Host Country Driven Implementation – The Case of Costa Rica

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Summary

This chapter discusses first results of the AIJ pilot phase in Costa Rica. This country has a relatively high level of economic and social development and a well-developed environmental policy which is comparable to that of advanced industrial countries. It is a major destination for ecotourism. Nevertheless, it suffers from high deforestation due to unequal distribution of land, migration and cattle ranching as well as expansion of coffee and banana plantations. Moreover, transport emissions are rising rapidly and fossil fuel electricity generation is growing fast despite a target of phasing out fossil fuels completely.

Costa Rica's knowledge base is broad and capacity building almost not necessary. Thus, Costa Rica was able to develop creative environment policy instruments such as debt-for-nature swaps and biodiversity prospecting to attract foreign funding. It is not surprising that it was the first developing country to open a JI office, develop project approval criteria and host AIJ pilot projects. The framework for project-based climate co-operation in Costa Rica is supreme, compared to the average developing country.

Nevertheless, the success can at best described as mixed. Only a third of the projects are actually funded though several of them seem to be profitable even without a value for carbon. Most of them are proposed by US entities. To attract more funding, the JI office now certifies tradable mitigation bonds and encourages multi-sector large-scale projects where transaction costs are lower and coherence with national development objectives can be more easily checked. It directs its attention to public investors such as the US and the Norwegian government.

The renewable energy projects suffer from the unrealistic target to phase out fossil fuels by 2001 thus making AIJ projects in this sector impossible from that time. Therefore the bulk of projects concern forestry which is prone to uncertainties in calculation of emission sequestration. A comparison of the estimates shows wildly differing assumptions in baselines and sequestration capacity of the forests. Whether actual project implementa-

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tion conforms to the plans remains to be seen. An independent verification of project results is being undertaken.

The analysis of the Costa Rica case shows that CDM can be only successful in the long run if the industrial countries offer incentives for investors and if baseline determination rests on a clear set of guidelines. Human and technical capacities are necessary but not sufficient conditions for successful climate co-operation projects in developing countries. They seem to be able to prevent complete project failures, though and can lead to innovative approaches. The issue will only be settled if large-scale project investment is forthcoming. Then the ability to process huge number of project proposals and check whether they conform to development priorities as well as monitoring and verification becomes crucial.

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Costa Rica as AIJ host country

Costa Rica is perhaps the most active host country for the current pilot phase activities implemented jointly (AIJ). As it was the first to break the blockade of the developing countries organised in the Group of 77, it received much criticism, but had the first-mover advantage within the developing countries. It received eight out of 15 first round US projects.

In order to evaluate the Costa Rican AIJ policy, a brief introduction to the country's geographic conditions and ecological problems will be given. Special attention will be paid to tourism that made ecology an export factor for Costa Rica.

Environmental conditions and policy

Costa Rica forms part of the geographical bridge both between North and South America and between Atlantic and Pacific oceans. It is among the ten countries with the highest amount of precipitation, but the precipitation patterns differ from region to region. Within the territory a remarkable variety of climatic regions can be found thanks to its mountain range that ascends from sea level up to nearly 4.000 meters.

This complexity in geographic circumstances is reflected in Costa Rica's huge biodiversity. Although Costa Rica represents only 0,035% of the earth's territory, scientists presume between three and seven percent of all species to be living within its boundaries (e.g. Fuchs 1997, p. 38). The extreme weather conditions on the other hand lead to erosion problems. Over 60% of its territory is not suitable for agricultural use (LeBlanc 1997, p. 2).

Compared to other countries of the subcontinent, there is a remarkable public awareness for environmental matters in Costa Rica. This observation is due to different reasons:

Although social climate has become rougher in recent years, poverty is not as big a problem as it is in other parts of Latin America. As the army was abolished in 1949, a major share of public budgets is destined to social welfare. Since then, no coup has taken place. A peculiarity of the Costa Rican democratic system is the *consensualismo*, which means embracing the political opponent. Thus non-governmental organisations (NGOs) find themselves integrated in the fulfilment of state functions, namely in nature conservation and environmental politics.

The right for a healthy environment was laid down as a constitutional amendment in 1994 (Saborio Valverde 1997, p 8, 38).

Protected areas now cover nearly 25% of the national territory. Eleven percent of the territory belong to the strongest protection category which is the declaration as national park in state property. Once declared, a national park cannot be removed, not even by law. Problems arise between protection of nature and the constitutional protection of private property (Art. 45). In some cases where compensation was only paid in state endowments the High Court granted full property rights to private landowners within the boundaries of national parks (SGS 1998, p. 28). Specialists distinguish seven legal statutes, depending on kind of owner (private, NGO — willing or unwilling to transfer property, state organisation) and progress of litigation. Only 5.4% of lands in National Parks and Biological Reserves are registered as state-owned (SGS 1998, p. 14; Goldberg et al. 1998, p. 5). As a consequence, the owner is eventually tempted to make the most of the land while it still belongs to him or her and fell all the rest of the valuable trees in a short span of time. This is why Costa Rican Government has desperately been seeking funds for buying ground within these "paper parks".[2]

The environment ministry MINAE[3] was founded in 1990. Ecology was made a compulsory subject at primary school. Classes undertake excursions to the national parks to learn about nature conservation. Sustainable development has been a major policy goal for the Government of President José María Figueres. The Costa Rican Planning Ministry has created a powerful system of sustainable development indicators (SIDES)[4] which allows measuring the fulfilment of this civil right. It includes social, economic, ecological and climate data. Figueres, in spite of being the son of the founder of the republic and his exterior recognition for his environmental engagement, was quite unpopular in his own country. People doubted his ability to really improve their living conditions. The newly elected government of Miguel Rodriguez undertook a process of "*concertación*" which includes environmental services (*servicios ambientales*). A parliamentary commission and a public forum on the topic tried to define the ecological benefits of forestry subsidies and how these should be financed (CSA 1998, FNC 1998). Recently, environmental groups comply that the current government seems unwilling to follow the proposals made by the *concertación* (Escofet 1999).

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2 The question is, if there is no legal alternative to this high commitment of state capital.

3 Ministerio de Ambiente y Energía, created by law 7152 on the 21st of July 1990. Its actual name was given to it in November 1995.

4 It can be accessed on internet (URL: http://www.mideplan.go.cr/sides).

Deforestation and forestry policy

By the time it was discovered by the Spaniards, 95% of the Costa Rican territory was covered by different kinds of forests. Although logging was already begun by the pre-Columbian indigenous people and then proceeded by the Spanish colonists, it was not until the second half of this century that massive lumbering destroyed the largest part of the virgin forests. Projections from the year 1992 foresaw complete deforestation between the years 2015 to 2033 (Notimex 1993, p. 21). Latest numbers given by the *Ministerio de Planificación* indicate a decrease in deforestation from 17.000 hectares in 1992 to 8.000 in 1994 (MIDEPLAN 1997). Nowadays there remain about 1.8 million hectares of primary forest, most of which is under some kind of protection (for 1994: MIDEPLAN 1997).

Reasons for deforestation, apart from the tropical timber business, are

- the expansion of plantations of coffee and bananas,
- export-orientated beef production and
- the dislocation of subsistence farming to less productive areas not claimed by the big land owning companies.

The beef export boom starting in the 1960s offered opportunities even for smaller farmers because investment needs are low as cattle are kept outside all year. Most of the beef is produced for export. Because of the high prestige of cattle farming — the "cattle subculture" (LeBlanc 1997, p. 18) — high incentives are required to counteract its expansion. Each kilogram of beef produced implies the loss of 2,5 tons[5] of soil (Fuchs 1997, p. 29). This results from the fact that half of the national territory (Lara 1995, p. 116; Santiago/ Schmidt 1995, p. 2) is covered by pastures, while only eight percent of it are regarded as suitable for cattle grazing (Lara, ibid.). Much of the farmland lies on steep hillsides and in areas where tropical rainfalls easily wash away the soils. On the other hand, beef exports only account for 1.4% of export revenues (for 1996: MIDEPLAN 1997), while the World Resource Institute estimates the value of nature's resources lost between 1970 and 1989 to be US$ 4.1 billion (Tenenbaum 1996, p. 17).

Subsistence farming on marginal grounds results from the unequal land distribution. Costa Rican law tries to compensate for this at the expense of primary forests: after two years of occupying land the *precaristas* are given possession rights, after ten years the "squatters" can claim a property title (LeBlanc 1997, p. 10). The vicious circle consists in the fact that previously tropical woodlands are rapidly exhausted and degraded by ero-

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5 The author always refers to metric units.

sion as roots no longer hold them together. Thus farmers see themselves forced to clear more virgin forests.

Forestry activities have been subsidised since 1979. For reforestation measures, a partial exemption from capital tax was available. Its benefits only went to the big landowners to whom this tax was applicable. From 1986, the *Certificados de Abonos Forestales (CAF)* give the right for exemption from any tax in the first five years of reforestation up to the amount of the total costs. This subsidy is equivalent to about US$ 1.000 per hectare. Still tax exemption is exclusive to small landowners who usually do not pay any direct tax.

In 1988 a revolving forestry fund, the *Fondo de Desarrollo Forestal* was created in context with a debt-for-nature agreement with the Netherlands. It was meant to encourage small forestry, crediting US$ 644 per hectare for the first five years, that were to be repaid as the wood was harvested. The FDF has been dissolved in the meantime (Heindrichs 1997, p. 5).

The CAF certificate system was remodelled in 1991 and linked to the pursuit of a sustainable forest management plan for each piece of forest. Access was made easier for small land-owners (introduction of the prepaid CAFa – *CAF por adelanto*).

A tax reduction on wood selling benefits from 30 to 20% is granted if the area has been reforested. This is neither an instrument to prevent logging of primary forest nor is the incentive for reforestation strong enough to take effect (LeBlanc 1997, p. 3).

These instruments indeed created incentives for reforestation, but showed some significant shortcomings:

- Primary forests were logged in order to give way for tree planting, because most subsidies only referred to reforestation and plantation.
- The certificates were traded by investment companies that did not care about the long-term protection of the new forests.
- Forest direction restricted the number of species to be planted. Most indigenous trees were excluded because there were no data available on growth and output (Butterfield 1994, p. 319). Of the subsidised lands 60% were reforested with exotic trees (Heindrichs 1997, p. 7).

Between 1979 and 1995, forest plantation measures on 167,451 ha were subsidised with 101.2 Million US$ (ibid, p 6). Only in 1992, two subspecies of CAF (*CAFma por el manejo del bosque* and *CAFma 2000 / CPB Certificado por la Protección del Bosque*) were introduced for the protection of existing forests (ibid., p. 5).

The 1996 forestry law instituted the Forestry Environmental Services Payment Program (FESP) in a stepwise replacement for the CAF.[6] The FESP includes the Private Forestry Project PFP for subsidies to private landowners and the Protected Areas Project PAP aimed to purchase land within the "paper parks" (Subak 1998, p. 9f).[7] However, a new certificate was introduced for forest conservation (*Certificado de Conservación de Bosque – CCB*) (Heindrichs 1997, p. 8). Responsibility was transferred to the now restructured *Fondo Nacional de Financiamiento Forestal* - FONAFIFO (LeBlanc1997, p. 3). The municipalities became entitled to logging allowances (Muñoz 1996, p. 2), surveyed by private forestry engineers. Under certain conditions, they are even entitled to allow "intervening" primary forests once in a while (*bosque intervenido*). The regionalization led to an 16% increase in logging permissions (Quesada 1997, p. 6A). Permits more than doubled from 431,566 to over one million cubic meters (Escofet 1997, p. 12). This is only partly due to the fact that permissions are now being granted for several years in advance. The main problems are the lack of work-force and skills in the regional administration and the increased temptation for bribery. Critics state that Costa Rica lacks a systematic measuring of its forest covers (ibid.). The estimation that "50% of the logging in Costa Rica is done without the required permit" (LeBlanc 1997, p. 3) can neither be proven nor denied. Logging can not even be impeded within national parks because the administration — the *Sistema Nacional de Áreas de Conservación (SINAC)* — does not have enough rangers to control the areas. Yet there is great public awareness about the item. Lately, the abolishment of a lumber shipment tag has been reversed, because of many complaints against transports of allegedly illegally cut-down trees (Escofet 1997, p. 12). The new Costa Rican government now plans to tie logging allowances to certification by non-governmental organisations (Escofet 1998). Although Costa Rican forestry policy has been trying to attribute a material and social value to forest cultivation and protection, its means are far too complex for the potential beneficiaries. It lacks constancy and reliability. Still there is too much emphasis on plantation compared to the protection of the existing forests. The Costa Rican idea to allow the sustainable management of primary forests, even if it does not lead to serious environmental damage, contributes to confusion in defining the status of the last remaining virgin forests.

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6 New CAF applications were not accepted from this point, to the exception of small landowners under 10 ha. For them, CAF was prolonged for 10 more years (Heindrichs 1997, p. 8).

7 The concept of environmental services will be treated later on in this chapter.

Agriculture and environment

Starting in the middle of the 17th century, plantations have become predominant in agriculture. The first crop was cocoa, later came coffee in the high plains and bananas in the Caribbean lowlands. Organic waste is one problem. Seventy percent of the overall organic products of coffee and 40% of banana plants are dumped, in many cases into the rivers, a practice which is illegal since 1938 (Oakes 1996). Coffee and banana growing are often linked to an abusive use of pesticides which actually lies seven times above world per capita average (Saito/Odenyo 1997, p. 2) thereby endangering farm workers' health and the water resources. The massive use of agrochemicals in cultivation of banana and new non-traditional crops (tropical fruit, macadamia nuts and flowers) and tannic acids stemming from coffee processing are mayor threats for ground and surface water. Since a new sun-resistant coffee bush was first planted in 1980 the shadowing trees are being cut down which leads to the disappearance of 90% of the birds living in coffee plantations and to higher soil erosion (Oakes 1996). Recently, much attention has been paid to diminishing hazardous use of pesticides in banana plantations. After years of lawsuit, Dow Chemical offered an out-of-court settlement for the banana workers affected by sterility after having employed DBCP (Avalos Rodríguez 1997, p. 8A), a pesticide banned in the US since 1979 (Saito/Odenyo 1997, p. 2ff). Chiquita Corp. and other banana producers have tried to install an own eco-label which is being certified by the New York Rainforest Alliance and the Costa Rican *Fundación Ambio* (Anonymous 1997b, Anonymous 1997c). Critics object that the "Better Bananas"-principles reflect more or less the requirements of the law on solid and liquid wastes, enacted in January 1995 (Scharlowski 1996).

Population and settlement structure

Population growth endangers sustainability as well. Although the density of 67 inhabitants per square kilometre does not indicate over-population the habitable part of the territory is relatively small, and two thirds of the 3.4 million population lives in the central valley. Population grows by annual rates around 2.5%, 3.2% in urban areas. This arises problems from inadequate infrastructure, air pollution and settlement competing with agriculture use of the most fertile soils of the country.

Energy production and policy

Today's share of renewable energy sources is 82.4%, 75.2% alone stemming from the Arenal hydroelectric plant. The first block of the geothermal plant Miravalles is opera-

tional since March 1994, the second one was said to be going on-line in the middle of 1997 (ICE 1997; Cordero 1996), but it has not been finished yet. An operator for the third block has been found by tender, using the model of BOT (build-operate-transfer) for a span of 15 years (Cordero 1996, Segnini 1997). In 1994 the minister for natural resources, energy and mining (MINAE) promised a phase-out in fossil energy production by the year 2001. The officials of the national JI office (OCIC) are very unhappy about this prematurely set aim because it is by no means rational. Firstly, it assumes that electricity consumption remains constant. Instead, power demand grows by approximately 8% per year (OCIC 1997, p. 1). Secondly, there is not yet a technically viable substitute for burning fuel or gas in the quantities needed during peak load. Finally, El Niño led to a lack of water supplies in Costa Rica as well.

The Energy Savings Act in 1996 introduced a 15% tax on all fossil fuels. It provided for one third of the revenues to go to the national forestry fund FONAFIFO. As the ministry of finance considered itself unable to fulfil the requirement of contributing US$ 15 million to the fund in 1996, in 1997 both institutions accorded to guarantee FONAFIFO an annual 2.7 billion colones[8] for five years. The centre-right Rodriguez government elected in March 1998 has already unveiled plans to abolish the fuel tax (Escofet 1999).

Industry and environment

Industry is relatively backwards concerning waste management and energy efficiency. Although already 47% of industrial energy demand is covered by the use of agricultural waste 37% still stem from burning fuel. Case studies for five typical Costa Rican enterprises led by the German society for development co-operation (GTZ) found out large potentials for reduction and substitution of energy use. Put in practice, the proposed changes could lead to an annual climate benefit in the dimension of 4,000 tons of CO_2 and 80 tons of SO_2. At the same time, cost saving potential would range between 10 and 13% (GTZ 1996, p. 25).

The wood processing industry still receives its raw material at low prices from settlers, which motivates them very little for sustainable forestry. On the other hand, cheap raw material leads to squandering. The nature conservation NGO *Fundación Neotrópica* estimates that only 54% of the logged wood reach the sawmill, where half of the wood delivered are wasted by unproductive processing (Butterfield 1994, p. 318).

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8 This amount is equivalent to 10 million US$ in the present. According to the treaty, is secured against falling below 7 million US$ due to devaluation (personal communication by Paulo Manso, OCIC, July 11, 1997).

As far as CO_2 emissions are concerned, the highest growth occurred in the transport sector: “From 1983 to 1993, the number of vehicles in use doubled from 190,000 to 390,000, with the number of automobiles increasing from 66,000 to 150,000.” (LeBlanc 1997, p. 4) Lately the Costa Rican Government eliminated the 40% consumption tax on electric vehicles, in order to make them more competitive. An enforced use of electric vehicles in public and private transport could on the long run ease pollution in urban areas and at the same time lower the CO_2 – emissions caused by transport (Muñoz 1997, p. 3), given the above-mentioned structure of electric power production. However, if electric vehicles do reach important numbers, this will lead to even higher increases in electricity demand.

Tourism

In its boom years by the end of the 1980s and in the beginning of the 90s, tourism rates grew by 25 to 30% annually. 1994 was the first year foreign currency earnings generated by tourism surpassed those from banana exports. Today tourism employs 17% of the active population (Burkard 1996, p. 20). Most tourists come from US and Latin America (41% each). The share of eco-tourists to Costa Rica is estimated to be above 40% (Panos Institute 1996). The term ecotourism or sustainable tourism is not clearly defined. In any case, ecologically aware travellers choose the country because of its natural beauties and, on the contrary, would not visit it without them. Within this range, scientific visitors or bird watchers can be found as well as white water rafters who tend to consider nature a scenery for their recreational activities. World-wide ecotourism is the fastest growing market share within tourism with a growth rate between 10 and 15% (Panos Institute 1996). After an initial phase of scepticism, the government of Costa Rica decided to strongly support ecotourism. Then minister Carlos Rösch advocated the integration of a clause concerning sustainable tourism into Agenda 21. The average eco-tourist spends more money on his or her vacation than normal tourists do. In 1995 every traveller to Costa Rica left US$ 840 within the country. This number rose by 71% within only eight years which reflects a rise in quality. Ecotourism relies very much on regulation in order to prevent destroying its own bases. The tourism ministry gives priority to small and medium enterprises and takes care for the offers being benign to the environment. In 1993, for instance, a German investor was expelled because of irregularities in constructing a hotel complex. He was charged of having eradicated valuable vegetation, killed animals of protected species and having damaged a coral reef (Anonymous 1993).

The village of Longo Mai is an example for an ecologically and socially orientated tourism development. It lies next to La Amistad National Park in the south-east mountain

region near the Panamanian border. Longo Mai has specialised in hosting educational travellers and solidarity workers (Burkard 1996, 21). Regional effects of tourism can as well be studied in La Fortuna, near the Arenal volcano. The village not only by its name resembles a gold digger town. Practically all of its 800 inhabitants are in one way or the other dedicated to tourism. The typical hostel does not exceed five rooms or cabins. Small supermarkets and restaurants provide food for the visitors; handicraft gift shops offer guided tours to the volcano and the hot springs beneath.

The national park entrance fees for foreigners were raised overnight from 1.3 (Panos Institute 1996, p. 10) to US$ 8 which at the same time increased the tourists' participation in conservation and halted the crowding of the areas. In some places now the number of visitors at one time is limited. Small farmers and land workers find jobs as rangers or guides in the parks, thus ensuring the support of the local population for nature conservation . Tourism also has its share in Central American co-operation. Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica and Panama plan the installation of a 1,500 mile biodiversity corridor, the *Paseo Pantera* (Stevens 1996).

Climate co-operation in national politics

External financing of nature conservation policy is not new to Costa Rica. It started with the so-called debt-for-nature programs, which cancelled external debts under the condition that their value, converted into national currency, was to be invested in national parks. Another creative means to generating income from preservation of primary forests is its use as a resource for genetic material. The first time its exploitation was put on a regular basis was in 1991 with the co-operation between the US based pharmaceutics enterprise Merck & Co and the National Biodiversity Institute INBio, founded as a NGO by the Costa Rican Government in 1989. The agreement implies the systematic collection and documentation of samples from the rain forests by INBio specialists and their use by Merck's research laboratories. Merck paid about one million US$ as a fixed sum on every renewal of the treaty[9]. A license fee between one and tree (in some cases up to ten) percent of the revenue is granted in case drugs basing on Costa Rican genetic substances get on the market. The gene database is made available to the public by the company by Internet (URL: http://www.merck.com). INBio is to use only half of this income for its operative purposes while the rest goes to the preservation of the forests (Tenenbaum 1996, p. 19). The rights of author stay within the country (Anonymous 1997b). This contract, the full text of which is kept secret, has widely been criticised for selling out a

[9] The initial payment is said to have been 1.14 million US$. There have been two renewals up to now, one in 1993, the other in 1997.

country's natural resources. Still it has to be considered that the “traditional” way to generate income is by destroying one’s own resources. Costa Rica's attempts to preserve its natural beauties as a way to have the cake and eat it too: Whole sectors of the economy are living on the survival of the indigenous flora and fauna.

On the basis of its prior experience, Costa Rica was among the first countries to play an active role in AIJ, taking the chance to promote its sustainability policy. It offers all the necessary requirements for successful climate co-operation: strong and lasting democratic institutions and wide acceptance of the goal of climate protection. Joint measures may help to counteract pressures of exploitative industry and farming. The measures financed do not induce a new path of development, they just foster and stabilise a process already begun by Costa Rican politics. Climate co-operation can set further economic incentives to realising the value of nature's resources. In contrast to the theory of Joint Implementation, this is no transfer of know-how in the north-south direction. In the field of nature conservation Costa Rica is working out knowledge transferable to other tropical regions.

The concept of environmental services

Environmental services has become the keyword for ecologically motivated subsidies. The 1996 forestry law differentiates between four service categories:

- Carbon fixation,
- Watershed protection
- Biodiversity and ecosystem protection
- Protection of scenic beauty.

Recent legislation added the protection of soils (CSA 1998). The financial mechanism behind environmental services is the Forestry Fund FONAFIFO. It collects and allocates transfers from parties who benefit from nature to those who participate in protection and restoration of nature. These are mainly the National Park System, forest owners who conserve or replant forests and the Biodiversity Institute INBio. There is a growing group of payers into this fund, foreign park visitors who pay higher entrance fees, pharmaceutical companies who investigate in genetic resources and fuel buyers. Thus foreign investment in greenhouse gas (GHG) mitigation is not the only source of income for the FONAFIFO. Costa Rican governments have always been very cautious to question the ecological role of the big US banana companies. Only in March 1997, a MINAE study revealed the damages banana plantations do to the environment (Alvarado Davila 1997).

This is a step beyond the traditional understanding of sovereignty in Central America. In a contract disclosed in September 1998, the ministry for the environment MINAE and the transnational fruit company DelOro accorded the transferral of 1,200 ha of land to the state-owned Guanacaste Conservation Area (GCA) as a payment for five kinds of environmental services received by DelOro. These are (Dutschke 1998, p. 25f):

- "Biological control agents" (i.e. insects) coming from the GCA to the plantations.
- Technical services rendered by national and international ACG consultants to DelOro
- Water provision from the nearby Rio Mena.
- Biodegradation of 1,000 annual truck loads of orange peels.
- Protection of an isolated orchard which serves to produce new seedlings in case a pest destroys the other plantations.

Each of these services is mentioned with price per unit and a minimum fee. Pricing seems a bit arbitrary though, bound to match exactly the value of the lands to be transferred. Any use of these services beyond the quantities mentioned are subject to further payment. On the other hand, carbon benefits resulting from restoring forests on the transferred lands will be shared between DelOro and the ACG. This clause speculates on the valuation of these benefits on a future international mitigation market.

The Costa Rican JI office and its guidelines

Costa Rican AIJ co-operation started in September 1994 with a "Statement of intent for bilateral sustainable development co-operation and joint implementation of measures to reduce emissions of greenhouse gases" (USIJI 1994), followed one year later by a similar document between the US and all Central American States. The aims of co-operation are best described in the bilateral statement. The following items are explicitly but not exclusively listed: "… biodiversity conservation and ecosystem protection, reduction of local pollution, sustainable land-use practices, improved rural income opportunities, and local participation in project planning and execution." (USIJI 1994)

In April 1994, the Costa Rican JI Office (*Oficina Costaricense de Implementación Conjunta*, OCIC) - was created as a result of the co-operation between the later Ministry for Environment and Energy (MINAE)[10], the privately organised Costa Rican Investment and Trade Development Board (CINDE) and two NGOs. One is the FUNDECOR, an NGO dedicated to nature conservation, whose president, Franz Tattenbach, at the same time

[10] In 1994, its name was *Ministerio de Recursos Naturales, Energía y Minas* (MINIREM).

heads OCIC. The other is the ACOPE, the Association of Independent Power Producers. OCIC receives additional funding from CRUSA, the Costa Rican — US Foundation for cultural exchange. OCIC was established by a presidential decree. It reports to the MINAE and executes the authority to formulate AIJ policy, evaluates and approves projects (LeBlanc 1997, p. 7). Nonetheless, it is not located clearly within the system of separation of powers. OCIC consists of only seven persons, many of whom are constantly representing the institution in international meetings. Five of them are scientists.

The OCIC's guidelines for project criteria are:

- Minimise red tape.
- Be experience based.
- Meet current international standards.
- Represent Costa Rica's particular interests.
- Address GHG abatement benefits sharing among participants (UNFCCC 1998b).

Project proposals are to be decided upon within six weeks. There are different sets of criteria, which can be grouped by general criteria, climate priorities and feasibility items.

The general criteria state that projects should be according to Costa Rican laws and sustainability goals. They should offer “enhancement of income opportunities and quality of life for rural peoples and members of certain vulnerable groups including cultural minorities” (Lay et al. 1996). The communities involved have to support the project. Transfer of skills and technology is requested as well as to keep negative influences of the project on an acceptable level.

Criteria cited from the UN Framework Convention on Climate Change (UNFCCC) are reinforced by OCIC and exceeded as far as verification by a “qualified, non-participating organisation” (ibid.) is requested. Financial additionality to development assistance or any other obligations by industrialised countries is called for, according to the UNFCCC. All costs related to the project have to be considered, including those of non-participants. Institutional feasibility is demanded on the Costa Rican side. Political, administrative or scientific institutions must be able to indeed administer the project as well as the proponent. Previous experience in climate co-operation on the proponent’s side are highly appreciated.

Current AIJ projects in Costa Rica

Nine bilateral AIJ projects have been approved in Costa Rica. The total amount to be invested in forestry projects is ten times higher than in energy projects, its volume in terms of carbon offsets is expected to be 73 times higher than in the energy projects (Gorbitz 1997, p. 55).

Of the initially five forestry projects approved by USIJI only one project is fully financed. Another one has received just enough funding to realise a pre-feasibility study (and was subsequently removed from the list). Two out of four energy plants are definitely operational. The lack of finance is as typical for the AIJ pilot phase as the fact that all participants tend to hide this fact from the public. A blatant example for this behaviour is the latest report to the UNFCCC where projects that are not financed are described to be operational. Co-operation with Norway is special in the way that projects are not only approved but also financed by the guest country's JI body.

The project descriptions are structured as follows: Once the objective is outlined, participants are listed, climate effects and project costs are calculated and possible externalities are taken into consideration. At the end of each description, additional information and a short summary will be given.

Forestry projects

Regarding climate effects, there are three possible forestry project forms: One consists in the preservation of existing forests in order to prevent adding GHG from deforestation to the emissions from the combustion of fossil fuels. This means that no imminent emission reduction is taking place. The second one is the restoration of degraded forests. Degradation is taking place when the density of species in one area is not high enough to sustain the existing forest cover. This depends on various factors, like precipitation levels, erosion and vegetation zone (Lund 1998). The third alternative is tree plantation on grounds where vegetation cover was lower before. This last distinction is important, because plantation policy risks to be a zero-sum game when existing forests are cleared for the purpose. In addition to that, the resulting biodiversity losses can be irreversible.

In theory, constant reforestation and plantation could for some time sequester emissions of industry and traffic, thus winning time for a change of patterns in production and use of energy. The problem is that pests, fire or simply logging and changes in land use can revert the progress made in all the years of forest growing. In contrast, emission reductions once achieved from efficiency gains cannot be reverted in the future. The aspect of

future losses makes forestry projects difficult to handle in context with climate co-operation. Formerly two projects, BIODIVERSIFIX and CARFIX, had been proposed. Because they lacked finance, they were removed from the UNFCCC listing and summed under the Protected Areas Project described below.

ECOLAND / Esquinas National Park

ECOLAND is the acronym for Esquinas Carbon Offset Land Conservation Initiative. The 13.4 square km Esquinas delta is located on the Golfo Dulce, opposite to the Osa peninsula in the extreme south-west of the country. In 1994 it was declared a national park under the name of Piedras Blancas. The project is aimed to purchase nearly 20% of the privately owned park area and to convey it to the national park administration. All except 350 hectares out of the total of 2,500 hectares to be bought are currently forested (UNFCCC 1997). Although the commercial participants will not be linked to the operation of the park, ECOLAND is the only conservation project to be fully financed. It started in January 1995 and has a life-span of 15 years.

Participants

ECOLAND is managed by Trexler and Associates, Inc. (TAA), an US based consultant, which tries to specialise in AIJ operations. Astonishingly, since the 1997 report to the UNFCCC TAA is not mentioned any more. In the ECOLAND case, MINAE co-operates with five US enterprises and three NGOs. Tenaska Washington Partners, Ltd. is the managing partner among four different power companies. The NGO participants include the US National Fish and Wildlife Foundation, the private Costa Rican forest conservation foundation COMBOS (*Conservación y Manejo de Bosques Tropicales*) and *Regenwald der Österreicher*, an Austrian non-profit organisation which supports an ecotourism project bordering on the park (USIJI 1996, p. 63f) and will also provide for monitoring the project (UNFCCC 1997). According to USIJI, ECOLAND was among the first projects being initiated by the Costa Rican Government in December of 1994.

Climate Effects

The baseline calculation assumes that under normal circumstances within 15 years the area would be completely deforested: “Some landowners hold logging concessions, a number of which are active, and many owners face economic pressures that encourage deforestation” (USIJI 1996, p. 64). There is no further explanation of this statement.

Calculation refers to “general soil and vegetation carbon content literature” (USIJI 1996, p. 65). Numbers cited in this context are put in italics (see Table 1).

The prevented fixation loss is added to fixation gains from the project, which makes a total carbon offset of 366,200 tons.

Different fixation quotas, according to decade and vegetation zone are not considered, which can be explained by the relatively small project area. ECOLAND is the only project to take carbon fixation in the soils into account. There is very little knowledge about annual growth of the so-called humus soils in the tropical rainforest. Numbers between 0.8 and 5.1 tons per hectare have been found (Nilsson/Schopfhauser 1995, p. 267ff). In one Costa Rican case after 18 years of regeneration, no significant growth of humus soil could be proven (Herold 1995, p. 30). Refraining from speculation on humus growth would result in lowering the estimates by 44%.

Of the total carbon offsets, only 250,000 tons are “credited” to Tenaska. This is done at once, although annual results are no higher than 23,037 tons. This does not matter during the pilot phase, but will create a liability problem as soon as GHG crediting will be effective within the CDM system.

Table 1: Total carbon sequestration ECOLAND

Reference Scenario				
total extension	2,500	ha		
without forest	350	ha		
forested area	2,150	ha		
deforestation time	15	years		
annual deforestation	135.73	ha		
soil fixation / ha	*143*	*t C/ ha*		
released by logging	*60%*	equivalent to	75	t C/ ha
carbon fixed in vegetation / ha	*110*	*t C/ ha*		
released by logging	*80%*	equivalent to	88	t C/ ha
complete carbon fixation	235	t C/ ha		
released by logging		total	163	t C/ ha
annual loss	23,363	t C		
total loss in 15 years	**350,450**	**t C**		
Project Scenario				
annual growth fixation/ hectare.	*3*	*t C/ ha*		
growth extension	350	ha		
annual fixation	1,050	t C		
total gain in 15 years	**15,750**	**t C**		

(Source: USIJI 1996, p. 65 ff., UNFCCC 1997, own calculations)

Costs

Land purchases cost US$ 910,000, which is about US$ 380 per hectare. An endowment of US$ 40,000 for annual implementation costs was created. Project development and representation, i.e. transaction costs, were US$ 150,000 (UNFCCC 1997) or 14% of total project costs, which were covered by Tenaska. The project turns out to be quite cheap, with net costs per credited ton of carbon sum up to 4.4 US$, even cheaper for Tenaska when discounting the US$ 450,000 which were contributed by the NGOs.

Externalities

Contrarily to the project approval criteria of both national JI bodies, no information is given about the side-effects. The following data is missing:

- How many owners are there within the newly declared national park?
- Is the land inhabited?
- Which part of the park area has already been logged?
- What made developers chose the actual project area?

Observations

It is remarkable that only the ECOLAND developers came up with the idea to calculate carbon fixation in soils thereby nearly doubling the expected climate effect. Social and regional economic effects have not been taken into account. It would be interesting to know where the money goes. Will it generate work or will it migrate to the capital? Another problem is the lack of independent third-party monitoring.

KLINKIFIX reforestation Project

KLINKIFIX was approved in November 1995. It stands for carbon fixation as fast and as efficient as possible. The fast-growing pine species Klinki (araukaria hunsteinii) is planned to be cultivated on former marginal pastures in forestry plantations. The conifer originates from Papua-New Guinea and produces wood suitable for utility piles or plywood (WBCSD 1997). It shall provide a new source of income for the farmers who market their carbon benefits in a kind of joint venture with the main project developer. The projected lifetime has lately been extended from 40 to 46 years, 6 of which count as implementation phase. Implicitly the carbon calculations indicate that between year 41 an 46 nearly all trees will be cut. Project location is the Turrialba Valley, 30 km bee-line east of the capital. Although there is no substantial funding yet, the project is reported to have started in June 1997 (UNFCCC 1997).

Participants

The project developer is Reforest the Tropics Inc., referred to by USIJI as “a not-for-profit, non-stock organisation” (USIJI 1996,68). It is a subsidiary of the Connecticut based forestry enterprise Newton Treviso Corporation (IUEP 1995) and also established the Macadamia nut in Costa Rica as a cash-crop some years ago (WBCSD 1997). For 29 years, it has been operating a model plantation of Klinki in Turrialba, east of San José. The Cantonal Agricultural Center of Turrialba (CACTU) will manage and monitor the project. The CACTU finances itself by selling utility poles (WBCSD 1997). Its board of directors is constituted by representatives of farmers, local banks and co-operatives (USIJI 1996, p. 68). Yale School of Forestry and Environmental Studies, The Forest Products Laboratory, which is a department of the US Agriculture Ministry and their Costa Rican counterpart, the *Centro Agronómico Tropical de Investigación y Enseñanza* (CATIE) will collaborate in the project. Last but not least, a survey among the farmers resulted in 40 farmers who declared themselves inclined to plant Klinki trees on 2,750 hectares (USIJI 1996, p. 69). Actually no more than five farmers have signed planting

contracts (USEPA 1998). The Costa Rican Government does support the measure, although the adverb “strongly” is left out in this particular case (USIJI 1996, p. 71).

Table 2: Klinki Project Case

year	annual growth	cumulated	ann. growth	cumulated
1	100 ha	100 ha	t C	t C
2	500 ha	600 ha	820 t C	820 t C
3	1,000 ha	1,600 ha	4,920 t C	5,740 t C
4	1,300 ha	2,900 ha	13,120 t C	18,860 t C
5	1,525 ha	4,425 ha	23,780 t C	42,640 t C
6	1,575 ha	6,000 ha	36,285 t C	78,925 t C
7	0 ha	6,000 ha	49,200 t C	128,125 t C
(...)				
41	0 ha	6,000 ha	49,200 t C	1,800,925 t C
42	-649 ha	*5,351 ha*	47,944 t C	1,848,869 t C
43	-991 ha	*4,360 ha*	43,881 t C	1,892,750 t C
44	-1,288 ha	*3,072 ha*	35,755 t C	1,928,505 t C
45	-1,511 ha	*1,561 ha*	25,191 t C	1,953,696 t C
46	?	*?*	12,799 t C	**1,966,495 t C**

(Source: UNFCCC 1997, own calculations)

Climate Effects

In the first year, only 100 hectares are to be planted, because the Costa Rican production capacity of the seedlings is very limited. Annual carbon fixation per hectare is said to be 8.2 tons, referring to the model plantation. The growth is consciously overestimated for the first years and underestimated for later years. This simplification is not acceptable, because the project developer could well offer exact data for the first 30 years from the Turrialba model plantation of Klinki pines. After an even more simplistic calculation model in the first report to the UNFCCC (USIJI 1996, p. 73), project developers adapted carbon calculation, time schedule and costs. Carbon calculation now takes into account the result of first year plantations in the second year etc. As cost estimations nearly tripled, project lifetime was extended. In the last five years carbon sequestration

slows down due to massive cutting. Year 45 sees the 6,000 ha pine forest reduced to 1,561 ha (UNFCCC 1997).[11]

Carbon profits are not balanced against losses, because the reference case is zero. The carbon content of pastures is supposed to be stable, and carbon emissions in cutting, processing and consumption of the wood are not taken into account.

Costs

The developers expect US$ 10,666,017 project costs, 30% of which are transaction costs like inventory (9.1%), monitoring (8.6%) and project management (11.8%). The derived price is US$ 5.42 per ton of mitigated carbon.

Externalities

The implementation of new, non-traditional agrarian products that help to reduce dependence on coffee and banana production certainly is beneficial for the Costa Rican economy, as are increased incentives to forestry and against cattle growing. Still there is no estimate of viability for the farmers. Project developers expect net revenues from the sale of wood to exceed US$ 150 million (UNFCCC 1998). Commodity prices for wood are so low that sawmills can afford to waste 50% of the raw material during the processing (Butterfield 1994, p. 318). On the other hand, project developers state among the social and cultural impacts of the project that it will provide more affordable construction materials (UNFCCC 1998).

Most of all, there is real doubt about the Klinki forestry from the ecological point of view. There is no information given about the soils needed for Klinki, nor about the water demand of the plants. There is no knowledge about water absorption capacity of the soils cultivated with the pine nor how it reacts to forest fire. It is hoped however, that it improves water habitats and streamflow (ibid.). The sole fact that Klinki can be grown in mixed species plantings is praised to be “contributing to biodiversity and plantation stability” (WBCSD 1997). This is exactly not the case with the exotic Klinki species which is to be planted massively. The 30 years of experiences in the model planting not even account for one generation of trees. It is quite probable, they will be subject to infestation and will themselves damage other organisms within the tropical ecosystem by secretion of needles, raisin or seeds. The rapid growth will deplete the poor soils of the pastures. The use of pesticides and fertilisers will be indispensable. Contrarily, project devel-

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11 This number is obtained by dividing the projected carbon sequestration in year 46 by 8.2 tons.

opers argue the plantations would “reduce the use of chemicals as low-yield crops are shifted to forest plantations” (UNFCCC 1998). This again sheds some doubt on the project developers’ definition of pastures. An uncontrolled spreading into the ACCVC buffer area adjacent to Turrialba can lead to unpredictable consequences. As there are no new plantings projected in the later years, Klinkifix might leave behind 60 square km of fallow land.

Observations

In the Klinki case, the criterion of program additionality is not fulfilled. On the contrary, the program has been planned and prepared for three decades before it was submitted for AIJ approval. The task of AIJ is to encourage measures that otherwise would not have taken place. Klinki developer Reforest the Tropics, Inc. freely compares the program to its foregone experience with the implementation of the Macadamia in Costa Rica, which did not need external financing either. An investment which would have been placed anyway is expected to be “sweetened” by the expected climate benefits. In our opinion, Newton Treviso Corp. alias Reforest the Tropics, Inc. has to be regarded as the typical free rider in the AIJ process. The company is the only provider of the seedlings, contractor of the farmers for planting and for marketing of their carbon credits. Only the commercial risk for selling the wood harvest is left to the farmers.

CACTU is too closely involved in the project outcomes to be suitable for independent monitoring. In March 1998, project director Herster Barres declared his expectation “that the sequestered carbon ... will be certified by the Government of Costa Rica” (Barres 1998). As the project obviously lacks investors, he now goes fundraising in schools and churches for “pre-project implementation”, as the uniform reporting format (UNFCCC 1998) states. Nevertheless, Klinki is reported to have started in June 1997

Obviously those are the reasons why the Costa Rican Government only gives its lukewarm support. In a personal conversation, Franz Tattenbach admitted that he did not feel too sure about KLINKIFIX, but the project developer had been so enthusiastic about it, OCIC did not want to disappoint him. Perhaps, due to the fact that two national bodies have to decide on the applications, the odd job of refusal is mutually left to the other side.

Virilla River Basin Project

Virilla project is special in many ways. It has to be considered a combined energy *and* forestry project. However, crediting is given only for the forestry part. It is financed by

the Norwegian foreign ministry. The project is located 20 km north-west of San José, near the airport and the free-trade zone. There is an older 1 MW power plant which will be replaced by the new 28 MW generators. The waters are heavily contaminated by industry of the nearby free-trade zone, so that a Norwegian technical manager preferred to call the project a "sewer power plant" (Anonymous 1997a). A primary forest area of 2,000 ha is being put under protection. A secondary forest of 1,000 ha will be managed and protected, with an annual incorporation of 100 ha, so that the total area will be reached by the year 2006. Another 1,000 ha will be reforested, starting with the year 1999, in annual steps of 100 hectares. The protection zone covers the upper Virilla river basin, limiting to a forest reserve and a national park. Implementation will take 10 years, but quantification and monitoring will go for 25 years. However the mitigation is guaranteed to the investor for no more than 20 years. Certificates will be emitted during the first five years, so that the last certificate covers the period from year 6 to 25.[12] The forestry part of the project is financially administered by the National Forestry Fund FONAFIFO. It is part of the above mentioned Private Forestry Program PFP, which compensates for sustainable forestry.

Participants

The Costa Rican side is represented by the *Compañía Nacional de Fuerza y Luz* (CNFL), the ICE's power production branch. The lion's share of US$ 1.7 million comes from the Norwegian Foreign Ministry. These funds are provided by the Norwegian Climate Fund and will not be reported as part of the official development aid (Jepma 1997, p. 18). The *Consorcio Noruego* (CN) is a consortium put together for the occasion by ABB Kraft and Kværner Energy, Statkraft Engeneering, Atlas Copco, Ølsen Stålindustri and Norman Olsen Maskin. CN spends US$ 300,000 on mitigation certificates and is compensated by a purchase commitment of 65% of all goods and services needed for the power plant to be provided by Norwegian companies (Anonymous 1997a). Financing for these will be facilitated by Norwegian official export credits. The funds are distributed over the Private Forestry Program PFP. Over 900 landowners were initially expected to participate. In the Virilla area the PFP is not as successful as in other parts of the country. The reason is that it is more attractive to beef producing peasants than to dairy farmers who have a wider margin of profitability and land prices are quite high. As of mid-1998, only 12 – 30 landowners are reported to have signed the FONAFIFO agreement (Subak 1998, p. 8).

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12 See below for the Costa Rican mitigation certificates called "Certifiable / Certified Tradable Offsets".

Climate Effects

Carbon credits are only given for the conservation and reforestation part of Virilla project. An average estimated deforestation rate of 7.5% seems overstated, because the overall deforestation rate in the same time period rounds 3.2% and deforestation is constantly declining. The estimate results from Landsat image evaluation of the years 1986 through 1992, confirming theoretical findings of FUNDECOR. Perhaps, because of the proximity to the capital, deforestation pressures may be higher than the average. Carbon contents per hectare in this case are estimated at only 67 t/ha. Compared to the ECOLAND project which calculates 110 t/ha in biomass (not accounting for soil fixation), in the field of biomass fixation Virilla is very conservative. Thus, the two potential baseline estimation errors in this case may rule each other out.
The formula for calculating the percentage of forest lost (L) is

$$L_n = 1 — (1 — p)^n.$$

Under the condition that the observed annual deforestation of 7.5% went on, over 25 years ($1 — (1 — 0.075)^{25}$ =) 85.7% of the forested area would be lost. The projected total carbon stock reaches 230,842 t in 25 years.

Table 3: Virilla — Carbon stored in forest and fixed by plantations

	Primary Forest		Secondary Forest		Plantations		"Cumulative Effect"
	Deforestation Rate **7.5%** Carbon Content per ha [t] **67 t C / ha**		Annual Growth of Carbon Stock [t/ha] **2 t C / ha**		Annual Growth of Carbon Stock [t/ha] **4 t C / ha**		
year	Deforestation [ha]	Carbon Emissions Avoided [t]	Accumulate Hectares	Carbon Sequestration [t]	Accumulate Hectares	Carbon Sequestration [t]	Total Carbon with Project [t]
1996	2,000	-	-	-	-	-	-
1997	1,850	10,050	100	200	100	-	10,250
1998	1,711	9,296	200	400	200	-	9,696
1999	1,583	8,599	300	600	300	405	9,604
2000	1,464	7,954	400	800	400	810	9,564
2001	1,354	7,358	500	1,000	500	1,215	9,573
2002	1,253	6,806	600	1,200	600	1,620	9,626
2003	1,159	6,295	700	1,400	700	2,025	9,720
2004	1,072	5,823	800	1,600	800	2,430	9,853
2005	992	5,386	900	1,800	900	2,835	10,021
2006	917	4,982	1,000	2,000	1,000	3,240	10,222
2007	848	4,609	1,000	2,000	1,000	3,645	10,254
2008	785	4,263	1,000	2,000	1,000	4,050	10,313
2009	726	3,943	1,000	2,000	1,000	4,050	9,993
2010	671	3,648	1,000	2,000	1,000	4,050	9,698
2011	621	3,374	1,000	2,000	1,000	4,050	9,424
2012	575	3,121	1,000	2,000	1,000	4,050	9,171
2013	531	2,887	1,000	2,000	1,000	4,050	8,937
2014	492	2,670	1,000	2,000	1,000	4,050	8,720
2015	455	2,470	1,000	2,000	1,000	4,050	8,520
2016	421	2,285	1,000	2,000	1,000	4,050	8,335
2017	389	2,113	1,000	2,000	1,000	4,050	8,163
2018	360	1,955	1,000	2,000	1,000	4,050	8,005
2019	333	1,808	1,000	2,000	1,000	4,050	7,858
2020	308	1,673	1,000	2,000	1,000	4,050	7,723
2021	285	1,547	1,000	2,000	1,000	4,050	7,597
Total		***114,917***		***41,000***		***74,925***	***230,842***

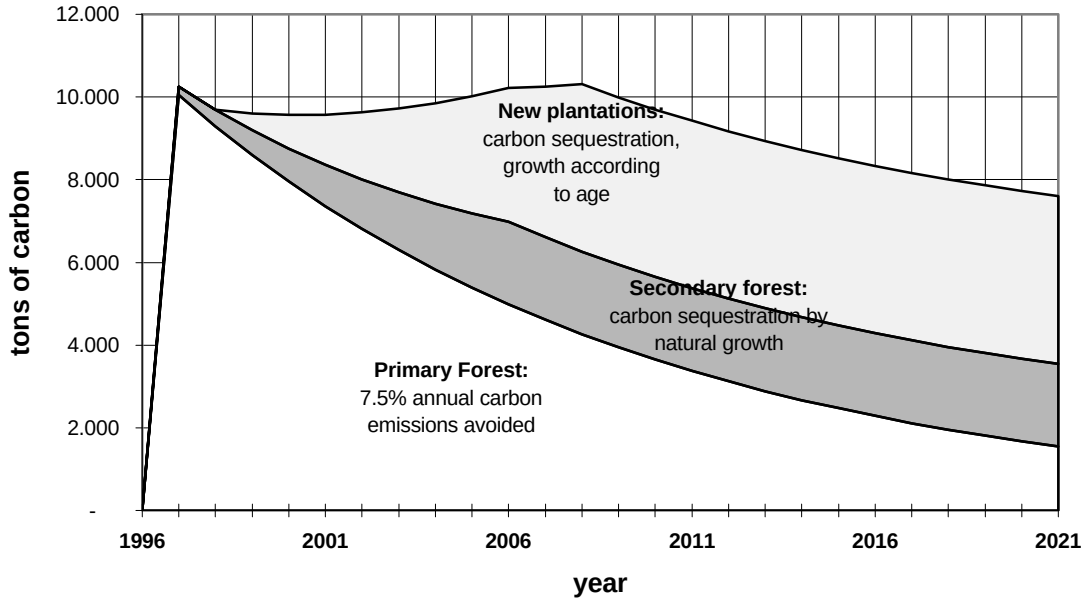
(Source: Jepma 1997, p. 17, UNFCCC 1997, own modifications)

Costs

The project costs are cited by the proponents to be US$ 3,395,243 (UNFCCC 1998a). The CNFL will invest US$ 1.39 million. This is the amount the utility would have spent for forestry issues without the project. Mitigation certificates are generated for the investment of the Foreign Ministry and of Consorcio Noruego. Relating carbon benefits from the forestry part of the project to total *external* financing results in US$ 8.66 per ton, not taking into account operational returns during the project phase. Including the CNFL contribution, the price is US$ 14.71 per ton (see Witthoeft-Muehlmann 1998, p. 24). On the other hand, these costs seem under-estimated because the Private Forestry Program PFP backs financing for forestry subsidies. Landowners receive payments over five years. Their contracts commit them to ten years for forest management and only five years in the case of plantations (Subak 1998, p. 11). If they disregarded the contract, they would have to pay back the total payment received. Depending on the future devel-

opment of the interest and inflation rates, opportunity costs for these lands might be higher than the choice to pay back the subsidies and clear the lands. Subak (1998, p. 24) finds the penalty system "very weak". She estimates the real cost "...is closer to 30 $/t in protected forests and 40$/t for carbon sequestered in plantations" (Subak 1998, p. 40).

Figure 2: Virilla basin project mitigation effects



Externalities

Forest and watershed conservation contribute to the improvement of the deteriorated environment of the San José region as well as to the improvement of soil and water quality and the hydrological regime of the area. Both will lead to an increase in energy production, estimated between 7 and 9% (UNFCCC 1997). The power plant itself would not have depended directly on forest protection. Given the Norwegian know-how in hydroelectric technology, the Virilla plant may now be more lasting and potent than it would have been without the co-operation. There is an external profit from the watershed protection for the hydroelectric plant resulting from the extended availability of water in the dry season.

Until mid-1998, landowners' participation was very low. Subak counted between 12 and 30 participants (1998, p. 8). She concludes, the forestry subsidies are attractive to beef-producing farmers, but not to dairy farmers in an area where land values are relatively high.

Observations

Beginning of the works was planned for November of 1996, but they were delayed due to problems with financing and contracts until March of 1997. Another serious problem was red tape: as no heavy machinery could be obtained in Costa Rica, it had to be brought into the country. Customs declaration was highly complicated and costly. Co-ordination manager Rolf Thorsen heavily complains about Costa Rican bureaucracy (Anonymous 1997a), thus contradicting the pretensions of the OCIC. Technical problems were posed by the notorious lack of infrastructure and the fact that the 69 m high dam was to be built in an earthquake-prone area.

As far as the forestry part is concerned, it seems more or less to be within the plan. Until mid-1998, about 25% of the planned forest had been included into the project area (Subak 1998, p. 8). However, due to a certain resilience among the landowners, it is doubtful if the incentives offered are high enough. For the actual participants, Subak, who investigated in the area, alleges "...that the Private Forestry Project may not be the major motivating factor behind participation" (1998, p. 21). If her assumption was true, that they had participated anyway for their individual environmental preferences, this would question the criterion of program additionality.

Energy Projects

Power production is dominated by the state-owned electricity and telecommunications monopoly *Instituto Costaricense de Electricidad* (ICE) with its regional subsidiaries. Although Costa Rica has a large potential for renewable energy, the indebtedness of ICE and legal constraints against private generation hinder the power grid to keep pace with the steadily growing demand (LeBlanc 1997, p. 3). Privately-owned renewable energy facilities are limited to 20 MW and in total are not allowed to constitute more than 15% of system capacity. Another maximum 15% can be covered by tender for no more than 20 years. Only companies with at least 35% of national participation are allowed to compete, and the cumulated limit for each provider is 50 MW. After the period has run out, ownership of the plant is transferred to the ICE. This procedure is known as build-operate-transfer (BOT) scheme (InterAm 1995). A recently proposed amendment limits small private renewable energy production to 5 MW for each plant and to 5% of system capacity (LeBlanc 1997, p. 4). If this proposal is turned to law, prospects are bad for small energy projects. However, if the new government should decide on the long discussed privatisation of the ICE, these restrictions could soon be made obsolete.

Due to the phase-out plan mentioned above, baseline projections are very restrictive for all power projects. In the USIJI report, each project has its own baseline, based on different data. In order to make emission reduction comparable to each other, the *Aeroenergía* baseline was chosen, because its cumulated bias was lowest, when applied to the other projects. The given data are set on a grey background.

Table 4: Reference case fossil energy production

Year	phase-out plan	fossil production [GWh]	carbon emissions [t]
1994	0,0%	829.8	235,048
1995	0,0%	829.8	235,048
1996	0,0%	829.8	235,048
1997	0,0%	829.8	235,048
1998	44,0%	464.7	131,627
1999	86,0%	116.2	32,907
2000	99,0%	8.3	2,350
2001	100,0%	0.0	0
C-emissions / GWh [t]:			*283.2586*

(Source: USIJI 1996, p. 40, own calculation)

Neither of the projects gives out tenders for goods and services. Contracts usually include provider commitments.

Wind power

The pacific rim of Guanacaste is best suited for wind power generation. All the three projected facilities are located in the surrounding of Tejona de Tilarán. The hilly plateau has been a cattle-farming area for centuries. Winds are extreme in the dry period between January and August, thus making wind power an ideal match for hydropower.

The *Aeroenergía* (AE) wind park is the smallest with a capacity of 6.4 MW. *Plantas Eólicas* (PE) and *Tierras Morenas* (TM) both are projected for the maximum level of 20 MW. All of them are strongly supported by the Costa Rican Government. Although OCIC official Adalberto Gorbitz (1997, p. 53) states, all energy projects were fully financed, PE and AE are the only project whose realisation has been confirmed, but much later than originally expected.

Up to the present, home markets for wind power stations are mainly Northern Europe and Northern America. Manufacturers are therefore interested in gaining experience un-

der tropical conditions and to find market entry to the developing countries. The main features of the three wind power projects are listed in Table 5.

Participants

See Table 7.

Climate Effects

Calculations for emission reduction achieved can be seen in Table 6. The Costa Rican fossil-fuel phase-out plan leads to a double disadvantage of the projects: first by comparing it to the baseline, secondly by discounting the reduction. The reason for this extremely conservative calculation is that the reduction shall not be claimed by several plants. There is no computation of the cumulative effect. Each wind park is assumed to be the only *additional* plant.

Costs

In contrast to the other projects, there is little sense in calculating the value per ton of carbon reduced, because – due to the unrealistic phase-out plan for fossil fuels – only the reductions achieved until 2001 could be considered. For the three projects, had they been constructed according to their schedules, carbon prices would vary between US$ 400 (PE) and US$ 900 (AE) per ton. Of course the delays lower the emission reduction even more. This is why the projects themselves have to be economically viable in order to be realised (See Table 7, 8). The Tierras Morenas proponents state to have operational costs of only US$ 0,015 per kilowatt hour (kWh), which would really be competitive.

Table 5: Features of the wind energy projects

	Aeroenergía	*Plantas Eólicas*	*Tierras Morenas*
Approval	July 1995	November 1994	July 1995
Participants	Aeroenergía S.A., CR Energy Works (subsidiary of US based Bechtel Corp. Power Systems Inc., US Bluefields international, US - Micon A/S, Denmark	Plantas Eólicas S.A. (joint venture between Merril International, US and Charter Oak Energy, subsidiary of Northeas Utilities, both US) - Kenetech Windpower, US	Energy Works, US ~~New World Power Corp., US~~[13] Molinas de Viento del Arenal S.A., Costa Rica - MINAE (CR Ministry for Environment and Energy Enercon, Germany
Suppliers	Micon A/S	Kenetech Windpower	
Monitoring	Aeroenergía S.A.	Plantas Eólicas S.A.	MINAE
Ann. Production	30.0 GWh/year	98.0 GWh/year	90.0 GWh/year
Starting date[14]	May 1997 (UNFCCC 1998a) / July 1998 (USIJI 1998)	June 1996	September 1997[15] (UNFCCC 1998a) / July 1999 (USIJI 1998)
Lifetime	21 years, 1 month	15 years	13 years, 11 months
Costs	US$ 8.85 million	US$ 27 - 30 million[16]	US$ 31.5 million[17]
Financing	Central American Economic Integration Bank: 75% - Aeroenergía Partners: 25%	Charter Oak Energy Tejona Corp.: 65% - Manuel Emilio Montero Anderson: 35%	Molinos de Viento del Arenal S.A.: 30% Commonwealth Development Corporation: 24% International Finance Corporation: 24% commercial banks: 22% **Funding not assured**[18]

(Source: USIJI 1996, p. 36-88, UNFCCC 1997)

13 New World Power Corp. is not listed any longer in the latest report.

14 Beginning of operation.

15 The UNFCCC uniform reporting format dates from October 13, 1998. Contrarily to the given date, the current stage is only given as “mutually agreed” (UNFCCC 1998a).

16 Total funding of the plant is kept confidential by the developer (UNFCCC 1997). Gorbitz (1997, p. 55) gives the number of 30.4 million US$.

17 Gorbitz (1997, p. 55) gives the number of 27.0 million US$.

18 As of October 1998 (UNFCCC 1998a)

Table 6: Project cases for wind power

Year	Aeroenergía			Plantas Eólicas			Tierras Morenas		
	annual capacity [GWh]	total carbon emissions with AE [t]	weighted difference [t C]	annual capacity [GWh]	total carbon emissions with PE [t]	Weighted difference [t C]	annual capacity [GWh]	total carbon emissions with TE [t]	weighted difference [t C]
1994	started								
1995	in								
1996	June '97			98.0	207,289	27,759			
1997	15.8	230,587	4,461	98.0	207,289	27,759	76.0		
1998	27.0	123,979	4,283	98.0	103,868	15,545	76.0	110,099	12,055
1999	27.0	25,259	1,071	98.0	5,147	3,886	76.0	11,379	3,014
2000	27.0		24	98.0			76.0		
2001	27.0			98.0			76.0		
		total AE	**9,838**		**total PE**	**74,950**		**total TM**	**15,069**

(Source: USIJI 1996, p. 36-88, own calculations)

Externalities

Apart from environmental benefits, renewable energy production serves both development and social objectives. Resistance against the privatisation of ICE can be understood in this context. According to the 1984 census, an average of 18.1% of Costa Rican households were not connected to electricity. In some regions, this rate amounted to over 50% (Hein et al. 1994, p. 134). Investment in infrastructure is needed as a prerequisite for the creation of employment.

Direct effects on the Tilarán region will be very few. Wind power stations do not require a lot of labour. Investment in property acquisitions for the wind installation will not be important.

Observations

Neither of the JI bodies of both countries took much trouble in the baseline calculation, maybe because the carbon reduction is not the incentive in this case. Apart from the different databases used (while always referring to the MINAE), there were several calculation errors, and they were even sometimes understating the emission reduction.

First experiences with Plantas Eólicas show that the project developers underestimated the fact that Guanacaste is a strong wind area. Although wind harvest was higher than expected, there are serious technical problems with the Kenetech generators. One of them was blown down, and all towers suffer from strong vibrations.

Another problem related to the Kenetech is that the company went into bankruptcy in April 1997 and is currently winding up its operations. Presently nobody knows neither

who will take the place of Kenetech in the management of the project, nor if spare parts and services will be available in the future.

Again in this case there are doubts about financial additionality. On 20th of December of 1995, the Inter-American Development Bank announced a US$ 18.7 million loan for PE, given partly (US$ 7.2 million) as a normal loan and the rest provided by a commercial bank, under subscription of participation agreement with the IADB. It also mentions a adjacent "sister plant" which would be operated by the ICE and financed both by an IADB loan and a GEF grant of US$ 3.3 million (IADB 1995). As IADB spokesman Daniel Drosdoff stated in September 1997, the loan was actually never signed, but the project was financed by Charter Oak. As the application to the USIJI was placed in November 1994, applicants evidently followed a double-tracked strategy.

The Aeroenergía project was reported to have started operation in May 1997. This fact was not known to Paulo Manso, the OCIC consultant specialised in renewable energies in July 1997.[19] The latest USIJI report (USIJI 1998) states the starting date was July 1998.

Finally Tierras Morenas does not give the impression of a AIJ project any more. It is mainly financed by the ICE subsidiary Molinos de Viento del Arenal and two multilateral development corporations.[20] Perhaps project developers decided to stop waiting for AIJ investors and took advantage of existing alternatives for funding. Once this funding will be assured, Tierras Morenas should be removed from the UNFCCC listing.

Water energy

The only US hydroelectric project was approved in July 1995. The 16 MW plant *Doña Julia* is to be constructed in Horquetas de Sarapiquí, in the Heredia region which has reportedly up to 8,000 mm of annual precipitation. The plant will be located on the rivers Puerto Viejo and Quebrandón. A reservoir will provide for peak load.

Participants

The project was developed jointly by MINAE and the New World Power Corp. Participants agreed on monitoring on a regular basis and co-operation with the ICE for development of offset information.

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19 This statement refers to a private conversation held on July 11th of 1997.

20 According to the UNFCCC report this funding is not yet assured (UNFCCC 1997).

Climate Effect

The reported baseline estimate was replaced by the one for Aeroenergía again. Doña Julia was originally planned to come on-line in October 1996. But it will not be able to really claim the carbon credits calculated unless an investor has been found. There is no evidence that the time schedule has been fulfilled and the plant is really operational. The second report to the UNFCCC from October 1997 appears to have been elaborated on the basis of the 1996 report. It is still unclear whether the plant has started operations.

Table 7: Project case for Doña Julia

Year	annual capacity [GWh]	total carbon emissions with AE [t]	weighted difference [t C]
1994			
1995			
1996	22.5	228,675	6,373
1997	90.0	209,555	25,493
1998	90.0	106,134	14,276
1999	90.0	7,413	3,569
2000	90.0		
2001	90.0		
		total	**49,712**
		USIJI data	**57,400**

(Source: USIJI 1996, p. 60f, own calculations)

Costs

Estimated total costs are US$ 28 million. This amount is not broken down by its factors. “The full capitalised costs of the project have been financed with a combination of debt (70%) and equity (30%).” (UNFCCC 1997) Both reports do no name any creditor and/or investor.

Externalities

An Environmental Impact Study was carried out by MINAE in April 1994 (USIJI 1996, p.59). The second report to the UNFCCC says:

> *“The negative effects include obstacles to fish migration, disruption of natural ecosystems by changing river regimes, changes in land use via construction of roads and transmission lines, sedimentation upstream of the dam, and river bed erosion downstream. Positive effects include mitigation of floods, creation on new habitats for some animal species, recreation, and the improvement of transport in rural areas by new roads.” (UNFCCC 1997)*

The project will provide employment during construction and operational phase. Nevertheless it seems difficult to quantify this effect.

Observations

USIJI admits there was no real program additionality in the *Doña Julia* case, because it was conceived several years before. An exception was made in order to get a languishing project off the ground. “In these cases, it should be shown that USIJI was instrumental in overcoming barriers that would, otherwise, have prevented the implementation of the project.” (USIJI 1996, p. 13) The mere approval as a AIJ project is not enough an incentive, if investors do not even see a future perspective to get credits for it. However, the uniform reporting format from May 1998 on the Climate Secretariat’s website (UNFCCC 1998a) makes believe the power station was operational since October 1996. In contradiction to that, a project description handed out on the Buenos Aires conference envisaged a planned starting date of November 1998 (USIJI 1998, p. 6). This means that under the current baseline projections practically no emission credits can be accounted for.

Climate co-operation in waste treatment

Astonishingly enough, up to the present no industrial project was proposed for AIJ co-operation in Costa Rica. Only recently, one agro-industrial AIJ project between Costa Rica and the Netherlands has been disclosed (Anonymous 1998, UNFCCC 1998a). Departing from the problem of waste water treatment in coffee processing (as depicted above), it finances additional investment for greenhouse gas mitigation. Since 1990, coffee mills are obliged to clear their waste waters in so-called “open lagoons”. Their disadvantage are major methane emissions. These emissions can be avoided by a closed, anaerobic reactor producing biogas. Four of these reactors have been constructed in different coffee mills. The projects run over 10 years, equal to the economic life-span of the equipment. The implementation ran between 15th of August, 1997 and 31st of March 1998.

Participants

The Costa Rican Coffee Institute ICAFE realised the feasibility study. Four local coffee mills (Cooperativas Naranjo, Jorco, Libertad and Cafetalera Pilas) will implement the technology in their plants. Biomass Technology Group BV (BTG) of the Netherlands developed the reactor process, Swiss-dominated Amanco de Costa Rica S.A. received

the BTG know-how to market and install the reactors. The project is financed by the Dutch government.

Climate effects

Over the project's lifetime, the amount of about 5,000 tons of Methane emissions will be saved in all mills, compared to the baseline scenario of using open sewage lagoons. This equals 126,780 tons of CO_2 or 34,545 tons of carbon equivalents using the IPCC conversion factor.

Costs

For the coffee producers, there would be a need to adapt their water treatment anyway to comply with an agreement with the MINAE signed in 1992. This agreement however allow for open lagoons. In this example, the incremental costs for implementing mitigation are easily defined by the difference between the two alternative systems.

Table 8: Costs for methane mitigation in coffee mills

	Naranjo	Jorco	Libertad	Cafet. Pilas	Total
Anaerobic reactor system costs	342,000	117,993	313,170	159,000	932,163
./. Alternative treatment costs	211,402	70,325	185,845	92,334	559,906
AIJ component costs	**130,598**	**47,668**	**127,325**	**66,666**	**372,257**
Saved GHG emissions [t C]	13,436	6,324	11,011	3,774	34,545
GHG abatement costs [$/t C]	**9.72**	**7.54**	**11.56**	**17.67**	**10.78**

Source: Anonymous 1998, p. 13, own calculations

The concept of incremental costs make the coffee mills project rather cheap. There is no estimation given on the gains generated by the use of methane for energy use. The reason is that the mills mainly use fire wood for that purpose. Another point seems to be the short project life. The commercial lifetime of the reactors will certainly be higher.

Externalities

The project is the topping of a business-as-usual project for the protection of water resources. Therefore, the regional environmental effects are not additional, apart from the substitution of firewood. Perhaps, awareness for biogas use may increase. Labour effects were positive during the construction phase. A new technology especially suitable for coffee production has been developed and transferred. Bad odours were reduced and the neighbourhood suffers less from insects. Negative influences like bad odours and methane escape now only occur when the plants are malfunctioning (UNFCCC 1998a).

Observations

The Dutch JI Registration Centre (JIRC) together with Costa Rican OCIC issues certificates. Two independent institutions from the Netherlands and Costa Rica developed the baseline scenario. The source does not give the name of these institutions, but it says that "a first monitoring study is scheduled for early 1999" (ibid. p. 13). It is interesting to notice that investor and host country share the certificates accrued. If the project is to be transferred to the CDM phase where credits will account against real emissions the question will arise what Costa Rica will do with them. Will it try to participate in emissions trading (which is actually not envisioned in the Kyoto Protocol) or will it claim the selling proceeds from the Netherlands?

Developing the instrument of co-operation

From the very beginning, Costa Rica has handled AIJ in a very autonomous way. The first projects stemming from co-operation with USIJI are being financed or are still seeking funding on a project-to basis. The investors are directly involved in proposal, planning and implementation. For these projects the transaction costs are high, return on investment as well as the real GHG effects are submitted to considerable entrepreneurial risk. This is why Costa Rica has developed an alternative model of financing climate co-operation.

The invention of so-called "Certifiable tradable offsets"[21] (CTOs) was the unilateral anticipation of an international crediting system. Costa Rica thus envisaged a CDM-type system very early where it could sell the CTOs on an international market. Each CTO stands for an amount of GHG reduced or sequestered in vegetation, expressed in carbon equivalents[22]. MINAE guarantees the amount to the CTO buyer for the period of 20 years. This means that, if any of the financed projects fails or does not produce the expected GHG effects, the state of Costa Rica will provide for other projects to take the same effect. For instance, if CTOs are sold over five years, the effective project duration is 25 years to guarantee the 20 year existence of greenhouse gas offsets to the last buyer. This is done by selling only a part of all possible carbon reductions as CTOs. Each single CTO (equivalent to 1 ton of carbon) was initially sold for 10 US$, while later CTOs are offered for 20 US$. As soon as emissions trading is begun, the price will be derived on

21 Later renamed "Certified tradable offsets", after a verification system was in place.

22 One ton of carbon equals 3.67 tons of CO_2.

stock markets. The whole mechanism depends on the two conditions before the start of the CDM:

- The home country of the buyer will recognise CTOs as valid.
- CTOs are of economic use for their bearer (e.g. entitles him or her to tax exemptions).

Under the CDM, it is still unclear whether host countries may freely trade credits.

Proceeds from selling CTOs go to the above mentioned National Forestry Finance Fund FONAFIFO[23], which is responsible for the so-called umbrella projects. In theory, these projects only need the approval of the Costa Rican JI office but not of the investor's country. On the contrary, CTOs would not be transferable. In practice, the State of Norway as the first buyer of CTOs developed two projects together with OCIC. The overall project volume being 3.4 million US$, Norway obtained 200,000 CTOs for the first 2 million US$ invested in forest conservation and reforestation.

Which are the advantages of CTOs over the project-to-project approach?

Investors can enter co-operation on a very small budget because virtually the minimum investment could be US$ 10 for one CTO. No administration is required and there are no external costs. The investor takes no risk if one project fails or is delayed; the only risk lies is the stability of the constitutional system of Costa Rica, which in turn has proved stable over the last 50 years. On the other hand, there is less free riding for the investor by linking the engagement to supply contracts. This goes in line with the restrictions set by the UN Framework Convention. On the other hand, each CTO is "tagged", meaning that it refers to a concrete project which can be traced at any time. This is to prevent that mitigations can be sold twice.

The benefits for Costa Rica consist in realising projects according to its own economical necessities and political preferences, thus fully conserving its sovereignty. This is reflected in the decision of OCIC to withdraw projects that have not yet received financing from the project-to-project basis and to carry them out under the Forestry Finance Fund's umbrella.

Because CTOs are insured against failure, they offer the opportunity to Costa Rica to sell greenhouse gas offsets that will be achieved in the future.

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23 In other publications reference is made to a "National Carbon Fund" (i.e. Foundation JIN 1996b, p. 2). This fund is not clearly defined. It seems to be just a part of FONAFIFO.

CTO financed umbrella projects

There are actually two "real" umbrella projects being financed by fuel tax and CTO selling.[24] Besides the PAP primarily serving the national park administration for purchasing land, there is the *Proyecto Forestal Privado*, which "aims to compensate farmers for forest conservation, reforestation or sustainable management efforts" (Foundation JIN 1996, p. 2). Whereas each CTO (equalling one ton of carbon mitigated) was initially (in the Virilla case) sold for 10 US$, after the SGS certification the OCIC raised this price up to 20 US$. The reforestation part of the Virilla project forms part of the PFP. The PFP has no clearly defined boundaries and can therefore be described as a program rather than a project. The second unknown factor is the magnitude of internal finance within the PFP (fuel tax). Further on, no time frame has been given for it. In the author's opinion, much work remains to be done to prove financial and project additionality of the PFP.

In July 1997, the US Initiative on Joint Implementation (USIJI) bought 16 million CTOs, 11 million of which are to be achieved by forest conservation and the rest by reforestation. An independent verification of all CTO-related projects by the Swiss company SGS has been agreed upon, which is financed by the World Bank. Up to the present, there is no private bearer of CTOs, except for the US based company Environmental Financial Products[25] which bought a 1,000-ton CTO at a price not revealed to the public (Liddell/Escofet 1997, p. 12) and placed it at the Chicago Stock Market.

Protected Areas Project

The Protected Areas Project (PAP, *Proyecto de Áreas Protegidas* in Spanish) comprises "paper parks" which were declared national parks or forest reserves but do not belong to the state. It is an attempt to join forces on a CTO base. Its surface totals 530,498 ha, nothing less than 41.9% of all Costa Rican areas under any kind of protection. As stated above, it bundles the former BIODIVERSIFIX and CARFIX projects, which were no longer reported since July 1998. The proponents declare explicitly: "... this project will not claim GHG benefits for any areas that are accruing GHG benefits as a result of their involvement in other active AIJ projects" (UNFCCC 1998a). This refers especially to the

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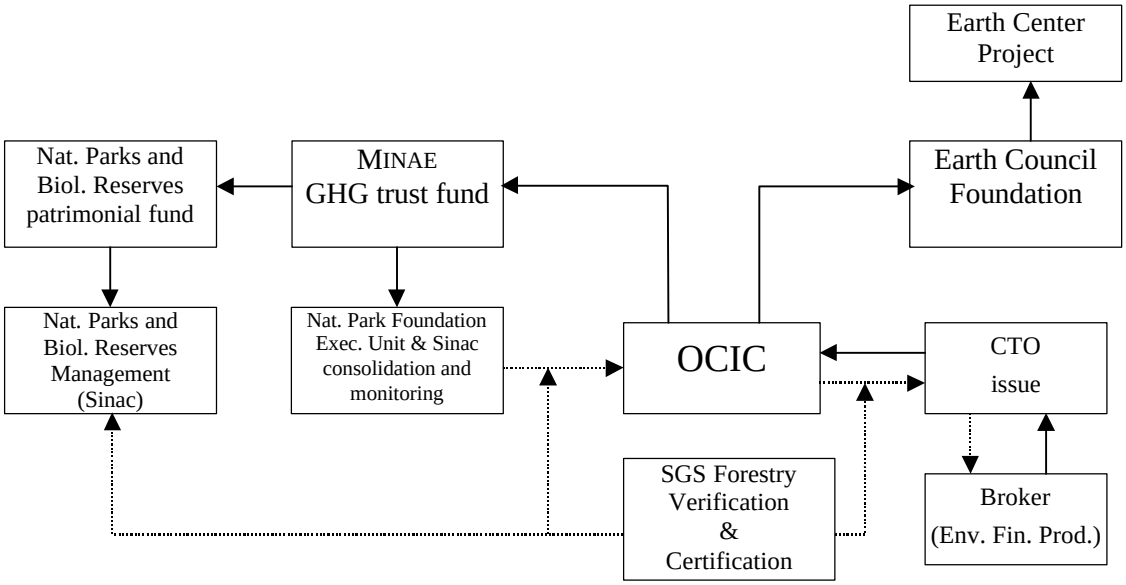
24 Another CTO program, the Costa Rican Renewable Energy Export Program which totals 215 MW of capacity to offset 0.35 million t carbon per year in the importing neighboring countries (LeBlanc 1997, p. 12f) seems to be languishing at present. There are technical shortcomings and incompatibilities of the electric grids between the different Central American states which question the program's feasibility.

25 Renamed in 1997, before: Centre Financial Products.

Piedras Blancas national park. As a part of its surface is subject to the ECOLAND project, it only accounts for 11,289 ha within the PAP.[26] Furthermore, an Earth Center will be built, "a multidisciplinary development combining residential, commerce, and work activities to provide public education and entertainment and to promote ecotourism" (UNFCCC 1998a).

Figure 1: Implementation of the Protected Areas Project



Source: SGS 1998, p. 17

Participants

The National Parks Foundation and the Costa Rican Earth Council Foundation cooperate on the Costa Rican side. They are supported by the US counterpart of the Earth Council. The bulk of the funding is expected to result from the sale of CTOs offered by the Chicago-based Environmental Financial Products Ltd.[27]

Climate effects

Constant monitoring and certification of the project is assured by the Swiss Société Générale de Surveillance (SGS Forestry). Its report (SGS 1998) has been made publicly available. SGS will certify on an annual basis the mitigation effects actually achieved. After scrutinising the different sub-projects thoroughly, SGS set preconditions for certification, among which there is the obligation to set up a buffer. Because of the high risk of forest losses due to erosion and fires in some regions, only some 56% of the potential

26 See the ECOLAND section above

27 In the July 1998 report, the old name and address of the company are still reported.

offsets of 1.76 million tons of carbon can be sold after they will have accrued. The remaining offsets have to be set aside, at least until the uncertainty is reduced. CTOs are now called Certif*ied* Tradable Offsets. The now included Biodiversifix and CARFIX projects were completely recalculated. The SGS baseline assumptions are very conservative, especially referring to the deforestation rate. SGS observed two trends in opposed directions:

- "Deforestation as a result of the rising demand for agricultural products is not expected to continue in the long term."
- "Population growth and increasing consumption of timber for construction and export are likely to maintain a proportion of deforestation trends in the future." (SGS 1998, p. 29)

The average deforestation rate within protected areas based on satellite imagery was estimated to be 1.47%. SGS uses a rate of 1,08% for the baseline calculation. "Another 16% of all offsets generated by deforestation of primary forest is set aside to cover the uncertainty related to the positioning of the baseline." (ibid.)

Costs

The total costs are estimated US$158.138.898 of which US$20,000,000 will go to the planned Earth Center. The certification and handling overhead US$1,033,735 is expected to be financed by the CTO buyers. This aspect is however questionable. Mulongoy et al. (1998, p. 21) calculate sequestration costs for Costa Rica at about 24 US$ per t of carbon, which correlates with the estimate given by Subak[28]. This makes the proceeds from CTO sales only *one* contribution to the governmental program, the other being the above referred proceeds from the fuel tax. On the other hand, if the fuel tax really was abolished, mitigation could no longer be offered at the same price.

Externalities

The project is part of the Costa Rican development strategy which fosters education, ecotourism, bio-prospection and the preservation of natural resources. The non-inclusion of Indian reserves around La Amistad National Park near the Panamanian border is explicitly given mention.

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28 See the Virilla case above.

Observations

The PAP is seen by the Costa Rican government as the third stage of climate co-operation. In fact, it seems the most mature of the projects presented in this chapter. However, in the light of the current negotiations, it is questionable if the PAP can still be called *one* climate project. It is rather a government program partially funded by foreign investors.

This leads to some doubts on financial additionality. If a climate co-operation funding only covers a part of the real costs the resulting credits cannot be fully attributed to the foreign investment. The way it is accounted today would have to be regarded as a subsidy for carbon sequestration services, or even unfair competition against other participating countries. Furthermore, it does not comply with the Article 6 (5c) of the Kyoto Protocol, demanding "...reductions in emissions that are additional to any that would occur in the absence of the certified project activity". In the case of the former CARFIX project which now has been included into the PAP, USAID development financing was even withdrawn in order to facilitate its inclusion into the AIJ program (Tattenbach 1995). This is opposed to the sense of climate co-operation. In the future, a *modus vivendi* will have to be found between development aid and GHG mitigation investment.

Conclusions

Costa Rica offers far better institutional and political conditions for climate co-operation than the vast majority of developing countries. This makes the small Central American country an appropriate testing ground for the viability of this flexible instrument. The key factor of the Costa Rican AIJ policy is that the process is host-country driven (Gorbitz 1997, p. 56). Climate co-operation requires reliability and longevity from institutions involved, making it a mechanism not applicable to least developed countries, in which open poverty and political risks are prevailing.

Still there are shortcomings of the mechanism itself which ought to be mentioned. They can be found in baseline scenarios, financial additionality, suitable project forms, "no-regrets", and procedure of approval.

Conflicting baselines

It is particularly interesting that the forestry projects try to both define baselines for afforestation and preservation of existing stocks. With one exception (CARFIX), they do

not account for sequestration / emission of the soil. In Costa Rican projects, the extrapolated deforestation rate is taken as baseline (USIJI, 1996, 65). In case there are uncertainties about existing stocks on deforested lands which can easily reach an order of magnitude, one ECOLAND chooses the upper bound as baseline (USIJI, 1996, 47) while KLINKI sets the stock after deforestation to be zero (USIJI, 1996, 54).

Renewable project baselines do not include life-cycle emissions of the plant material. A very interesting aspect of the renewable energy projects in Costa Rica is that because of the commitment of the Costa Rican government to phase out fossil fuel electricity production by 2001 the baseline is zero emissions after 2001. USIJI doubts whether this commitment can be fulfilled (USIJI, 1996, 39), but nevertheless requires the baselines to take it into account. This means that renewable energy projects will not become creditable under the CDM regime after 2000. Therefore, all the renewable energy projects actually approved and implemented are likely to be "no-regret" projects.

The pilot phase should be seen as a chance to gain experience with GHG calculations. There are many different approaches as far as reference and project cases are concerned. While project cases can be monitored during the realisation, the baseline problem remains crucial. Usually baselines are static and remain valid for the whole project lifetime. Only in the CARFIX case the possibility was considered to keep the baseline dynamic by monitoring the surrounding deforestation. This proposition is a new approach to the baseline discussion which should be observed in the future.

Sometimes the JI institutions involved seem to have neglected the importance of the climate effect calculations and therefore did not even take the trouble to check them. They should consider that after the actual pilot phase these carbon credits might entitle the bearer to GHG emissions in his / her home country. There is a need to issue credits only when they actually accrue – not in advance. Emission credits for the ECOLAND investor were accounted for right away, long before the carbon benefits are being achieved. In the later AIJ stages, the risk associated to the imminent payoff were covered by the CTO "buffer", which is a kind of insurance. In the future, insurance companies are likely to cover these project risks. This will act as an additional incentive for the accuracy of monitoring and verification.

Financial additionality

As illustrated in the PAP case, the question of financial additionality remains controversial. This relates not only to unfair competition by internal subsidies to climate projects, but as well to climate-relevant development co-operation. If climate co-operation is to be

beneficial for development too, it seems sensible that both forms of financing should be bundled together whenever a project equally fulfils both priorities. However, the question is who should be allowed to harvest the mitigation fruits. Clearly, greenhouse gas mitigation is a side-benefit to many development projects and must not be accounted for by the investing country or international institution, like in the case with the Tierras Morenas wind park. But, whenever the World Bank or national ODA institutions finance enabling activities of climate capacity building to attract third-party investors, should these investors receive the full amount of credits once the project is in place? For instance, the SGS study on the PAP was financed by the World Bank. Can project development, administration, monitoring and verification be separated from its outcomes?

Project forms

To the recent exception of the coffee mills project, there are but energy substitution and carbon sequestration projects in Costa Rica, although a lot of alternatives could be thought of. In terms of GHG reductions, forestry projects have been preferred. There are several reasons for this observation:

- Most projects were proposed by or in close co-operation with the Ministry of Environment and Energy MINAE which is very much concerned with conserving the remaining forests and uses AIJ as one instrument of international financing among others.
- At first glance, forestry projects offer vast carbon mitigation benefits, when comparing reduction, sequestration and non-emission. However, if baselines and risks are assessed in a realistic way, the real costs may become comparable. In the future CDM regime, preference could be given to technological reductions which cannot be reversed by attributing these options a higher degree of accountability.
- A political declaration — the phase-out plan for fossil energy — was taken as the baseline for the energy projects, thus punishing the good intention by obstructing investment.

The last point relates to the principal problem of perverse incentives for governments. If environmental regulations are too strong they tend to spoil the baseline for climate projects. The dilemma is between the most favourable baseline calculation for a country whose environmental policy is worst and the selling-out of each and every environment-related measure in the name of greenhouse gas mitigation. This last possibility would conflict heavily with the additionality criterion.

No-regret criterion

There are a lot of emission reduction opportunities which are profitable either for a company or for a country as a whole. The latter includes externalities such as the reduction of other pollutants. Now the question arises whether these so called micro- or macroeconomic “no-regret”-projects are included in the baseline. So far, the question of “no-regret”-opportunities has led to heated debates in the economist community. While some say that there can be no “no-regret”-projects as such opportunities would have been grasped immediately (e.g. Sutherland, 1996), others estimate that 10-30% of today's emissions could be reduced via “no-regret“ projects (IPCC, 1996).

These differences come from the fact that despite of the theoretical profitability of many options there are regulatory and juridical obstacles, lack of information and skilled personnel as well as organisational rigidities. It is often reported that managers do not invest in raising energy efficiency even if its internal rate of return is much higher than the prevailing market interest rate. The main reasons are probably short planning periods, requirement for a minimal rate of return much higher than market interest and lack of capital. It is not surprising that private households have even higher thresholds for internal rates of return. This applies particularly to countries in transition (Nordic Council of Ministers, 1996, 28) and developing countries. Often an investor cannot appropriate a gain as it is an externality accruing to others. Therefore, it seems that pure microeconomic “no-regret”-opportunities are rather scarce whereas macroeconomic “no-regret” abounds.

In practice, program and financial additionalities can hardly be separated from one another. The objectives of MINAE have been realised in different project forms, none of which was induced by the AIJ co-operation. Some, perhaps most of the projects, had been developed before and were proposed under the AIJ regime. Would it be different, chances for realisation and subsistence were considerably lower. The same applies to financing: from the host country’s perspective AIJ is but another opportunity to raise funds for projects that bear positive externalities. If the rules for the AIJ pilot phase had been observed strictly, many Costa Rican projects would have been disapproved because the proponents showed too much engagement and consequently might as well have found other ways of financing. In two cases financing was withdrawn in order to clear the way for approval as AIJ projects. The rational alternative would have been to pool the money and to enlarge the projects. This is how CTOs were created. They guarantee each investor a certain amount of carbon offsets, without interfering in the rights of any other investor. These “carbon bonds” need to be confirmed by an international clearinghouse if a carbon trading system will be established in the future.

A critical point is the lack of information. In the author's opinion a project should not be approved if the developers hold back relevant data. This refers to source and amount of funding (like in the case of Plantas Eólicas), baseline and project case calculations, ecological and local economic side-effects or post-project prospects (KLINKIFIX).

Procedure of approval

It is hard to understand, why two national JI bodies need to approve each project applying the same set of criteria. It could be demonstrated that the double approval did not guarantee an efficient control. As both bodies are interested in carrying out the program, even a kind of complicity may arise. Supposing the guest country is interested in climate effects, while the host country is interested in positive externalities, each of them should confirm the relevant components.

Nearly all reports to the UNFCCC try to give the impression that the project is currently in progress, even if funding is not assured. Monitoring and verification by independent institutions will be pivotal for credibility in the future.

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