

The social impacts of carbon markets in Costa Rica

A case study of the Huetar Norte region

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Abstract

This study assesses the impacts of the payments for environmental services (PES) programme in Costa Rica in relation to reforestation activities for the establishment of carbon sinks. The methodology used is the Sustainable Livelihoods Approach (SLA), which is based on five assets: financial, human, social, physical and natural. The study shows that the PES programme has had a significant impact on financial assets, not so much through the payments themselves but from the income expected from timber sales. The payments have acted as a catalyst for reforestation programmes, covering some of the initial outlay. However, the high transaction costs and obstacles to joining the scheme can preclude access to the PES for some of the most vulnerable groups who are dependent on other government programmes for their survival (e.g., peasants in receipt of housing support). There have been important benefits in terms of human assets through the provision of technical assistance and through 'learning by doing', particularly in relation to reforestation. The PES programme has had a considerable impact on social organisation, encouraging alliances between NGOs and providing the financial and human capital to consolidate objectives in organisations working with small producers. There has been a positive impact on the recovery of forest landscapes in the area, contributing to improvements in natural assets, which in turn has brought benefits for tourism. There have also been negative effects, particularly in relation to physical assets, including the deterioration of existing infrastructure such as roads and bridges, through increased use.

Acronyms and abbreviations

ACOPE	Costa Rican Association of Energy Producers
AGUADEFOR	Guanacaste Association for Forestry Development
AIJ	Activities Implemented Jointly
APAIFO	Association of Agro-industrial and Forestry Producers
CACSA	Agricultural Centre of the Canton of Sarapiquí
CATIE	Tropical Agricultural Research and Higher Education Center
CCF	Forestry Chamber of Commerce
CDM	Clean Development Mechanism
CERUPT	Certified Emission Reduction Unit Procurement Tender
CIFOR	Center for International Forestry Research
CODEFORSA	Forest Development Commission of San Carlos
COP	Conference of Parties
COSEFORMA	Cooperation in the Forestry and Timber Sectors
COSUDE	Swiss Agency for Development and Cooperation
CTO	Certified Tradable Offsets
FERCO	Central American School for Reforestation
FONAFIFO	National Forestry Finance Fund
FRP	Forestry Research Programme of the UK Department for International Development (DFID)
FUNDECOR	Foundation for the Development of the Central Volcanic Mountain Range
GHG	Greenhouse gas
IDA	Institute for Agricultural Development
JUNAFORCA	National Rural Forestry Board
MINAE	Ministry of Environment and Energy (formerly Ministry of Natural Resources, Energy and Mines)
NGO	Non governmental organisation
OAS	Organization of American States
OCIC	Costa Rican Office for Joint Implementation
OLAFO	Conservation Project for Sustainable Development
ONF	National Forestry Office
PROCAFOR	Regional Forestry Programme for Central America
PROSIBONA	Silvicultural Project for Natural Forests
PES	Payment for Environmental Services
RHN	Huetar Norte Region
SINAC	National System of Conservation Areas
SUDESCA	Sustainable Development Strategies for Central America
TRANSFORMA	Project for Technology Transfer and Promotion of Professional Training in Natural Forest Management
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

1 Introduction

International demand for carbon credits opened up a wide range of possibilities for developing countries during the 1990s when carbon credits from forestry projects and other sources of efficient energy (hydroelectric, wind, solar or biomass) became a new feature of the market.

Although markets for trading these services are not yet fully established, in principle, developed and developing nations are eager to participate. The former includes those countries that address the problems of climate change by ‘buying time’ while seeking to implement the technological changes required to reduce polluting emissions in the atmosphere. The latter consists of the countries interested in participating in the flow of international funds from these innovative markets in order to establish their own sustainable development projects. However, there remain difficulties, partly because society has yet to learn how to deal with intangible commodities. As with traditional markets, this new market will have to be based on the principles of transparency, acceptance and trust.

There has been much debate about the opportunities and constraints of carbon markets, with a number of different perspectives on the subject at global level. Positions vary from the view that carbon markets could provide an excellent opportunity for developing countries to move towards sustainable development through the employment of international funds (Richards 1999), to assertions that this type of market is merely a mechanism for delaying the urgent structural changes that the industrialised countries must implement (Dutsche and Michaelowa 1997). Other arguments put forward are that carbon markets are a form of ‘carbon colonisation’; or a way of evading the requirements established by the Kyoto Protocol; or a way of acquiring the right to continue polluting.

The above points of view are based on a social concern that transcends mere economic trade. Therefore an approach is being sought that would enable carbon credits both to reduce air pollution and ease rural poverty in developing countries.¹ However, a number of factors make the process of developing carbon markets complicated and slow, including biophysical uncertainties, power relationships, increased pollution, and differences in philosophy, culture, living conditions, and, particularly, income distribution.

This report concentrates primarily on the experience with carbon markets in Costa Rica and on some of the social consequences of this experience. The report focuses on reforestation activities as a means of providing carbon sinks and as a source of sustainable development for a community in the Huetar Norte region (RHN), which is the region of Costa Rica most involved in forestry.

The report is organised into five sections: the introduction briefly presents the, objectives, the main issues and the methodology. International markets for carbon credits are discussed in

¹ According Miranda, Glasbergen and Dieperink 2002, carbon markets can be considered: ‘... to include a new type of social organisation, regulated by well defined rules within a wider social context. Development of this market will depend on the context and the impacts. The effects could include access to carbon credits, and new finance and investment opportunities. Carbon markets could enable developing countries to both conserve their environment and make it productive through this conservation. This productivity should not just be considered from an economic point of view but from a social and environmental one. Thus, a carbon market could also be considered to be a “green market”’.

the second section. The third section discusses national carbon markets and the participants therein, and Costa Rica's pioneering role in these markets. Section 4 deals with some of the socio-economic impacts of the PES in Huetar Norte region. The concluding section discusses the financial, social, natural, human and physical assets of the reforestation activities in the RHN and ends with an analysis of CO₂ markets in Costa Rica.

1.1 Objectives of the study

The principal objective of this study is to summarise Costa Rica's experience of carbon markets. The study also aims to contribute to the knowledge of the development and operation of carbon offsets markets through an analysis of specific experiences. It also briefly analyses the impacts of the carbon credits market on the basis of the Sustainable Livelihoods Approach (SLA). The main topic explored in this report is the capacity Costa Rica has developed for accessing international carbon markets. Other issues addressed are:

- what carbon offsets markets are;
- the state of the carbon offsets market internationally;
- the participants;
- the opportunities and risks;
- how carbon offsets markets have developed in Costa Rica, and their features; and
- the socio-economic and environmental impacts of the carbon offsets market in Costa Rica

1.2 The Sustainable Livelihoods Approach

The impact of the Payment for Environmental Services (PES) programme on the community is studied by observing the impact on the financial, social, natural, human, political and physical assets that the community possesses, on the basis of the Sustainable Livelihoods methodology.

The framework for the Sustainable Livelihoods methodology was developed by the UK Department for International Development (DFID) in the 1990s as a diagnostic tool to analyse projects aimed at reducing poverty (DFID 2001). It is based on the recognition that livelihood strategies include multiple components and are based on the availability (or lack) of financial, human, natural, social and physical assets.

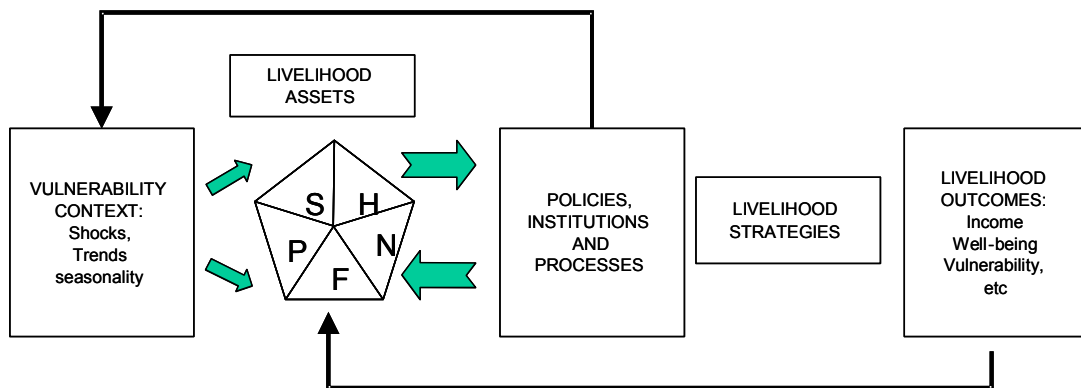
- Financial assets: e.g., capital flows, savings, credit supplies, regular remittances and pensions;
- Human assets: including skills, knowledge, ability to work and good health;
- Natural assets: land, water, wildlife, biodiversity and wider environmental resources;
- Social assets: including social resources (e.g., networks, partnerships, trusted relationships, access to social institutions) and political assets which determine the ability to influence decision making; and
- Physical assets: basic infrastructure (transport, shelter, water, energy and communications) and production equipment.

This framework integrates individual and domestic vulnerability to the environment, such as shocks, trends and seasonality, within a wide political and institutional context, which

includes government organisations, the private sector, law, culture, policies and institutions, all of which affect livelihood strategies and influence livelihood outcomes (see Figure 1.1).

While the framework is useful in providing a graphic representation, it is not intended to tell the livelihood story for all situations, and varies according to the situation. In some cases, division of the different assets is more theoretical than practical. Moreover, the benefits derived from a particular resource will rely to a large extent on how they are combined with other assets, e.g. machinery and skilled labour, as well as the existing institutional framework.

Figure 1.1 The focus of the sustainable livelihoods approach



Source: based on DFID (2000) and Landell-Mills and Porras (2002).

1.3 Data collection

An exhaustive review of existing information was carried out and primary information was collected. Visits were made to documentation centres in government agencies, universities, research institutes and some NGOs. It was necessary to carry out *in situ* work to determine the social impact of the markets due to the scarcity of published information on the subject. Individual and group interviews were conducted in September, October and November of 2002. Representatives from central government, the Costa Rican Office for Joint Implementation (OCIC), the Foundation for the Development of the Central Volcanic Mountain Range (FUNDECOR), the Forest Development Commission of San Carlos (CODEFORSA) and the National Forestry Finance Fund (FONAFIFO) were interviewed. Work was also carried out individually with landowners in La Virgen, Las Palmitas, Puerto Viejo in the sub-region of Sarapiquí, and landowners in Coopevega, Moravia, La Cascada, San Joaquín and Rio Tico in the sub-region of San Carlos.

Focus groups were held in Sarapiquí² on 30 October 2002, in which seven re-foresters participated, and in Coopevega,³ on 31 October 2002) where ten participated. Both of these

² Sarapiquí is a canton of the province of Heredia.

³ The Community of Coopevega is located in the district of Cutris in the canton of San Carlos which forms part of the province of Alajuela.

communities are within the Huetar Norte region.⁴ The guidelines followed in these focus groups were based on the Sustainable Livelihoods methodology (see Table 1.1). Relevant questions were submitted and discussed widely by the participants to obtain their views and ideas regarding reforestation activities. This method is not aimed at reaching a consensus, but rather at allowing participants to articulate their knowledge and opinions in a less formal environment than that of an interview, and to gather information in a more interactive way than the traditional survey. A focus group is not simply a discussion group; it needs to be planned carefully and to be based on the objectives of the research; the participants should be homogeneous and number between six and twelve.

Table 1.1 Guidelines for the focus group in the Huetar Norte Region

Type of Asset	Related Questions
Financial	How have you benefited from the reforestation programmes? How would you describe these benefits? What are the main benefits? What do you think was the cost of acquiring the aforementioned benefits? How was the income generated by reforestation activities invested? What has been the impact on land prices?
Human	Has reforestation encouraged better quality education and health? Have the beneficiaries received technical assistance? Has reforestation affected the labour market?
Natural	Can you identify changes in the landscape as a result of the reforestation activities (including changes in agricultural technology and production methods)? Have the participants increased the value of their forestry assets? Have there been impacts on other natural resources, e.g., biodiversity, water and scenic beauty
Social and political	What effect has the group work created around reforestation? Have local people acquired greater access to decision making powers through the reforestation programme?
Physical	Has reforestation stimulated investment in local infrastructure (e.g., communications, transport, electricity)?

⁴ This region makes up 18.04% of the national territory and is formed of the cantons of San Carlos, Guatuso, Los Chiles, Upala and Sarapiquí.

2 Contextual framework of the carbon market

2.1 The international context

There is a growing consensus among the global scientific community that climate change is a real and dangerous phenomenon: the economic anthropogenic growth strategies of the last two hundred years have produced an increase in the concentration of greenhouse gases (GHGs), such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and chlorofluorocarbons (CFCs), in the atmosphere. GHGs absorb heat radiated from the earth's surface and the increased concentration of GHGs has a negative effect on the thermal structure of the atmosphere.

An increase in the presence of GHGs, principally CO₂, has been observed since the industrial revolution (WBCSD Latin America 1999). This increase is caused mainly by the emissions produced by the burning of fossil fuels and biomass, and by the destruction of natural CO₂ sinks.⁵ The concentration of GHGs, particularly CO₂, has caused an increase in the average global temperature.

According Loguercio (2001), there has been an increase of more than 25 per cent in the concentration of GHGs in the atmosphere in the past 50 years. Taking into account both emissions of CO₂ and absorption by natural sinks, such as seas, forests, and other vegetation, the net annual total of emissions in the atmosphere is 3,000 million tonnes. As a result of this increased concentration of CO₂ the greenhouse effect has become more acute, causing an increase of approximately 0.6° C in the earth's average temperature since the beginning of the industrial era. This has caused changes in physical, meteorological and environmental processes, which in turn has had economic, social and environmental impacts. Flooding in certain regions, severe draughts in others and an increase in tornadoes and hurricanes are all attributed to this phenomenon.

In addition to increased GHG emissions, millions of hectares of natural forest have been converted to other land uses. Deforestation in Central America in 1990 was estimated at 416,000 hectares a year (Lindergaard and Segura 1997). Carbon emissions and deforestation were examined in order to obtain a global perspective on the problem and thus implement strategies directed towards climate change mitigation. These strategies were developed in 1992 during the Earth Summit held in Rio de Janeiro, where the United Nations Framework Convention for Climate Change (UNFCCC) was established. The aim of this convention was to reduce the emission of greenhouse gases to a level at which there would be no risk of producing serious climate changes (article 2 UNFCCC 1992). The framework consists of protocols that specify the exact measures to be taken to mitigate the risks of climate change.

An annual meeting known as the Conference of the Parties (COP) was established to discuss and implement measures to reduce GHG emissions and reduce the effects of global warming.⁶ A pilot phase was set up in Berlin (1995-2000) to comply with the measures established by the UNFCCC. The projects developed during this initial stage did not consider a reduction in the quota of emission of GHGs. For this reason, few industrialised countries

⁵ Vegetation during the process of photosynthesis and the ocean during the process of liquid-gas exchange consume CO₂ from the atmosphere.

⁶ The first COP was held in Berlin in 1995, followed by Geneva (1996), Kyoto (1997), Buenos Aires (1998), Bonn (1999), The Hague (2000), Marrakech (2001), New Delhi (2002), Milan (2003). COP 10 is to be held in Buenos Aires in December 2004.

implemented measures. Two years later, during the conference in 1997, the Kyoto Protocol was signed.⁷ The Kyoto Protocol established explicit and mandatory limits on industrialised and transitional nations' (Annex 1 countries) emissions⁸, setting out three potential flexibility mechanisms permitting emission rights trading: the Clean Development Mechanism (CDM), allows the generation of Certified Emission Reductions from projects in non-Annex 1 countries (i.e., developing countries outside the capping regime); the International Emission Trading mechanism allows Annex 1 countries to trade emission permits; and the Joint Implementation (JI) mechanism allows countries to earn Emission Reduction Units through projects in other Annex I countries. The Kyoto Protocol opened up the possibility of green markets through emissions trading between countries. Emissions can be reduced through improved forest management, forest conservation and protection, development of clean energy projects, or by increasing carbon sequestration and storage through reforestation/afforestation and forest management programmes. The sequestration of carbon and the emissions averted through the reforestation programmes are considered to be compatible with investors' commitment to climate change.

After four years of negotiation following Kyoto, the Marrakech Accord was signed in Morocco in November 2001 at the COP 7. This accord revived the possibility of carbon markets, despite the refusal of the United States to ratify the Kyoto Protocol. The uncertainty over ratification of the Kyoto Protocol undermined the development of carbon markets until the signing of the Marrakech Accord when the countries of Annex I and II were clearly established to ensure that the CDM complied with the commitments of UNFCCC. Various sources of funding have recently been created⁹, including increased funding for the global environment, a financing fund especially aimed at climate change, and bilateral and multilateral channels.

Since the Marrakech Accord, the European Union, Switzerland, New Zealand, Canada and Norway have provided US\$410 million annually to fund adaptation to climate change. This funding will be used to manage adaptation, technology transfer, energy, transport, industry, agriculture, forestry and waste, as well as for developing activities to address diversification of the economy in developing countries.

The CDM is a component of the Kyoto Protocol and promotes carbon reduction projects in developing countries through energy efficiency and forestry projects. The agreement reached in Morocco established that CDM projects had to be 'additional'¹⁰ and that forestry projects could only be for afforestation and reforestation activities. Forest protection projects do not qualify under the CDM, and at present, no framework exists for implementing forestry conservation projects.

Without the United States' ratification the Kyoto Protocol is not so attractive for Latin American countries. The United States would have the greatest demand for emissions trading and for the implementation of the CDM. Some of the poorer Latin American countries are hoping that the United States will return to the negotiating table, although there is still the

⁷ The Kyoto Protocol is the international legal instrument under which markets for environmental services, such as carbon emissions trading, is permitted. To date, 96 countries have signed. The United States, one of the major global polluters, has not yet signed the agreement.

⁸ These are the countries listed in Annex 1 of the UNFCCC.

⁹ UNFCCC/COP7/2001/ held in Marrakech.

¹⁰ Additional means that the emissions reductions are additional to any that would occur without the CDM project.

possibility of establishing bilateral projects within the Joint Implementation framework given that the United States is a signatory of the UNFCCC. Some members of Congress and major US companies, for example, car manufacturers, have been urging President Bush to join the international community in combating global warming. The reaction of the automobile industry may be due to increased environmental awareness, but it could also be because of the fear of consumer boycotts as has already happened in other industries when the views of international consumers have been ignored.

Many poor countries have been eagerly awaiting the development of the emissions market. Developed countries have yet to create the instruments and structures needed to institutionalise effective participation in emissions markets. Several specialists from Central America support the Marrakech Accord and consider it to be an effective means through which to develop a carbon offsets market.¹¹ Southern countries could help to control GHG emissions and at the same time develop new economic activities, such as reforestation programmes. Tatemback (2001) suggests that the CDM could generate US\$100,000 million from the market. There is potential to market 250 million tons of carbon. Now that an international council for the CDM has been established, the international community is hoping for a credible mechanism and infrastructure to launch this market.

The quantity of carbon that forests can produce is measured in metric tons. The capacity of the carbon sinks is then converted into Certified Tradable Offsets (CTOs) which can then be marketed. CTOs are defined as a fixed amount of reduction in GHG emissions and are measured in metric tons of carbon (mtC). One mtC is equivalent to one mtG of pollution. Developed country governments and are the potential buyers of these CTOs. Some initiatives have already begun at global level. Prices have been set by each country involved (Table 2.1).

¹¹ Juan Carlos Godoy, Guatemala, Franz Tatemback, Costa Rica and Ana Maria Majano, El Salvador

Table 2.1 Carbon prices in some AIJ¹² projects (US\$)

Seller country	Buyer	Name and type of project	Price US\$/mtC
Costa Rica	Norway	PJIACR Reforestation Project Forest protection	10
Bolivia	American Electric Power, USA	Noel Kempff National Park Forest protection	0.5
Ecuador	GRF	Forest protection	3-4
Guatemala	AES Thames, USA	Reforestation	1
Paraguay	AES Barber Point, USA	Agroforestry and forestry preservation	1.5
Malaysia	NEES	Sustainable forestry	2
Russia	Tenaska, USA	Afforestation	1-2
USA	Pacific Cooperation, USA	Sustainable forestry	5

Source: Otarola and Venegas (2000)

2.2 The national context

2.2.1 Evolution of the legislative framework

It is difficult to assess Costa Rica's carbon offsets markets in isolation because they are classified as part of the Payment for Environmental Services (PES) scheme, which considers the four environmental services provided by forest ecosystems together: carbon sequestration, watershed protection, landscape beauty and biodiversity protection. The majority of carbon projects have been aimed at protection.¹³ Reforestation began as a carbon sequestration activity, mainly as a means of halting deforestation and replenishing the supply of scarce natural timber in the tropical forests. Reforestation is also considered to be an additional economic activity. Because of its small size, Costa Rica is unable to store significant quantities of carbon, and consequently, investment in Costa Rica's economy will not be significant. Reforestation gained importance as a carbon offsets activity at the COP 7 meeting in Marrakech.

Costa Rica has played an important role in the area of carbon markets. Its main contribution in the establishment of carbon markets has been its institutional capacity as a pioneer in accessing the market and implementing a system of payments for environmental services. Initially, the country took a gamble on the potential of these markets for achieving sustainable development. Although Costa Rica has developed and tested a legal, institutional

¹² Activities Implemented Jointly (AIJ) is a pilot programme of joint implementation that began in 1995 (see 2.2.2 for a detailed description).

¹³ The joint implementation project carried out in Costa Rica was aimed mainly at protection. At present, reforestation has other purposes besides carbon markets.

and operational structure and has carried out research on its physical stock of carbon, clarification is still needed about participation in the CDM.¹⁴ Through its pioneering role in Activities Implemented Jointly (AIJ) (see 2.2.2 for a description of AIJ) and the sale of the first batch of Certified Tradable Offsets (CTOs) to Norway, Costa Rica has gained valuable experience in markets for carbon offsets.

To understand why Costa Rica has such an advantageous position and is, to some extent, the leader in the area of markets for environmental services, it is necessary to review her evolution in terms of perception, protection and evaluation of natural resources.¹⁵ Although only a small country, Costa Rica was a pioneer in several Joint Implementation projects (see Table 2.1) and also developed the institutional capacity that enabled her to be recognised globally in the areas of markets for environmental services and environmental awareness. Costa Rica was the first country to implement a national programme of payments for environmental services and the first to begin Activities Implemented Jointly.

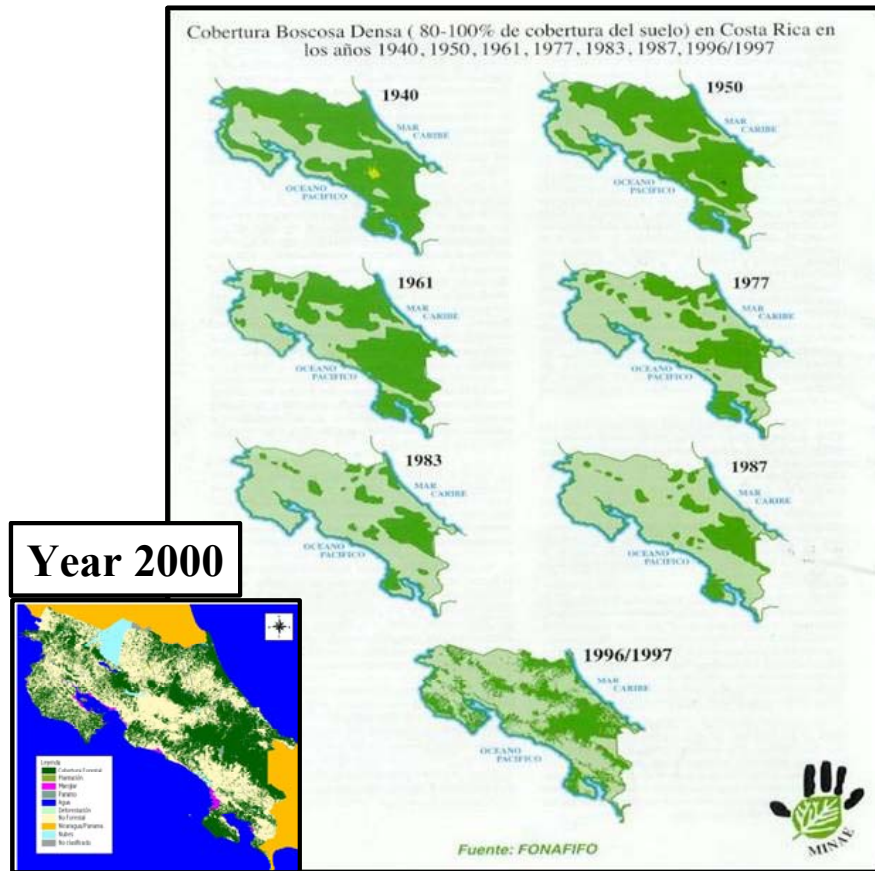
Costa Rica experienced one of the highest rates of deforestation during the 1970s and 1980s and large-scale logging destroyed a large part of her native forests. In 1950, more than 50 per cent of Costa Rica's territory was forest, yet this figure had dropped to 25 per cent by 1995. Approximately 60 per cent of Costa Rica's forest, an area totalling 1.2 million hectares, is privately owned; the remainder is made up of national parks and biological reserves. Some studies indicate that 80 per cent of the deforested area, almost all located in private land, was converted to pasture and agriculture.

This change in land use was mainly caused by inappropriate policies, including small credits for livestock, legislation on property rights that encouraged deforestation and rapid expansion of the road network. The incentive policies have since been cancelled and Costa Rica has become one of the world leaders in sustainable environmental development. It has only been since the early 1990s that the country has radically changed its environmental policies. Deforestation fell to 8,000 hectares a year in 1993 and to 4,000 hectares a year in 1994. According to PNUMA-MINAE (2002), deforestation fell from 60,000 hectares during the 1970s and 1980s to 3,000 hectares in 2002. Figure 2.1 illustrates why Costa Rica has become one of the foremost exponents of sustainable development. It shows that, while only 25 per cent of its territory was covered by forest in 1980, this rose to 40 per cent in 1997, and by 2002 Costa Rica had attained 46 per cent forest cover (Rodríguez 2002).

¹⁴ Costa Rica has gained valuable experience in sustainable certification but needs to develop a certification system in order to obtain CDM projects.

¹⁵ Costa Rica forms part of the tropical geographic bridge between North and South America and is situated between the Pacific Ocean and the Caribbean. There is a variety of climatic regions and landscapes within its small territory, due to the range of mountains which run from north to south, sometimes reaching an altitude of 3,820 metres. Sixty per cent of Costa Rican territory is suitable for forest development owing to the extreme climatic conditions and the characteristics of the soil. The complexity of the geographic micro-climates and micro-regions is reflected in the enormous biodiversity found in Costa Rica. Although Costa Rica represents only 0.035 per cent of the earth's land mass, scientists estimate that between 3 per cent and 7 per cent of all species live within this territory. Protected areas cover almost 25 per cent of the national territory.

Figure 2.1 The process of deforestation and recovery of forest cover



Source: FONAFIFO

Costa Rica began internalising environmental values in the 1960s with the enactment of the first forestry law. During the next two decades the Forest Incentives Programme was developed. These incentives provided valuable experience to all the participants in the programme, and evolved into the Payment for Environmental Services programme in 1996. Table 2.2 details the development of funding instruments for forest activities in Costa Rica. The fundamental principle of the PES scheme is no longer that of simply regarding the forest as a source of timber, but as a valuable ecosystem. Thus, the activities undertaken in forests should be regarded as tangible assets. Costa Rican Forestry Law No. 7575 (1996) recognises the four main forest services in economic terms: greenhouse gas mitigation (fixing, reduction, sequestration and storage of carbon); watershed protection (for rural, urban and hydroelectricity benefits); biodiversity protection, both for conservation and for scientific and pharmaceutical use (use in genetic research and improvement and protection of ecosystems and wildlife); and protection of landscape beauty for the purposes of tourism and science. These services are paid for jointly through conservation and reforestation activities.¹⁶

¹⁶ Although the Forest Law establishes the framework for paying landowners for reforestation, conservation and sustainable forest management, the latter was recently removed by the Ministry for the Environment and Mines (MINAE)

Table 2.2 Financial instruments for forest protection and development

Name	Legal Basis	Purpose	Target groups	Activities required	Nature of the incentives
Deduction of income taxes (1979)	Forestry Law 1969	Halt deforestation for agriculture & pasture	Owners of primary forests	Halt the change in use of land	Tax exempt status for land under this regime
Soft credits (1983)	Forestry Law 1969	Reforestation	Owners of non forest land	Comercial tree planting	Low (8%) durable interest rate (up to 30 years) for loans with a grace period of 10 years
Title of payment for forests (1986)	Forestry Law 1986	Reforestation	Owners of natural forest	Comercial tree planting Funding of total planting cost	Subsidies in the form of tradable bonds for the reduction of taxes
Municipal Forestry Fund (1986)	Forestry Law 1986	Promote forestry activities	Municipalities and local organisations	Planting trees, begin managing water reserves, begin care of trees, build infrastructure	Tax on felling (20 %) subsidies for forestry activities
Certificate of Forestry Credit (in advance) (1988)	Forestry Law 1986	Promote reforestation	Organisation of owners of non-forestry lands	Comercial tree planting Funding of total planting cost	Subsidies in the form of tradable bonds for the reduction of taxes
Certificate of Forestry Credit for the management of forests (1994)	Forestry Law 1990	Promote management of natural forests	Owners of natural forests	Preparation of the management of tree planting, improvement of road network, preparation of forestry and harvesting practices	Subsidies in the form of tradable bonds for the reduction of taxes
Certificate of Forest Protection (1996)	Forestry Law 1990	Protection of natural forests	Owners of natural forests	No logging for at least 20 years prior to application	Subsidies of US\$50 per hectare p.a. for an initial period of 5 years
Environmental Services Payments (1996)	Forestry Law 1996 (note)	Recognition of environmental services provided by forestry ecosystems	Small & medium size landowners	Development of protection, reforestation and sustainable forest management	US\$201.60 per hectare p.a. for protection, US\$516 per hectare p.a. for reforestation and US\$314 per hectare p.a. for sustainable forest management

Note: As a result of this law, opportunities for landowners to develop new forest activities were strengthened. This law is the result of a process of forestry incentives in which the interested groups took an active part. The Certificate of Forest Credit was created in 1986 to promote reforestation; the Certificate of Sustainable Forest Management was established in 1990; and the Certificate of Forest Conservation was established in 1995.

Source: Miranda et al. 2002

2.2.2 Carbon projects in Costa Rica

As mentioned previously, Costa Rica has gained valuable experience in the development of carbon markets. First, it played an active role in the pilot phase of Joint Implementation; second, through this, it encouraged awareness of climate change issues in the Central

American region for the first time; third, it was the first country to trade CTOs in international markets; and finally, it has a permanent seat on the Executive Board of the Clean Development Mechanism. The country has developed the capacity, the formal institutional framework, and the competitiveness to enable it to participate in the carbon offsets market.

Following the UNFCCC in 1992, Costa Rica began to prepare in earnest to take part in Activities Implemented Jointly (AIJ), a concept introduced by UNFCCC. Regarded as an innovative way of developing economic cooperation between countries from the North and South for obtaining a reduction in emissions of greenhouse gases, AIJ is the international mechanism that allows companies or agencies in industrialised countries to invest in projects in developing countries that reduce emissions of greenhouse gases. Since the Kyoto Protocol, Activities Implemented Jointly have largely been superseded by Clean Development Mechanism projects.

The principal objective of AIJ is to produce quantifiable long-term environmental benefits aimed at mitigating climate change which would not occur without this type of activity. The pilot phase was developed between 1995 and 2000. The Centre for Sustainable Development in the Americas (1996) describes the purpose of AIJ as follows:

- to identify and initiate profitable opportunities for reducing the global rate of GHG emissions. Since the costs of reducing emissions vary from country to country, AIJ allows industrialised countries to carry out these activities in other developing countries at a lower cost than it would be able to do at home. In other words, AIJ will produce quantifiable long-term environmental benefits, aimed at the mitigation of climate change, which would not happen if this type of action were not implemented;
- to support, promote and sustain human and economic development. AIJ can direct investment projects towards sustainable development by influencing the distribution of private capital. This contributes towards improving the relationship between a country's economic base and the development of new markets for energy efficient technologies and greenhouse gas reduction; and
- to promote other environmental objectives locally, nationally and regionally, such as protection of water sources, improvement of food production, biodiversity protection, and improvement of forest yields.

At the beginning of the 1990s, Costa Rica adopted sustainable development as its economic model. Shortly thereafter she adopted the concept of joint implementation and began preparing different sectors for active participation in AIJ - first the forestry sector (Table 2.3), followed by energy and coffee. Projects were implemented jointly with the United States, Norway and Holland. The AIJ pilot phase in Costa Rica was developed with an investment of US\$158.4 million (OCIC 2000).

The first joint implementation activity was carried out with the Norwegian government in 1996. This project was known officially as the Reforestation Conservation Activities Implemented Jointly Project (RFCAIJP), and was established through a bilateral agreement between Costa Rica and Norway. The basis of this project was the exchange of carbon offsets for money, and it formed part of a larger project aimed at the improvement of one of the most important watersheds in the country. This was done through forestry activities and improvements in energy supply (Miranda et al. 2002a). Norway bought 200,000 hectares of

Costa Rican tropical forest for US\$2 million for the purpose carbon storage.¹⁷ Costa Rica used this money to implement a programme called the Environmental Improvement Project whose objective was to contribute to the environmental improvement of the Virilla watershed.

The Virilla river is vitally important for the production of hydroelectric energy and its watershed supplies one of Costa Rica's most populated regions with drinking water. After the first five years of the RFCAIJP, the impacts, both positive and negative, on financial, natural, social and human assets were assessed in Miranda et al. (2002b). Through this AIJ project, Costa Rica demonstrated the potential for marketing carbon credits internationally as well as the potential for establishing a formal programme that could achieve social, economic and environmental benefits.

Table 2.3 Joint Implementation forestry projects in Costa Rica

Name of project	Type of project	Area (Ha)	Total cost (US\$ million)	Duration (years)	Emissions Reduction (mt C)	Carbon storage (mt C ₀)
ECOLAND	Conservation	2,340	1.0	15	345,548	1,267,124
KLINKI	Reforestation	6,000	3.8	40	1,968,000	7,216,656
CNFL	Conservation	4,000	3.3	25	313,646	1,150,139
	Regeneration					
	Reforestation					
P.A.P	Conservation	530,000	150.0	25	18,000,000	66,000,000
EARTH	Reforestation	530,000	0.334	20	4,493	16,474
TOTAL		542,461	158.434	125	20,631,687	75,650,393

Source: OCIC 2000

The AIJ projects strengthened the country's human capacity for developing carbon markets and other related projects. Costa Rica submitted the Ecomercados project to the World Bank in May, 2000. Under this project the country would receive US\$8 million to increase conservation of national forests through the development of markets and suppliers of environmental services from privately owned forests. Through Ecomercados, the National Forestry Finance Fund (FONAFIFO) would be able to offer incentives to forest owners located in buffer zones and interconnected biological corridors under existing forms of protection.¹⁸ The projects are for carbon storage, reduction of carbon emissions, watershed and biodiversity conservation, and maintenance of landscape beauty.

Another example of this type of project is the project sponsored by KFW, a German bank. The KFW would pay approximately US\$11 million to develop the PES programme in the north of the country. This contribution would finance the development of protection, reforestation and natural regeneration activities over 43,000 hectares in the Huetar Norte region. The project was due to begin in 2001, but because of external difficulties FONAFIFO started the project without the KFW funding and, to date, only 50 per cent of the project has been carried out (Table 2.4). Similarly, a Dutch bank purchased 800,000 tons of carbon. It invested US\$ 4.5 million to avoid emissions through renewable energy. The Costa Rican Institute of Electricity (ICE) invested this income from carbon offsets to develop the Tejona wind energy generation project, located in Tilarán, Guanacaste.

¹⁷ The US\$2 million from the AIJ project with Norway was invested in reforestation and protection of the water source of the River Virilla, located in Costa Rica's Central Valley.

¹⁸ Costa Rica has identified seven different categories of nature conservation: national parks, biological reserves, wildlife sanctuaries, forest reserves, protected areas, wetlands and private reserves.

Table 2.4 FONAFIFO Investment in the KFW Project October 2002

Forestry activity	Number of contracts	Hectares	US\$
Protection	189	19,000	
Forest management	51	4,200	
Reforestation	68	3,588	
Total	380	26,788	3.5 million

Source: FONAFIFO 2002

Four of the seven projects presented by public and private Costa Rican organisations qualified as potential CDM projects. They are hydroelectricity from El Encanto and Peñas Blancas, bio-gas from the River Azul and a project called ICESA from a cement company. The owners of these projects will be the direct beneficiaries in the event of obtaining CDM project status (Manso 2002).

Findings from a field trip to the Huetar Norte region of Costa Rica (October and November, 2002), suggest that small-scale forestry projects are very important for gaining experience in land management strategies for erosion control, prevention of landslides and averting sedimentation of water channels. Reforestation activities also enable local communities to consolidate their knowledge of forest management and environmental services, and thus value the forest. Table 2.5 summarises this paragraph.

Table 2.5 Benefits of JI and CDM: investors and developing country

Benefits for the investor	Benefits for the country
Options for mitigating emissions at a reasonable cost	Attracts otherwise inaccessible additional foreign capital
Opportunity to explore investment abroad in a positive political environment	Transformation to modern renewable efficient technologies
Opportunity to pioneer a new funding mechanism	Advance in the development of energy technologies
Public relations value	Capacity building, particularly in knowledge of renewable technologies and sustainable forestry and agriculture
Attractive investment potential with good rate of return	Creation of additional jobs and sources of income, especially in rural areas
Direct involvement in the creation of national and international climate policies	Export of renewable goods (reduction of emissions)
Opportunity to collaborate in reducing domestic emissions of GHGs, taxes and legislation	Funding for sustainable development projects which would not otherwise be implemented
Opening-up of new technology markets that respect the environment	Benefits for the local environment such as improvement in watershed quality, reduction in contamination and protection of biodiversity

2.2.3 Participants in the national market

Direct participants in the carbon markets in Costa Rica can be divided into four different groups: government, civil society (represented by NGOs), the academic and scientific community, and the landowners who carry out forestry activities through the carbon markets.

The government

MINAE-SINAC, OCIC and FONAFIFO form the Costa Rican state framework for the development and implementation of the carbon offsets market. The Ministry of the Environment and Mines (MINAE), created in 1987, is the main organisation responsible for

natural resources in Costa Rica. In the mid-1990s, MINAE created the National System for Conservation Areas (SINAC) with the aim of dispersing and decentralising the management of natural resources.¹⁹ Two organisations were created in the process: the Costa Rican Office for Joint Implementation (OCIC) and the National Forestry Finance Fund (FONAFIFO). Both have played an important role in the creation and marketing of carbon offsets. OCIC and FONAFIFO follow MINAE thinking but operate as distinct autonomous institutions.

The Costa Rican Office for Joint Implementation (OCIC) was created and assigned to MINAE in July 1995. It provided support to the private sector and civil society. Organisations like the Coalition of Initiatives for Development (CINDE), the Foundation for the Development of the Central Volcanic Mountain Range (FUNDECOR) and the Costa Rican Association of Energy Producers (ACOPE) provide financial support. The OCIC is made up of five members who act as technical officials and take the decisions. They can propose policies, criteria and formulation mechanisms to evaluate, approve, promote and market projects for setting and reducing levels of greenhouse gases.

The main role of the OCIC is to promote bilateral agreements for the development of financial mechanisms to promote and market joint implementation and CDM projects. OCIC receives funds from the international carbon market and distributes them to the National Forestry Finance Fund (FONAFIFO) subject to satisfactory evidence of carbon sequestration or reduction of carbon emissions through PES. OCIC also issues tradable bonds, known as Certifiable Tradable Offsets (CTOs), to foreign AIJ investors as confirmation that emissions of CO₂ have been averted or sequestered by means of the investment. Each CTO represents a certain quantity of carbon and will be guaranteed by the Costa Rican authorities for a period of 20 years. OCIC offers technical assistance and advice to both private and public companies that are preparing CDM projects. Costa Rica pre-qualified for four CDM projects from the 96 that were submitted worldwide for funding from CERUPT, the Dutch government's carbon offsets purchasing programme.

FONAFIFO is another of the principal bodies dealing with carbon offset-related activities. This is a subsidiary of MINAE and was created by the 1996 Forestry Law. This organisation is responsible for promotion, implementation, evaluation and the administration of the Payment for Environmental Services programme.²⁰ Its main objective is 'to obtain funding for the Payment for Environmental Services programme and other activities required to develop the natural resources sector' (Forestry Law No. 7575). FONAFIFO obtains funding from several sources. The principal source is the tax on fossil fuels, which has been increased by the state. The fund receives 3.5 per cent of these taxes annually (approximately US\$ 8.6 million a year). FONAFIFO also raises money from the sale of carbon bonds in the international market, for example to Norway. It also receives funds from the Global Environment Facility (GEF) to protect the land in the Mesoamerican Biological Corridor. It receives further funds from private hydroelectricity companies interested in measures to prevent erosion in the water reserves where the generating plants are located.

¹⁹ Decentralisation involves the creation or revitalisation of local elected bodies. It is unlikely to succeed unless these bodies control some of the resources. Dispersal involves the transfer of operating responsibilities from the central ministry to sub-units outside the capital (Carney and Farrington 1998).

²⁰ Until October 2002, FONAFIFO shared the responsibilities of operating the Payments for Environmental Services programme with MINAE. The executive board designated FONAFIFO as solely responsible for implementation of the programme in 2002.

A drinks company has recently decided to contribute to the Payment for Environmental Services programme for forests located in the river Segundo watershed. This money is transferred to landowners in this region through the PES scheme. FONAFIFO is seeking additional funds from industry and from the National Institute of Aqueducts and Sewerage Systems (A&A), particularly since not all applications for PES, especially those aimed at protection, can be granted (Miranda et al. 2002).

Civil Society

Civil society has been well represented by the NGO Foundation for Development of the Central Volcanic Mountain Range (FUNDECOR). Established with funds from USAID in 1991, FUNDECOR deals with unsustainable use of natural resources in the central part of the country, and has played an important pioneering role since the 1990s in setting up and implementing institutional environmental agreements for sustainable development in the forestry sector. It has also created innovative funding instruments aimed at supporting forestry activities. In relation to the carbon offsets market, FUNDECOR has both gained experience in Costa Rica and shared its knowledge and experience worldwide.

FUNDECOR has played an important role in the promotion and implementation of PES in and around the Central Volcanic Mountain Range and in the Sarapiquí region in the northern plains. With FUNDECOR's help, the private hydroelectricity company Global Energy entered into a voluntary environmental agreement to protect its watersheds in the north. FUNDECOR also offers free consultancy services and technical assistance to small and medium-sized landowners interested in reforestation.

Other organisations have been part of the capacity building process within the carbon offsets market. They include the National Rural Forestry Board (JUNAFORCA) which has 56 affiliated organisations with a membership of 28,511 small and medium forest producers. The Costa Rican Chamber of Forestry Commerce (CCF), made up of more than 140 forestry companies (reforestation companies, forest owners, primary and secondary forest industry and service companies).²¹ The National Forestry Office (ONF) is an organisation that was created by legislation to represent the interests of the private sector. CCF and JUNAFORCA are represented in the ONF along with ecological and artisanal groups. Local organisations include CODEFORSA, AGUADEFOR, APAIFO, regional agricultural centres, the Tropical Science Center, the Neo-tropical Foundation and others. Further information about these types of organisation can be found in the Directory of Social Organisations published by the Arias Foundation (1998).

The academic and scientific community

There is a large number of organisations in Costa Rica with considerable capacity in the identification and evaluation of forest ecosystems. Most of these are universities, schools and academic and research institutes, and the main ones are: the National University (UNA), the Technological Institute of Costa Rica (ITEC), the University of Costa Rica (UCR), the State University for Distance Learning (UNED) and the Agricultural School of the Humid Tropics (EARTH), the Tropical Agricultural Centre for Research and Education (CATIE), the Inter-

²¹ The private forestry sector is made up mainly of small and medium-sized businesses. The average area being put to good forest use is 50 per cent nationally; 33 per cent of the area under cultivation belongs to small forest owners. In 1996, 65 per cent of these farmers owned cultivated areas of less than 100 hectares.

American Institute for Cooperation in Agriculture (IICA), and the Central American Institute for Economic Administration (INCAE).

The National University, through its Forestry Engineering programme and the Institute for Forestry Research (INISEFOR), has accumulated a great deal of experience in forest management research and education, and has developed important extension projects related to the management of tropical ecosystems. Through its International Centre for Economic Policy for Sustainable Development (CINPE), it has made an important contribution to the introduction of sustainable development into national affairs. It organised jointly with the International Society for Ecological Economics (ISEE) the 'Down to Earth Congress' in 1994, in which Costa Rica demonstrated its interest and capacity in valuing natural capital to the international community. The congress was the catalyst for redirecting the country towards sustainable development. CINPE contributes to the training of professionals in Central America and the Caribbean, and has recently carried out important research on markets for environmental services and the social impacts of carbon markets (Miranda 2001b, Miranda et al. 2002a, Miranda et al 2002b, Segura 2000, Camacho et al. 2001, etc.). CINPE has also carried out valuation of natural resources.

The University of Costa Rica, with funding from the German Cooperation Agency (GTZ) and the Inter-American Institute for Cooperation in Agriculture (IICA), proposed an Integrated Index of Sustainability for the Natural and Agricultural Resources Sector for Latin American and Caribbean countries in 1993. With the United Nations Development Programme (UNDP), it established the Observatory for Development (OdD) in 1997 with the aim of identifying gaps and carrying out information initiatives (Gutiérrez, 1998).

CATIE has been conducting research and education on ecology and forestry in tropical forests since 1984 and has also played an important role in establishing principles, criteria and indicators for sustainable management and certification of forests. It has carried out scientific research on the measurement of carbon and on other subjects related to the carbon market, the findings of which have been disseminated widely by the various participants. Its active role in the international debate about carbon markets is widely acknowledged.

The project Estado de la Nación (State of the Nation for the Sustainable Development of Humanity) is the fruit of joint efforts by the European Union, the local office of the United Nations Development Programme, the Public Ombudsman's Office, and public universities. This project established a Forestry Programme, whose aim is to design a global strategy for financing sustainable forest management. The programme promotes national and international policy development, and seeks new financial mechanisms to achieve sustainable management of tropical forests (UNDP 1999).

Forest owners

Landowners and forest owners are key participants in the development and application of markets for environmental services, since they represent these resources. They have responded actively and enthusiastically both individually and as a group to the development of the environmental policies and other government programmes directed towards sustainable development. Forestry activities have been implemented throughout the country and landowners are increasingly protecting, reforesting or managing natural forests.

With the establishment of the incentives system and the PES over the last two decades, a process of protecting and regenerating existing forests was initiated (Figure 2.2). At the same time, reforestation began to be promoted.

The RHN is one of the most developed forest regions in Costa Rica. The typical size of a small property is less than 30 hectares. Primary and intermediate forests, secondary forests and plantations make up a significant part of the RHN landscape. Private primary and intermediate forest account for more than 105,000 hectares while secondary forest covers an area of 20,000 hectares. An area of 31,000 hectares was planted with native species for commercial use, under the Costa Rican incentives programme (Figure 2.2). Exotic species such as melina, terminalia, eucalyptus, teak and pine form part of the landscape of the San Carlos micro-region and native species such as laurel, almond, golden fruit, cancho, oak, mahogany, manú, and the jícaro have mainly been planted in Sarapiquí. Although this region constitutes just 18 per cent of the total territory of Costa Rica, it represents 43 per cent of national timber consumption (COSEFORMA 1996). Forest development is continuing with the PES programme. According to FONAFIFO (2002), during the first four years of the programme, 4,700 hectares were dedicated to reforestation, 20,248 hectares were converted to protected areas and 8,371 hectares of natural forest came under more efficient control. Forestry is one of the main sources of income in the area, along with tourism and production of pineapple, sugar cane, lemon, ornamental plants, cassava, coconut and meat. Another major source of income is hydroelectricity production. There are several hydro-power stations in the area.

The RHN is one of the most advanced regions in terms of the implementation of the PES programme in Costa Rica. Some of the important factors that the region can avail of are knowledge and experience, social organisation and the availability of funds and infrastructure (Miranda et al. 2002).

Stakeholders have built up valuable experience of financial instruments since the Government of Costa Rica began promoting reforestation in the 1980s and sustainable forest management at the beginning of the 1990s. Thus the region already had knowledge of forestry activities by the 1990s when various organisations began to develop forest conservation techniques and programmes in Central America and, particularly, in Costa Rica and the RHN. These organisations include: PROCAFOR, PROSIBONA, TRANSFORMA, OLAFO and COSEFORMA.²⁴ The Central American School for Reforestation (FERCO) has also provided training for technicians and farmers in this area. New methods for, amongst other things, valuing ecosystems, measuring CO₂ in sinks, carbon market opportunities, were also designed and introduced. As a result, some innovative options for forestry emerged, with the participation of NGOs, landowners and MINAE/SINAC.

national and international banana companies deforested the land. At the same time, landless peasants began to invade private properties, mainly the large ones, and a process of 'peasant resettlement' (*recampezinación*) began. Through the National Institute for Agricultural Development (IDA), the state established 50 small isolated rural communities, known as peasant settlements. During the following decade, these community groups responded positively to the forestry activities promoted by the state and other organisations.

²⁴ Costa Rican researchers play an active part in some international research programmes, financed by Germany (COSEFORMA), the United Kingdom (DFID Forestry Research Programme), Denmark (SUDESCA), Austria (PROSIBONA), Norway, Sweden and Denmark (OLAFO). Collaborative research with the Netherlands has also begun. CATIE has concentrated its research efforts on implementation of FSC principles. FERCO was created to train people in the use of the new skills for everyday forestry activities.

The important role played by civil society in the RHN with regard to reforestation is illustrated by the fact that the process of peasant resettlement was established spontaneously. Some of the people involved in these illegal occupations were the drivers of the first forms of civil and national social organisation.

This process has given people useful skills and experience in such areas as community group work, and has created confidence in NGOs. Consequently, the groundwork in terms of social organisation was already laid for the local NGOs - the San Carlos Timber Development Corporation (CODEFORSA), the Association of Agro-industrial and Forestry Producers (APAIFO), the Agricultural Centre of the Canton of Sarapiquí (CACSA) and the Foundation for Development of the Central Volcanic Mountain Range (FUNDECOR) - to implement the PES programme in the RHN.²⁵ The NGOs promoted PES among local landowners and encouraged them to participate in this new economic activity. The landowners overcame their doubts thanks to the economic benefits provided by the state through the local NGOs. The availability of additional funds was also an important factor in the RHN implementing the PES programme.

In addition to FONAFIFO's efforts to finance the programme, other organisations showed interest in financing certain activities carried out by landowners in particular areas, even when there was no legal title to the land (Miranda et al. 2002). Voluntary agreements with the hydroelectricity sector have become another source of finance for PES in the region.²⁶ Both local and private hydroelectricity companies are investing in watershed protection to prevent erosion and improve water quality. The Global Environment Facility (GEF) and the German bank KFW have offered additional funds. The GEF provides economic assistance to the Meso-American Biological Corridor, and KFW is investing US\$4 million in forest protection and development activities. For each hectare submitted to the programme KFW will finance 70 per cent of the payment, and FONAFIFO will finance the remaining 30 per cent.

Basic road and communications networks were originally developed for primary timber processing. Although the timber factories began processing wood from primary forests, they quickly adapted to processing timber from plantations. Shortly afterwards, the Rolly²⁷ company was set to supply the RHN and other regions of the country.

Finally, a factor directly related to the above is the stakeholders' capacity to change their attitude towards development, and particularly sustainable development. Civil society (through NGOs, the academic community, community and municipal groups, amongst others), private industry, and the government have participated in a joint initiative to find strategies to protect the remaining natural ecosystem, restore degraded landscapes and develop new economic forest-related activities. The government has started a process of institutional change based on the concept of participatory development through decentralisation and dispersal, and this has been welcomed by the RHN. The government is now sharing or even transferring responsibility for activities that were previously under its exclusive control. Carney and Farrington (1998) suggest that the institutional changes lead to

²⁵ Although FUNDECOR and CODEFORSA are local NGOs, both are highly professional. The former concentrates its activities in Sarapiquí while the latter operates in San Carlos.

²⁶ Miranda 2002 discusses the role of voluntary environmental agreements, as an innovative instrument for Costa Rican environmental policies. It also refers to new relationships in environmental management.

²⁷ Rolly is a small business in the Huetar Norte region which produces timber processing machinery.

‘social efficiency’. These institutional changes seek a balance between environmental, economic and social aspects, which will guarantee that the communities’ needs are met without over-exploiting natural resources.

The combination of the above factors encouraged local landowners to alter their land use and thus benefit from the PES. As a result, agriculture and cattle ranching now share the regional landscape.

3 Opportunities and risks

International discussions on the subject of carbon markets began shortly after the Activities Implemented Jointly (AIJ) were established as tools for reducing atmospheric pollution. One issue that emerged was whether it was ethical to continue to contaminate the atmosphere in exchange for income - or investment - in poor countries, instead of reducing the global levels of gas emissions.

Representatives from some industrialised countries and some international agencies agree that 'green' markets enable them to contribute to the implementation of projects aimed at mitigating the effects of greenhouse gases, by financially backing developing countries. Northern nations can thus participate in the sustainable development of Southern countries. The United States, Switzerland, the Netherlands, Canada, Germany, Norway are among the developed countries that are financing reforestation projects in the South.

According to the World Bank (1997), developing countries can have developed countries as their financial partners in the implementation of greenhouse gases mitigation projects. Industrialised countries can develop activities in conjunction with other countries to eliminate or reduce GHG emissions. The World Bank created the Prototype Carbon Fund, based on the potential market for services and certified emissions reductions. The transactions are estimated to be in the range of tens to hundreds of millions of dollars a year. Some Dutch and German banks have begun to get involved GHG emissions markets in developing countries. The Canada Climate Change Development Fund (CDFCC) was created in 2000 with an initial budget of \$100 million to promote activities in developing countries to address the causes and effects of climate change and to contribute to sustainable development and poverty reduction. This fund has financed projects in carbon sinks in Central America.

Carbon markets are being promoted as an innovative means of foreign investment (Miranda 2001). Some of these activities within the carbon markets generate Certified Emission Reductions (CERs) which can be sold on the international market. Argentina, Colombia, Bolivia, Brazil, Uruguay, Mexico, Chile, Guatemala and Costa Rica see carbon markets as an important opportunity for obtaining funding for sustainable development. Panama, El Salvador and Guatemala are preparing the necessary national infrastructure to participate in these 'green' markets. Panama set up a pilot project for the Punta Patiño Nature Reserve (PPNR), which is to be financed mainly by the Saskatchewan Consortium of Canada.²⁸ This project was established with support from the CDFCC (PPNR 2001). Approximately 2,144,518 metric tons of carbon will be sequestered over an area of 15,000 hectares of sustainably managed forest.

Another example of this type of activity is the Mi Bosque project, developed in Guatemala under the administration of CARE with funding from the Electricity Services Agency in the USA. This is a bilateral project committed to the management and conservation of communal forests and the development of communal forestry activities. In addition, an agreement was signed in July 2001 between the US Treasury Department and the Government of El Salvador under the Conservation of Tropical Forests Act through a debt-for-nature swap. Under this

²⁸ The Saskatchewan Consortium is made up of public and private sector organisations and is coordinated by Conglobal Management Inc.

agreement the US Treasury Department acquired US\$14 million of El Salvador's debt in exchange for carbon sequestration activities to reduce the effects of global climate change.

MacDicken and Smith (2000) also maintain that the carbon markets, by means of the CDM '... can benefit local communities significantly by supplementing and diversifying incomes, increasing access to forestry goods and services...'. It is important to bear in mind that in most developing countries land tenure is a significant issue, and that the peasants tend to own very small plots of land on which they grow fast-growing crops to earn a living. However, sustainable land use and improved forest management is possible. It has already been demonstrated that sustainably managed forests can contribute to improvements in rural areas, especially when land use has changed from cultivation of low yield crops or pasture to reforestation or agroforestry, if carbon offset payments are received. New employment opportunities are another potential source of income.

However, some international NGOs, civil society organisations, and researchers do not believe that 'green' markets are the best way of reducing GHGs, because the developed countries are not reducing the GHG emissions from their industrial activities. Greenpeace, the World Wildlife Fund, Friends of the Earth, Climate Action Africa and the Bangladesh Centre for Advanced Studies see carbon markets and the CDM as a way of evading the climate change commitments of the Kyoto Protocol (WRM 2000). These organisations formed part of the group that was vehemently opposed to the CDM during COP 6 in The Hague and was largely responsible for the decisions taken at this conference.

The group changed its position considerably in relation to CDM between COP 6 in The Hague in November 2000 and COP 7 which took place in Bonn in July 2002. They agreed that a solution to global warming was urgently required. The WWF made known to the international community its new position and acknowledged that the political treaty established a solid framework for the Protocol and provided countries with a good base to ratify and reduce GHG emissions (Kerr 2001). Similarly, Greenpeace wrote '... the Protocol continues to be a mechanism of vital importance in tackling the harmful effects of global warming and its rejection indicates the lack of initiative on the part of the world's only superpower'. Greenpeace urged the United States and Japan to ratify the Kyoto Protocol (Leipold 2001).

Boscolo et al. (1999) and Chomitz (1998) defend the use of 'green' markets during the transition period until technological changes can reduce the cost of improvements in energy efficiency and eliminate fossil fuel emissions. They emphasise that the carbon markets are a temporary and partial solution to atmospheric contamination.

The main concern about carbon projects is that if adequate precautions are not taken, some forestry projects could impede access to natural resources. Large-scale reforestation or forest protection projects can have a negative effect on rural people because the change in land use could reduce access to land that previously provided basic sustenance for the poor in rural communities. Reforestation does generate employment but it does not compensate for the loss of access to land.

There is opposition to the inclusion of hydroelectricity within the carbon offsets market because '... the approval of projects for generating carbon credits will transform the CDM into a subsidiary mechanism for hydroelectricity producers and a device for carbon finances in industrialised countries, instead of making it a tool for environmental protection' (WRI

2003). Although seven hydroelectric dams qualified as CDM projects in five countries (Chile, Costa Rica, Panama, Peru and Uganda), there have been discussions about the social and environmental damage that hydroelectricity projects can cause (Eco2site 2003). Thus, these projects may not comply with the CDM mandate in relation to sustainable development.

It is not known at present how long carbon sequestration through forestry projects, and consequently, carbon markets, will continue (Miranda et al. 2002a). The sequestered CO₂ will eventually return to the atmosphere and become part of the GHGs but is not yet known when this will happen. This issue affects carbon credit transactions because of the different biophysical conditions of the different areas where these activities are being developed. Although various methods and models have been proposed (MacDicken 1997, Márquez 2000, Pfaff et al. 2000, Castro 1999, Segura 2000 and others), a unique approach to resolve these uncertainties has yet to be found.²⁹

To summarise, it is generally agreed that the importance of forest ecosystems has been recognised at local and global level since the Earth Summit in Rio de Janeiro in 1992. New opportunities for using forests to sequester carbon emerged and new markets have been established through Activities Implemented Jointly.

The Kyoto Protocol created further possibilities a few years later, providing impetus for the establishment of carbon markets.³⁰ The use of these markets to halt deforestation, restore landscapes, and address rural development by planting trees have been discussed and studied around the globe. At present reforestation and afforestation are the only forestry activities eligible to participate in the carbon markets. However, expectations remain high, especially for developing countries hoping to use the revenues generated by this market to improve development and living conditions for rural people.

As noted earlier, carbon markets are being discussed at international, national and local level, and participants from the North and South are developing the legal, commercial and institutional frameworks necessary for their implementation. Landell-Mills and Porrás 2002 identified 75 programmes related to markets for environmental services. As yet there is no tangible market, but an international debate on the opportunities and risks of carbon markets is taking place.

²⁹ Pfaff et al. (2000) have made progress in developing a model for determining carbon and land use baselines and forecasting carbon sequestration supply to a carbon offsets market. On the ecological side, they apply advanced process models of carbon storage, in particular the CENTURY model, to simulate carbon dynamics in the dominant ecosystems in Costa Rica, and empirical models such as the use of life zones. These models must be based on an underlying conception and quantification of the physical processes that control net primary productivity (NPP).

³⁰ The opportunity to develop a new market gained momentum worldwide, both in supply and demand. Many international organisations are now addressing forestry-related issues in order to prepare for access to this market. The FAO now has an international programme focusing on forestry and agroforestry; the UNDP also has a well-developed global forest programme; the World Bank and other international agencies are investing in forest development programmes. Some regional organisations like the Central American Commission for Environment and Development (CCAD) and the Central American Council for Forests and Protected Areas (CCB-AP) are also participating in these types of project.

4 Socio-economic effects of PES in the Huetar Norte Region

The reforestation process which was given impetus following the enactment of law no. 4465, has contributed to strengthening the institutional framework and also the country's capacity with regard to international trade in carbon.

However, knowledge and understanding of carbon markets is limited to the political sector (OCIC, MINAE), the academic community (universities, research institutes, etc.), and the non-governmental and private sectors (FUNDECOR and the Costa Rican Association of Energy Producers (ACOPE), for example. The concept of carbon markets is not familiar to the beneficiaries of PES at community level. The reforesters know that the plantations 'purify the air' and that the country sells 'clean air' but they are not clear about the concept itself or the dynamics generated by carbon markets.

Reforestation as an economic activity has been promoted nationally by a series of agricultural policies, encouraging producers to change their land use by a process of trial and error. This dynamic has evolved over time and has resulted in valuable experience. However, the costs and benefits have not been calculated thoroughly. This section of the study attempts to provide more information on the financial, social, human, natural, political and physical effects of reforestation activities for the sequestration of carbon in the Huetar Norte region of Costa Rica.

As mentioned in the methodology section, the following analysis is based upon the Sustainable Livelihoods Approach, which emphasises the sustainability of people's asset base, which may include financial, human, natural, social and physical capital.

4.1 Impacts on financial assets

Financial assets are the financial resources available to people, such as savings, access to credit, pensions or regular remittances, that provide them with different livelihood options. Markets for environmental services present both opportunities and risks for the most vulnerable groups (Landell-Mills and Porras 2002).

Opportunities include:

- income from the sale of environmental services;
- employment income (e.g. non-timber forest products (NTFPs), firewood, timber, ecotourism, transport, research); and
- income security and stability through diversification of activities on the property.

Among the risks and constraints are:

- high transaction costs which can exclude certain groups;
- reduction of income from forestry activities because of new restrictions on the use of forest resources on the property;
- exclusion of vulnerable groups through lack of management and negotiating skills; and
- inability to respond to shocks in long-term contracts.

The following benefits were discussed during the field work and the focus groups in the Huetar Norte region.

4.1.1 Income streams

Revenue from the PES scheme

The payment is equivalent to US\$516 per hectare per annum for a period of five years. However, according to information gathered in the focus groups, this is not the main incentive for participating in reforestation activities. Potential future income from the sale of timber is the main incentive.

Income from timber sales

The greatest economic benefit comes from the sale of timber from thinning. This activity also provides timber for building and repairing participants' own homes (Sarapiquí focus group, 2002). Although the producers complain about low prices market prices for thinned timber, they recognise that the earnings generated enable them to continue the activity.³¹ The hope of eventually obtaining better prices encourages them to persevere, particularly since the remoteness of the communities and the poor soil prevents them from carrying out other economic activities (Coopevega focus group, 2002).

In terms of added value within the property, many producers feel they are able to retain very little of the income because of the number of intermediaries involved in the process. The prices received for timber in the few local sawmills are low (Coopevega focus group, 2002), and the situation is exacerbated because the current forestry systems (whether public or private) do not allow the producer to sell the timber directly and thus make more profit, as has happened with timber from primary forest.³²

Investment for the future through reforestation

The reforesters have learned to value reforestation activities as an investment for the future, that generates medium- to long-term benefits for the family.

4.1.2 Diversification of on-farm activities

Because of the high set-up costs involved in the reforestation process and the long wait for the final harvest, landowners only benefit economically from reforestation when it is developed alongside other activities. Generally speaking, reforestation is not profitable for small producers if it is their sole economic activity. Integrated farm management which is not restricted to monoculture but includes activities such as cattle raising, and cultivation of ornamental plants, fruit, etc, provides income in the short term. Reforestation as an additional activity generates income from thinning in the medium term, and the final harvest enables them to meet longer term needs.

³¹ The sawmill owners pay reforesters 40 colons per inch on-site and 60 colons if delivered to the sawmill.

³² FUNDECOR created a successful programme known as the Timber Auction where producers have obtained increases in prices of up to 70 per cent (Miranda, 2000).

4.1.3 Employment creation

Farm level

Generally, forestry does not have as great an impact on job creation on the farm as other agro-industrial activities have (e.g., banana production in Sarapiquí). Reforestation is mainly carried out by the property owners and their families, but, occasionally, by hired labourers, often from Nicaragua (Coopevega focus group, 2002).

Industrial level

With current average timber consumption of 200,000m³ in the northern region, reforestation is generating new economic activities such as the establishment of small-diameter sawmills and platforms.³³ There are a total of 13 fixed sawmills and 25 domestic and mobile sawmills in the area (Salas 2002). Other related activities include furniture stores and factories, and timber transportation, etc.

Professional level

Although there are no national statistics on the effect of reforestation for carbon sequestration, it can be assumed that at the professional level the impact has been significant, since jobs have been created for topographers, forest engineers, biologists, geographers, economists, sociologists and support personnel working in reforestation and related activities. These professionals are employed by the state, NGOs, universities and private companies.

The organisations and groups that provide brokering services within the PES system also benefit financially. For example, the Agricultural Centre of the Canton of Sarapiquí (CACSA) charges 18 per cent of the PES for the technical assistance it provides to producers, and this income goes into its operating budget. The organisation runs a forest nursery for its own reforestation programmes and those of FUNDECOR in the micro-region of Sarapiquí.

4.1.4 Impact on property values

The participants in the focus groups indicate that reforestation through the PES programme has contributed to increased property values. Properties with only pastureland currently have a lower value than those which, in addition to growing traditional crops, have been partly converted to reforestation (focus groups October, 2002). In some areas plantations have led to improvements in the soil, thus also increasing land values. This increase in the value of reforested land has begun to be validated by the National Banking System which has recognised reforestation as an economic activity and, for the first time, the banks are allowing reforesters access to credit (Coopevega focus group, 2002).

4.2 Impact on human assets

Human assets relate to the skills, knowledge, good health, and ability to work which allow an individual to pursue different livelihood strategies. In terms of human capital, there are both opportunities and risks associated with the creation of markets for environmental services.

³³ The country consumes 750,000 m³ of plantation timber.

The opportunities include:

- education and training; and
- improvements in health (through improvements in water and air quality, investment in clinics, increased disposable income to spend on health, etc.).

Among the risks and limitations are:

- diversion of funds from investment in education towards inappropriate/inadequate training;
- loss of access to small-scale jobs for the poor; and
- deterioration in health because of a fall in disposable income if economic activities, such as harvesting and sale of NTFPs, are restricted.

The capacity generated in Costa Rica as a result of the carbon markets can be divided into two main groups: training for participation in the international market as vendors of carbon certificates; and training at national and community level in the management of the carbon supply through forest plantation management.

4.2.1 Participants in the international carbon market

Costa Rica is internationally competitive in the preparation and negotiation of carbon projects and clean development mechanisms (see Section 2 of this study for further details). Although the impact a country of its size can have in fixing carbon at global level is small, Costa Rica has managed to amass significant experience of the carbon offsets market, which can be of benefit to other countries.

4.2.2 Local forestry knowledge

Farmers have learnt about reforestation through a process of ‘trial and error’. Landowners, disillusioned with traditional agricultural activities, turned to forestry with no prior knowledge about forest plantations. According to the participants in the focus groups, they initially thought it was simply a case of ‘planting some trees, collecting the money and that was it’. However, it became apparent that if they wanted financial benefits they would have to treat reforestation as an additional economic activity on the farm.

Private and state organisations have made significant efforts with regard to providing training in relation to planting techniques, plantation management, native and foreign species, types of soil, diseases, thinning and pruning, etc. Nevertheless, much of the learning process has been *in situ*, based on farmers’ own experience. The farmers discovered themselves which species grew better, which adapted to existing soils, which responded to the demand for timber, which would have greater market value and which would help to recover the landscape and biodiversity. An important aspect to note is that knowledge and skills were not just acquired by the person responsible for reforestation but also by other family members (Sarapiquí focus group 2002, Coopevega focus group 2002).

The learning process has not been easy and, according to the participants those who started first were the ones who fared worst, while those who started later were able to learn from previous experience. The producers initially had limited knowledge about the species they should plant, the types of diseases that could harm the plantations, or the effect the trees

would have on the soil. But they have now gained experience in the day-to-day management of plantations (Coopevega focus group, 2002). For example, they have learned that terminalia should be planted with more space than melina because the roots are very large. However, the farmers need additional technical assistance, particularly in tackling the diseases that are attacking the terminalia plantations (Coopevega focus group, 2002). The participants in the focus groups believe this knowledge should not just be shared among the landowners carrying out reforestation but also with the Ministry of the Environment, which should use it to improve its activities. Those responsible for managing the PES system should provide better technical training to the reforesters and more information about the costs and benefits of reforestation.

To summarise, it can be argued that the impact reforestation and the carbon markets has had on human capital has been significant. All of the actors involved have learned from the process about: entering new markets (OCIC, MINAE); the biophysical characteristics of the region; the carbon storage capacity of the forests planted in the Huetar Norte region; social organisation; the national timber market; and the environmental services provided by the plantations.

4.3 Impact on social assets

Social assets are the resources, such as networks, membership of groups, relationships based on trust, access to other national institutions, etc, upon which people draw in pursuit of livelihoods. The opportunities and risks associated with the markets for environmental services in relation to social assets are summarised by Landell-Mills and Porras 2002:

Opportunities:

- security of land tenure where the market formalises tenure;
- capacity-strengthening of local groups in management and organisation;
- protection of forest-based culture; and
- increased political representation through support for community organisation.

Risks and limitations:

- reduced security of land tenure if the poor are displaced;
- erosion of cooperative agreements with the introduction of new ‘winners and losers’; and
- threats to local culture with the introduction of market systems.

With the opening-up of the carbon offsets market, the state was obliged to accelerate the decentralisation and dispersal process, and this led to the creation of new organisations like the National System for Conservation Areas (SINAC), the National Forestry Finance Fund (FONAFIFO) and the Costa Rican Office for Joint Implementation (OCIC). The process also encouraged change in existing organisations and the way in which they interacted. Non-governmental organisations collaborated with local producers to comply with the requirements of the new markets. For example, CACSA provides technical assistance to reforesters, with financing from FUNDECOR. The latter also signed an agreement with CODEFORSA for forest development in the RHN.

The PES has been instrumental in the development of many organisations which participated in its establishment, such as the Foundation for Development of the Central Volcanic

Mountain Range (FUNDECOR), the Agricultural Centre of the Canton of Sarapiquí (CACSA), the Timber Development Corporation of San Carlos (CODEFORSA) and the project for Cooperation in the Forestry and Timber Sectors (COSEFORMA). In some cases, reforestation enabled them to increase their organisational capacity and become important organisations within the community. CACSA, for example, has about 150 small producers and promotes a variety of agricultural programmes and projects aimed at improving conditions for these producers.³⁴ CACSA was very important for linking small landowners who were working individually. CODEFORSA fulfils a very important social function in the San Carlos micro-region by providing training and technical assistance to reforesters. At present the organisation is trying to establish a cooperative in the northern zone which would bring together small reforesters to market timber, and thus obtain better prices by dispensing with the intermediaries.

The NGOs have established links with other organisations, including schools in the national educational system, to develop environmental education programmes. However, there still remains incoherence and conflicts of interest among some organisations, and this is detrimental to the producers' welfare. The IDA and CACSA clash over their activities although both have the aim of supporting and advising producers. While CACSA promotes forest development, the IDA does not allow it despite the fact that the land is suitable for forestry.

The PES programme has generated training at community level for the different groups within society. For example, seminars are held for children of school age to teach them about the need to conserve the landscapes and recover the degraded areas. They put these principles into action by planting trees. A community programme is being implemented with finance from UNEP-OAS to reforest the banks of the rivers Sarapiquí and Sucio so that the trees can mitigate the effects of the seasonal flooding of both rivers.

Some landowners have made reforestation a fundamental part of their livelihoods and are now determined to increase the area of their property dedicated to tree planting. They are proud of the economic activity that they carry out and they pass the knowledge they have gained on to their children and neighbours. Others, on the contrary, have decided that, in view of the difficulties they have faced, they will return to cattle raising and cultivating other crops (Coopevega focus group, 2002).

All the participants in the focus groups were in agreement that social organisation is fundamental in order to access the PES. Many of the producers who currently receive payments for environmental services could not have done so without the support of certain organisations. In areas such as Sarapiquí, as a result of the reforestation activities, communities were able to improve their organisational capacity, creating advisory committees and councils to promote community development. In San Carlos, where communities are isolated, farms are situated far from each other and the roads are almost inaccessible in winter, social organisation is now largely centred around forestry and the PES.

³⁴ Reforestation enabled diversification of productive activities in the area and provided the basis for setting up other agricultural projects (such as banana cultivation, intensive cattle ranching, etc.).

4.4 Impacts on natural assets

Natural assets are the natural resource stocks from which resource flows useful for livelihoods are derived (e.g. land, water, wildlife, biodiversity). Markets for environmental services can present opportunities and risks for natural assets (Landell-Mills and Porras 2002):

Opportunities:

- increase in the value of the forest through new market opportunities;
- increase in property values if accompanied by formalisation of land tenure; and
- positive externalities such as soil fertility, or improved air quality because of the reduction in fires, etc.

Risks and limitations:

- loss of access to and use of resources;
- loss of use values (e.g., timber) if restrictions are imposed; and
- negative externalities, e.g., hydrological impacts on large carbon plantations.

The Huetar Norte region has largely managed to recover the physical conditions of the landscape through a series of programmes for protection, reforestation and sustainable management of natural forests which started at the beginning of the 1990s. The changes in land use have not only brought about benefits for natural capital but have also contributed to the development of economic activities such as ‘rafting’ and ecotourism (Camacho et al. 2002). Some regions have seen the recuperation of a number of ecosystems, which has brought about an increase in certain animal populations that were previously in danger of extinction, such as limpets and toucans. It is hoped that this will have a multiplier effect, such that new landowners will join the programme and contribute to improving the quality of life for the communities and protecting and recovering biodiversity. While the landscape of the Huetar Norte region was dominated by pasture in the 1980s, it now has more than 100 hectares of protected primary forest, 20,000 hectares of secondary forest, and approximately 36,000 hectares of forest planted with exotic and native species. In Sarapiquí, an area of 600 hectares has been reforested through the PES, which, in addition to absorbing carbon, contributes to the recuperation of degraded soil, the mitigation of potential natural disasters and the recovery of flora and fauna (Sarapiquí focus group, 2002).³⁵

According to data obtained from OCIC, the RHN has avoided emissions of 527,625 metric tons of CO₂ by fixing carbon through forest protection, and 1,255,500 metric tons of CO₂ through carbon sequestration in forest plantations.³⁶ Secondary forest fixes 820,000 metric tons of carbon.

³⁵ Sarapiquí is a very low lying area and the rivers regularly flood their banks. It is expected that losses will be reduced with the 600 hectares of reforestation.

³⁶ Data obtained based on a table designed by OCIC for calculating gas emissions for joint implementation projects, May 1997.

4.5 Impacts on physical assets

Physical assets refer to basic infrastructure (transport, shelter, water, energy and communications) and equipment that enable people to pursue their livelihoods. Markets for environmental services provide opportunities in terms of physical capital, for example, development of roads and transport, nurseries, research, and access to markets, but they also present the risk of damaging existing infrastructure (e.g., roads) and increasing inequality if the new infrastructure excludes vulnerable groups.

In the Huetar Norte region the PES has not produced positive improvements in existing infrastructure. Indeed, the increase in trucks loaded with timber is causing local roads and bridges to deteriorate. Most of the roads were originally built by loggers and at present it is the reforesters who have to maintain them in order to extract timber. Part of the Payment for Environmental Services is used for this purpose. The cost increases during the rainy season when the roads become inaccessible, and the passage of trucks exacerbates the situation.

4.6 Limitations of the Payments for Environmental Service scheme

The producers who followed the guidelines for the management of forest plantations have benefited from reforestation, although they found the learning process to be difficult, costly and long. The main financial restrictions identified by the participants were:

- high yield expectations, but low initial management capacity;
- underestimation of contingencies such as disease, which affected costs and production cycles;
- restricted access to other public funds; and
- high transaction costs, particularly relating to time spent on administration.

For some landowners, the importance of reforestation as an economic activity will only become apparent once the final harvest begins - provided they have managed the plantation well (Sarapiquí focus group 2002).

High expectation, low initial capacity

Although reforestation is recognised as a profitable economic activity for small and medium producers when it is part of a farm strategy and not a stand-alone activity, many farmers have become disillusioned and are waiting to complete the cycle when they will cut down the trees and discontinue the activity (Camacho 2002, Sarapiquí focus group, 2002, Coopevega focus group 2002). The root of the problem is that reforestation was over-hyped by the state and the NGOs as an innovative economic activity with high medium- and long-term profits. Various actors saw it as an instrument that would solve the problem of rural poverty in Costa Rica.

According to members of the focus groups, the recipients of the PES who became disillusioned with the activity had never understood the dynamics of the process, thinking that it was merely a case of planting some trees, requesting the payment from the state and then chopping the wood at various stages. There was a certain amount of misinformation about the real costs of establishing and maintaining a forestry plantation. Moreover, it was not just a change in economic activity that was required but also a cultural change, and the latter requires time to establish itself. In general, the payments received by the landowners to establish the plantation covered only 60 per cent of the total expenses. Those landowners who

were able to provide the remaining 40 per cent themselves and manage the plantations effectively now have profitable plantations, while those who did not add the remaining 40 per cent are now disillusioned with the activity because it has not fulfilled their expectations (Sarapiquí focus group, 2002).

4.6.1 Underestimation of contingencies

It is clear that because of inexperience and unfamiliarity with the activity, mistakes were made regarding the types of species planted and where they were planted, and in the calculation of costs.³⁷ Costs are likely to increase with unforeseen problems such as disease in the planted species. In Coopevega, for example, terminalia is currently under attack from a disease which does not allow the trees to be grown for more than ten years, at which time and it must be extracted and sold (when possible) in smaller diameters, which means lower prices. The producers who planted this species are disappointed by the losses incurred and, according to them the only solution would be to request MINAE to cancel the contract. However, this could take a long time and would involve further expense.

4.6.2 Restricted access to other public funds

A negative aspect pointed out by participants in the PES scheme is the restrictions imposed within the system. Once enrolled in the system, land use is limited to family activities, and access to bank credit and state benefit programmes, such as housing benefit, is denied.³⁸

The lack of coordination between the environment, forestry and agriculture sectors within government institutions impedes participation in the system. For example, the Institute for Agricultural Development (IDA-AG 18 January, 2000), directed that as from 2000 their beneficiaries could not receive Payments for Environmental Services because their lands were for agriculture and not forestry, and because it would mean the landholders were receiving 'double benefits' (Camacho et al. 2002, Sarapiquí focus group, 2002). Thus, peasants with small properties on which there is forest cannot obtain incentives for forest management or reforestation.

4.6.3 Transaction costs

A negative economic impact of the activity is the financial costs incurred by farmers while they are preparing the paperwork required to access the PES. Some producers have waited up to twelve months to establish a plantation³⁹, and this has not been accounted for within the system. Once the application to join the PES has been made the land has to lie fallow until the application has been processed.

³⁷ Experience shows that it is better to plant species like melina and teak on fertile soil, while natives species should be planted on less fertile soil.

³⁸ Housing benefit (*bono de la vivienda*) is a state subsidy to enable people to build their own home. They can only access this benefit if they can prove that the plot on which they are going to build the house belongs to them and does not have any charges against it.

³⁹ It is very difficult for a small producer who has immediate financial needs to keep his land unproductive for twelve months while he waits for the first disbursement.

5 Summary and conclusions

Following the assessment of the social impacts of the carbon markets in the Huetar Norte region, the project concludes that these markets are more than an exchange of goods in the traditional sense between buyers and sellers. A new group of economic activities has developed around this market. Carbon sequestration projects provide benefits for developing and developed countries, because they can generate employment and increase income, and also reduce deforestation and increase reforestation (Lindergaard and Segura 1997).

Moreover, these markets have the potential to generate multiple income channels because of the other services that have emerged as result of the international sale of carbon offsets. These services include cartography, insurance, security, engineering, economics, financial systems, professional marketing services, etc.

Carbon projects can both improve forest management and establish more sustainable patterns of energy use by increasing the energy efficiency of forest product use and processing. According to MacDicken and Smith (2000), there are many examples of successful forestry and renewable energy projects that have increased biomass fuel resources and improved energy efficiency by introducing better cooking stoves and charcoal kilns. Carbon markets have also increased knowledge about sustainable use of natural resources and have encouraged the creation of environmental policies and frameworks at local, national and international level. Innovative funding instruments such as Costa Rica's Payments for Environmental Services programme have emerged alongside the process.

Following Costa Rica's example, all the countries of Central America have created specific laws relating to sustainable development, and government offices, departments and ministries for natural resources have been restructured based on the principles of sustainable development. The decentralisation and dispersal of public organisations has strengthened the capacity of local offices and institutions committed to promoting rural development and improving local livelihoods.

The carbon offsets markets form part of a larger process. In order to develop and access these markets certain basic conditions have to be met, and it is essential that countries wishing to participate in these markets understand these requirements (Miranda et al. 2002). Costa Rica serves as an example of the conditions that have to be fulfilled. Tatemback (1998) identifies some of the reasons why Costa Rica became involved in the carbon markets: Costa Rica was the first country to introduce environmental services into national policy; Costa Rica has a wealth of forestry knowledge due to the large body of research carried out by national and international specialists, in both private and protected forests; Costa Rica also has excellent institutional capacity for implementing projects and responding rapidly to international demand. Finally, as a result of the foregoing, the quality of Costa Rican carbon is very high.

Table 5.1 Conditions necessary in order to compete in carbon markets

- the country selling carbon offsets must be politically stable to reduce the risks for investors;
- the country selling carbon offsets must have clear and viable environmental policies, based on an adequate legal framework;
- independent, professional and reliable NGOs must be involved in the political process, particularly for verification and monitoring;
- other participants in addition to the NGOs must be actively involved in the process;
- the participants must be willing to learn;
- benefit-sharing must be the overriding principle of the country selling the carbon credits;
- additional local funding should be available for the implementation of carbon projects, so that there is less dependence on international financial assistance; the likelihood of local funding would be greater if the resulting benefits were local as well as global.

Source: Miranda et al. 2002

Costa Rica is not selling the promise of carbon sinks in the future; it is selling the carbon already stored in its forests, which can then be certified by a specific organisation. Costa Rica has environmental credibility in an international context, so any country or investor wishing to purchase carbon credits from her could be sure of its investment. The income Costa Rica receives from carbon credits would be invested in new projects in pursuance of its environmental policies, although this is not obligatory since the carbon sold has already been sequestered. The carbon offsets market is not a traditional private enterprise; it is an environmental services enterprise, which involves the participation of government, the private sector and civil society. Moreover, this initiative will generate more knowledge about forest ecosystems and will increase capacity in terms of implementation, measuring and monitoring. Costa Rica has invested in the development of this initiative and now has significant local capacity to enable her to participate in this market, which places the country at an advantage over other developing countries.

In addition, many developing countries regard carbon offsets markets as a tangible source of investment in the local environmental and political knowledge base, as well as a means of implementing sustainable development. There are a number of countries preparing to participate in carbon and other related markets, such as water (see Landell-Mills and Porras 2002). Brazil, Ecuador, Guatemala, Panama, Costa Rica and Mexico are a few examples of countries already involved in or preparing carbon projects.

A large number of small producers in Costa Rica has benefited from the carbon markets; forestry activities represent an additional economic activity enabling them to increase their income. Many rural families have improved their quality of live thanks to the introduction of forestry activities (Miranda 2001).

Carbon markets have promoted and encouraged the establishment of organisations made up of small and medium producers. Since management of small forest plots is not ideal, producers have organised themselves into groups in order to carry out sustainable development activities. FUNDECOR, CODEFORSA, AGUADEFOR, CACSA and JUNAFORCA are some of the NGOs whose objectives are to guide producers to participate in national conservation and forestry development projects.

To conclude, Table 5.2 presents a summary list of the main benefits of the carbon markets in Costa Rica. Although members of the focus groups highlighted a number of limitations and

negative impacts of the system, the majority of the landowners concede that their quality of life has improved as a result of carbon markets.

Table 5.2 Benefits of the carbon markets

Benefits	Financial benefits	Non-financial benefits
New source of income	x	
Possibility of title to land	x	x
Reduction in taxes	x	
New economic activities	x	
New economic activities such as eco-tourism	x	x
Improvement in quality of water sources	x	x
Creation of institutional capacity	x	x
Valuing of natural ecosystem	x	
Stimulus to environmental education		x
Motivation for social organisation		x
Employment opportunities	x	
Conservation of natural resources		x
Knowledge of local and national natural resources		x
Knowledge of new market opportunities		

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