CBBIA-IAIA

Capacity-building for good practice in biodiversity and impact assessment

A PROCEDURE TO EVALUATE THE IMPACTS OF INFRASTRUCTURE DEVELOPMENTS IN AND AROUND PROTECTED AREAS

Final Report

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EXECUTIVE SUMMARY

The Central American region is working towards the integration of all the countries that form it (Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica and Panama). There is a Central American Integration System (SICA – Sistema de Integración Centroamericana), which includes several organizations. One of those, the Central American Commission on Environment and Development (CCAD) gathers all seven ministries of the environment and is dedicated to the harmonization of environmental policies and legislation, to the conservation of biodiversity, and to guarantee a healthy environment in order to enhance the quality of life of Central Americans.

Working together, the Central American countries have consolidated the Central American System of Protected Areas (SICAP), which includes approximately 25% of all Central American lands and which is today one of the main attractions for the growing tourism in the region.

In the field of environmental impact, the work has involved the search for harmonious environmental policy and legislation in all seven countries of Central America. Nevertheless, no specific tool has been developed to evaluate the environmental impacts caused by infrastructure development in and around protected areas, despite the growing importance of the issue with increased visitors and the development of new infrastructure in and around such areas.

This study aimed to address this by developing a standard procedure for the evaluation of environmental impacts of infrastructure development projects in and around protected areas. We initially based the procedure on the "*Guidelines on biodiversity inclusive Environmental Impact Assessment (EIA)*" (NCIA 2005) and followed the definition of EIA included in the guide: "Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse". Then, all relevant agreements and proposals prepared in the region that aimed to harmonize EIA legislation and procedures were reviewed. A specific EIA procedure was then designed – as opposed to the general one used so far, taking into consideration the ecosystems present in the region, their status in Central America and their potential limitations regarding development activities.

The standard procedure is based on the fundamental components of an EIA, including the following stages: screening, scoping, impact analysis and development of mitigation initiatives, reporting, review, decision-making and monitoring, compliance, enforcement and environmental auditing.

1. INTRODUCTION

One of the hardest issues to understand about Environmental Impact Assessment (EIA), and to explain to audiences that are not involved in the subject, is that EIAs are a process and not just documents or studies. As a result, there is often confusion between an EIA and an Environmental Impact Study (EIS). This report aims to overcome this confusion and propose *a process that facilitates EIAs* of infrastructure projects within and around National Parks and other protected areas, including their buffer zones.

The present study is designed to address the current lack of a standard procedure amongst countries in Central America for the evaluation of environmental impacts of infrastructure projects developed in and around protected areas.

The procedure is initially based on the "*Guidelines on biodiversity inclusive Environmental Impact Assessment (EIA)*", (NCIA, 2005) and according to the definition of EIA included in the guidance "Environmental impact assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse". Then, all agreements and proposals prepared in the region with the goal of harmonization of legislation and environmental impact assessment procedures were reviewed, and a specific procedure was designed – as opposed to the general one used so far, taking into consideration the ecosystems present in the region, and the degree of limitation they have for the development of activities, as well as the present status of that specific ecosystem in Central America.

The procedure focuses on the fundamental components of an EIA, including the following stages: screening, scoping, impact analysis and development of initiatives, reporting, review, decision-making and monitoring, compliance, enforcement and environmental auditing.

It is anticipated that the proposed standard procedure for EIAs should be widely applied because it provides clear guidance on the explicit consideration of biodiversity in environmental impact evaluations. This should help administrations comply with article 14a of the Convention on Biological Diversity (CBD), which states: "Appropriate procedures will be established, which will require the environmental impact evaluation for proposed projects that may have important detrimental effects on the biological diversity, so as to avoid or reduce to a minimum such effects and, when appropriate, will allow stakeholders' participation in such procedures."

Much has been discussed in Central America[1] about EIA. For example, several joint meetings have been held[2] by the seven EIA directors from each of the Central American countries in an attempt to harmonize EIA systems; resulting in the preparation of a Regional Strategy and Regional Plan of Action. Several general instruments have been produced to help harmonize EIA systems, including a list of projects categorized by size, specialty, and socio-economic aspects (referred to as a typology), a categorization of development activities, a code of best practice, the promotion of citizen participation, standardization of environmental impacts, procedures for environmental control and monitoring, and environmental information systems. However, these initiatives have provided general recommendations, rather than specific protected area related guidance such provided in this report.

For the preparation of this report, experts in protected areas and EIA were consulted, both from the government sector (the authority or administration) and the private sector (mostly consultants who conduct EIAs). Infrastructure developers, both for tourism and for services in protected areas, were also consulted. A review of EIA and protected area legislation was conducted in each Central American country, as well as a review of

[1] In July 2002, the Council of Ministers of the Central American Commission for Environment and Development (CCAD for its Spanish initials), an instrument of Central American Integration, agreed to strengthen the EIA systems in Central America and established a series of instruments and basic guidelines.
[2] The 7 EIA directors for Central America are gathered under the auspices of Central American Integration in the CCAD EIA Technical Committee.

proposals for a new EIA system for the region, presented by consultants, the IUCN and the Secretariat of the Central American Commission for Environment and Development, which had been discussed within the framework and authority of the Council of Ministers of the Environment and Natural Resources in Central America.[3]

The next chapter of this report includes brief background information on Central America, the Central American System of Protected Areas and the status of EIA procedures in Central America and in each Central American country. The remaining six chapters then describe this study's proposed procedure for each stage of an EIA as follows:

Stage 1 (Chapter 3): the preliminary environmental assessment: typology lists (project categorization according to size, social or economic specialty), project categorization, zoning of protected areas and others.

Stage 2 (Chapter 4): the preparation of an environmental impact study. This chapter includes a couple of case studies of infrastructure development conducted inside and around a protected area.

Stage 3 (Chapter 5): citizens' participation and its importance.

Stage 4 (Chapter 6): the appraisal of environmental impacts.

Stage 5 (Chapter 7): the review of the environmental impact study.

Stage 6 (Chapter 8): control and monitoring of actions and impacts.

2. ENVIRONMENTAL IMPACT ASSESSMENT IN CENTRAL AMERICA

2.1. THE PHYSICAL AND BIOLOGICAL CHARACTER OF CENTRAL AMERICA[4]

There are approximately 530,000km^2 and 35-million inhabitants in Central America. One out of five inhabitants is of indigenous origin and more than 60% of all people in the region live below the poverty line. Nearly 50% of the population lives in rural areas.

Water (supply and quality) is a significant factor behind the origin of 80% of all diseases: less than 10% of sewage water is treated and nearly 10-million tons of garbage are generated every year. Approximately 65% of Central American land is in watersheds shared by two or more countries. Air pollution comes mostly from moving sources and is composed of suspended particles and other combustion residues (e.g. NOx).

Central America is biologically and physically diverse. It is bathed by two oceans, the Atlantic and the Pacific, and has the largest coral reef chain in the Western Hemisphere. Its mountains reach 4,000m above sea level, annual rainfall levels vary from 500 to 7,000mm, annual average temperatures go from 7 - 33^{0}C, at least three biomes are present, 20 life zones and 33 ecoregions. Consequently, the region has an extremely rich biodiversity. Although it makes up less than 1% of all land on the planet, Central America's biodiversity represents nearly 10% of all known life forms. Therefore, when we

[3] The leader for the preparation of this proposal, Mauricio Castro-Salazar (M.Sc), was Executive Secretary for the Council of Ministers of the Environment and Natural Resources from 1998 to 2003 and was one of the main proponents of guidelines and changes in the subject of EIA in Central America.

[4] The summary was prepared based on data obtained from the sites www.sgsica.org and www.ccad.ws and from "Mesoamérica en Cifras", published by the World Bank and the CCAD in 2002.

speak of EIA, one has to take this diversity into consideration, as the impacts will vary widely depending on the ecosystem involved.

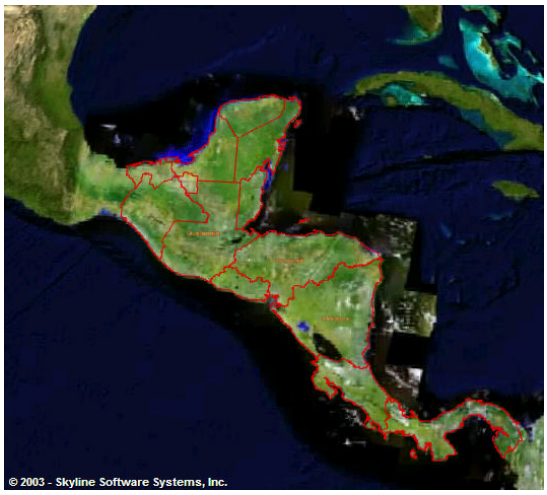

Figure No. 1: Central America, territorial division

Source: NASA-CCAD, 2005

2.2. THE CENTRAL AMERICAN SYSTEM OF PROTECTED AREAS

Protected areas have been created in Central America (CCAD-IUCN 2003b) for various reasons, including the assignment of areas to recreation and tourism, protection of archeological sites and management of threatened species.

Over the last few years, multiple use protected areas have been established, *inter alia* to prevent further environmental deterioration and to protect the provision of environmental goods and services.

In some countries, at different times and under special political circumstances, creation of conservation areas has been considerable (usually to conserve specific resources or ecosystems). Areas have been created to protect cloud forests, volcanoes and others. For instance, 23 Protected Wild-lands were created in Honduras through a single law (Bylaw 87-87), with the purpose of protecting the country's cloud forests. In the same way, Costa Rica and Guatemala declared in 1955 all volcanic peaks as protected areas, in the form of National Parks and closed zones respectively.

Through all these processes, the Central American System of Protected Areas (Sistema Centroamericano de Áreas Protegidas - SICAP)[5] today includes a total of 554 legally protected areas, with an approximate surface of 129,640km^2, that is, approximately 25% of all the Central American territory.

As indicated in Table 2.1, each country's contribution to SICAP is different and can be interpreted from different angles (commitment to conservation, size of the country, uniqueness of the biodiversity, etc.). Guatemala has committed the largest surface of land to the SICAP (approximately 31,930 km^2), which represents close to 25% of the surface of the SICAP. Belize has the largest percentage of its land in wild protected

[5] The SICAP, from the "natural" point of view, is the sum of all Central American protected areas, from the "human" and "organizational" point of view it does not exist as such, although the general directors of the 7 national systems of protected areas do meet periodically.

areas, that is, 47% of its territory. On the other hand, Costa Rica has the largest number of designated protected areas (155), representing 28% of the total SICAP area.

Table 2.1. Number and area of declared protected areas in each country in Central America

Country	Number of protected areas[6]	% of the total number of SICAP areas	Area (Ha)	% of the SICAP surface	% of national territory
Belize	74	13.4	1,071,664	8.3	47.2
Costa Rica	155	30.0	1,288,565	9.9	25.2
El Salvador	3	0.5	7,110	0.5	0.3
Guatemala	120	21.7	3,192,997	24.6	29.4
Honduras	76	13.7	2,220,111	17.1	19.7
Nicaragua	76	13.7	2,242,193	17.3	17.0
Panama	50	9.0	2,941,386	22.7	26.0
Total	554	100	12,964,026	100	100

Source: CCAD-UICN (2003).

2.3. THE CURRENT STATE OF ENVIRONMENTAL IMPACT ASSESSMENT IN CENTRAL AMERICA

EIA legislation

For a long time, EIAs in Central America were performed upon request by multi-lateral international organizations, mostly the World Bank and the Inter-American Development Bank (UICN-ORMA 2004).

Costa Rica was the first country to create environmental regulations, through the Mining Code, Law No. 6797, from 1982. Guatemala was the second country in the region to introduce the EIA, in 1983, through Executive Bylaw No. 68-86, followed by Belize in 1992 with its Environmental Protection Act, Honduras in 1993 with its General Environmental Law, Nicaragua in 1994, and in 1998 El Salvador and Panama adopted their respective EIA legislation. Therefore, all the countries of the region currently have EIA systems and supporting environmental legislation. Most of the legislation dates from the nineties (except for the Guatemalan law, which was last updated in 2003) (Aguilar 2002).

[6] IUCN, as quoted by the World Bank in 2003, has established the following management categories:
I. Strict Natural Reserve or Wild Land: mainly for science or wildlife protection.
II. National Park: mainly for ecosystem protection and recreation.
III. Natural Monument: mainly for the conservation of representative natural specimens.
IV. Área or Habitat for Species Management: mainly for the conservation through management or intervention.
V. Protected marine or terrestrial landscape: mainly for protection and recreation.
VI. Managed Resource Área: for the sustainable use of natural ecosystems.

Environmental Impact Assessment challenges in Central America

In general, there are 4 main problems in Central America with respect to EIA (CCAD. 2002):

- Institutional Capacity

  There is limited technical and budgetary capacity for conducting and enforcing EIAs (equipment, human resources, multi-disciplinary knowledge, etc.) which results, among other things, in little control and monitoring of EIAs and eventual project impacts.

- Training

  The officials responsible for EIAs, be they from the government or the judiciary authorities, require better knowledge and training in issues relating to EIA. The private sector has the same requirement.

- Public participation

  There is minimal participation in the countries, although it is supposed to be a requirement according to existing legislation.

- Information exchange

  There is basically no information exchange between and even within the countries.

Belize[7]

The Environmental Protection Act was approved in 1992, it regulates matters dealing with EIA and via several specific regulations it establishes the minimum requirements of an EIA as:

- A description of activities proposed.
- Description of the environment potentially affected.
- Description, when appropriate, of the practical activities.
- Appraisal and description of measures to mitigate adverse impacts.
- Indication of gaps in knowledge and uncertainty.

The regulations establish two lists, all the activities and projects included in List 1 require an EIA, for which content and extension will be defined by the Department of the Environment. The requirement for an EIA for activities included in List 2 is decided by the Department of the Environment.

Costa Rica[8]

The "Ley Orgánica del Ambiente" (General Environmental Law) states in Chapter 17, among others, the following: *"…human activities that may alter or destroy elements of the environment or generate residues, toxic or dangerous waste, will require an Environmental Impact Assessment, to be conducted by the National Technical Environmental Secretariat…"*

[7] Summary based on a text by Aguilar (2002)

[8] Summary based on a text by Aguilar & Iza (2005).

The General Regulations for the Procedures of EIAs (RGEIA), of 2004, update and correct EIA concepts and procedures and also correct existing deficiencies. The RGEIA includes new instruments for environmental audits, cumulative effects, environmental inspection, strategic environmental evaluation and others. The Regulations classify the activities according to the Uniform Industrial International Classification (CIIU according to its Spanish initials).

El Salvador[9]

The EIA system is based on the Law of the Environment of 1998 and its regulations from 2000. According to its dispositions, the Ministry of the Environment and Natural Resources has the role of producing guidelines for the Strategic Environmental Assessment (SEA) of the policies, plans and programs of the public administration. It can request, by means of an environmental form, preliminary information about activities, works and projects that may cause impacts; it also determines guidelines for the preparation of terms of reference for conducting the EIA; conducts public consultations; performs environmental audits and others.

Guatemala

The instrumentation of the Law for the Protection and Improvement of the Environment, Bylaw 68-86, took effect in January 2003 by means of the Regulations for Environmental Assessment, Control and Monitoring (RECSA). The Ministry of the Environment and Natural Resources is responsible for enforcing the RECSA.

The RECSA (Aguilar, 2002) creates an EIA system and includes original tools for EIA. It establishes an administrative procedure to be applied to activities, projects and works; it develops the instruments for the EIA, develops control and monitoring instruments, authorizes the consultation of experts, establishes a register of consultants and reinforces citizen participation.

The EIA process can be divided in three stages:

1. Preliminary assessment process.
2. Review process for the EIA study.
3. Control and monitoring process for the approved EIA.

Honduras[10]

EIA was introduced as part of the General Law for the Environment in 1993. The Secretary for Natural Resources and the Environment (SERNA) is responsible for the EIA, through the General Direction of Environmental Assessment and Control (DECA).

The EIA includes the following stages:

1. Categorization of projects and drafting terms of reference.
2. Preparation of the EIA.
3. Review of the EIA.
4. Granting of environmental permit.

[9] Summary based on a text by Astorga & Méndez (2002).
[10] Summary based on a text by Astorga & Méndez (2002).

5. Control and Monitoring.

Nicaragua

The EIA System is regulated by the Regulations of Permits and Environmental Impact Assessments, Bylaw No. 45-94, of October 28, 1994. It was reviewed in 1996, with the General Law 217 for the Environment and Natural Resources, which includes the above-mentioned bylaw, but also creates a new framework for the environment.

The Law names the types of activities and projects subject to an EIA. Those that are not mentioned in the list are required to present at the corresponding municipality the appropriate environmental form.

Panama

In 1991, Bylaw No. 96 was introduced to regulate the environmental impact of mining projects. In 1998 the Law No. 41, General Environmental Law, signed and in 2000 the Regulations for EIA were published via Bylaw No. 59.

The Law 41 establishes the guidelines, policies, structure and organization the State will need in order to protect, preserve and restore the environment. It creates the National Environmental Authority (ANAM) and authorizes it, amongst other things, to manage the EIA process.

The EIA process is conducted both for public and private projects. It applies to any project that may generate an environmental risk. All environmental impact studies will be presented to ANAM, and it will decide whether it grants the project environmental approval.

3. STAGE 1: THE PRELIMINARY ENVIRONMENTAL ASSESSMENT

The following section describes our recommended first steps in carrying out an EIA inside and around a protected area (including within the buffer zone). It must be pointed out that we are assuming that the projects developed within a protected area are to service the area in question, whilst those developed in the buffer zone (and elsewhere outside) may be for services of the protected area and/or for other purposes (e.g. private use such as hotels, restaurants and shops).

3.1. USE OF A LIST CATEGORIZING PROJECT TYPES

In order to facilitate the formalities required for the preparation of an EIA, it is appropriate to have from the start a standardized list of project types. We recommend for the description of activities the use of the *Uniform Industrial Classification of all Economic Activities* (CIIU), that the Statistics Commission of the United Nations has been promoting for over 30 years. Despite the use of the name “industrial”, the CIIU considers not only industrial activities, it deals with all kinds of economic activities, goods and services[11].

[11] See for example the Peruvian Electronic Business Directory at www.denperu.com.pe

The advantage of using the CIIU in Central America is that practically all the relevant government ministries in the region already use it, making the categorization and screening processes easier to adopt and homogenize. In the case of projects not included in the CIIU, it is recommended to establish a list of special projects, following the outline presented in the CIIU.

3.2. CATEGORIZATION OF PROJECTS ACCORDING TO POTENTIAL ENVIRONMENTAL IMPACT

The draft CBD *Guidelines on Biodiversity inclusive Environmental Impact Assessment*, (NCIA, 2005)[12], describes three approaches for deciding whether there are likely to be impacts that require an EIA (i.e. "screening"): positive lists of projects requiring an EIA, expert judgments and a combination of lists with expert judgments.

For the case of projects developed inside a protected area, it is advisable to have a combination of a positive list of projects and expert judgments, in order to facilitate the selection process or "screening".

The categorization proposed here is based on the screening mechanisms developed by NCIA, the analysis conducted in 1999 by the Economic Commission for Latin America (CEPAL),[13] pollution levels associated with CIIU project classes and the lessons learnt from real cases. It also takes into account the answers to several questions, such as the following[14]:

1. Will the project directly or indirectly lead to the local loss or decrease of species populations?
2. Will the project interrupt the routes of migratory species, affect nesting sites or reproduction or feeding areas of individuals or species?
3. Will the project affect the sustainable use of a species population?
4. Will the project cause serious damage or total loss of ecosystems or of the kind of land use established in the land zoning?
5. Will the project affect the sustainable use of the ecosystem or land use in such a way that this use becomes destructive or unsustainable?

We recommend the distinction of the following three classes of project on the basis of the answers given to the above questions:

- Type A: certain high potential environmental impact (this applies to all the projects where the answer is "certainly yes" to the questions).
- Type B: probably moderate potential environmental impact (i.e. projects where there is some uncertainty over likely impacts).
- Type C: low potential environmental impact (all projects for which the answer to each question is "no").

For type A and B projects, a visit to the site is mandatory. Where such projects are to be developed in very sensitive areas, such as protected areas and their buffer zones, the

[12] Prepared by the Netherlands Commission on Impact Assessment –NCIA- together with the IAIA, on the request of the CBD.
[13] CEPAL. La liberalización Comercial y los Acuerdos de Libre Comercio: Perspectivas ambientales para Centroamérica. México. 1999.
[14] The questions have been adapted from the recommendations of the NCIA Guide.

authorities should make a site evaluation and not rely on a desk exercise. It is important that agents visit the site to see the conditions.

Some examples of projects[15]:

Type A Projects

- Construction of access roads
- Construction of trails
- Visitors centres
- Power generation beyond 1 MV
- Lodges or shelters
- Restaurants
- Docks for vessels more than 12m length

Type B Projects

- Restoration of trails and access roads
- Wardens / rangers accommodation (with toilet, sleeping arrangements, hall)
- Dorms and kitchens of limited capacity
- Power generation below 1MV
- Dining rooms (food sale)
- Bed and breakfast (family lodgings)
- Docks for vessels less than 12 meters length

Type C Projects

- Signs and postings
- Demarcation of borders
- Wardens / rangers shelters (without toilet or bedroom)
- Cableways or winches for transporting goods

Irrespective of the project category, since we are dealing with a protected area or its buffer zone, it is always advisable to perform an environmental risk appraisal[16]. We assume the protected areas already have management plans[17], and within them there is a zoning plan. where, among other things, they describe their environmental services,

[15] This list was prepared based on the authors' experiences and a publication generated by CCAD-PROARCA in 2001

[16] Environmental risk is defined as the conditional possibility that a specific environmental event will take place, with negative consequences for the environment, and it is linked to the measure or evaluation of the consequences of the damage produced. The environmental risk is calculated by rating the threat or the possibility that the phenomenon will occur with a specific intensity, to the vulnerability of the exposed elements, be the risk of natural, geological, hydrological or atmospheric origin, technological or generated by humans (CCAD 2003).

[17] If a protected area does not have a management plan, it must be requested that at least a zoning be defined before allowing the project to be developed.

such as disaster impact reduction, watershed protection, landscape and others, and also their fragility and vulnerability.

3.4. PRELIMINARY ENVIRONMENTAL ASSESSMENT

We recommend the use of a form to present information on the development project. The purpose is not to require complex information, it should not take too long to fill out and it should not be more than 5 pages long. The form should be considered as a sworn statement and signed by the project initiator. The form must contain at least the information listed in Table 2.2.

Table 2.2. Preliminary Environmental Assessment Form

- Name and company name of the physical or commercial person promoting the project.
- Geographical location where the project will be developed.
- Project description:
  - CIIU classification (when appropriate)
  - Number of employees or users the project will have
  - Area to be used, in square meters
  - Sketch of the project
  - Raw materials and supplies to be employed
  - Goods and services required
  - Emissions to be generated
  - Solid and liquid waste
  - Phases of construction
  - Development or operating plan
- Site description (physical setting – include photographs – social and cultural environment and others).

The authority responsible for reviewing this form needs to analyze it in the shortest possible time, some experiences recommend the following timelines:

Type	Maximum review time
A	4 weeks
B	2 weeks
C	1 week

Type C activities should be exempt from EIA, as long as there are established procedures and regulations (urban, municipal, construction, etc.) and specific regulations for controlling their impacts. For type A and B projects, it is better to have generic guidelines of terms of reference for the preparation of EIAs, which must be appropriate for each type of project.

It is important that the authority possess a list of forbidden activities and projects, in compliance with national and international policies applied in the country, and that this be part of the state policy of environmental protection.

3.5. MANAGEMENT PLANS

In most countries, protected areas are legally required to have management plans[18], in others, it is just good practice. Management plans are management instruments and one important component of them is often zoning[19]

It is highly recommended that protected areas where infrastructure projects are planned have a management plan or at least a defined zone.

3.5.1. Zoning

Typically protected areas in Central America may include the following zoning categories[20]:

- **Absolute Protection**: zones requiring the maximum degree of protection or where, for different reasons, no use of any kind should be allowed, with the general exception of scientific research. It has one or several of the following characteristics: uniqueness, fragility, biodiversity and scientific interest, restoration, or a key are during the life cycle of a species (e.g. a turtle nesting site). Human presence is to be avoided, or if allowed, it is only for scientific purposes. It is closed to public use.
- **Restricted Use**: the area may have suffered some degree of human intervention, it maintains its natural values in good condition or is in the process of regeneration. Scientific activities are allowed, and occasionally public use or tourism. Access with engine-powered vehicles is restricted to management needs, the construction of buildings or permanent structures is not permitted, and trails for control and protection can be built. The construction of roads is not permitted.
- **Public Use**: infrastructure for visitors can be developed: e.g. visitors' centers, parking areas, recreational areas, camping areas and picnic areas.
- **Sustainable Use of Resources**: by means of a relatively flexible management, different degrees of disturbance and use of biodiversity can be allowed, as long as the integrity of the entire protected area is not affected or put in jeopardy. Example uses include forestry, mining, hunting, fishing, livestock and agriculture.
- **Human settlements**: areas with houses, businesses, offices, community services and public roads etc.
- **Special Use**: this includes the administrative area for the management of the protected area (control booths, offices, fire-watching towers, etc.).

[18] This is the planning instrument orienting the management of a protected area towards the achievement of its conservation goals, based on a long, medium and short term outlook within the frame of the natural, socio-cultural and institutional reality and the territorial and macro-regional dynamics where the protected area is immersed (SINAC 2004).

[19] Zoning, according to Costa Rica's National System of Conservation Areas, is *"….the organization of the land in a wild protected area based on the value of its resources and its capacity to host the different uses, where clear and precise goals are established, with the appropriate regulation so as to minimize negative impacts and ensure that the use of the space is compatible with the conservation of the natural and cultural resources present in the area and in line with the social and environmental dynamics of its immediate environment"* (SINAC 2004). Zoning is based on the intensity of use of each zone depending on its physical characteristics.

[20] idem

- **Buffer zone**: the zone immediately adjoining the protected area, the regulation should be viewed as a complement to that of the protected area. The function of the buffer zone is to reduce detrimental pressures on the protected area (e.g. disturbance and pollution).

The typical occurrence of each zone with respect to protected area type is summarised in Table 3.1.

Table 3.1. Zoning categories vs. management categories

Key: NP: National Park, BR: Biological Reserve, WLR: Wildlife Refuge, PZ: Protective Zone, FR: Forest Reserve, NM: National Monument, NatM: Natural Monument, W: Wetland, MUMA: Multiple Use Marine Area

Zoning Category	NP	BR	WLR	PZ	FR	NM	NatM	W	MUMA
Zone of absolute protection	X	X	X	X	X	X		X	X
Zone of restricted use	X	X	X	X	X	X	X	X	X
Zone of public use	X		X	X	X	X	X	X	X
Zone of sustainable use of resources			X	X	X			X	X
Zone of Human Settlements			X	X	X			X	X
Special Use Zone	X	X	X	X	X	X	X	X	X
Buffer Zone	X	X	X	X	X	X	X	X	X

Source: adapted from SINAC 2004

3.5.2. Fragile areas

It is useful to start with a definition of what is an environmentally fragile area[21]. These are areas that, in view of their geological conditions, soil capacity, the ecosystems that compose it or its socio-cultural character, have a limited carrying capacity and are vulnerable to certain kinds of activities.

This definition aims to provide both the environmental authority and the users with preliminary technical criteria about the environmental condition of the development area. In this way, the level of detail and thoroughness that is required from an EIA can be

[21] Adapted from Modak & Biswas (1999)

related to the fragility of the area. The fragility helps to determine the kinds of measures that need to be taken in order to adapt the project to the environment.

The Central American region has proposed "degrees of limitation" of actions for some management categories in some specific areas, and the United Nations Environmental Program (UNEP) and the CCAD performed an analysis of the status, pressure and impact on ecosystems in Central America. They proposed that if the status level of the ecosystem is critical, the degree of limitation for activities should be determined as "Very High", for those that are "endangered", the degree of limitation should be "High", and for those that are "vulnerable" and "relatively stable" the degree of limitation should be "Medium" (Astorga 2002). Based on this and further expert advice, we make the recommendations outlined in Table 3.2 for the limitation of development activities according to protected area management category and ecosystem type.

Table 3.2. Environmentally Fragile Areas (by management category and by ecosystem) and degrees of limitation

Environmentally Fragile Areas		
Type of geographic space	**Development activity limitation**	
By Management Category		
National Park	Very high	
Forest Reserves	High	
Protective Zones	High	
Biological Reserves	Very High	
Wildlife Refuges	High	
Natural Monument	High	
By Ecosystem		**Level of ecosystem status**[22]
Subtropical Humid Mountainous	Very high	critical
Tropical Humid Mountainous	Medium	relat. stable
Pre-mountainous Humid	High	endangered
Subtropical Humid	High	endangered
Subtropical Humid Hot	High	endangered
Tropical Humid	Medium	vulnerable
Very Humid Mountainous	Medium	relat. stable
Very Humid Pre-mountainous Tropical	Medium	vulnerable
Very Humid Pre-mountainous	Medium	vulnerable
Very Humid Subtropical	High	endangered
Very Humid Subtropical Hot	High	endangered
Very Humid Tropical	Medium	vulnerable

[22] It relates to the level of the ecosystems in Central America.

Andean Subtropical Paramo	Medium	vulnerable
Subtropical Dry	Very high	critical

***Source*:** original, based on (Astorga 2002) and PNUMA-CCAD (2005)

Based on the table above, an activity inside a National Park will have a "Very High" degree of limitation and the environmental considerations will be higher if the park is in a subtropical humid mountainous ecosystem.

3.6. APPRAISAL OF ENVIRONMENTAL IMPACTS

We suggest that a Leopold type matrix is used to identify and appraise potential environmental impacts in relation to the main components of the development project. The appraisal is conducted in terms of magnitude and significance, as demonstrated in the hypothetical example illustrated in Table 3.3. It is also recommended that critical threshold limits for environmental impact are defined, which are directly related to the environmental regulations valid in the country and the environmental fragility of the area where the project is to be developed.

Table 3.3. An example of the use of a Leopold matrix

Key: High (H), medium (M) and Low (L), significant (+) or irrelevant (-).

Effects of the activity			
	Work Site	**Materials extraction and transportation**	**Operation of the center**
Factors			
Air	**L-**	**M+**	**L-**
Soil	**L+**	**L+**	**L-**
Surface waters.	**L+**	**M+**	**L-**
Underground waters.	**L-**	**L-**	**L-**
Flora/fauna	**L-**	**L-**	**L**
Solid waste	**L-**	**L-**	
Liquid waste	**L**		
Landscape	**L-**	**M+**	**L+**

Source: prepared by the authors based on a Leopold matriz (taken from Conesa Fernández 1997)

3.8. THE ENVIRONMENTAL DECISION SYSTEM

Once the preliminary environmental assessment is concluded, the environmental authority should decide on the acceptability of the proposed project and the necessary EIA requirements. We suggest that there are the following four broad options.

Option 1 – for projects that can reliably be predicted to have no significant detrimental environmental impacts. It is not necessary to present an environmental impact study or any further information, and thus the project obtains an environmental permit (although the administration may require that certain guidelines or requirements are followed).

Option 2 – for projects that are unlikely to have any significant detrimental environmental impacts. No environmental impact study is required, but additional information is requested to confirm the assessment.

Option 3 – for projects that are likely to have significant detrimental environmental impacts, but which may be acceptable and/or mitigatable. An environmental impact study is required. The Environmental Authority provides the project promoter with guidelines or terms of reference that define the scope of the study (see Chapter 4).

Option 4. – for projects that can reliably be predicted to have unacceptable significant detrimental environmental impacts (event taking into account potential mitigation measures). The project is NOT considered acceptable and is rejected.

4. STAGE 2: THE PREPARATION OF ENVIRONMENTAL IMPACT STUDIES (GUIDELINES AND TERMS OF REFERENCE)

Once the environmental authority has decided that an environmental impact study is required, the project proponent should be provided with guidelines or terms of reference for the preparation of the study. Guidelines should be appropriate to the type of project, whilst terms of reference should be project specific.

4.1. GUIDELINES

In general, the guidelines should include[23]:

1-Project description

a- A summary of the environmental impact study (written in simple terms, not technical or scientific) or of the environmental impact declaration. Impacts should be described in terms of nature, magnitude, location, time, duration and frequency.

b- Description of alternatives considered and the one selected, including biodiversity restoration.

Several weaknesses have been detected in the EIA systems of the Central American countries. Some of the most common have to do with the lack of procedure manuals, the lack of resources and equipment and the limited quality of the environmental impact studies (Astorga 2002). In order to correct this limitation, it is important to share the

[23] Original adaptation, based on CCAD-IUCN (2003a) and NCIA (2005).

experiences of NCEIA on the preparation of guides and manuals for the conduction of environmental impact studies[24] and the following CBD recommendations:

- Dedicate the necessary time to the study to be able to determine whether there are seasonal aspects that need to be taken into account.
- Special attention needs to be given to processes and services that are critical for human welfare and ecosystem integrity. The risks and benefits to biodiversity must be explained.
- Use an ecosystem approach[25] and consult with the most relevant stakeholders.
- Consider the entire range of factors affecting biodiversity (land conversion, removal of forest cover, emissions, disturbances, introduction of invasive species or modified organisms etc).
- Evaluate the impacts of possible alternatives with respect to a baseline situation, including the possibility of no project development. Assess the impacts in relation to thresholds and goals of the national biodiversity strategy or the protected areas.
- Take into account cumulative threats, either as a result of repeated impacts or as a result of programs, plans or policies.
- Seek the cooperation of different specialists. Biodiversity has social, cultural, economic and biophysical influences.
- Quantify, whenever possible, the predicted changes in quality and quantity of biodiversity. Explain the consequences to be expected from a loss of biodiversity for the purposes of the project. Include the cost of replacing the services provided by biodiversity if those were to be damaged by the project.

2-Description of the environment

a- Description of the political, legal and institutional environment where the project will be developed.

b- Description of the physical environment (biological, geological, etc.), emphasizing potential impacts, especially to threatened or endangered species. It is important to highlight the changes to be expected in soil, water, air, flora and fauna and environmental services. It is appropriate to describe the bio-physical changes in terms of space and time and their effect on the ecosystems connectivity.

c- Description of the socio-economic environment, including the mechanisms to be used to guarantee stakeholder participation, the interaction with communities close to the

[24] Based on NCIA (2005).

[25] The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. In addition, the ecosystem approach has been recognized by the World Summit on Sustainable Development as an important instrument for enhancing sustainable development and poverty alleviation (CBD Decision VII-11). Humans, with their cultural diversity, are an integral component of many ecosystems. People and biodiversity depend on healthily functioning ecosystems and processes; these have to be assessed in an integrated way, not constrained by artificial boundaries. The ecosystem approach is participative and requires a long-term perspective based on a biodiversity-based study area. It requires adaptive management to deal with the dynamic nature of ecosystems and the absence of complete understanding of their functioning.

area, interested or affected by the project. It is important to highlight the changes to be expected, particularly in terms of environmental services provided by the area where the project will be developed.

3- Environmental diagnosis

a- Application of a conventional methodology for impact identification (e.g. Leopold matrix, surveys etc), which must include all alternatives studied.

b- Assessment (qualitative and quantitative) of identified impacts. It is relevant to conduct the assessment in terms of composition (what is there in the project area), structure (how is the biodiversity organized in terms of time and space) and function (what role the biodiversity plays in the ecosystem).

c- Identification of cumulative, synergistic, residual and regional impacts.

d- Evaluation of environmental risk. The participation of stakeholders is very important in this assessment, in order to determine risks to the environmental services and values of land use.

4-Environmental Management Plan (EMP)

a- Mitigation and compensation measures:

- careful attention and time must be given to these measures, supporting them and having them interact with society, by doing so, the risk of negative publicity, opposition and delays is decreased noticeably;
- mitigation requires a joint effort between the project proponent's engineers (designers and builders) and ecologists;
- these measures must include an impact study, so as to be able to evaluate their feasibility, and thus they need to be identified during the categorization phase; and
- during the planning of the project, it must be taken into account that the effects may not appear immediately and that it also takes time to develop compensatory measures.

b- Contingency plans

c- Monitoring plan

5-Annexes

a-Bibliography

b- Spread-sheets, blueprints

4.2. INDICATIVE TERMS OF REFERENCE

All environmental impact studies for type A and B projects must at least include and consider in their analysis[26], the following information, in order to identify possible impacts.

- Name of the protected area.
- Location (in a map of a scale at least 1:50,000).
- Date of establishment of protected area (date of agreement and date of publication).

[26] Based on UNEP-CCAD (2005) and World Bank (2003)

- Owner (physical or private person, state institution, NGO or other).
- Authority legally responsible for its management.
- Size of the protected area.
- Number of employees managing the protected area.
- Annual budget, reflecting government funds, donations, income from entrante fees and others.
- Management category (IUCN, Ramsar, UNESCO).
- Reasons that justify the management category.
- Main goals of the protected area.
- Main threats to the protected area.
- Legal status (law, executive bylaw, ministerial agreement, or other).
- Regulations of land use (control mechanisms).
- Enforcement of the legislation (institutional capacity, staff directly responsible for law enforcement).
- Planning schemes (strategic plan, annual plans, management plan).
- Borders of the area (boundaries clearly demarcated and known to all neighbours).
- Inventory of resources of the protected area (ecosystems, species).
- Management capacity (fire prevention, invasive species, illegal logging, vigilance, control of flora and fauna).
- Equipment and facilities available (vehicles, computers, tractors, trucks, boats, accommodation, meeting rooms).
- Equipment maintenance (periodicity, control, quality, monitoring).
- Educational and environmental awareness programs (regularity, coverage, means).
- Indigenous communities (protected area joint management, relationship with authority that manages the protected area).
- Local communities (participating in the management of the protected area).
- Tourism and visitors facilities (contact with the protected area management, existing infrastructure, visited areas).
- Access to the protected area (trails, roads, highways).
- Benefits provided by the protected area (environmental services, tourism).
- Monitoring and permanent assessment of the protected area (monitoring and evaluation plans, effectiveness and efficiency).

This information will also help the environmental administration assess the institutional capacity of the protected area managers and their ability to deal with the project's impacts.

Case Study 1: Construction of a lodge in the buffer zone of a national park: Tortuguero (turtle nesting site).

Although in Costa Rica and in the entire region there is not a procedure that allows appropriate evaluation of the environmental impacts that the development of infrastructure might have in the buffer zone of a protected areas, we present this case to show how it is possible to build a lodge – a type A Project – in a nesting zone for an endangered species of turtle, without affecting the species. The experience gathered in this case can be applied in other parts of the World and we have thus included it in this document.

Tortuguero National Park

The Tortuguero National Park covers approximately 26,000ha of marine territory and belongs to the Tortuguero Conservation Area of the National System of Conservation Areas of Costa Rica (SINAC).

It is the third most visited park in the country and it is a Ramsar wetland of international importance. The park holds the most important beach in the world for the nesting of Green Turtles (*Chelonia mydas*), which is one of the main reasons for the creation of the park. Leatherback turtles (*Dermochelys coriacea*), the Hawksbill Turtle (*Eretmochelys imbricata*) and the Loggerhead Turtle (*Caretta caretta*) also nest in the National Park and Manatees (*Trichechus manatus*) occur.

The park includes a great diversity of environments, including flooded or marsh forests, very humid high forests and patches of "Yolillo" palms (*Raphia taedigera*).

During the nesting season, the SINAC declares a restriction "pro natura" to reduce the presence of humans on the beaches where nesting is taking place, inside and outside the park. The nesting months are from July to the end of October and the restriction applies from 6 pm to 6 am.

The hotel and its justification

The number of visitors coming to Tortuguero National Park increases every year, according to National Parks data, in 2000 it was visited by 42,000 tourists and in 2003 by 68,000. The tourists come mostly to see the turtles nesting. The amount of beds available in 2003 was only 1,169.

To reach the park, and more specifically the turtle nesting zone, visitors must travel 130km by road (approximately 2.5 hours) and another 50km on the river (approximately 1.5 hours).

The need to have facilities to respond to the demands of hospitality is growing, and given the distance from the main population centers of Costa Rica and the time of the nesting, the construction of a hotel is fully justified.

The hotel and its operation

The lodge is located 3 km from Tortuguero National Park, in a strip of land 200m meters, the hotel gardens border the sea on one side and the Tortuguero lagoon on the other (see Figure C1.1 below). It has 82 rooms. The lodge owns 6ha of land. The beach bordering the lodge is one of the turtle nesting sites.

Figure C1.1. Location of the Laguna Tortuguero Lodge
Source: www.lagunatortuguero.com 2005

Environmental measures enforced

No hotel facility is higher than two floors (approximately 9m) and it is not possible to see any construction from the beach, as there is a "protective zone" approximately 25m wide. Additionally, there are no unshielded lights, so virtually no lights can be seen from the beach.

Solid and liquid wastes are appropriately managed (there are no open air dumps or waste spilled into water bodies). Boats in general use 4-stroke engines, so the levels of water pollution are reduced.

The construction materials were selected in agreement with the conditions of the environment and they do not cause disruption of the landscape.

Lesson learnt

It is possible to build a facility near a NP, bordering a beach where turtles nest – including CITES and red listed species – without causing them any damage whilst generating an income

For type A and B projects, the following variables must be considered as part of the impacts diagnosis and appraisal[27]:

4.2.1. Status of the ecosystem

Present status of the ecosystem and its main components or characteristics.

4.2.1.1. Fragmentation and size of blocks

Size of habitat blocks within the ecosystem, distance between the blocks and habitat modifications etc. These variables are expressed in terms of size of unaltered areas, presence of original species, presence of ecological processes and others.

4.2.1.2. Ecosystem conversion

[27] PNUMA-CCAD 2003

Describe whether the ecosystem has been degraded, expressed in percentage of conversion.

4.2.1.3. Degree of protection of the ecosystem

Describe the status of the ecosystem in terms of protection. Expressed in percentage of land protected and based on the potential that should be protected.

4.2.1.4 Status of species

Percentage of endemic and rare species and biological value of those species (e.g. number of species per ecosystem, percentage of endemism with respect to the total number of species of the ecosystem, percentage of rare species with respect to the total number).

4.2.1.5. Presence of unique biological components

Existing communities and unique biological processes in the ecosystem.

4.2.1.6. Ethnic diversity and use of ecosystems

Presence of indigenous people and other communities and the use they make of the environment. Approximate percentage of areas occupied with respect to the total area, percentage dedicated to agriculture, traditional uses of biodiversity and others.

4.2.2. Pressure on the ecosystem

Pressure placed on the ecosystem, be it from conversion, degradation, exploitation or natural events such as hurricanes, storms, tornadoes – and climate change.

4.2.2.1. Pressure from conversion

Pressure produced by ecosystem conversion, growth and population density, logging, road construction, expansion of the agricultural frontier, exploitation or destruction of mangroves, mining works and other works of infrastructure.

4.2.2.2. Pressure from degradation

Pressure produced by the degradation of the ecosystem. Selective logging, deforestation, introduction of exotic species, aquaculture and fisheries, natural events and climate change.

4.2.2.3. Exploitation of wildlife

Pressure produced by the exploitation of wildlife. Hunting and poaching, extraction of flora, traffic of species.

4.2.2.4. Uses of the ecosystems

Types of uses of the ecosystem.

4.2.3. Impacts

Impacts derived from social and environmental pressures and responses provided to modify the ecosystem situation.

4.2.3.1. Economic losses

Impacts of the pressure on the economy of the ecosystem, in terms of changes in the production of goods and services (reduction of fertility and decrease in productivity etc.).

4.2.3.2. Social losses

Social impacts present in the ecosystem, in terms of human populations affected (moving entire communities and relocation because of natural disasters etc.).

4.2.3.3. Cultural losses

Impacts of the pressure on cultural aspects (acculturation, loss of language, community life, traditions, history, etc.).

Case Study 2. A project inside a protected wild area: micro hydro-electric plant in the Genio river, Cocos Island

As in the previous case study, there are no established procedures in Costa Rica or the rest of Central America to evaluate the impact of developing a project inside a protected area. This case study is therefore presented to demonstrate how it can be possible to build a micro hydro-generation dam – a type A project – inside a protected area with acceptable impacts. The experience described here can be applied in other parts of the world and has been incorporated to the procedure presented in this document.

Cocos Island

The Island is part of the Cocos Island Marine Conservation Area (ACMIC). The ACMIC belongs to the National System of Conservation Areas of Costa Rica (SINAC) of the Ministry of the Environment and Energy. The ACMIC is one of 11 areas forming the SINAC. The island is 24km^2 and it is uninhabited.

Cocos Island is an oceanic island, mid way between the westernmost point on the Pacific coast of Costa Rica (approximately 495km) and the Galapagos Islands (approximately 680km). See Figure C2.1.

Cocos Island was declared a National Park in 1978, in 2001 its marine borders were extended to 12 nautical miles. In 1997, UNESCO declared it a World Heritage Natural Site. In 1998, it was declared Wetland of International Importance under the Ramsar Convention. In 2002, the Ministry of Culture of Costa Rica declared it National Historic Heritage Site.

Figure 2.1. Location of Cocos Island
Source: Friends of Cocos Island Foundation, 2005

Figure C2.2. Geographic aspects of Cocos Island
Source: Pagetelecom 2005

The need for the project

To provide power for the staff of the National Park (an average of six employees and four volunteers per month), diesel generators had been employed, resulting in pollution from noise, leaks of hydrocarbons and fumes. In addition, there was the permanent problem of transporting the fuel in rough seas and transfer to land (there is no dock or storage tank). The transfer had to be done in barrels with the risk of producing a spill or a labor accident.

The generators were used at fixed times and were turned off at 10pm, causing serious inconveniences, among others, in matters of communications and food storage.

A permanent power supply would facilitate communications systems: telephone, internet, direct TV, and the park would be able to provide additional services to support research (cold chambers and water purifiers etc).

The project

The Genio river is *"…a creek with an average water flow of 200L/s, it has a steep incline… it is a classical mountain river, with a strong incline and abundance of rocks indicating clearly that during the high waters, they get dragged down. The river is quite enclosed within its canyon, at least until the waterfall, thus two sites were defined for the dam, which allowed enough space for the sand remover and good conditions to drag the water out of the site. The possibility of exploiting the river further up than the waterfall was not considered, because the latter is so beautiful that it would be environmentally unacceptable to reduce its flow significantly*". The fauna of the Genio river includes the "rock sucker" fish – Chupapiedras (*Gobiesox fulvus*) and at least two species of shrimp. The fish has the ability to swim up very steep inclines.

A small concrete sink was built, with a bottom water take incorporated. The waters are caught at an elevation of 116 m.a.s.l. The structure is 1.6m high and 10m long. At the base, it was provided with steel anchors for better stability. It has closing side walls to control the water flow. The waters caught are conducted to the sand remover and then to a loading chamber, where reinforced piping begins. The power house has a surface of 35m^2 and was located in a place that had already been disturbed and was close to the administrative center of the park.

Environmental measures applied to the project included:

- A detailed study of the selected river canyon and the construction site.
- Enforcement of the Environmental Impact Statement's requirements.
- The manual transport of building materials.
- Use of existing trails for materials and workers.
- Construction of steps for the passage of *G. fulvus.*
- Piping and power house painted in green to reduce visibility (it is expected that the

vegetation will cover the pipes during the coming months).

- Collection and removal of all residual and waste materials from the park.

Lesson learnt

It is possible to conduct works in a National Park with minimal disturbance and impacts on the environment. This requires building and environmental teams with a good understanding of the situation that follow the measures and recommendations from the environmental study. It requires dedicated workers, aware of the fragility of the environment where they are working.

4.2.4. Guidelines to be taken into consideration for the selection of alternatives and the Environmental Management Plan[28]

4.2.4.1. Construction and rehabilitation of access roads and trails

- Select alternatives that require the least removal of vegetation.
- Select alternatives with shallower slopes (to minimize erosion).
- Build speed reducers to control the running waters.
- Canalize running waters and avoid direct discharge into water courses.
- Re-use wood where possible.
- Avoid constructing roads and trails that interrupt the passage routes of animal populations.
- Include a management plan in the project.

4.2.4.2. Construction of housing infrastructure

- Consider the environment in the design, in such a way that the infrastructure is integrated.
- Build toilets taking into consideration the height of the phreatic mantle (the underground stratum of rock or gravel closest to the surface of the soil).
- Build at a distance of more than 50m from water sources in areas of steep incline and more than 25m in areas of low incline.
- Avoid running water emptying into water courses.
- Avoid the use of non-biodegradable substances.
- Consider in the design the management of solid and liquid waste, and site where this will be stored must be at a distance of no less than 50m from water courses and at such a depth as to avoid pollution of underground waters.
- Perform a risk appraisal to avoid building in places unprotected from natural phenomena (land slides, floods, tidal waves, surges, etc.).

4.2.4.3. Use and management of natural resources

(This includes activities such as ecotourism, sports fishing, controlled harvest of turtle eggs, forestry and others.)

[28] CCAD-PROARCA/Costas.2001

- For ecotourism, the carrying capacity of the sites to be visited must be determined (other methods can be used, such as management of visitor impact and acceptable levels of change). As part of the study, a regulation for public use must be presented, as well as a characterization of the tour operators likely to bring visitors to the site.
- For projects dealing with sports fishing, precise indications will be needed to ensure minimal use of the nesting and reproduction (particularly for species with low tolerance of human presence).
- For the controlled harvest of turtle eggs, quotas assigned must be determined using reliable information such as harvesting seasons, size of the population, hatching rates, rates of predation, traditional uses, market volume, control methods, similar experiences in other places, marketing schemes, close-season recommendations and others.
- Forestry projects should consider information dealing with the type of exploitation (natural populations or plantations), existing (or about to be planted) population densities, population growth rates, expected yields, replanting or regeneration methods, cutting (harvesting) methods, transport to processing and marketing sites, potential pests and controls, potential effects on animal populations (be it from logging or noise, habitat reduction or others).

4.2.4.4. Projects or activities involving toxic substances

(probably the most commonly used will be agro-chemicals, solvents, paints and oils)

- Consider the following security measures, among several: recommended doses and volumes; shape, equipment and times of application; security equipment to be used; average lifetime of the active ingredient; actions in case of emergency; measures for the maintenance of warehouses and inventories; action plan in case of biological resistance; procedures for washing the equipment and legislation dealing with substance use.

4.2.4.5. Reforestation projects

The issues listed above should also be considered for these project. In addition:

- The use of native species is recommended.
- The planting of monocultures should be avoided.
- Impacts on biodiversity within the area should be assessed.

4.3. ENVIRONMENTAL VARIABLES

The variables listed in Table 4.3 are characteristics of the environment that may be used to describe the baseline conditions which may be impacted by projects. The most appropriate variable should be selected using expert judgment, taking into account that some may be difficult to determine.

Table 4.1. Environmental variables that may be used to describe baseline conditions

Variables	Parameters	Associated Factors
Soil		
Rate of erosion	Ton/ha/year	Incline, type of soil, forest cover, rainfall, erosion processes.
Rate of sedimentation	Ton/ha/year	Erosion, running water, topography, water courses
Forest cover	Ha (%)	Changes in cover and disturbance of conditions.
Soil chemistry	mg/l	Chemical composition, pollution
Hydrological		
Running waters and drainage	m3/sec	Changes in patterns, risk of flooding, effects on superficial and underground waters.
Rate of infiltration	Cm/tour	Changes in patterns, risk of floods, effects on superficial and underground waters
Phreatic level (the aquifer closer to the surface of the soil)	Meters	Changes in the phreatic level and effects on neighboring activities.
Biodiversity		
Critical or indicative species	%, number and locations.	Life zones, size of populations, biodiversity and population dynamics.
Fragile ecosystems	Endemism, resilience, degree of fragmentation	Critical habitats, size of the ecosystem, conservation areas and activities, biological corridors.
Critical relations between populations	Density, growth, mortality, interactions	Community dynamics, species and relative abundance, type of ecosystems, intra-specific relationships.
Land use		
Changes in present patterns of use	Ha(%)	Potential use, available services, access roads, traditional economic activities
Riverbeds		
Morphology	Shape	Water flow, incline, geology, river vegetation
Coasts		

Morphology	Shape	Currents, winds, tides, coast incline, geology and materials of the coastal bed, coastal vegetation.
Water		
Quality (Eutrophication)	DBO, Oxygen levels, content of pollutants	Water flow, currents, rate of water renewal, neighboring activities
Quantity	Flow (max, min, average, m3/sec	Superficial, riverbed, rainfall, incline, infiltration, drainage, cover, vegetation
Hydric balance	Hm3/year, mm/year	Hydraulic dynamics, annual discharge of the watershed, natural variations, uses of the water.
Air		
Quality	Suspended particles in ppm.	CO2, NOx, particles, diffusion factor.
Human impacts		
Esthetics	Index of visual quality	Kind of landscape, visual corridors, cultural values.
Odors	Description	Oxygen reduction due to stagnating waters, increase of organic cover, environmental humidity, winds
Noise	dB	Machinery employed, wind direction, source of emission
Infectious diseases	Index	Presence of vectors, nutrition of the populations, existing health measures.
Security (violent deaths, homicides, damages to property)	Index	Socio-economic level, cultural characteristics
Threats	Probability	Topography, soils, seismicity, meteorology.
Archeological-cultural	Monuments, sites, cultural values	Deterioration of archeological and cultural values.

Source: adapted from CCAD-PROARCA/Costas 2001 and norms PAHO.

5. STAGE 3: STAKEHOLDER PARTICIPATION[29]

5.1 THE VALUE OF STAKEHOLDER PARTICIPATION

There is often considerable awareness and sensitivity amongst local people and other stakeholders regarding issues affecting protected areas. Consequently proposed projects may quickly lead to concern and negative reactions. It is therefore recommended that the EIA process is transparent and objective and uses the best available technologies and data (which can be made available on a web site).

We consider that stakeholder participation[30]:

- Improves the quality of decisions.
- Reduces costs and prevents delays.
- Brings transparency and facilitates the acceptance of decisions.
- Reduces controversy and public confrontations.
- Improves the understanding of potential impacts.
- Facilitates the identification of mitigation measures.
- Helps determine the need for compensation.
- Clarifies values and the process to reach different alternatives.

The purpose is to *"… actively involve the citizens in the defense of the interests commissioned to the administration in terms of environment…"* (Martin Mateo, 1994). Although the final decision on whether or not to grant a permit to a development project belongs with the state, the latter has the obligation to inform its citizens when it is going to make a decision. Citizen participation is associated with some key principles, including the right to information, access to justice and the right to participate.

The right to information guarantees to all citizens open access to information without discrimination. This means information that is timely, truthful and sufficient (quoting *Aristotle "… one can only have an opinion about that which one previously knows…"*).

Access to justice concerns a citizens' right to go to the Supreme Court of Justice when information has been denied. Unfortunately, most Central American countries do not have an appropriate judiciary framework to enable citizens to access judiciary control. This has caused some citizens to pressurize governments and undertake protests measures to attract some attention to their views.

The right to participate relates to the right to being heard, and may be confused with hearings, consultations and surveys. Participation includes, beyond the right to being heard, the right to get an answer from the administration. In Central America, there are very few cases where the law establishes deadlines for answering public questions.

5.2. CITIZEN PARTICIPATION DURING THE PHASES OF THE EIA

Practically every phase of the EIA requires public participation and access to information: including preliminary report (screening), preparation of terms of reference

[29] CCAD-UICN (c). 2003
[30] CCAD-IUCN (c). 2003

(scoping), preparation of the EIS, and construction and monitoring of the project. In the Central American region, citizen participation in the EIA typically takes place during the review of the environmental study report, but we recommend that it should take place through the entire EIA process, as outlined below.

Preliminary report or screening stage: Citizens could, if sufficiently well informed, provide the administration with information that may help it to determine with more certainty whether or not the project requires an EIA.

- **Definition of terms of reference (scoping)**: The project proponent is responsible (directly or through consultants) for identifying the main issues of concern for the authorities and stakeholders and above all, is responsible for ensuring the latter feel informed and that their opinions and concerns are established. It is important to include in the terms of reference, the methods that will be employed to inform the public of the project proposal and how their comments will be considered, and at what stages citizen participation will take place.
- **Preparation of the EIS**: The developer should consult with stakeholders and establish a process of interaction with the groups or communities that may be affected by the project.

Review of the EIS It is normally during this phase that citizens participate most. Interested stakeholders should make themselves known to the relevant authorities and request the opportunity to study and comment on the EIS. In some cases, the administration must promote public hearings to take into consideration stakeholders' opinions before making its final decision.

- **Monitoring and follow-up**: It is useful to involve stakeholders in the regulation and monitoring of projects and their impacts, particularly where projects are in isolated areas, which is typically the case for projects within protected areas.

Deciding who the stakeholders are, and thus who participates, is often a controversial subject, and very subjective. In principle, anyone interested should be able to participate. Nevertheless, as it has been pointed out[31]: the *"….opinion is not binding. The audience serves the purpose of getting to know people's opinions, not to make them "a part", since in that case the decision making process would become so tricky it would never end."* (PNUMA/ROLAC 1996). The focus should be on making information available. In this case, citizens' participation can be promoted when[32] we must be aware that the citizens, whether or not they have already participated in some kind of public participation process, have the right of appeal to justice, whether to call attention to an issue or to force the administration or the developer to rectify a problem.

It is always advantageous to ensure effective stakeholder participation, therefore we recommend that the following needs are provided[33]:

- Timely, truthful and sufficient information.
- Resources to provide citizens access to a second qualified opinion on the results of the environmental study.
- A legal framework for citizen participation.
- Community organization for participation.

[31] PNUMA/ORALC (1996)
[32] Department of the Environment, Transport and the Regions (2000).
[33] CCAD-UICN (2003c).

- Sufficient time for the study of the EIA documents and preparation and distribution of comments and views.
- Opportunities to express opinions at any stage of the work (pre-feasibility, feasibility, design, execution and monitoring, etc.).
- The right to obtain answers to the questions put forward by stakeholders.
- Administration support to facilitate the work of decision-makers.
- Sufficient budget to respond to participation requests.
- Training in management of public meetings and conflict resolution.

There are several mechanisms to ensure participation, among them we can mention the following: invitations, consultations, surveys and public hearings. An increasingly popular mechanism is the one known as "voice", expressed as the participation in meetings of committees or councils, where community representatives have a "voice". We recommend that all mechanisms should be used and that they need to be clearly regulated and established.

One of the main concerns in Central America is how to approach the issue of citizens' participation in the case of infrastructure developments in protected areas located on the borders between countries[34]. The possibility of adopting the measures in the Convention on EIA in the context of trans-boundaries, better known as Espoo is being considered[35]. This convention, among other things, aims to[36]:

- Improve relationships between peoples and countries, and prevent trans-boundaries environmental conflicts.
- Promote timely access to relevant information to the participants of the environmental decision-making process.
- Ensure that people understand and respect the final decisions about the projects.

6. STAGE 4: APPRAISAL OF IMPACTS IN THE ENVIRONMENTAL IMPACT STUDY

One of the basic requirements of all EIAs is the identification and appraisal of the potential environmental impacts the project or activity may produce. The logical sequence for the impacts appraisal could be as follows:

1. What are the possible impacts? (Identification)
2. Where, how, when, quantity, quality (Impact Analysis)
3. How strong is the effect? (Impacts Appraisal).

[34] At least the following protected areas are located on the borders: Mayan Biosphere Reserve, Trifinio reserve, Golf of Honduras, Golf of Fonseca, Río Coco Reserve, Cayos Miskitos, International System of Protected Areas for Peace, Salinas Bay Reserve, La Amistad Biosphere Reserve, Sixaola Reserve, Darien region. (CCAD 1992).

[35] This Convention was signed in Espoo, Finland, in 1991, under the auspices of the United Nations Economic Commission for Europe.

[36] United Nations Economic Commission for Europe, 1991.

It is recommended that the impacts be quantified, so they can be given a specific value. It is then easier to establish appropriate mitigation and compensation measures and compare different types of potential impacts.

There are many methodologies for the appraisal of environmental impacts, which can cause problems for the administration if a study has applied methodologies that are not commonly used or were developed by the team conducting the study. Therefore, we suggest that administrations define a standardized methodology for impact assessment, without restricting the use of other methodologies as a complement.

We recommend the appraisal scoring system outlined in Table 6.1 as a standard for environmental impacts[37]:

Table 6.1. A standard appraisal scoring method for environmental impacts

By sign	
Positive impact	(+)
Negative impact	(-)
Area impacted (A)	
Spot (a limited and defined area encompassing less than 25% of the site)	1
Partial (between 25% and 50% of the area	2
Extended (between 50% and 100% of the area	3
Total (100% of the area)	8
Persistence P	
(permanence over time of the effect)	
Fleeting (can be counted in hours or days and then disappears	1
Temporary (only during the development stages of the project, then disappears	2
Steadfast (lasts for years but is not permanent)	4
Permanent (forever)	8
Corrective measures	
Projected	P
In preparation	O
In operation	F
None	N
Intensity (It)	
(degree of destruction)	
Low	1
Intermediate	2
High	3
Very high	8
Time period (M)	
Long term (more than five years)	1

[37] Adapted from the procedures of Environmental Management of Costa Rica and from CCAD-IUCN (2003a).

Medium term (two to five years)	2
Immediate (up to two years)	4
Reversibility (R)	
(reconstruction)	
Short term	1
Medium term	3
Long term	5
Irreversible	8
Irrecoverable	20
Importance (I) = +/- (3 It + 2 A + M + P + R)	

7. STAGE 5: THE REVIEW OF THE ENVIRONMENTAL IMPACT STUDY

Consulting teams who prepare an EIS must do so according to specific terms of reference. Similarly, it is appropriate for those that review an EIS to follow a specific appraisal procedure (that should include consideration of the observations from stakeholders).

The procedure must be based on the terms of reference or guidelines provided for the preparation of the EIS, using Table 6.1 for impact appraisal.

We recommend that the following issues are considered when reviewing an EIS:

1. Review the most important or outstanding aspects of the project.
2. Examine the terms of reference or guidelines provided by the administration and verify step by step that the EIS meets all the requirements. If no terms of reference were set, use the model terms of reference prepared by the World Bank.[38]
3. Learn from previous experience by studying similar previous projects, if they exist and were subject to an EIS. Determine what information was taken into consideration during the review and what problems took place during project implementation. If possible find monitoring reports or "*ex-post*" assessments to assess what happened.
4. Review in detail all the requirements that the EIS needs to satisfy, including:
    - Legal requirements.
    - Environmental goals and standards.
    - Quality of the prediction and assessment of impacts.
    - Assessment of alternatives.
    - Significance of the impacts for decision-making.

[38] See OP 4.01, *Environmental Assessment*, from January 1999.

- Clarity of the EIS.
- Simplicity of the abstract so it can be read by non technical audiences.

We also recommend that the review follows the following steps:

1. List all the weaknesses or deficiencies of the EIS and the differences between what is presented and the terms of reference, or if they don't exist, best practice requirements for similar projects.
2. Determine which weaknesses or deficiencies are important and have a direct impact on the decision.
3. Give the authority indications as to how and when these differences, weaknesses or deficiencies need to be overcome.

We suggest that the results of the review are used as follows:

1. If the EIS has major differences, deficiencies or weaknesses, a complement to the study is requested to fill in the gaps and strengthen the parts considered weak, clearly indicating what needs to be improved and how to do it. The decision is not made until the supplementary information is presented.
2. If the EIS has minor differences, deficiencies or weaknesses, additional information is required. The decision can be made, indicating the additional information to be included later.
3. If the EIS has differences, deficiencies or weaknesses that can only be overcome during the phase of implementation, the decision is made and those are considered during the monitoring stage.
4. If the EIS is satisfactory, the decision can be made on the acceptability of the proposed project.

The decision should be one of the following:

1. The activity is not considered to be environmentally acceptable and therefore an environmental permit is not granted.
2. The activity is environmentally acceptable if it complies with certain conditions, requirements or commitments. These are included in the design or the (EMP). Once these inclusions are incorporated into the project proposal and verified, the environmental permit is granted.
3. The activity is environmentally acceptable and it includes all necessary measures, requirements, commitments and design conditions as well as an EMP. The environmental permit is granted.

In all cases, the authority or administration should issue a public statement describing the reasons for the decision.

8. STAGE 6: MONITORING, CONTROL AND INSPECTION

The control and monitoring of the implementation of projects is one of the critical stages of the EIA procedure. It enables verification of the validity of the studies and the implementation of the EMP. Unfortunately, in Central America (as in many other regions) this is one of the weakest stages in the EIA process. Typically few projects are visited and the role of the authority is normally limited to making the environmental statement or granting the permit.[39]

Considering the fragility of protected areas, we consider that there should be an obligation to visit project sites to verify the EIS and monitor the fulfillment of the EMP.

In order to facilitate the control and monitoring task, we recommend:

- The appointment of an environmental monitoring and evaluation consultant who is responsible for the enforcement of environmental laws and other commitments in the EMP etc. They must be registered and approved by the administration in order to conduct the task to an acceptable standard.
- The use of an environmental log-book to record the results of monitoring and follow-up. After each inspection, minutes are drafted within the logbook, summarizing the environmental actions performed. The logbook must remain at the project site and should be available for reviewed at any time by the environmental authority.
- The production of periodic reports40 for the environmental administration by the monitoring and evaluation consultant that report on compliance with environmental commitments. These reports should be made publicly available on the administrations website and for stakeholders wishing to view them at the administration.
- The appropriate administration or environmental authority should visit the project regularly from its first stages. During visits they should complete inspection reports to verify that the measures included in the EMP are being upheld, as for example illustrated in Table 8.1 (for a hypothetical road construction project).

Table 8.1. An example site inspection form

Name of the Project: e.g. Construction and rehabilitation of access roads and trails for Protected Area XXXX

Date of inspection: DD/MM/YYYY

Owner: e.g. National Parks Service

Activity	YES	NO	Observations or comments
Selection of alternatives Was the alternative with less removal of materials selected? Was the alternative with the lowest			

[39] The author witnessed a meeting that took place in Antigua, Guatemala, in 2003, where the EIA directors of Central America commented on the highly elevated amount of EIS they had to review and the absent task of site control in field projects.

[40] See Global Reporting Initiative.

incline selected?			
Management of erosion Were speed bumps built to reduce the speed of running waters? Were running waters canalized? Were direct discharges of running water into the water course avoided?			
Use of removed materials Is removed wood being used for the same project? Was the soil protected for future use in the stabilization of slopes and site recovery?			
Animal migrations Did the project avoid blocking animal migration routes?			
Extraction and dumping sites Are these sites that will not cause future or permanent effects?			
Noise level Are noise levels within allowed levels?			
Management of toxic substances Are fuels and lubricants being managed according to the required standards?			
Management of solid and liquid waste Does the site manage its solid waste adequately? Does the site manage its liquids waste adequately?			

9. CONCLUSIONS

One of the most significant gaps in the relationship between EIA and biodiversity is the lack of procedures and specific tools to evaluate the environmental impacts from the development of infrastructure projects in protected areas. This gap is particularly serious in a region like Central America, which has a high biological diversity and is extremely fragile and vulnerable.

The region is placing a great emphasis on developing tourism as a key component of its economy. All the countries are competing to attract tourists and the figures show they are being successful, since the number of tourists visiting Central America grows every year. The major attraction “sold” is the region’s biodiversity, therefore there are many development projects in and around protected areas.

The implementation of the CBD is a good way to improve the management and conservation of biodiversity, but the Convention itself does not provide specific tools so that the biodiversity may be appropriately considered in EIAs. The efforts made, such as the CBD's EIA Guidance and best practise, are important but insufficient, because they cannot be applied equally to all regions and ecosystems in the world, and thus remain too general and non-specific. That is why it is important to develop guidance such as described in this document, which is specific for the Central American region and takes into consideration existing laws and regulations.

The next steps need to include the incorporation of the recommended procedures into national regulations. However, institutional building is also necessary. This implies on the one hand providing the managers with more resources and equipment and, on the other hand, training the staff and enforcement agencies. This is one task that international cooperation should support in the region over the coming years.

10. BIBLIOGRAPHY

Aguilar, G. (2002). *La Evaluación de Impacto Ambiental en Centroamérica, estado de la cuestión. [The Evaluation of Environmental Impact in Central America: State of the Issue]* La Serie, Volume 1. San José, Costa Rica.

Aguilar, G. Iza, A. (2005). *Manual de Derecho Ambiental en Centroamérica*. *[Manual of Environmental Law in Central America].* San José, Costa Rica.

Amador, C. and Romero, J. (2005). *Informe de Gira de reconocimiento PN Isla del Coco*. *[Report of a fact finding misión to Cocos Island Nacional Park].* Proceso de Tecnologías de Generación ICE. Mimeographed. San José, Costa Rica.

Astorga, A. (2002). *Diagnóstico de la Situación Actual sobre los Estándares Ambientales en Centroamérica y Propuesta de Acciones Estratégicas*. *[Diagnosis of Present Situation of Environmental Standards in Central America and Proposal for Strategic Actions].* San José, Costa Rica.

Astorga, A. and Méndez, H. (2002). *Valoración de la efectividad de los procesos de EIA y propuesta estratégica para la armonización de los sistemas de EIA en Centroamérica*. *[Assessing the effectiveness of EIA processes and a strategic proposal for the harmonisation of the EIA systems in Central America].* San Salvador, El Salvador. 2002.

CCAD (1992). *Convenio Centroamericano de Biodiversidad*. [*Central American Agreement on Biodiversity*]. Guatemala, Guatemala.

CCAD-PROARCA/Costas (2001). *Lineamientos para el desarrollo de Estudios de Impacto Ambiental. [Guidelines for the development of Environmental Impact Studies]*. Guatemala, Guatemala.

CCAD (2002). *Mesoamérica en cifras. [Mesoamerica in numbers]*. San Salvador, El Salvador.

CCAD (2) (2002). *Plan de Acción Regional para el Fortalecimiento de los Sistemas de EIA. [Regional Action Plan for Strengthening EIA Systems]*. San Salvador, El Salvador.

CCAD-UICN (2003a). *Manual Técnico de EIA. Lineamientos Generales para Centroamérica. [EIA Technical Manual. General Guidelines for Central America*.] San José, Costa Rica.

CCAD-UICN (2003b). *Estado del Sistema Centroamericano de Áreas Protegidas. Informe de Síntesis Regional. [State of the Central American System of Protected Areas. Regional Report Abstract].* San José, Costa Rica.

CCAD-UICN (2003c). *Desarrollo Económico y Evaluación de Impacto Ambiental. [Economic Development and Environmental Impact Evaluation]*. La Serie, [The Series] Volume 5. San José, Costa Rica.

CCAD (2003). *Manual Técnico de EIA. Lineamientos Generales para Centroamérica. [EIA Technical Manual. General Guidelines for Central America]*. San Salvador, El Salvador.

Chamorro, E. (2005). Chief of Tortuguero Nacional Park. Personal communication. San José, Costa Rica.

Conesa, V. (1997). *Guía Metodológica para la Evaluación del Impacto Ambiental. [Methodological Guide for the Evaluation of Environmental Impact]*. Spain.

Cure, K. and Zanella, I. (2004). Recopilación de Información acerca de las zonas acuáticas en la Isla del Coco y Organización de sus oficinas de documentación. [Information gathered about the aquatic areas of Cocos Island and Organisation of its documentation offices]. Mimeographed. San José, Costa Rica.

Department of the Environment, Transport and the Regions (2000). *Public Participation in Making Local Environmental Decision*. *Good Practice Handbook*. Department of the Environment, Transport and the Regions, Bristol, England.

Global Reporting Initiative. Guidelines. www.globalreporting.org

Harrison, E *et al.* (2004). *Reporte Programa Tortuga Verde 2003. [Report 2003 Green Turtle Program].* Mimeographed. San José, Costa Rica. [missing author names]

Leopold, L *et al.* (1971). *Procedure for Evaluating Environmental Impact*. Circular 645. USGS. USA. [missing author names]

NCIA (2005). *Guidelines on Biodiversity inclusive Environmental Impact Assessment* (EIA).

Martín Mateo, R. (1994). *Nuevos instrumentos para la Tutela Ambiental. [New instruments for Environmental Stewardship]*. Spain.

Modak, P. and Biswas, A.K. (1999). *Conducting Environmental Impact Assessment for Developing Countries*. United Nations University Press.

NASA-CCAD. http://servir.nsstc.nasa.gov/.

PAHO. www.paho.org

Pagetelecom (2005). Internal Correspondence.

PNUMA/ORALC (1996). *Ley Modelo de Evaluación del Impacto Ambiental. [Model Law for Environmental Impact Evaluation]*. Mexico D.F., Mexico.

PNUMA-CCAD (2005). *Perspectivas de la Biodiversidad en Centroamérica 2003. Una primera aproximación de un tema prioritario. [Perspectives for Biodiversity in Central America 2003. First approach to a priority issue]*. San Salvador, El Salvador.

PROSIGA-CCAD (2002). *Diagnóstico de la Situación Actual sobre los Estándares Ambientales en Centroamérica y propuesta de Acciones Estratégicas.[Diagnosis of the Present State of Environmental Standards in Central America and proposal for Strategic Actions].* San Salvador, El Salvador.

Quirós, F. (2005). Director of Cocos Island Marine Conservation Area. Personal communication. San José, Costa Rica.

Rodríguez, J. (2005). Biologist with the Technical Unit of Cocos Island Marine Conservation Area. San José, Costa Rica.

SINAC (2004) *Guía para la formulación y ejecución de planes de manejo de áreas silvestres protegidas. [Guide for the design and implementation of management plans in protected areas].* San José, Costa Rica.

SINAC (2004). *El Alma de la Naturaleza, Parque Nacional Tortuguero. [Tortuguero Nacional Park, the soul of nature].* Mimeographed. San José, Costa Rica.

SINAC-ACMIC (2005). *Plan Anual de Trabajo 2006. 2006 Annual Work Plan.* Mimeographed. San José, Costa Rica.

SETENA (1997). Resolution 588-1977. San José, Costa Rica.

UICN-ORMA (2004). Memoria Proyecto EIA en Centroamérica. Memoir of EIA Project for Central America. San José, Costa Rica

United Nations Economic Commission for Europe (1991). Convention on Environmental Impact Assessment in a Transboundary Context. Geneva, Switzerland.

World Bank (2003). *Reporting Progress in Protected Areas. A site-Level Management Effectiveness Tracking Tool*. Washington, U.S.A.

World Bank (1999). OP 4.01, *Environmental Assessment*. Washington, U.S.A.

APPENDIX 1: ACRONYMS

CBD: Convention on Biological Diversity

CCAD: Central American Commission on the Environment and Development: the Council of Ministers of the Environment and Natural Resources of Central America (Comisión Centroamericana de Ambiente y Desarrollo).

CIIU: Uniform Industrial Classification of all Economic Activities (Código Internacional Industrial Uniforme)

EPA: Environmental Protection Agency of United States.

NASA: National Aeronautics and Space Administration of USA

NCEIA. Nethertlands Comission on Evaluation on Impact Assessment

ORMA: Mesoamerican Regional Office of IUCN (Oficina Regional para Mesoamérica de la UICN)

SEA: Strategic Environmental Assessment

SGSICA: General Secretariat of the Central American Integration System (Secretaría General del Sistema de Integración Centroamericana)

SICAP: Central American System of Protected Areas (Sistema Centroamericano de Áreas Protegidas)

UICN: World Conservation Union (Union Mundial para la Naturaleza)