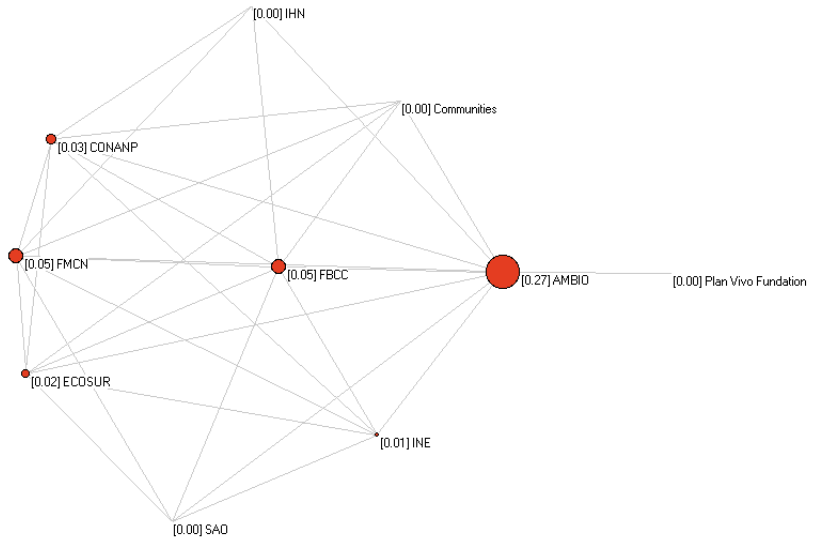

Figure 11.23: Consolidation phase — Betweeness in the H. Capital Network

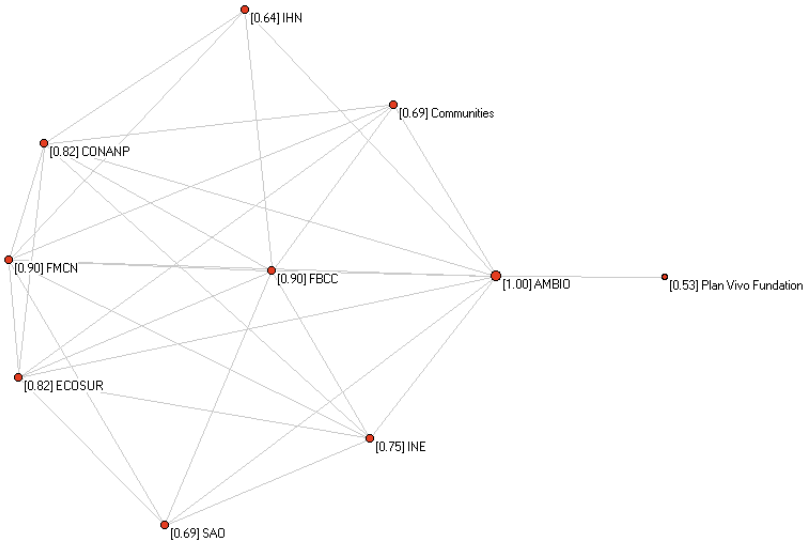

Figure 11.24: Consolidation phase — Closeness in the H. Capital Network

lack of accountability in the carbon market at local level have generated a reduction in the value of the carbon project and has created unintended incentives for actors to adopt less environmentally responsible strategies. On one side, the emergence of an unregulated local carbon market has allowed local communities to look for carbon projects with low commitment that represent less effort in terms of time and money. On the other side, AMBIO has incentives to move to the unregulated market given the high cost to participate in the regulated market and the need to make the project more attractive to the local communities. As a result, this thesis confirm that the lack of accountability and the high cost of compliance in the carbon sequestration market can lead to the derailment of the aims of the *Scolel Te* project . Moreover, the comparative analysis between social network analysis and social exchange in the determination of the power in the *Scolel Te* network come to different conclusions. SNA shows that AMBIO is the most central actor in the network. Indeed, the central position of AMBIO allows the connection between local and global actors in the distribution of economic and human capital in the network. However, this results contrast with SET. In this context, even when AMBIO is the most central actor in the network, AMBIO has little possibilities to exercise its power among local communities for two main reasons. The value of the tree plantations among local communities is low and the communities have better exchange alternatives in the carbon market such as ProArbol. As a result, AMBIO is the weakest actor in

the network even when it is the most central. Next chapter will offer conclusions.

Chapter 12

Conclusions

This Thesis evaluates the implementation of a tree plantation project in Chiapas, Mexico, called *Scolel Te*. We treat *Scolel Te* as a productive network because it involves a set of organisations, or collective *actors*, exchanging resources through formal and informal mechanisms with the aim of producing an outcome that is only possible through the co-ordination and co-operation of all participants. Each actor brings different resources and abilities such as land, economic resources and human capital. As a result, the *Scolel Te* can be treated as the structure of the network in which actors are embedded and have access to a set of available opportunities, such as information broadcasting, flow of resources, and influence. This Thesis studies how informal social mechanisms (also known as relational mechanisms), such as trust and reputation, create or solve co-ordination problems in the *Scolel Te* network. I analyse the *exchange* relationships among actors starting from the dyad (micro level), or the relationship between two actors, and try to identify the changes, or dynamics, of such relationships over time. Once the exchange relationships at a micro level are understood, an overall picture of the exchange relationships in the *Scolel Te* network is intended (macro level). I am particularly concerned in understanding how and why power in the network is exerted. Similarly, the Thesis describes how changes in the distribution of power among actors affect the functioning of the *Scolel Te* network. Specifically, I look at how individual interests and strategic alliances have the potential of derailing the aims of the environmental project.

This case study is both a qualitative and quantitative piece of research that uses Social exchange theory and Social Network Analysis (SNA) as a main theoretical

frameworks. The study collected Cognitive Social Structure (CSS) data which consist of collecting the set of beliefs/judgements that each participant of a network has about all other participants. I collected data by the application of a questionnaire and the conduction of semi-structured interviews. This study collected information from 35 local farming communities in the regions of Chiapas and Oaxaca, 6 environmental NGOs in Mexico and the UK, and 5 governmental organizations in Chiapas, Oaxaca, and Mexico City.

According to the field work and interviews, this Thesis found that communities assign value to the *Scolel Te* project according to three dimensions: (1) because its environmental benefits, (2) because of the resources derived directly form the trees, such as wood, and (3) because of the money that actors obtain by participating in the tree plantation scheme. These motivations have led the author to develop a parallel set of analytical categories. Namely, it is suggested that one could define three *ideal types* of community (actors): (i) environmentalists, (ii) resource seekers, and (iii) income seekers. This is just a theoretical taxonomy, as all communities are to certain degree environmentalists, resource seekers, and income seekers. However, by looking at the relative importance that each community gives to dimensions (1) to (3) we assign to each community a working label (i), (ii) or (ii), always keeping in mind that in reality the communities are always a combination of (i), (ii) and (iii). However, this classification is useful for understanding the dynamics of exchange in the *Scolel Te* network. We find that communities re-evaluate the value of the project over time, as they engage in the exchange process. This, in turn, implies a re-ajustement of their initial perceptions about the project. In this context, environmentalist communities become more rent seekers and therefore less committed to the project. Similarly, resource seekers become more environmentalist. Findings indicate that income seekers are the large majority of the participant communities but that they leave the project relatively soon. Hence, their numbers are heavily underrepresented in the data.

The findings suggest that implementing the policy of the Kyoto protocol with projects like *Scolel Te* is hardly a feasible alternative to generate sustainable development in the forest sector in Mexico. The structural analysis the *Scolel Te* network indicate that the local carbon projects in Mexico have difficulties participating in

the regulated international carbon market (CDMs) for two main reasons. First, the low value that local communities assign to the trees in terms of the economic and environmental benefits generate low participation and interest in the carbon projects in the long run. Second, the lack of accountability of the unregulated local carbon market at local level have generated a reduction in the value of *Scolel Te* project which is the most committed with the environmental protection and has created unintended incentives for actors to adopt less environmentally responsible strategies. Indeed, the emergence of an unregulated local carbon market has allowed local communities to look for carbon projects with low commitment that represent less effort in terms of time and money. Further, AMBIO project has incentives to move to the unregulated market given the high cost to comply with the international standards (monitoring and certification) that are required to participate in the regulated market. This makes AMBIO more competitive in the difficult task of recruiting communities to the *Scolel Te* scheme.

Results from the comparative analysis between social network analysis and social exchange in the determination of the power in the *Scolel Te* network come to different conclusions. For the SNA, AMBIO is the most central node in the network. Indeed AMBIO allows the connections between the local communities and the global actors in the distribution of economic resources and knowledge in the network. However, this result contrast with SET which indicates that even when AMBIO is the most central actor it is not, actually, the most powerful actor. True, the structural power advantage of AMBIO has been important to give it leverage to shape the rules of the game in the project. However, the analysis of the process of exchange in the *Scolel Te* project shows that AMBIO has difficulties to exert power among local communities for two main factors. The value of tree plantation among local communities is low and the communities have relevant alternatives for participating in other carbon projects which are cheaper and offer a better deal from their point of view. As a result, SNA shows that local communities have actually more power advantage than AMBIO because they are the principal resource of the *Scolel Te* project. They hold the land, have the labour, and are well socially organised over and above the links created by the *Scolel Te* network. Further, and most importantly, it is difficult to bring the local communities to the scheme. In a few words, the communities are a

scarce resource in the network and this simple fact give them a strong position to influence the behaviour of AMBIO. At international level, the lack of a commercial infrastructure makes AMBIO dependent of the international actors. Indeed, AMBIO must pay a fee to Plan Vivo Fundation if it wishes to sell carbon sequestration certificates in the international market and to find potential new global clients.

In terms of the dyadic analysis of the process of exchange this thesis found different outcomes. First, our findings indicate that the main co-ordination problem in the *Scolel Te* project is the generation of commitment among local actors in the long run. In this context, we find evidence that relaying on economic incentives as the main mechanism to bring and generate commitment among communities has failed to create stable exchange relationships in the middle and long term. Further, the case study shows that local communities are difficult to integrate into the carbon sequestration scheme. And that the recruitment is a slow process that delays the establishment of the project. Because of this AMBIO had to invest significant resources in time and money to establish a positive link/connection with local communities. At the bottom of the problem, this is a consequence a clash between a closed and tightly enforced form of social organisation and culture pre-existing in the communities and the open nature of the *Scolel Te*'s network. Indeed, the *Scoel Te* project intends bringing people to the scheme under the basis of free access, no matter where people come from or to which community they belong. That is, the project works as an open network. In contrast, communities' relationships are limited to people who know each other either because they are associated by the rules of land tenure (the ejido) or because they belong to a determined indigenous group — hence the closed nature of their social organisation, tied to a common holding of land, language, social norms, culture, and even blood line. Then, when communities start an association with outsiders, they tend to restrict the access to the community to unknown actors until they determine their trustworthiness. The better known an outsider is, the most trust is given. As a result, the generation of reputation in the local networks is a key element in the success of the *Scoel Te* project. However, generating reputation among local communities takes time.

In this context, this thesis found that relational mechanisms are the principal drive in the generation of relationships with local communities. In specific, trust

relationships between local communities and AMBIO has been the principal factor to extend the project in Chiapas and Oaxaca. This also implies that the environmental organisations have to adjust their own schedule to take in account the time dedicated to develop the relationships at the local level. Clearly, this situation slows down the process of implementation of the *Scolel Te* project with respects to the CDMs schedule. Indeed, the Kyoto protocol established a five year period to see results of CDMs. However, for the environmental NGOs in the forest sector in Mexico, such time has been used only in the generation of relationship among local communities in Mexico. Today, AMBIO is still building its reputation.

Results also indicate that the ability to generate real commitment between the local communities and the *Scolel Te* project depends highly on the degree of risk and costs that each community must bear to stay within the scheme. Type of land tenure, main economic activity, and pre-existing power relationships embedded at local level are the principal factors that determine the dynamism of the social exchange relationships and commitment in the long-run. Taking into account all of these elements, this thesis found that communities generate different forms of interdependencies with the *Scolel Te* project. That is, there are different mechanisms to generate commitment:

(i) complementarity dependencies emerge when actors depend on the resources and actions of their exchange partner to produce mutual benefits / rewards. Here the principal commitment mechanism is the impossibility to generate a benefit without the resources of the exchange partner. Examples of this in the *Scolel Te* project are communities which main economic activity depends critically on the trees, such as producers of organic coffee, communities with eco-turism, and some resource seekers.

(ii) Institutional arrangements. The principal example of institutional dependencies in the *Scolel Te* project are the communities who participate under the *Tequio system*. Under the *Tequio* actors are subject to the actions of the local authority, which becomes guarantor that the obligations undertaken by community members will be discharged. In others words, the exchange relationship is secured and sustained over time because pre-existing normative

mechanisms that exert power and discipline among actors is involved.

(iii) Relational dependencies. In the absence of a regulatory mechanism capable of safeguard the process of exchange, the structure of social relationships emerge as the mechanism that fosters co-ordination and co-operation among actors. This relations are based on trust, reciprocity, and reputation. Examples of this in the *Scolel Te* project are given by the communities that enter under the individual system.

(iv) Instrumental commitment. When actors' commitment depend exclusively on the flow of economic incentives or payments. Once, payments stop, commitments disappear as well. In terms of the *Scolel Te* project, this form of commitments is the most common among local actors.

The case study shows that even when the *Scolel Te* project considers the economic incentive as the main mechanism to generate commitment among local communities, such incentives play a small part in the development of commitment at local level. The economic incentives can play an important role when when the trees are little and vulnerable. However, the existence of economic incentives tend to promote the emergency of income seekers. That is, it fosters the emergency of instrumental commitment. Then when the economic incentive ended, the commitment of communities/farmers as well. In contrast, when commitment is achieved by other type of mechanisms it is possible to establish more stable relationships in the long run. Especially if the communal systemis involved. However, the promotion of the communal system has been rather limited because the environmental service sector gives more priority to the individual system. There is indeed a pre-conception that *diffused* property rights in the communal system cannot generate the right set of incentives to adopt the tree plantations. Clearly, findings of the case study suggest that the promotion of the communal system should be given more emphasis in the future.

We also find that introducing economic incentives can have undesirable consequences, especially if environmental organisations do not take in account the real dependencies between the communities/farmers and their natural resources. Given

the incentive, even environmental communities find it tempting to deplete their own natural resources due to the lack of reward for their conservation efforts.

Finally, there was evidence that a lack of understanding of the dependencies between local communities and tree plantations can be costly for NGOs and derail the international environmental policy. Much time and money is spent trying to implement policies that local actors cannot really cope with given their intrinsic characteristics and needs. This thesis shows that a "single size" do not fit everyone. Successful environmental policies cannot been planned in abstract at the highest international level without taking into account local knowledge of the ground. Future international efforts must promote agreements that allow enough heterogeneity of policy and local involvement so that a *menu* of approaches for local action are offered rather than the "single size fits everyone" approach taken in the Kyoto protocol.

The main limitation of this thesis is related to the retrospective way of collecting information about values and ties in the past, specially those that existed during the formation of the *Scolel Te* project. Clearly, having a retrospective view may be subject to recall biases and telescoping. This can, without doubt, introduce error in the data and hence in the analysis. We believe that this type of error, if present, is rather small. However, much detail about the dynamics of the dyadic relationships and the structure of the network can be gained by collecting longitudinal prospective data rather than retrospective data. The longitudinal data would allow to trace and study with more the detail the time dimension of the project. In the future, however, following a carbon sequestration project prospectively from the start and over its whole life span will be highly valuable given the opportunity.

To conclude, one of the most important finding of this thesis is that Social Network Analysis (SNA) and Social Exchange Theory (SET) offer complementary theoretical constructs of the workings of a social network, even though SNA and SET come to a very different result in terms of the power analysis in the *Scolel Te* project. It is our opinion that the theoretical differences of SNA and SET do not necessarily represent a limitation but rather an opportunity to produce a comprehensive and accurate explanation of power relations and dynamics in a social network. Specially, when a single theory fail to explain the whole aspect of power relationships in a network. For instance, SNA is more accurate to determine the structural power

of actors — i.e. the power of holding a given position in a determined network structure. This is a *macro* aspect of the network. However, SNA does not explain how power emerges and changes in the network — i.e. how and why the structure of a network emerges and evolves. In contrast, SET is accurate in explaining the dynamism of power in dyadic relationships. This is a rather *micro* aspect of the network. SET, however, fails to take an overall view where the structure plays a role in determining power. In this context, bringing SNA and SET predictions together opens new possibilities of explaining the micro and macro aspects of power in a social network. That is, clearly, a new field for developing in the future.

12.1 Contributions and political implications

This thesis shows that CDMs initiatives established by the Kyoto protocol has failed to generate an environmental governance that takes into account local needs in developing countries. The impossibility to connect local environmental issues with international environmental policies has led to a total co-ordination failure of the CDMs policy in the forest sector. Why do CDMs fail to attract local actors in the forest sector? The institutional design of CDMs generate a series of interdependencies among actors by creating a market that pays money for planting trees. However, this thesis found that the economic incentives are not producing the expected outcomes because of a series of factors.

First, the CDMs have not been established at local level because the adoption of tree plantation projects at local level is difficult. In fact, lack of commitment among local actors and high cost in the establishment of tree plantation has prevented the participation of the *Scolel Te* project in the CDMs scheme.

Second, CDMs leave little room for the interests of the local groups to be represented, directly or indirectly, in the international agenda. Indeed, the CDMs are designed to bring potential sellers of carbon sequestration into the international carbon market without considering that local actors are embedded within traditional societies that work with a logic which is different to that of a market. This thesis finds that generating and sustaining local actors' commitment with a carbon sequestration project is difficult because of the absence of real dependencies between the

tree plantations projects and the economic activities of local actors. Furthermore, this thesis finds that the main problem of the international environmental agenda is a lack of knowledge about the real dependencies between local actors and the natural resources in the design of the environmental policies.

Indeed, interdependencies between the natural resources and patterns of consumption at the local level are not taken into account in the logic of carbon projects. On the one hand, local farmers live in an agricultural system of subsistence where land tenure determines the logic of production such as the size of parcel, products, and type of labour (communal vs individual). This in turn determines local farmers' ability, in terms of costs and available resources, to engage in a tree plantation project. On the other hand, the international carbon market sets a single price and a single framework contract for all carbon sequestration projects across the world. Clearly, this fails to recognise local conditions of production and the heterogeneity in costs of production. So, the final result is the derailment of the policy.

This thesis shows that if the international environmental policies are to succeed in the future, it is paramount to take into account the local actors in the design of the policy. One size does not fit everyone. It is important to recognise the heterogeneity of resources, local institutions and practices, costs and needs of the people that are in control of the areas and have potential for implementing tree plantation projects.

Third, the carbon projects generate unstable relationships between the trees and farmers in the long-run because the permanence of trees depends on market participation decisions. This thesis shows that if trees are treated only as a means to supply carbon sequestration certificates to the carbon market, farmers tend to take decisions only based on the monetary benefits that they get from participating in the scheme. That is, if the trees are not an essential part of the local farmers' main economic activity, farmers value the trees only if they bring a monetary return. In this context, local communities keep going in the tree plantations project while they obtain a rent for planting trees. However, such weak relationship between the trees and farmers tend to lead to total failure if local communities consider that the benefits of cutting a tree is larger in relation to the cost of keeping it. In such a case, farmers have an incentive to cut the trees and pull out from the project. In this scenario, all actors lose and the environmental policy aim is derailed as well. In

contrast, if trees are an essential part of farmers' main economic activity or if the trees have a special meaning among actors, then carbon projects tend to generate more stable relationships in the long-run.

This thesis finds that the main problem of the current market approach to producing carbon sequestration in developing countries is that the current arrangements do not give chances to establish different kinds of contracts and prices for different kinds of actors and local conditions. Allowing for a contract heterogeneity and price adjustments to reflect local production conditions and farmers' needs are likely to generate more stable commitment to carbon sequestration projects. For instance, this thesis shows that carbon market mechanisms do not distinguish which kind of incentives are more effective to generate commitment among different types of farmers — environmentalist, income seekers, resource seekers . The economic incentives are the same for everybody and this generates perversive behaviour such as the emergence of income seekers that participate in the project only to obtain a stream of income or to burn the jungle to clear out land for entering the tree plantation scheme. Clearly, these perverse incentives erode the possibilities of local carbon projects to participate in the CDMs and in turn derail the CDMs aims in the forest sector.

Finally, the analysis of carbon sequestration projects in Mexico shows that the international environmental policy cannot have a single framework to deal with energy and forest together. We need a policy specially designed for the forestal sector that entails not only deforestation but also forests conservation, keeping in mind that deforestation and forest conservation are not only a matter of economic resources, but also a result of social processes. In this context, the few resources that local actors obtain for carbon sequestration are not enough to change the material conditions of people in developing countries. Poverty and self-subsistence system needs to be addressed in order to change patterns of consumption and deforestation at local level. Clearly, carbon sequestration projects play a small part in the sustainable development of local actors. In this context, the economic resources from the carbon projects help to reduce the everyday problems of people to fulfil their basic needs. However, people keep struggling to survive. For that reason, income seeker behaviour is rife in Mexican carbon sequestration projects given the lack of real

sustainable development initiatives. In this context, poverty reduction still remains as the missing link in the CDMs and the international environmental policy.

Appendix A: Interview

1. General information
   (a) What is the name of your organization/community?
   (b) Which is the role that you take in the organization?
   (c) How many people integrate the organization or community?
2. Access to the FBCC project
   (a) Since when the community have participated in the Scolel Te project?
   (b) How was the process to enter to the Scolel Te project?
   (c) As an organization or community had you had an internal or external problem to participate in the project?
   (d) Why did you decide to enter the project?
   (e) What benefits did you expect for taking part in the Scolel Te project?
   (f) Nowadays, do you consider that you managed to obtain the benefits that you were waiting or they changed?
3. Internal organizations of the FBCC project
   (a) What are the objectives of the project Scolel Te?
   (b) What are your aims in the Scolel Te project?
   (c) Do you consider that your goals have been achieved?
   (d) Explain how the Scolel Te project is organized internally.
   (e) What are your rights and responsibilities in the project?
   (f) How are the decisions taken within the Scolel Te project?
   (g) Can you participate directly in the decision making in the carbon project?
   (h) How is the process of negotiation among actors in the project?
   (i) Can you influence the decision making in the Scolel Te project?
   (j) How does the internal organization of the projec solve the conflicts?
   (k) Can you coordinate actions with other members in situations where there are no contractual obligations? Can you give me an example?
   (l) Is it fair the internal organization and the rules established in the project?
   (m) Do you feel represented in the project?
4. Resources
   (a) In what type of activities are you involved in the project?

(b) Do you provide some type of resources in the project such as knowledge, economic, social capital or the other?

(c) Do you have access to other resources by participating in the project?

(d) What resources do you consider are essential for your activity in the project?

(e) Do you have problems accessing these resources?

(f) Do you pay for gaining access to these resources?

(g) Do you consider that the members with the most valuable resources tend to have more influence than members with less valuable resources?

5. Costs and benefits

(a) Was it difficult to enter the Scolel Te project in terms of obligations?

(b) Did you stop doing something for taking part inside the project?

(c) What are the costs for taking part in the project with regard to going out?

(d) Do you consider that alliances with other members increase your profits?

(e) Have you changed your activities in the project to increase your benefits?

Appendix B: Questionnaire

1. Social Network Analysis

   (a) Name (organization, community, single member)

   _____

   (b) When did you enter to the project?

   _____

   (c) In which activities are you involved in the *Scolel Te* project?

   _____

   (d) Below there is a list of members (community, organization, person) that are part of the *Scolel Te* project. Please answer the following questions:

   - Thick in the box if you know directly.
   - Thick in the box if you do not know directly but you know through others ways such as a third person, or other communication ways such as email, internet, letter, phone, or other form.
   - Specify the activity of each member.
   - Please add the names of the members that are not in the list but you know are part of the project.

	Name	1.Know directly	2.Know through others ways	3. Activity
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

   (e) Think of four participants from the Scolel Te project (community, organization, or person) with whom you have the most closed contact, where 1 is the most important and 4 the last important, and specify: 1) which activity they do in the Scolel Te project; 2) where do you meet them; and 3) if the participants is a community member, organization member, or single person.

	Activity	Where/how you met	Type of organization
Participant 1			
Participant 2			
Participant 3			
Participant 4			

(f) Please indicate by ticking the appropriate box, which of the four participants named above have contact with one another.

	Participant 1	Participant 2	Participant 3	Participant 4
Participant 1 has contact with	[redacted]			
Participant 2 has contact with		[redacted]		
Participant 3 has contact with			[redacted]	
Participant 4 has contact with				[redacted]

(g) Do either you or any of your close contacts participate in any of the following activities?

	Not at all	Not very	Fairly	Very
Participate in an non profitable activity I have never done				
Participate in a profitable activity (where benefits are clear)				
Participate in a profitable activity (where benefits are uncertain)				
Participate in a profitable activity I have never done				

(h) Which of the following statements are true for you?

	Yes/No
There are members in the Scolel Te project that I can discuss work problems.	
There are one or more members in the Scolel Te that I can discuss personal problems.	
Members in the project include me in new activities and projects.	
I can always find a Scolel Te member to help me with a practical problem.	
I can only take decisions related with my direct activities in the project	
Members hears me in issues not related with my direct activity in the project	
Members and I discuss sometimes ours common problems in the project	
I feel represented in the project	
I am happy with my role in the project	
I am happy to be part of the project	
Members in the project keep my interests and needs in mind.	

2. Social Exchange

Think in one of the most important member with whom you exchange resources (economic, financial, information, advice, or other resource) in the Scolel Te project. Then respond the following statements by putting an "X" in the block that most accurately represent your opinion concerning your experience with this member in terms of the project activities. There are no correct responses; it is your own views that are important.

(a) Name (person, organization, community) who/which you exchange:

_____

(b) Type of resource that you exchange with this member:

i. _____

ii. _____

(c) How long have you known this member?

_____

1. Trust		1 Not at all	2	3 Some times	4	5 All the times
How often do you have contact with this member?						
You can count on this member						
You expect that this member follows its promises						
You expect this member tell you the truth						
You can sanction your partner if she/he incur in misbehaviour?						

2. Dependence		1 Not at all	2	3 Some times	4	5 All the times
There are other actors that can provide the same resource						
It is difficult to replace this member						
My activity will suffer greatly if we lost this member						
The support of this member is crucial to obtain this resource						
We are relaying on this actor to obtain this resource						

3. Coordination		Not very		Fairly		Very
How easy is to revise and modify the terms of the arrangement with my partner						
How easy is to resolve difference between what we want and the other party wants						
How easy is to communicate with this actor						

3. Justice		Very unfair		Fair		Very fair
How fair is my partnership exchange						
How fair are my obtained benefits						
How fair are my workload						
How fair are my assignments						
How fair are my costs						

3. Demographic questions

   (a) Male/Female/Organisation (specify e.g. NGO)

   _____

   (b) How old are you? (If it is applicable)

   _____

   (c) How would you describe your race/ethnicity? (if it is applicable)

   _____

   (d) What is your religion? (If it is applicable)

   _____

   (e) Location

      i. Country: _____
      ii. County: _____
      iii. City/village: _____

End of questionnaire, thank you for your help.

Appendix C: Communities visited and persons interviewed

Table C1.1: Communities visited and persons interviewed

Community/organization	Interviewees	Location
Agua Azul	Antonio Ruiz Hernandez	Ocosingo
Alamkantajal	Miguel Cruz Mendez	Chilon
AMBIO	Sotero Quechulpa Montalvo	San Cristobal de las Casas
Arroyo Palenque	Nicolas Rodriguez Lopez	Salto del Agua
Babilonia 2da Sec.	Domingo Rodriguez Lopez	Palenque
Cololil	Cristobal Diaz Trujillo	Tumbala
Cololtel 2do	Miguel Moreno Mendez	Chilon
CONAFOR	Roberto Ramos Torrez	Tuxtla Guttierrez
CONANP	Jose Hermenegildo Valdovinos Agala	Tuxtla Guttierrez
CONANP	Jose Feliciano Dominguez Hernandez	Palenque
Emiliano Zapata	Mateo Velazquez Vazquez	Salto del Agua
FMCN	Juan Manuel Faustro Leyva	Mexico D.F.
Fondo Bioclimatico	Elsa Esquivel Bazan	San Cristobal de las Casas
Frontera Corozal	Fernando Martinez Lopez	Ocosingo
Juznajab	Gonzales Perez Garcia	Comitan
Hidalgo	Miguel Guzman Sanchez	Tumbala
Horizonte	Manuel Lopez Guzman	Tumbala
INE	Aquileo Guzman Perdomo	Mexico D.F.
IHN	Emerit Melendez Lopez	Tuxtla Gutierrez
La Tronconada	Pascual Montejo Diaz	Salto del Agua
Los Angeles	Olirio Santos Gutierrez	Villa Flores
Los Laureles	Rafael Lopez Hernandez	Comitan
Metzabock	Mincha Valenzuela Sanchez	Ocosingo
Mukenal	Antonio Gomez de Meza	Chilon
Naha	Miguel Garcia Cruz	Ocosingo
Nueva Argentina	Manuel Gomez Juarez	Maravilla Tenejapa
Nueva Rudulfo	Jose Lauro Ton Alvarez	Maravilla Tenejapa
Nuevo San Isidro	Efrain Lopez Martinez	Marquez de Comillas
PEMEX	Carlos de Regulas	Mexico D.F.
Plan de Rio Azul	Gonzalo Perez Perez	Maravilla Tenejapa
Plan Vivo Foundation	Alexa Morrison	Edinburgh, Uk
Punta Brava 2da Sec.	Gazpar Sanchez Montejo	Salto de Agua
Community/organization	Interviewees	Location
Quexil	Pablo Cruz Jimez	Chilon
Rio Jordan	Miguel De Aragomez	Salto de Agua
San Felipe Jatate	Fernando Aguilar Torrez	Maravilla Tenejapa
Maximo Manzano Martinez	Santiago Teotlasco	Ixtla de Juarez, Oaxaca
San Luis	Mario Diaz Perez	Ocosingo
San Juan Metaltepec	Ciriano Aragon Cortez	Santiago Zacatepec, Oaxaca
SAO	Carlos Marcelo Perez Gonzales	Oaxaca, Oaxaca
Samaria Kantajal	Geronimo Gomez Perez	Chilon

(Continued on Next Page)

Table C1.1 – Continued

Community/organization	Interviewees	
Tehuacan	Arnolfo Perez Peñate	Tumbala
Tierra y Libertad	Abimalez Cabrera Perez	Villa Flores
Villa las Rosas	Manuel Hernandez Giron	Ocosingo
Yaluma	Fernando Lopez Aguilar	Comitan
Zaragoza	Cristobal Cruz Lopez	Ocosingo

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