

Integrating Biodiversity into the Forestry Sector: Best Practice and Country Case Studies

Costa Rica

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ACRONYMS

AC	Conservation Areas
AFE	State Forestry Administration
CATIE	Tropical Agricultural Center for Research and Education
CCT	Tropical Scientific Center
CNCF	National Commission on Forestry Certification
CODEFORSA	Forestry Commission of San Carlos
CONAGEBIO	National Commission on Biodiversity Management
COSEFORMA	GTZ-MINAE project office for the northern zone
CTO	Certified Tradable Offset
FAO	United Nations Organization for Food and Agriculture
FONAFIFO	National Fund for Forestry Financing
FSC	Forest Stewardship Council
GEF	Global Environment Facility
IFF	International Forum on Forests
INR	Internal National Revenue
IPF	International Panel on Forests
ITCR	Technological Institute of Costa Rica
MINAE	Ministry of Energy and Environment
NGO	Non-governmental organizations
OCIC	Costa Rican Office of Joint Implementation
ONF	National Forestry Office
PNDF	National Plan on Forest Development
PPSA	Environmental Services Payment Program
PROFOR	Program of the Forestry Sector Institutional Strengthening
SETENA	National Environmental Technical Secretariat
SINAC	National System of Conservation Areas
SIREFOR	Information System for the Forest Resources
UNDP	United Nations Development Program

I. OVERVIEW OF PRESENT STATE OF NATIONAL FOREST MANAGEMENT IN THE COUNTRY

A. History of forest management within the country

In the 70's and 80's a number of different actions were taken by the government as the alarming rate of deforestation - some 50,000 hectares per year- threatened to make all the forests disappear by year 2000. The main causes of this were the agricultural and cattle raising sectors' growth (see Table 1 and Table 2, and Figure 1). It was then predicted that the country would have to import \$350 million of forest products every year to supply the internal demand (Castro *et all*, 1998).

Table 1. Deforestation rate

Year	Hectares/year
70's	50,000
80's	22,000
1994	4,000
1998	0

Source: PNDP, 2001

Table 2. Forest cover

Year	Percentage
1961	53 %
1977	31,7 %
1983	26,1 %
1997	40,3 %

Source: PNDP, 2001

As a result of those predictions, the government implemented a series of incentive programs and decided to give more importance to forestry issues and protected areas. New institutions and laws were created in order to accomplish the task of reducing the deforestation rate.

In the 70's, the government tried to protect some areas by declaring 11 national parks, 5 biological reserves, 6 forest reserves and 10 protected zones. The total protected area was expanded from 3% to 12% of the whole country surface, and to 25% approximately nowadays, comprising 25 national parks, 8 biological reserves, 56 wildlife refuges, 11 forest reserves, 32 protected zones, 14 wetlands and 4 special categories (see Table 3 and Figure 2). But this policy of purchasing lands was definitely not sustainable, and other instruments had to be implemented (Castro *et all*, 1998).

Table 3. Protected wildlife areas in Costa Rica

Management category	Number	Area (hectares)	% of the country
National Parks	25	624,082	12.21
Biological Reserves	8	21,674	0.42
Wildlife Refugees (public, private and combined)	56	178,225	3.49
Forest Reserves	11	227,834	4.46
Protected zones	32	155,829	3.05

Wetlands	14	66,359	1.30
National Monument and Experimental Station	2	7,561	0.15
Absolute Natural Reserves	2	1,330	0.03
TOTAL	150	1,282,894	25.11

Source: SINAC, Information Systems Unit, July 2001

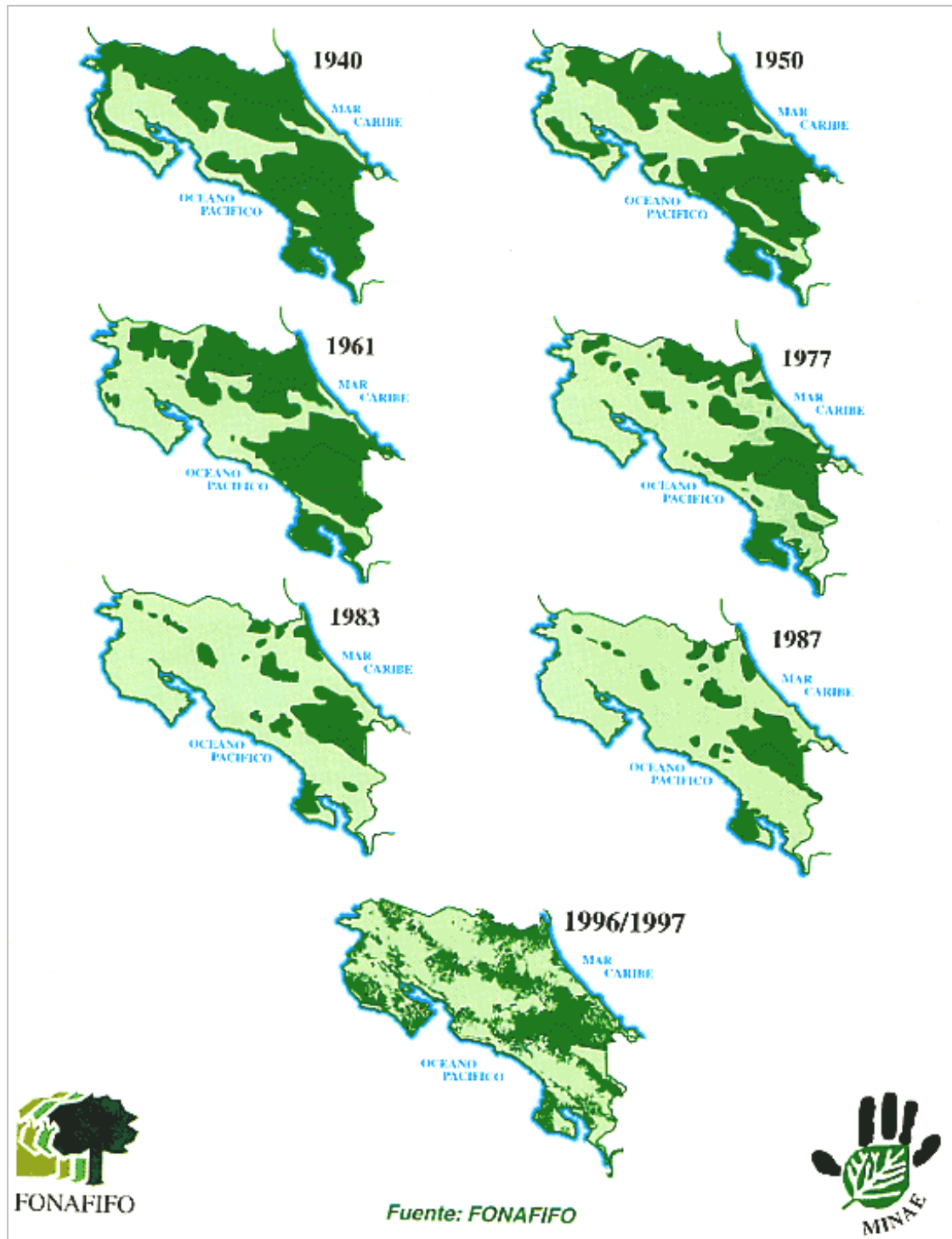
In 1979, the first program of forest incentives was created. It was not very successful and was not adequately conceptualized. In order to be able to obtain the incentives for reforestation, the interested party had to clear-cut the land, and only then, the reforestation took place. In a number of cases, this meant to cut the native species and plant one single species not necessarily native. Other tax exemptions were also created to benefit those involved in forest activities, but they were not sufficiently “attractive” to constitute a strong incentive.

In recent years, this scheme of incentives became the Environmental Services Payment Program (PPSA), created by the current Forestry Law (1996).

In 1986, a small department of the Ministry of Agriculture was converted into the Ministry of Natural Resources, Energy and Mines (MIRENEM). The Law of Environment (1995) assigned new functions to this Ministry, and renamed it as Ministry of Environment and Energy (MINAE). This Ministry has an organ called the National System of Conservation Areas (SINAC), which is regionalized and has offices all over the country. The whole country is currently divided into 11 Conservation Areas (AC), that is, planning units with protected areas and buffer zones under the administration and protection of the Ministry of Environment (see Figure 3).

This new Ministry, the new environmental services program and the creation of other institutions, facilitated the decrease of the deforestation rate to “zero”. That means we have a permanent percentage of forest cover - primary forest, secondary forest, regeneration of forestlands and tree plantations-, of around 40% of the country total surface. This was demonstrated in a 1997 study undertaken by CCT and FONAFIFO. It is important to have obtained these results, but it was then pointed out that the quality of the forest cover had to be measured, especially in reference to the biodiversity that is present in those forest ecosystems or plantations. This has not been achieved yet.

Figure 1. Costa Rica's forest cover (80-100%) in 1940, 1950, 1961, 1977, 1983, 1987 and 1996/1997



Source: FONAFIFO, 1998

Figure 2. Protected areas

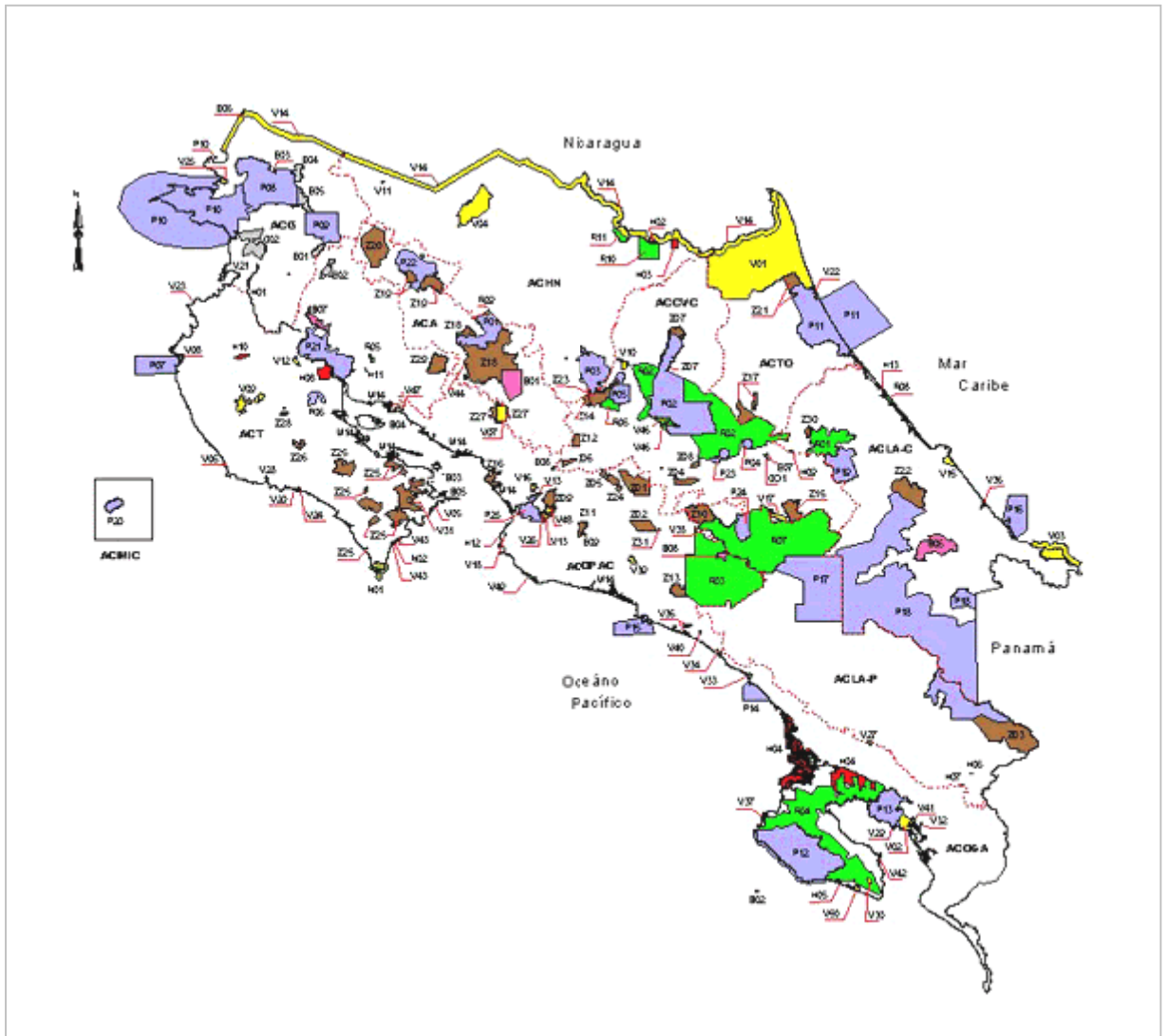


Figure 3. Conservation Areas National System (SINAC)



Source: SINAC, 2000

B. Relative priority in national planning policy

There has been noticeable progress in the environmental field in the last 30 years, which ended on the protection of 25% of the country's total surface and many other achievements.

But as a matter of fact, those achievements have not always been backed by a governmental policy, but they can be attributed to some dedicated and visionary people interested in biodiversity conservation.

In the present governmental period (1998-2002) there has been some concrete working guidelines in the forest issues: the EcoMarkets project (GEF-World Bank) and the German Development Bank (KFW) donation for the environmental services payment program (PPSA), for example.

At the beginning of this administration, a participative process called "consensus" took place under the sponsorship of the government. One of the main issues discussed here was the environmental services payment program (PPSA). And of course, another important issue was the elaboration of the National Forestry Plan (2000-2001).

The National Forestry Plan - as the Ministry of Environment has often stated - is a piece of the utmost importance in the national environmental policy.

Therefore, some importance has been given to forest issues, but it cannot be said that they are of priority importance in the national planning policy, whereas health, housing and education issues were preponderant.

If we examine closely the Human Development National Plan - *Plan Nacional de Desarrollo Humano 1998-2002* - direct reference on the Forestry Plan or policy cannot be found. There are nine different areas, grouped into four sectors in the National Plan: one of those areas comprises all the environmental issues. Among those, there are six different components: institutional strengthening, mining and energy, climate and vulnerability, land planning, pollution-free environment, and environmental services.

The environmental services are considered a powerful economic tool to consolidate the protected areas system and make it sustainable on the long term. But they are not considered as an integral part of a forestry plan or policy. Or better yet, the forestry policy only considers the development of environmental services programs, in order to secure the natural forests.

Some of the actions established in the National Plan aim to:

- Secure the payment of environmental services to 200 000 hectares of private forests under management plans
- Promote the recovery of the secondary forests by means of environmental services payments
- Massive reforestation policy – 50 000 hectares per year - by means of environmental services payments and other instruments
- Add value to trees, natural forests and tree plantations, improving the sustainable exploitation, transportation, industrialization and trade

C. Relative importance in the national economy

There are different studies mentioned in the National Forestry Plan that tried to determine the real contribution of the forestry sector to the national economy. There is not a single methodology to obtain these results. The national accounting system includes only the "timber" line in the Internal National Revenue, which sums up to 2% -in 1998 it corresponded to \$ 42 millions).

It has been determined in those studies that the real contribution is around 5% of the INR and might even reach 10% in the following years. Table 4 shows all the lines that should be included and are not yet.

Tree plantations are the third crop in importance at a national scale, after coffee and banana – whose importance diminishes year after year-, and they represent the largest one in surface.

Table 4. Forest accounting

Timber products	1. Primary sector	Nurseries Natural forests exploitation Tree plantations exploitation Natural forests timber industrialization Tree plantations timber industrialization Mobile sawmills Board and panels factories
	2. Secondary industry	Furniture Factories of moldings Platforms Manufacture of sawmills
	3. Transportation	Timber and furniture transportation
	4. Commerce	Timber deposits
	5. Governmental sector	MINAE Universities Other entities
Non-timber products	6. Environmental services	Gas emissions mitigation Water protection Biodiversity conservation Landscape Others (soil protection and natural disasters)
	7. Pharmaceutical primary materials	Medicinal plants Bioprospecting materials
	8. Ornamental plants	
	9. Wildlife	
	10. Research	

D. Description of National Forestry Plan

First of all, the Plan was drafted with consultations to all stakeholders. It was not a wide process, like the drafting of the Biodiversity Strategy, and it lacked participation from NGOs and of communities concerned with forest issues. Even so, 150 people participated in one phase or another.

The National Plan on Forestry Development (PNDF) has an introductory framework containing three elements:

- National environmental policy
- Forestry policy: a result of a participative process undertaken by the Ministry of Environment in 2000
- International forestry principles promoted by the United Nations (Rio 92)

Based on those policies and principles, the Plan is divided into six different and priority areas:

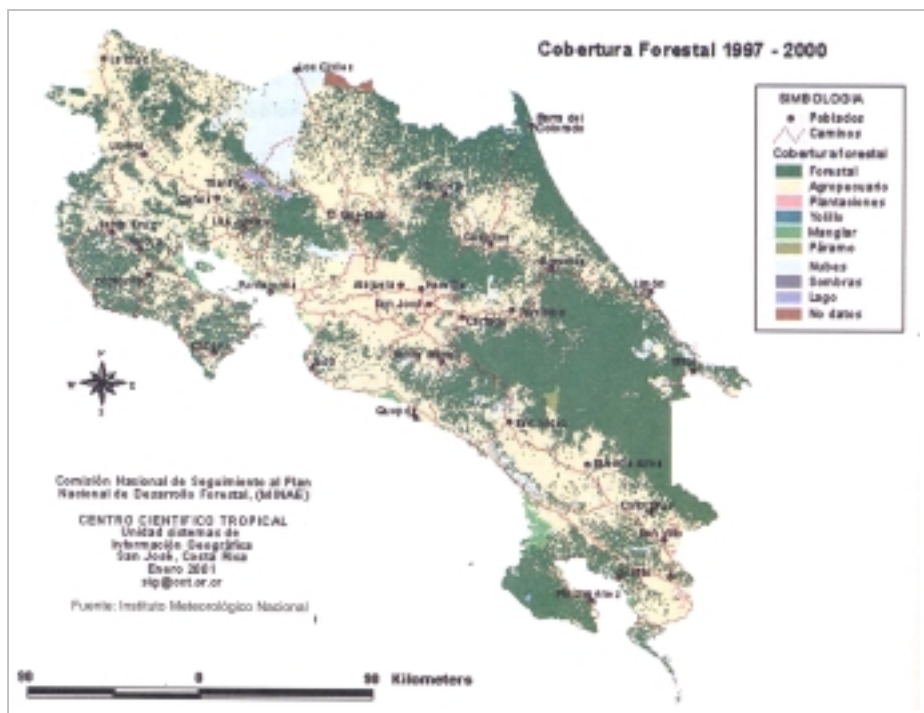
1. Land planning

The first and most important task is to implement land planning on all forest and forest-oriented lands, which represent almost 70% of the country's total surface. This is going to be done during a span of 10 years. From that 70%, 40% is already under forest cover, but 30% is dedicated to other uses.

Based on data from the Environmental Land Plan, there are maps showing the updated situation on land use, the ideal situation for the next 10 years and the conflicts in the land use, resulting from superposing both maps. (See Figures 4, 5 and 6)

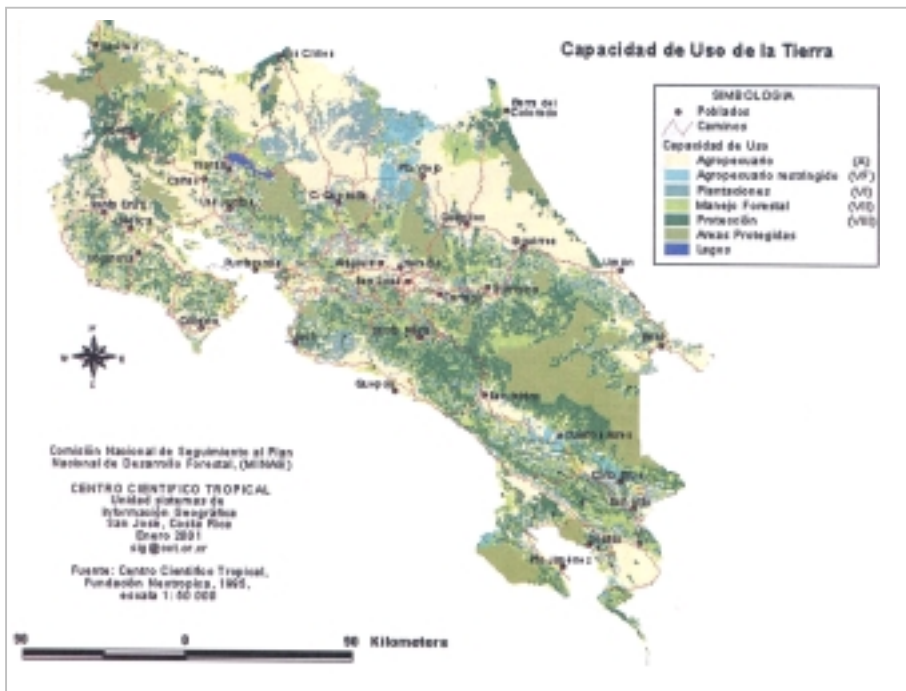
The goal is to reduce all the areas in conflict of use – Figure 6, and reach the uses shown in Figure 5.

Figure 4. Updated forest cover (41,2% of the country's total surface)



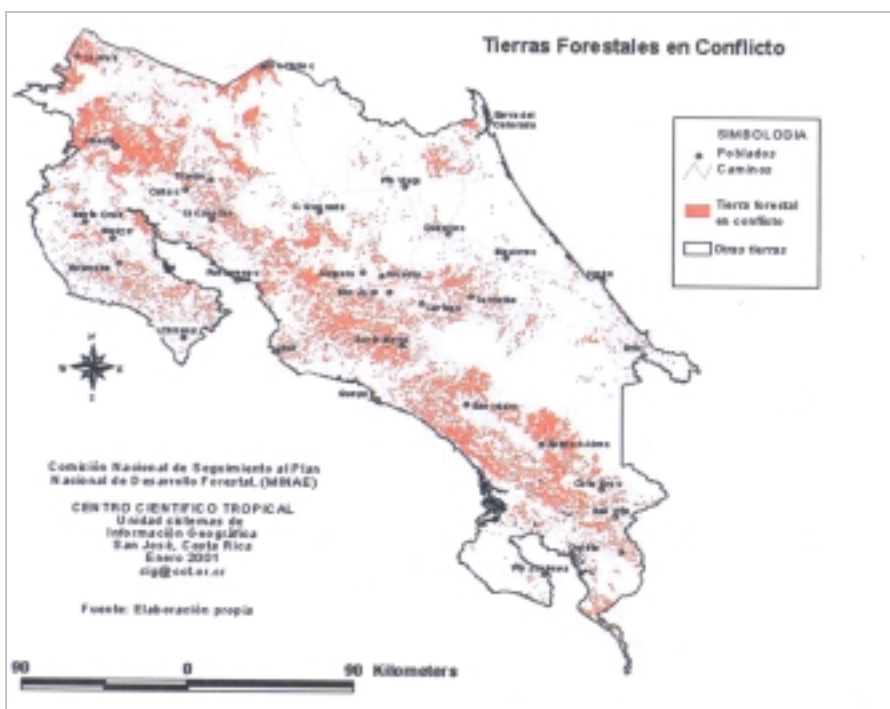
Source: PNDF, 2001

Figure 5. Ideal forest cover (70% of the country's total surface)



Source: PNDP, 2001

Figure 6. Forestland use conflicts (30% of the country's total surface)



Source: PNDP, 2001

2. *Competition and positioning of the forestry sector*

Certified Costa Rican tree plantations represent almost 100% of all certified tree plantations in Central America (PNDF, 2001). The most important ones are Ston Forestal, Flor y Fauna, FUNDECOR and Tropical American Tree Farm (see Table 5). The forest certification has been identified as a valuable instrument to access the forest products market.

Table 5. Certified Forest Projects in Costa Rica

Project	Area (hectares)	Activity
PORTICO S.A.	3,946	Natural forest
Fundación TUVA	500	Natural forest
FUNDECOR	17,551	Natural forest, tree plantation
Forestales internacionales	300	Natural forest
Flor y Fauna	2,788	Teak plantation
Tropical American Tree Farms	2,629	Teak plantation
Asociación San Migueleña de Conservación	81	Tree plantation
BALSATICA	3,500	Tropical forest
Bosque Puerto Carrillo S.A.	3,785	Tree plantation
Corporación Buen Precio	2,662	Tree plantation
ECO Capital	385	Tree plantation
EcoDirecta	1,121	Tree plantation
Germano-Costarricense S.A.	1,200	Tree plantation
TOTAL	40,538	

Source: Forest Stewardship Council (FSC), December 2000 in PNDF, 2001

Tree plantations are the crop with more area in our country with over 150,000 hectares - 123,000 hectares only in the past 14 years -. Private landowners also have 200,000 hectares of primary forests and 400,000 hectares of secondary forests, which is a great asset for the forest development (PNDF, 2001).

Another condition that needs to be fulfilled in order to be competitive is to comply and monitor the implementation of all the international regulations on forestry issues: IPF-IFF, Agenda 21 Chapter II, Rio 92 commitments.

The Plan states that \$ 17 millions need to be invested in the industrial forestry sector between 2001 and 2010, just to cope with the timber supply of tree plantations.

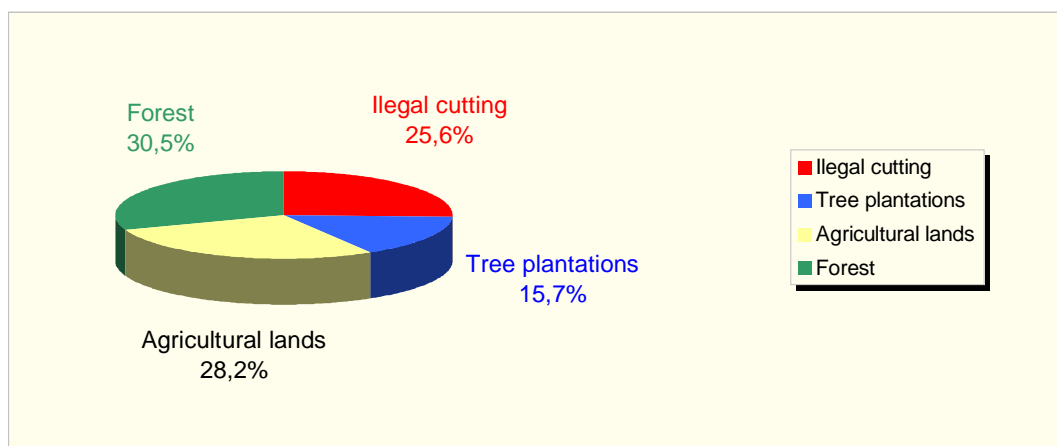
3. *Follow-up, control and evaluation of sustainability*

The PNDF has roughly determined all the timber supply sources of the primary forest industry, as shown in Figure 7.

The percentage of illegal tree cutting is still very high: 25%. The percentage corresponding to forest refers to forest management plans. The percentage corresponding to agricultural lands refers to isolated trees in pastures or other non-forest-capacity lands. This almost 30% is somewhat worrying, because those trees require very simple procedures to get a permit to be cut, in opposition to the forest management plans, which means a load of paperwork and expenses. They might be threatened under our legal regulations. This situation has to change. Many biological corridors depend on those “isolated trees” connecting forest areas, and they constitute nesting sites and food for many species, not to mention, serving as genetic resources. Some tree species are not shade tolerant, this is their natural situation.

Further more, by means of protecting those trees, is precisely the way of regenerating lands previously covered by forests.

Figure 7. Timber supply sources of the primary forest industry



Source: PNDP, 2001.

The plan mentions some priority actions in this area:

- Illegal cutting control with all stakeholders participation
- Discourage the cutting in pastures
- Stronger punishments to the timber industry - not only the landowner
- Auditing improvements
- Encouragement of the good forest management

4. *Financial instruments and mechanisms*

The most important instrument that our government has implemented is the Environmental Services Payments Program (PPSA). Table 6 shows the area covered in 2000 and Figure 8 the area covered in 1999. Our Forest Law recognizes four environmental services provided by our forest: water protection, energy supply, clean air and landscape.

Some mechanisms have been used so far: a tax on all fossil fuels; a percentage included in the water and electricity bills representing the environmental costs of producing those services; agreements with the power supply companies; CTO's international sales; and others.

Table 6. PPSA in 2000

Conservation Area	Conservation	Reforestation	Total
ACA-HN	2,639.58	932.78	3,572.36
ACA-T	1,242.01	75.00	1,317.01
ACTO	999.94	99.92	1,099.86
ACLAP	2,169.55	109.50	2,279.05
ACOPAC	2,569.29	166.00	2,735.29
ACLAC	2,344.10	198.48	2,542.58
ACG	3,840.97	117.16	3,958.14

ACOSA	2,614.57	33.27	2,647.85
ACT	5,121.40	350.00	5,471.40
ACCVC	3,041.78	374.67	3,416.45
TOTAL	26,583.20	2,456.79	29,039.99

Source: Arturo Venegas, FONAFIFO, July 2001.

Figure 8. Location of Environmental Services Projects - 1999



Source: FONAFIFO, 1999

In order to make the PPSA sustainable, there are many projects. The most important of those is EcoMarkets, representing \$ 60 millions for the next ten years - see Table 7 - meaning the payment of environmental services in more than 100,000 hectares of priority areas.

Table 7. EcoMarkets

World Bank loan	PPSA	\$ 32 millions
World Bank – GEF donation	PPSA for biodiversity conservation	\$ 8 millions
KFW – German Development Bank donation	PPSA	\$ 10 millions
Government contribution	PPSA	\$ 10 millions
TOTAL		\$ 60 millions

Source: PNDF, 2001

Other mechanisms that would be strengthened are: reforestation program, advance timber purchase, future timber sale, timber on tree auction program, industry financing.

5. *Information System for the Forest Resources (SIREFOR)*

This information system is a clear need in order to be able to adequately identify the contribution of the forestry sector to the national economy. It will also serve as a clearinghouse mechanism to disseminate information about our forest resources, projects and progress towards the goal of 70% of the country's total surface under forest cover (see Figure 5).

The first step will be to identify the different sources of forest information, the compatibility of the different methodologies used to generate it and the different geographic information systems (GIS). On second hand, the technological platform must be put into operation, as well as the information sharing and generating mechanisms with a strong component of training.

6. *Interinstitutional coordination and strengthening*

The PNDF establishes different actions to strengthen the institutions with attributions in forestry matters - SINAC, FONAFIFO, ONF - increasing their budgets and training their officials; to consolidate the participation of the civil society; and to reformulate the legal framework.

E. Participation and degree of interaction of different sectors and stakeholders in the logging process: public, private, NGOs, local communities, universities, etc.

Our Forestry Law declares that all the forests located in public lands, might not be cut, but for very specific reasons. It also states that all the forests located in private lands might be exploited following a management plan written by a *forestry engineer*. In Costa Rica, it's hard to find large properties, and they are generally small or medium size - no more than 300 hectares -. Even so, any *landowner* might have access to the PPSA, sometimes it is difficult for small farmers to pay the cost of a management plan. This is where another stakeholder enters the scene. He is the *logger*. He pays for the management plans in others' properties; he provides the timber transportation and all the necessary paperwork. The landowner only gets a little money for the trees and occasionally, might be responsible for damages done to the forest.

Sometimes, there are NGO's and community-based organizations that can provide the same services as the loggers. They charge a commission and pay directly to the landowner. They are both responsible before the Ministry, for the compliance of the management plan.

Other institutions and universities have been researching in the forest field for many years now, such as CATIE, Technological Institute of Costa Rica (ITCR), COSEFORMA, CODEFORSA and others.

Apart from the participative processes of elaborating the national plan and the national policy, there was the above mentioned 'consensus' process on the PPSA. A new bill was drafted and a series of principles were agreed upon. But there was no support for the government to approve it, favoring the big industrial forestry sector.

A similar situation occurred when the new Forestry Law was being discussed at our Congress, in 1995. Even so, a great achievement was the inclusion of the prohibition to change the land use, that is, to clear-cut land.

F. Institutional structure of logging planning and policy

The Forestry Law establishes that the policymaking and planning correspond to the State Forestry Administration (AFE), which is the Ministry of Environment and Energy (MINAE) and within this Ministry, the National System of Conservation Areas (SINAC) (see Figure 9).

Furthermore, SINAC is responsible to approve or refuse management plans or tree cutting permits, and to control in the field, the adequate implementation of the management plans. SINAC must file in case there is a violation of the Forestry Law or of the management plan.

The National Fund for Forestry Financing (FONAFIFO) is the institution that, once a management plan and a petition are approved, wires the payments to the landowner that applied for the environmental services payments. FONAFIFO is also constantly searching for new funding for the PPSA. Their Board of Directors comprises delegates from the private and public sectors involved in forestry issues.

Another entity in charge of looking for adequate funding for the PPSA, is the Costa Rican Office for Joint Implementation (OCIC). Thanks to their efforts, the EcoMarkets project was approved by the World Bank and by our government. The officials of OCIC represent the Costa Rican government in all Climate Change Framework Convention meetings.

The private sector, meaning small, medium and large loggers and landowners of forestlands, is represented at the National Forestry Office (ONF), which is a private entity created in the Forestry Law. It was created in 1997, and it was only in 1998 that an Executive Director was appointed. They have done an intensive effort to follow all the Congress' bills on forestry issues - environmental services, forest taxes, reforms of the Forestry Law, among others - and they have widely participated in the PNDF process as well as in the forest policy making process. They are represented in the FONAFIFO Board of Directors. They have also elaborated a number of case studies: forest policies, institutional evolution, financing mechanisms, forest management best practices, etc. Since 1998, the UNDP Program of the Forestry Sector Institutional Strengthening (PROFOR) has supported the ONF (Barrantes, 2001, pers. comm.).

All of the above mentioned organizations have delegates to the PNDF Follow-up Commission. One more delegate comes from the Program of the Forestry Sector Institutional Strengthening (PROFOR) of the UNDP office in Costa Rica. This Commission is in charge of coordinating and executing actions implementing the PNDF, and monitoring and evaluating the whole process. There are institutions coordinating each of the six main areas of the PNDF. In the implementation and monitoring of the PNDF, other institutions, mainly NGO's and research centers, collaborate in many ways (Ulate, 2001, pers. comm.). See Box 1 below as an example.

Box 1. National Forest Inventory

Currently, a project is being implemented in order to revise the forest policy, called the *national forest inventory*. It is important at this stage, as it represents a step forward in knowing what we have and how we can improve the forest management and conservation. In 1997 and 2000, FONAFIFO studied the national forest cover, but could not evaluate the forest resources as this project now intends to. This is a pilot project - second of his type at a worldwide scale - with the support of the Forest Resources Assessment Program of FAO, that intends to standardize the methodology and include new variables (Ramírez, 2001, pers. comm.).

The objectives of the project are:

- To design a methodology for the forests evaluation of the Latin American tropical zone, that can contribute with FAO Global Forest Survey
- To measure the forest resources and forest cover of Costa Rica
- To establish a system of permanent demonstrative parcels
- To integrate new variables - environmental, socioeconomic, politic and institutional -

It has been undertaken by CATIE with the collaboration of the National University (UNA) and the supervision of SINAC.

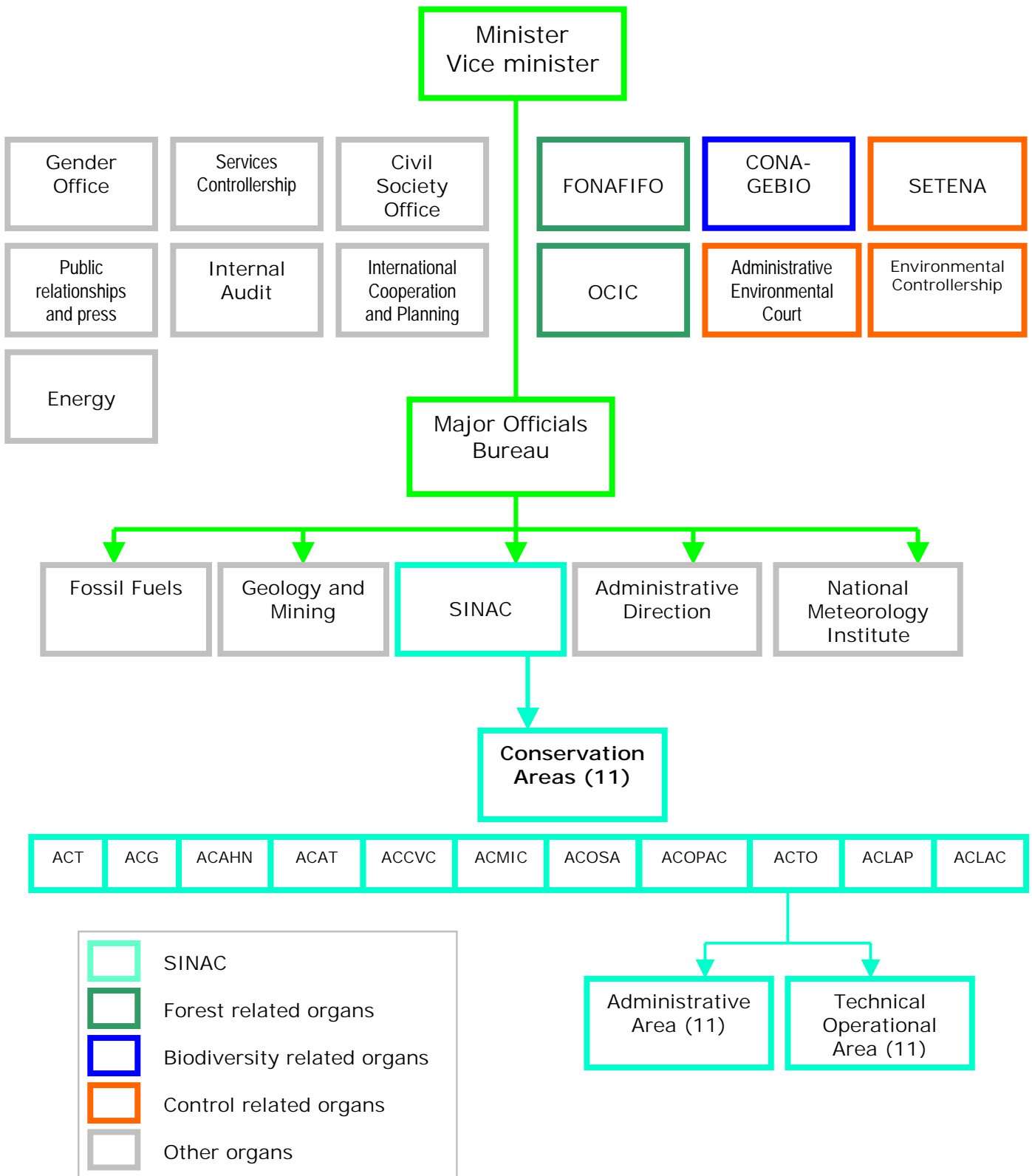
This project has different components:

- Interpretation of the aerial pictures (235 demonstration sites)
- Socio-economic study
- Field verification
- Final report due in October 2001
- Publication at FAO web page

Source: MINAE, FAO, UNA, CATIE, Inventario Forestal Global, Estudio Piloto en Costa Rica, resumen de proyecto, 2001, 9 pp.

Figure 9. Flowchart of the Ministry of Environment and Energy (MINAE)

Source: SINAC, 2001



G. Compliance with existing international guidelines on best practice for sustainable logging

As it has been mentioned before, many of the principles and best practices for sustainable logging have already been adopted in our country.

There are a number of tree plantations and projects that have been certified by the Forest Stewardship Council (FSC) (see Table 5). We have developed very similar criteria for certification at the national level through the National Commission on Forestry Certification (CNCF). Those principles, criteria and indicators are established in the executive decrees 27388-MINAE and 27998-MINAE, and they refer mainly to the management impacts, the management plan, monitoring and evaluating, natural forests conservation, tree plantations and secondary forests.

The national certification process is still slow. The companies will rather go through the whole process at the FSC, because it allows them to have international recognition, than go through the national system, which is not internationally recognized and is equally hard to attain.

Although, the certification process has not reached an adequate status, the principles, criteria and indicators elaborated by the CNCF, are the same ones applied to all management plan approval requests, and to all management plans in the field. They summarize the experience of the many sectors represented at the CNCF.

Another effort already mentioned, is the inclusion of the international forest principles in the text of the Forestry Plan (PNDF). Although we have to work on this issue furthermore, we are convinced of the necessary implementation of those guidelines.

H. Brief description of main production areas of the country

As evidenced in the data contained in Table 8, the three main production areas of the country are Agriculture and Forestry, Manufacturing and, Commerce, Tourism and Leisure. The preponderance of Manufacturing can be explained due to the presence of multinational computer chip manufacturer INTEL that distorts the real numbers of the production in the country. Agriculture has traditionally been Costa Rica's main production area, but current down turns in the coffee and banana markets have cause a recession in this sector, giving forestry a boost in ranking. Curiously enough, the Tourism industry, one of the largest in the country, thrives in Costa Rica's image as a natural, wild and preserved country. In this same vein, a large portion of the income of SINAC comes from fees charged to tourists at the national parks. It is evident from this analysis that Costa Rica's main production areas rotate around two axis, natural resources and technology.

The importance of Costa Rica's forests in its economy is undeniable and this provides an incentive for the government to further support the efforts being undertaken in these fields, as well as to make sure that a sustainable use is made of these resources in order to benefit all stakeholders.

Table 8. National Internal Revenue (millions of colones)

Concept	1999*	2000*
Real national internal revenue	1,391,827.1	1,411,882.3
Taxes minus product subvention	130,436.5	143,427.7
Base price national internal revenue	1,261,390.6	1,268,454.6
Agriculture, Forestry and Fishing	151,259.8	146,722.0
Mining	1,239.1	1,213.0
Manufacturing	352,936.1	342,292.8
Construction	47,710.9	47,710.9
Water and Electricity	37,611.5	39,868.2
Commerce, hotels and restaurants	248,210.4	251,222.0
Transport, storage and communications	125,291.7	134,312.7
Insurance and financial services	49,680.0	51,170.4
Real Estate	69,000.9	70,036.0
Other services from private enterprises	33,047.0	34,699.3
Government services	33,203.4	33,867.4
Community, social and personal services	141,481.6	145,018.7
Minus: financial intermediation services (SIFMI)	29,281.7	29,678.8

*provisional

Source: Banco Central de Costa Rica in <http://www.mideplan.go.cr/sides/economico/01-14.htm>

II. OVERVIEW OF PRESENT STATE OF BIODIVERSITY IN THE COUNTRY

A. What is known of the biodiversity at the (i) ecosystem; (ii) species; and (iii) genetic levels?

Many efforts were made in the elaboration of the first country study sent to the Secretariat of the Convention on Biological Diversity in 1998. The same project financing the study, borne of collaboration between INBIO and SINAC, is now preparing an update of the country report for 2001. A draft version was made available to us even though it is not yet ready for publication, and is the basis for the information included in this paragraph.

Ecosystem level

There is no official ecosystem classification, but the most popular in Costa Rica is Holdridge's life zones: 12 life zones and 12 transition zones divide the country in many kinds of forest (Obando, 2001).

The main forest types are: very humid tropical (10.5% of the country's total surface), pre-mountainous very humid (7.2%), pluvial mountainous (5.9%), pluvial pre-mountainous (5.6%) and humid tropical (5.5%) (Obando, 2001).

Costa Rica possesses an extremely high diversity in its forest ecosystems (Obando, 2001).

As we have mentioned before, the deforestation rate has diminished and the forest cover increased to 41.2%, including primary forests, secondary forests, wetlands, brush lands and tree plantations (PNDF, 2001).

Wetlands cover 7% of the country's total surface, and ten of them are included in the Ramsar List. An inventory of wetlands was elaborated very recently by SINAC with the collaboration of UNA and IUCN (see Figure 10).

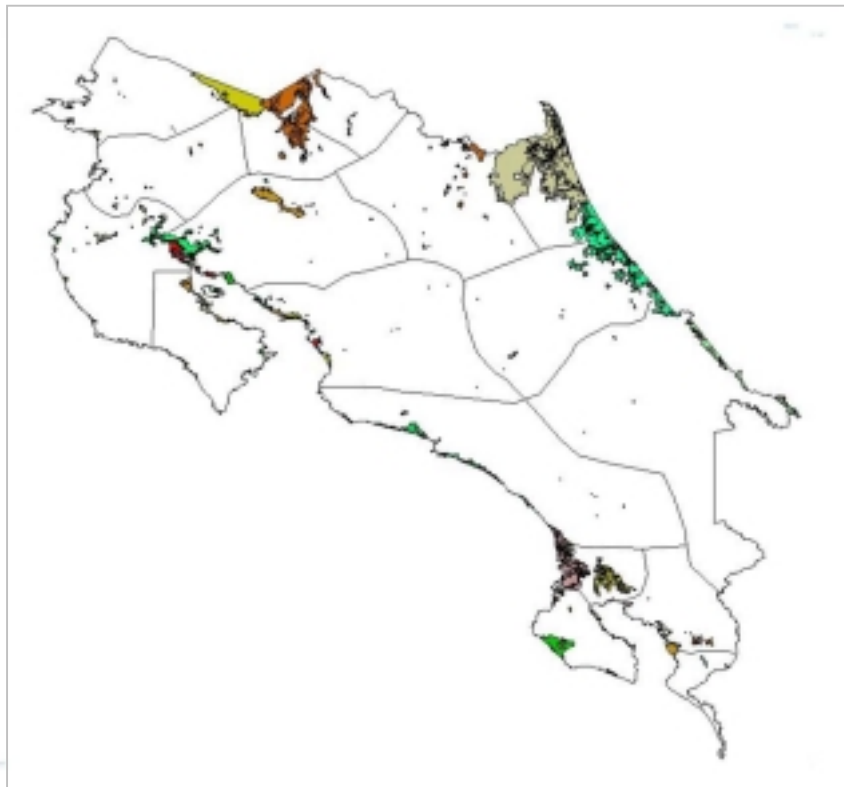
Mangroves cover only 1% of the country total surface and the most important ones are located along the pacific coast.

Costa Rica's Pacific coast is 1106 km long, while the Atlantic coast is 210 km. The length and size of the continental platform explains the richness of fish in the Pacific. Nonetheless, the territorial sea is 10 times bigger than the continental portion.

Unfortunately there are not many efforts to protect marine and coastal biodiversity, which may be important for future discovery of new food sources, medicine, genes and sustainable uses.

The agro biodiversity resources are rapidly disappearing. We have some native species that are important food sources, but we are very dependent on imported seeds (rice, corn, fruits and vegetables).

Figure 10. Costa Rican wetlands



Source: SINAC - UNA, 2000

Species level

With only 51,000 km² of territory - representing only 0,03% of the world's surface and 589,000 km² of territorial seas, Costa Rica is considered one of the world's 20 most biodiverse countries. Even though there are countries with a higher total number of species than Costa Rica, what makes our country special is the density - number of species per area - (Obando, 2001) (see Table 9).

Table 9. Density of species

Group	Estimated position worldwide	Number of species	Density (sp./1000km ²)
Plants	12	10,000	234.8
Amphibians	14	178	3.5
Reptiles	18	228	4.5
Mammals	30	236	4.6
Birds	23	864	16.9

Source: Obando, 2001

It has been estimated that Costa Rica contains 4% of over 13 million of the world species. Of the 500,000 species expected for the country, scientists have identified approximately around 90,000 species, which represent roughly over 5% of all the known species in the world (Obando, 2001).

Table 10 shows the number of identified and expected species for Costa Rica.

Table 10. Identified and expected species

Group	Expected species for Costa Rica	Known species for Costa Rica	Percentage of known species from the world's total expected
Virus	8,000	125	1.56
Monera	26,350	213	0.8
Fungi	65,000	2,311	3.6
Algae	4,350	564	13
Plantae	12,117	10,000	83
Protozoa	8,000	670	8.4
Animalia (vertebrates)	37,235	71,016	18.8
Animalia (invertebrates)	3,011	2,424	80

Source: Obando, 2001

The best-known groups are the plants - with 83% described- and the mammals - with 81% described. The country's largest herbarium and probably one of the largest in Mesoamerica, belongs to the National Museum, followed closely by the ones from INBIO, UCR, UNA and CATIE, which altogether have around 500,000 collected species (Obando, 2001).

For the vertebrate group, the numbers of described species has already surpassed the numbers originally expected for the country, containing around 10% of the birds and 5% of the mammals and fish known or described for the planet. Costa Rica is expected to have 10% of the bat biodiversity for the world, and this group represents over 50% of the country's terrestrial mammals. In mammals species' density (number of species/1000 km²), Costa Rica holds the first place worldwide, followed by Colombia, Indonesia and Mexico (Obando, 2001).

The number of marine species is far more difficult to estimate than that of terrestrial species. Since 1956 to present day, 1106 research studies on coastal and marine biodiversity have been identified. Those studies globally describe almost 5500 coastal and marine species. The most studied groups are fish, shellfish, reef organisms, algae, fungi, and plants, especially those related to mangroves and to commercial activity (INRECOSMAR, 2001).

Costa Rica has a moderate endemism, with only 1,5% of the species being found only in Costa Rica. The groups with highest percentage of endemism are amphibians with over 20%, followed by reptiles with 16% and freshwater fish with over 14%. There is a conservative estimate of approximately 12% of endemism for plants (Obando, 2001).

Four endemic regions have been defined: Golfo Dulce, the highlands of the Volcanic Central Mountain Range, Talamanca Range and Coco's Island (Obando, 2001).

Some experts have pointed out the local extinction of species, such as the golden frog in Monteverde, the giant ant eater in Braulio Carrillo and the harpy eagle, as they have not been observed for several years in their natural habitat in the country. Currently, the main threats to Costa Rican biodiversity are the alteration of ecosystems - deforestation and water pollution - introduction of alien species, poaching and illegal extraction (Obando, 2001).

Around 2% of the known species in the country are threatened or endangered. Above 25% of the total Costa Rican flora is considered rare, due to its scarcity. All of the freshwater fish species are threaten to a certain degree, due to pollution, riverbed altering, legal and illegal fishing and drying of wetlands. Also 10% of the vertebrates is considered threatened or endangered (Obando, 2001).

The total number of alien species is still unknown. But, 38 fish species, 58 bird species, 20 mammal species and 1,500 plant species have been identified (Obando, 2001).

Genetic level

Genetic research so far has been to the point and scarce, and the information is dispersed. Most of the genetic information has been obtained from viruses, followed by plants specifically those of commercial use. Other groups from which genetic information have been obtained are nematodes, insects, corals, amphibians, fish, reptiles, mammals and bacteria (Obando, 2001).

The National Commission on Biodiversity Management (CONAGEBIO) is now preparing a report on genetic resources. It has been a long process, because there is no such thing as an ex-situ collections inventory, and the institutions in charge of the gene banks are not used to share the information requested. In many of the cases, the information had to be elaborated for the first time (Jiménez, pers. comm. 2001).

It is now until the present year, and in order to comply with the Convention on Biological Diversity, that there is going to be a first report on genetic resources.

B. What is the status of mapping of biodiversity within forest ecosystems within the country?

In the past five years, SINAC, with the aid mainly of NGO's, has made increasing efforts to improve the research stations at the different conservation areas.

There are many ex situ collections, the most important of which is INBIO's. This database is completely systematized and is easily updateable. It is the outcome of the National Biodiversity Inventory, started in 1989, and based mainly in the research carried out in the protected areas.

A project called "ECOMAPS" started in 1998 and is implemented in six conservation Areas (ACLAP, ACLAC, ACOSA, ACT, ACAT and ACOPAC) (see Figure 3) with the purpose of mapping ecosystem distribution in those conservation areas. Half the project has already been completed and the project is estimated to end in 3 or 4 more years (Obando, 2001).

Approximately 25% of the country's entire surface is protected in some category or another. Those areas represent 50% of all the forest cover (see Table 11). And considering that this is the only biodiversity mapping effort currently being undertaken, there is still 75% of the forest cover that is not being included yet. Those areas also protect 78% of the country's vegetation.

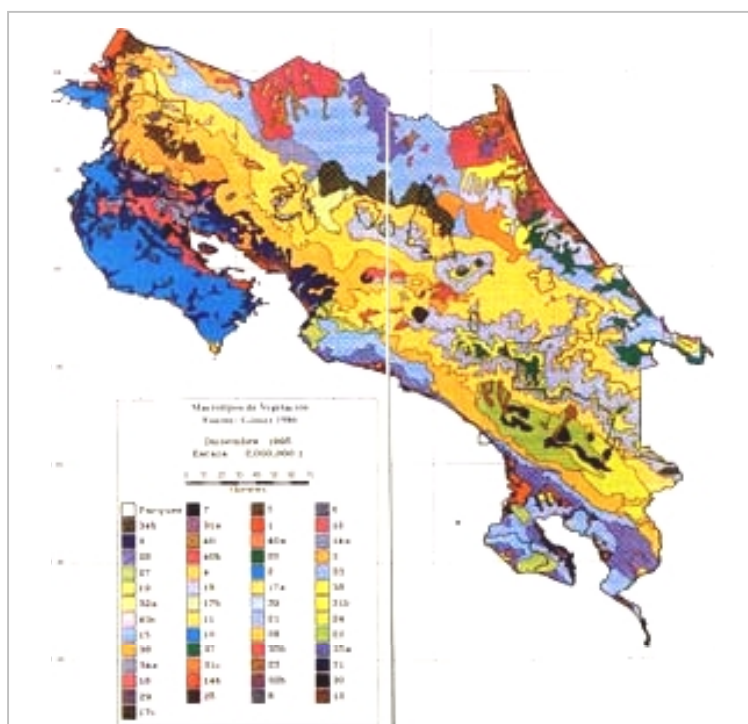
Table 11. Forest cover in protected areas

Biological Reserves	81%
Forest Reserves	79%
Protected Zones	71%
Wetlands	59%
National Parks	54%

Source (Obando, 2001)

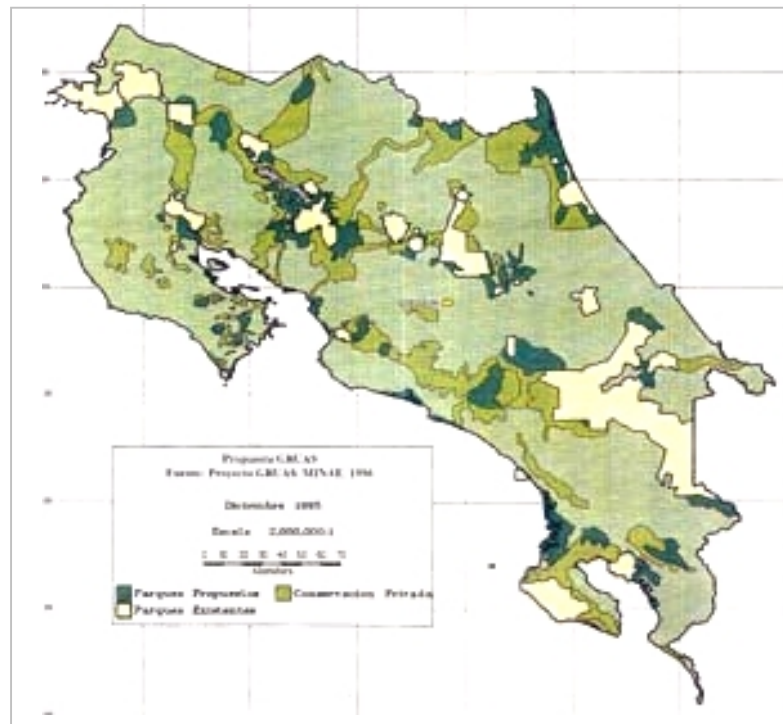
An important ecosystem mapping participative process, called GRUAS and directed by MINAE, was carried out between 1995 and 1997. GRUAS determined that 22 of the 53 vegetation macro types identified were found in the protected areas, corresponding to 78% of the country's vegetation. Declaring new areas might protect nine ecosystems, and 8 macro types might be included through private conservation efforts. It also stated that 75% of all protected areas needed to change in size or category and determined which areas needed to be protected in order to cover all different macro types (García, 1997). It was also the first project to show which areas needed to be protected under private conservation tools, thus establishing the first biological corridors (see Figures 11 and 12). GRUAS has become the starting point for all initiatives to declare new protected areas or new biological corridors (Rodríguez, pers. comm., 2001). GRUAS is also the criteria for the payment of environmental services (Venegas, pers. comm., 2001).

Figure 11. Vegetation macro types distribution



Source: Gómez, 1986 in García, 1997

Figure 12. Proposed and existing parks and conservation areas and corridors



Source: GRUAS 1996

C. What is known about the rate of change of the components of biodiversity covered in the sections above?

Because of the lack of information, and especially the lack of a base line, it is very difficult to determine the rate of change of the biodiversity components. As the National Forest Inventory concludes this year, it might show some significant facts about the impact of the forest degradation over the biodiversity components.

Some other areas need to be enhanced, such as research on threatened and endangered species.

There is also other project trying to implement the Forest Resources Information System, with FAO funding and the participation of SINAC and CATIE. The objective is to have a unique methodology and a base line, that allow further monitoring, as stated in the PNDF (Rodríguez, pers. comm., 2001).

In a very short period of time, the country is going to be able to determine a better picture of its resources, thanks to instruments such as the biodiversity inventory, the forest inventory, the forest cover studies and the databases.

D. To what extent has cause and effect been established in the measured (and estimated) loss of forest biodiversity described above?

The goal for the next ten years is to reach a surface of 70% of the country under forest cover. There is a direct relationship between forest loss and species loss, since most of

the country should be under forest cover. This is one of the principles of the environmental services program, biodiversity conservation.

And, as mentioned before, it has already been determined that the country's species density is one of the highest 20 in the world. And is even higher in our forests.

Every effort to preserve and regenerate our forests is an effort to preserve our species.

As our history has shown us, the forestlands have tremendous value. Because of our land titling policy, our forest had almost disappeared. We have already started the reversal of this situation.

III. OVERVIEW OF PRESENT STATE OF BIODIVERSITY CONSERVATION AND PLANNING

A. Relative priority in national planning policy

One priority aspect in the national planning policy, which is being reached through the PPSA, is the consolidation of all protected areas. That means, the compensation of the private landowners still present in 44% of the protected areas total surface (Garita 2001 in Obando 2001).

As the agricultural borders exert more pressure on the protected resources and our country's population increases, it becomes urgent to assure the biodiversity conservation in a permanent manner.

But as is the case with forestry issues, the biodiversity conservation is not a very strong area in this government's program, even if many concrete objectives have been achieved:

- The elaboration of the National Biodiversity Strategy with the participation of more than 1000 stakeholders
- The creation of the National Commission on Biodiversity Management (CONAGEBIO)
- The negotiation and discussion process lead by CCAD, in order to obtain a Mesoamerican position for all CBD meetings

B. Institutional structure of biodiversity government planning and policy

Ministry of Environment and Energy (MINAE)

The Ministry of Environment and Energy (Ministerio de Ambiente y Energía-MINAE) was created in 1982 by the law that reorganized the Executive Branch and the law's amendments in 1987, and particularly by the law that changed the Ministry of Industry, Energy and Mines into the Ministry of Natural Resources, Energy and Mines-MIRENEM (1990). In November 1995, the promulgation of the Environmental Organic Law defined a more specific range of activities for MIRENEM regarding the field of natural resources, and its name became Ministry of Environment and Energy (Ministerio de Ambiente y Energía-MINAE).

The creation of MIRENEM and, later, of MINAE, was Costa Rica's response to a series of social demands to develop an institutional framework adequate to the protection of the country's natural resources.

One of MINAE's main objectives is the consolidation of the National System of Conservation Areas (Sistema Nacional de Areas de Conservación-SINAC), aimed at developing an integrated institutional effort to carry out the Ministry's biodiversity-related activities throughout the country.

National System of Conservation Areas (SINAC)

The National System of Conservation Areas (Sistema Nacional de Areas de Conservación - SINAC) is a decentralized and participatory institutional system that assumes the Ministry of Environment and Energy's responsibilities regarding protected wild lands, wildlife and forest areas, in order to plan and execute processes aimed at achieving the sustainable management of the country's natural resources.

Administratively, SINAC is a system comprised of a head office and several subsystems called Conservation Areas. Conservation areas are territorial units administered according to a common management and development strategy, where private and government activities interrelate in fields such as the use and conservation of natural resources, while sustainable development alternatives are sought as part of a joint effort with the communities.

The philosophical framework of SINAC is based on three ideas:

- Decentralization: progressive decision-making process driven by the Conservation Areas
- Deconcentration: redistribution of human, technical and financial resources to the Conservation Areas
- Democratization: active participation of all stakeholders in the decision making process related to the natural resources management.

These principles are currently established in our legal framework as well. And the participation of the communities is guaranteed through the creation of the Conservation Areas' Regional Councils.

Others

In 1998, when the country had to finish the first National Report on articles 6 and 8 of the Convention on Biological Diversity and, at the same time, had to elaborate the National Strategy for the Conservation and Sustainable use of Biodiversity, GEF approved a proposal presented in order to complete this tasks. Thus a coordinating commission was formed with members from SINAC and INBIO.

Since then, multiple projects have been coordinated between those two institutions, regardless of the fact that INBIO is and NGO.

C. Perceived degree of participation of the country in the Convention on Biological Diversity (CBD), and perceived benefits of being a part of CBD

Since the entry into force of the Convention on Biological Diversity, the country has been very active in the implementation of the Convention itself and all the decisions derived from the different meetings.

Many stakeholders have participating in the dissemination and compilation of information needed to implement the CBD. And many others have participated in the elaboration of the National Strategy, the National Biodiversity Law and the National Forestry Plan.

It is hard to tell which are the concrete benefits of being a part of the CBD, at the national level of implementation. But the principle of sovereignty and the objectives of the Convention have profoundly impacted the national legislation and policy. We are trying to gather experience in the equitable benefit-sharing dimension.

D. Overview of the role of NGOs and local communities in biodiversity conservation: main activities, constraints, and achievements

In general terms, the participation on the biodiversity issues has been wider than that in forestry issues.

In many subjects, there are different NGO's working at the moment. Some of them have their own private reserves linked to the SINAC efforts, such as the Monteverde Private Reserve belonging to the Scientific Tropical Center, or La Selva Biological Station belonging to the Organization for Tropical Studies (OET).

INBIO has a main role, leading bioprospecting projects, the National Biodiversity Inventory and many other projects in coordination with SINAC.

Around the different protected areas, there are groups of volunteers that look after the enforcement of the environmental laws, such as:

- Committees for the surveillance of the Natural Resources (COVIRENAS), working since 1992, created by the Wildlife Conservation Law
- National Association of Volunteers (ASVO), with more then 700 people involved.
- Volunteer firemen associations, where forest fires are a primary concern
- Local and regional committees or councils, advising the decision making process in the Conservation areas. The most successful experience being in Talamanca
- Volunteer guards also coordinating control actions with SINAC

It must be noted that the participation of all stakeholders is present at all levels, national, regional (Central America) and local.

SINAC is the regionalized organ of MINAE and since 1996 is trying and learning to work with local NGO's and groups, local governments, international cooperation and experts' groups, in order to fulfill its functions.

It has succeeded in consulting all stakeholders, but has to advance further towards a real shared decision-making and policy-making process.

E. Overview of national system of production forests, national parks and protected areas: constitutional basis, administrative structure, operational budget, and brief description of main areas and present usage

As commented on paragraph B of Chapter III and paragraph F of Chapter I, SINAC is the entity in charge of the national parks, forest and biodiversity conservation, management and protection.

SINAC's budget is decreasing, as the national policy is to reduce state bureaucracy and the national internal debt. SINAC could be self sustainable if land purchasing for conservation is not taken into consideration, as it makes around 1000 million colones every year, but only half of this makes it back to SINAC in the form of a budget.

It is hard to change this situation, it requires the effective commitment of our government to provide all the necessary resources to SINAC, being that the Constitution states that the government will have a single unitary budget and that the Ministry of Treasury has wide ranging powers over this budget and executes it according to the government current policies.

IV. OVERVIEW OF LINKS BETWEEN LOGGING AND BIODIVERSITY CONSERVATION AND PLANNING (BCP)

A. Description and critique of existing national strategy, plan or policy applied to any interaction between logging and biodiversity conservation and planning – i.e., national biodiversity strategy and action plans (NBSAPs)

After a participative process that took over a year, a facilitating group with people from SINAC and INBIO came with a text of the “National Strategy for the conservation and sustainable use of biodiversity”. More than a thousand people participated in more than 20 workshops held locally and nationally. The Advisory Commission on Biodiversity (COABIO), and since the beginning of 1999, the National Commission on Biodiversity Management (CONAGEBIO), gave advice and direction to the whole process. It was all possible thanks to GEF/UNDP funding.

The Strategy's vision as stated in the text, read as follows: the country's biodiversity is protected, known, and used in a sustainable manner on the part of Costa Rican society, in such a way as to improve people's quality of life. To this end, the costs and benefits derived from their biodiversity conservation and use are integrated and are shared equitably.

Through the process, 13 strategic issues were identified. For each strategic issue, policies and actions were defined for a five-year period. In one year, different stakeholders have taken actions to implement the Strategy, although there is need for a participative monitoring process to assess the effective implementation of all priority activities, strategies and policies.

- Strengthen the mechanisms required for the prevention and mitigation of the adverse impact of productive activities on biodiversity, and the integration of different social actors.

There is an entity in the Ministry of Environment, the National Technical Environmental Secretariat (SETENA) which needs to have more technical capacity and better guidelines for the application of environmental impact evaluations and monitoring.

There is also need for more accurate systems and methodologies of assessing environmental impact and damage.

- Strengthen national and regional planning and land use processes.

The land planning process must incorporate conservation and development goals and it needs to be effectively implemented.

- Establish the necessary cross-institutional and cross-sectorial coordination for the integrated management of biodiversity as a strategic element of the country's development.

The government has worked with the civil society in the implementation of many environmental goals. But there is need for a coordination body or the strengthening of the existing bodies, such as the environmental councils created for the Conservation Areas.

The National Commission on Biodiversity Management also has many responsibilities, which cannot be assumed properly until its management capacity is developed.

- Strengthen research activities required for the generation of knowledge on sustainable use and conservation of the country's biodiversity.

Every Conservation Area has an independent research strategy, identifying the different priorities for each one. Those strategies have been adapted to perfectly articulate with this one. There are some Conservation Areas, like Guanacaste, in which research is one of the main activities (Chavarría, pers. comm., 2001).

Based on those priorities and each Conservation Area requirements, as part of the INBIO-SINAC agreement, 26 studies have been undertaken in 6 CA since the entry into force of the National Biodiversity Strategy (Obando, pers. comm., 2001).

- Establish the necessary formal and informal mechanisms to provide the public and private sectors with information required for conservation and sustainable production based on the elements of biodiversity.

Although there is still much publication work to be done, INBIO/SINAC have already published about many different biodiversity issues and also, reports using the biodiversity inventory information available. Ten publications are available and twelve more are in the editing and printing process. The Internet tools are being used more often. The different CA biodiversity strategies and action plans can be found online. Seven educational games for children have also been elaborated (Obando, pers. comm., 2001).

- Strengthen public awareness of biodiversity issues.

There is a very interesting project that intends to do so in a very practical way. It is the INBIOPark, an ex situ collection that represents three different ecosystems, combined with exhibition shows and training classrooms. Those facilities are being used for post-graduate courses as well as for a school teachers' training program named ACACIA (Obando, pers. comm., 2001).

There is also need to improve the introduction of environmental issues in the formal education.

The Ministry of Environment is constantly elaborating TV and radio campaigns about biodiversity conservation and sustainable use.

- Consolidate national efforts directed at in situ conservation.

To pay all private lands that are still in the different protected areas is a high priority. In national parks and biological reserves, the protection is total, there are no activities allowed except walking on their trails. In those, there is less than 10% of the land in private hands.

The participation of all stakeholders is necessary, in order to reach that goal.

- Strengthen national capacity to carry out ex situ conservation activities with species of particular interest.

MINAE has presented a proposal to the Japanese government in order to build the first public wildlife rescue center. The capacity of the private centers is very limited and specific (green and red macaws, iguanas, marine turtles, etc.).

- Establish the necessary mechanisms to facilitate access to the genetic resources of biodiversity and the fair and equitable benefit sharing derived from these.

Those mechanisms include the definition of the indigenous peoples' sui generis system on traditional knowledge and practices rights, the improvement of the intellectual property system, the necessary legal framework, training, and the strengthening of the National Commission on Biodiversity Management.

- Develop national capacity for the prevention of social, economic and environmental risks arising from the management of modified living organisms that result from biotechnology.

The priority activities are the strengthening of the Biosafety Commission and the creation of the necessary legal framework, to guarantee the safe transfer, manipulation and release of modified living organisms resulting from biotechnology.

- Strengthen actions to internalize the costs of environmental services and incentives for the sustainable use of biodiversity.

The strengthening of the environmental services payment program (PPSA) is necessary, as well as the creation of other innovative mechanisms to promote conservation activities and sustainable use.

- Define a national strategy for the development and protection of marine and coastal resources.

Costa Rica's territorial sea is ten times larger than its terrestrial portion. But there is little we know about our marine and coastal biodiversity resources. This is an area that requires a thorough revision: a new legal framework, a program for the integrated management, research, and training.

- Strengthen national capacity for the sustainable management of biodiversity both in the public and private sectors.

The biodiversity conservation and sustainable use will depend upon the effective involvement of all stakeholders. It is not a task that the government might achieve by itself.

B. Description and critique of existing monitoring and accountability systems in place

There is not one single monitoring or accountability system, as it has been mentioned before. But the important fact is that there has been efforts to establish monitoring systems and base lines, and to make all the information available more compatible. The information management and clearing-house mechanisms have been identified as a priority in the National Forestry Development Plan (PNDF), as well as in the National Biodiversity Strategy.

Box 2. GEO Costa Rica - OdB / MINAE

SINAC is now collaborating with the Development Observatory (OdD) of the University of Costa Rica, in a project that intends to build biodiversity indicators, based on the methodology of the GEO Latin American report (OdD / UNEP). The project has two phases: the elaboration of a basic set of environmental indicators with experts' advice and focal points in every main area, as well as a report on the tendencies, based on all the statistical information (both due in October); and the elaboration of the report that analysis the information obtained when using the indicators (due in April, 2002). The Ministry of Environment is going to measure their successes and failures using this methodology. It is the hope pf the OdD that every four years, at the end of the governmental period, every Minister of Environment follows the methodology in order to have comparable reports. The present Minister has agreed and already started the process (Fernández, pers. comm, 2001).

C. Analysis of main perceived problems and constraints at the national level

i. Political

The country has signed over 50 international and regional environmental treaties or agreements, being so active especially in the past 10 years. Though, at a national level the legislation does not reflect the effective implementation of those new treaties.

In other words, all the commitments are accepted. But they are not easily accomplished or even clearly understood.

There is one important political ingredient to achieve that: will. If there is the desire to achieve any project or activity, the government will look for funds and for cooperation at

the national and international level. And the desire will appear, if there is a strong convincement about the necessity of the activity (Ulate, pers. comm., 2001).

The international agreements often separate forests issues from biodiversity issues. The link at the international level is not that clear, and this situation is repeated at the national level.

ii. Economic

The environmental services payment program tends to concentrate only on forests, and their contribution to the national economy. More experiences need to be developed.

One important issue is that the payment for reforestation is higher than the one for conservation. Many stakeholders think that it should be the opposite way: conservation must be a priority, because reforestation activities get an economic retribution anyway. More small property owners should have access to the PPSA. Reforestation plans and paperwork is far easier than that of forest management or conservation.

The demand for the PPSA is also higher than the resources available.

The benefits of this program and other economic incentives must be monitored and published periodically.

iii. Social

The participation of all stakeholders is a requirement for every planning process or conservation process. Historically, when the national parks were created, the communities were just afraid to lose their properties or not being paid for them. It is only in the present day, that many Costa Ricans know about the benefits of biodiversity conservation, and promote different actions and collaborate in many ways.

Taking into account all the different interests and motivations is the basis for a strong consensus and for success. Not doing so will be equivalent to have an instrument, which will not be implemented, as the government is not the only actor involved.

iv. Technical (managerial)

The structure of SINAC is still new and in order to be successful, needs to secure its financial sustainability. The decentralization process is not consolidated. More participation is needed in the decision making process.

Other institutions also need to be strengthened, such as CONAGEBIO, FONAFIFO and the Conservation Areas regional councils.

The legal framework needs to be revised and fully implemented. The Ministry of Environment need better monitoring and control tools, and better information systems.

The general impression is that the Ministry of Environment lacks economical and technical resources for the effective implementation of their tasks. Though, there have been many achievements.

The rest of the governmental departments and ministries also need to understand environmental issues, in order to establish necessary coordination mechanisms.

v. Human resources

Associated to the managerial capacity, there is a permanent need for training all the ministry's officials. Much of the expertise is still in the private sector. This sometimes represents a problem. For example, the officials of SETENA in charge of evaluating all the environmental impact assessments are not sufficiently prepared as the consultants that were hired by the company to elaborate the EIA. The Ministry has to efficiently train its officials in all strategic areas, and has to identify all the possible experts and advisors for a specific issue.

At the international level, we need to strengthen the Central American process and the negotiation delegations.

vi. Biodiversity conservation *per se* (at all three levels: ecosystem, species and genetic)

In the national biodiversity strategy, a principle is formulated: to protect biodiversity, you must sustainably use it, to use it you must first save it, and to save it you must first know it, as you may not save what you do not know.

And since the elaboration of the information might be a long process - like the inventory - we must try to save the biodiversity components for further research (precautionary principle). Thus, conservation is a high priority and it must take into consideration public protected areas as well as private lands. GRUAS project has proposed to have 18-19% of the country's total surface under absolute protection (national parks) in order to protect the total number of expected biodiversity species and all the vegetation macro types.

V. PROPOSED STRATEGIES AND SOLUTIONS

A. Examples of failures and successes in linking logging and BCP:

- i. Name of project or development**
- ii. Exact location**
- iii. Management and coordination**
- iv. Description of main objectives, achievements, and constraints**

Environmental services payment program (PPSA)

It has a national scale and is implemented in all Conservation Areas.

SINAC approves the petitions and FONAFIFO makes the payments and both, monitor the compliance of the legal and technical terms agreed upon.

The main achievement has been to recognize all the different services that a forest could provide, and is not only a subsidy for an economical activity, as the last incentive system used to be.

It is the most successful way of linking forest and biodiversity planning and conservation.

CODEFORSA monitoring

CODEFORSA is a forest landowners' organization based in the northern zone of the country.

For many years now, they have succeeded in establishing sustainable tree plantations and forest management projects.

Last year, when the environmental organization claimed to the Ministry of Environment the destruction being made by the "so-called forest management", CODEFORSA organized a field trip among their project, and convinced the Minister that there is a possibility to achieve forest management in a sustainable way (Barrantes, A. and Méndez pers. comm., 2001).

FUNDECOR forest projects

Since the last decade, FUNDECOR is achieving a number of innovative projects in the buffer zones of many protected areas, such as the Braulio Carrillo National Park. They have succeeded in the certification of most of their tree plantations and forest management projects. They have planted tree native species. They have been part of the first joint implementation agreements. They have implemented a number of economic mechanisms, such as the advanced timber sale.

FUNDECOR is now a step ahead, starting a biodiversity monitoring program in all their forest management projects and La Selva private reserve - which is not under forest management plans - to effectively demonstrate that there might be management without biodiversity irreversible damage. They monitor every year and their research is based mainly in butterfly species and beetles. They are also checking the custody chain. This project is being made in collaboration of CATIE and CIFOR (Solano, pers. comm., 2001).

B. What are the proposed strategies and solutions for improving integration of biodiversity conservation and planning into the logging sector?

i. Policy-oriented

Environmental issues must be cross-sectorial issues in the government general planning instruments. The Ministry of Environment is responsible for those issues, but it cannot achieve them on its own.

The role played by the Ministry of the Treasure in securing the necessary fund is a priority, among others.

The different strategies and plans must be coordinated and implemented.

The most difficult task might be to assure that those plans and strategies are being recognized and implemented by the next government. The participation of all stakeholders help in this direction.

ii. Economic

The environmental services payment program must be strengthened. It has proved to be an effective tool as well as popular, and of high demand. But the payments for conservation should be higher than those of forest management or reforestation, corresponding to the importance of the services provided by forest conservation.

iii. Technical/managerial - including mechanisms for intersectorial coordination

The widest participation has proven to be an effective pressure mechanism to force the government to implement the plans and strategies. It is also a guarantee that there is constant monitoring and follow-up, not subject to the governmental periods.

This participation must be accompanied of a certain quota of the power and the decision-making. Otherwise, it becomes a merely consultative process that can make the stakeholders motivation diminish and the interest lose.

The conservation and sustainable use of our resources is the responsibility of all of us, it is only possible with the participation of all sectors involved: governmental, non-governmental, private and academic, at the local, regional and national level.

Another strategy implemented by our government six year ago, was the successful creation of SINAC: an entity that concentrates all the forest, biodiversity and protected areas issues, and that has offices all over the country. Decentralization has been important in the successful biodiversity conservation and sustainable use.

iv. Human resources (including education and training)

Many of the conservation achievements of our country were possible because of the efforts of different individuals, who understood the steps needed to be taken and convinced the policy makers to support their actions.

History has proven the value of the human resources and it is a permanent obligation of the research centers, universities and the government institutions to implement training programs and involve the maximum number of people.

v. Biodiversity conservation *per se* (at all three levels: ecosystem, species and genetic)

Research is fundamental for the biodiversity conservation. We protect what we know. There are areas where research has been scarce: marine ecosystems and species, genetic resources, ex situ collections, alien species and endangered species.

The relationship between forest loss and biodiversity loss must be adequately established.

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