The Integration of Biodiversity into National Environmental Assessment Procedures

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4.1 Introduction

4.1.1 Colombia's Biological Diversity[1]

Colombia has a land area of 114,174,800 hectares which constitutes approximately 0.7 % of the earth's continental area. In this area is contained 10% of the world's biodiversity. This is why Colombia is considered one of the mega diverse countries in the world.

Of the land area of Colombia, 53.2 ha are covered by natural forests; 21.6 ha by other types of vegetation, which include savanna, arid areas and wetlands; 1.1 million hectares by continental waters, snow peaks and human settlements, and at least 38.4 million are under agricultural use or colonization processes. These general categories of land cover host the wide ecosystem diversity typical of Colombia. This richness in ecosystem types has been attributed to a variety of factors including the following: the country's location between the two tropics, the variety of soil and climatic conditions and the existence of areas that have been isolated geographically. The country's ecosystems are so diverse, that there are only a few of the world ecosystems that are not represented.

Ecosystem diversity is related to species diversity, which is the most common way to refer to biodiversity and represents the number and abundance of species in any given area. There is no consensus concerning the existing number of species worldwide. Nevertheless, as knowledge advances there is consensus that some 'mega-diverse' countries support a disproportionate amount of the world's biodiversity. These countries, of which Colombia is one, have approximately 40% of the world's biological resources.

Approximately 35,000 vascular plants are known to be present in Colombia. This is a large number for a small country, especially if we consider that the whole of the South African Sahara contains in total 30,000 species and that Brazil, (which has a land surface 6.5 times larger), has 55,000 species of vascular plants. Colombia has between 3,000 and 3,500 species of orchids, representing approximately 15% of the world's total. Other extremely diverse groups are the *Aracea*, with one sixth of the known species; as well as *heliconiacea* with approximately 95 species; and the *ericacea* with 267 species. Studies on seaweeds in the Caribbean region of Colombia's coast, have shown it to be one of the richest areas in the Atlantic coast with approximately 430 species. The pacific coast has a lower species diversity with only 133 species.

Regarding vertebrates, Colombia holds the third place with 3278 species, not including fish. Table 1 shows comparative numbers of vertebrate species per group known worldwide and known for Colombia and the percentage they represent, excluding fishes. Of particular note is the country's richness in mammals and in particular bats (151 species) and rodents (94 species). There are 27 primate species which represent a third of the number found in tropical America. Only Brazil has more, with 55 species. It is common for Colombia to be classified as the country with the largest number of birds: its 1766 species represent 19.5% of the world's and 60% of the identified South American birds. Of these, approximately 60 species are endemic. Four hundred and seventy species of reptiles have been identified, and 583 Amphibian species. Information on fish diversity is extremely scarce, and large areas of the country haven't yet been surveyed.

Table 1 Comparative number of vertebrate species per group known in Colombia and worldwide and the percentage they represent, excluding fish

[1] / The information contained in the Introduction was taken from Colombia's National Biodiversity Policy, National Biodiversity Strategy and Action Plan and the Colombia's National report on the State of Biodiversity published by the Instituto de Investigación en Recursos Biológicos "Alexander von Humboldt".

Group	World	Colombia	% represented in Colombia
Mammals	4629	454	9.8
Birds	9040	1766	19.5
Reptiles	6458	475	7.3
Amphibian	4222	583	13.8
Total	**24394**	**3278**	**13.5**

Species richness in coral reefs is particularly noticeable in the Atlantic coast where 326 species have been identified, with a total estimate of 700 in all of the Caribbean coast. Insects are particularly relevant because of their endemism and rareness.

4.1.2 Causes of Biodiversity Loss

Direct causes

Currently the country is under an accelerated trend of destruction of its habitats and natural ecosystems due to causes such as inadequate land use policies, that have led to colonization and land clearing for agricultural use. Other causes of habitat transformation are the establishment of illicit crops, construction of infrastructure and services works, mining activities, land drainage to transform wetlands for pasture, firewood consumption, fires in natural ecosystems and in some cases wood production. These factors all cause habitat reduction or fragmentation.

Between 1960 and 1995 the main land use changes can be summarized as follows: there was a decrease in land for agricultural use from 5 million hectares to 4.4 millions; on the other hand land under pasture increased from 14.6 million hectares to 35.5 million hectares; and there was a decrease in forest cover and other uses from 94.6 to 72.4 million hectares.

There is no consensus concerning the country's rate of annual deforestation. Nevertheless there are estimates that 40% of the cover of natural ecosystems has disappeared, with some specific areas under more critical conditions. For example the Andean cordilleras have lost 74% of their forest cover, and dry tropical forests are only 1.5% of their original surface. In 1996 the causes of deforestation where classified in importance: 73% due to expansion of the agricultural frontier and colonization, wood production was accountable for 11,7%, firewood consumption for 11%, forest fires for 2% and illicit crops 2%. In recent years due to the expansion of illicit crops this last percentage may have increased substantially.

Another factor that has contributed to habitat loss is the construction of infrastructure works and road development without adequate environmental considerations. Main roads cross lowlands with important wetland ecosystems, for example in the plains of the Atlantic coast. The inter Andean valleys and the "llanos" savannas are also affected by poorly planned roads.

Another major cause of biodiversity loss is the introduction of invasive and alien species, that have competed and eventually displaced native species. This displacement has often imperiled the viability of the populations or caused them to go extinct. Often the introduction of species is promoted by government policies, particular in the case of fisheries. For example in the watersheds of the Amazon, Cauca, Orinoco and Catatumbo rivers at least 32 species have been introduced, substantially reducing native populations.

On the other hand the over-exploitation or unsustainable management of wild species of fauna and flora for domestic consumption or commercialization is also having important effects on biodiversity. In Colombia, the fauna is under severe pressure due to hunting, mainly to provide specimens, skins and products for the illegal international market. The fisheries are also affected by overexploitation and by the use of inadequate fishing practices. For example the watershed of the Magdalena river has lost 78.4% of its yearly production. Similar numbers have been reported for other watersheds.

Wood provision by industry has also led to unsustainable forest use, affecting substantial forested areas. Additionally wood provision comes from the most biodiverse areas in the country: the Amazonian and the Pacific Coast. For example, in 1994 50% of wood for industry came from de pacific coast forests, which are not managed in a sustainable manner. Estimates for 1997 showed that between 40,000 and 68,000 hectares of forests had been negatively affected by timber-extraction. Recently timber industries have increased their wood planting activities as well as their imports.

Another direct cause of biodiversity loss is domestic and industrial contamination that has affected natural environments, so that their carrying capacity areas has been surpassed. The damage due to contamination has not yet been quantified, but its impact can be foreseen by the following data. Of urban settlements in Colombia, only 65% of urban areas and 27% of rural areas have waste disposal systems. Solid waste production is estimated to be 15,903 tons per day, of which only 32% are disposed in adequate waste facilities, 3% are buried, 50% are left without any treatment in open air space, and 15% go to water bodies. Contamination is also produced by the improper use of insecticides and pest control substances.

Indirect Causes

Behind the direct causes of biodiversity loss described above, are a set of political, social, demographic, technological, institutional and economic factors that can be considered as indirect causes.

The importance of biodiversity and its relevance to achieve development goals has traditionally been ignored by decision makers, and in the development policies of governments. Even though there is a growing awareness of its importance it is far from being considered by leaders in government or the private sector. This is accompanied, and partially caused by ignorance of the importance of biodiversity.

Another major indirect cause is the land distribution pattern that has often led to inappropriate land use patterns. Likewise the lack of a real land reform has lead to the use of forest reserves to cover for the need of additional lands by peasants. On the other hand, policies regarding illicit crop eradication have induced their shift from one place to the other, increasing land clearing to establish these crops, having an enormous impact on the county's biodiversity. The areas where these crops have been established coincide largely with the location of the more vulnerable ecosystems in the Andes and the Amazonian region.

Also, a major cause of biodiversity loss is the very low institutional capacity to reduce impacts. Even though there is a complex environmental system in place, with a Ministry of the Environment, 34 regional corporations that act as environmental authorities and 4 research institutes, their responsibilities often surpass their capacity. Additionally, the government presence in remote areas of the country has been traditionally very low, and the local empowerment weak, which has not contributed to biodiversity conservation.

4.2 National Biodiversity Strategy and Action Plan (NBSAP)

4.2.1 The National Biodiversity Policy

Colombia, as a party to the Convention on Biological Diversity (CDB) is committed to the conservation and sustainable use of its biological resources. Therefore in 1997 the Colombian Government approved a National Biodiversity Policy (NBP) which determined Colombia's policy priorities in the long term. The Policy is built on three pillars: conserve, use and increase knowledge of Colombia's biodiversity. These three pillars were further developed in nine strategies. The guidelines for the development of the policy were approved by the National Environmental Council, which is the maximum advisory authority to the Ministry of the Environment (MoE). It is noteworthy that the National Environmental Council has the representation of different stake holders, including representatives of other sectors, ethnic minorities, academia and research institutes, corporate representatives, other ministries and non governmental organizations (NGOs). These initial guidelines where further developed by the Instituto de Investigación en Recursos Bilógicos "Alexander von Humboldt"[2], the National Planning Department[3] and the MoE. There was a consultation on the document, which finally led to the final document of NBP, which was published in 1997.

The NBP has also a set of principles that are very relevant for its interpretation and orientation. These principles are as follows:

- Biodiversity is a national patrimony and has a strategic value for the nation's present and future development.
- Biological diversity has tangible components at the molecular level, genes and populations, species and communities, ecosystems and landscapes. There are also intangible components, that include knowledge, innovations and associated cultural practices.
- Biodiversity has a dynamic character both in space and time, and its components and evolutionary processes must be preserved.
- The benefits derived form its use must be used in a fair and equitable manner and in an agreed fashion with the community.
- The importance of the protection of individual and collective intellectual property rights is recognized.
- The conservation and sustainable use of biodiversity must be addressed globally, thus being indispensable the international commitment between nations.
- The conservation and sustainable use of biodiversity requires a cross sector approach and must be addressed in a de-centralized manner, including the participation of the government in all its levels and of civil society.
- The precautionary principle is adopted, mainly in the measures regarding genetic erosion and biosafety.

The NBP proposes ten strategies as follows:

- Equitable distribution of the benefits derived from biodiversity.

- Understand

[2] / Research Institute on Biological Resources, linked to the MoE, in charge of promoting, coordinating and undertaking research leading to the conservation and sustainable use of Colombia's biodiversity.

[3] / Departamento Nacional de Planeación is the central government office responsible for designing and setting economic, social and environmental policies in coordination with other Ministries and territorial entities.

- Characterize the components of biological diversity.
- Recover, protect and make known traditional knowledge.

- Conserve
- Conformation and consolidation of the National System of Natural Protected Areas.
- Reduction of the processes that deteriorate biodiversity.
- Ecosystem restoration and species recovery.
- Promotion of *exsitu* conservation.

- Use
- Promotion of sustainable management systems of renewable natural resources.
- Sustainable development of the economic potential of biodiversity.
- Biodiversity valuation systems of biodiversity components.

4.2.2 The National Biodiversity Strategy and Action Plan

Since the NBP proposes a set of strategies meant to provide a long-term view of Colombia's policy objectives regarding biodiversity, it was necessary to develop a strategy. This strategy should determine specific goals, objectives to reached and actors that had to be involved in its implementation. Therefore, in 1996 the MoE of Colombia formulated a project to finance such endeavor and got UNEP resources to develop the National Biodiversity and Action Plan (NBSAP). The initial NBSAP project was supposed to have two stages. The first stage was meant to develop a technical proposal of the National Biodiversity Action Plan. This task was assigned to the Instituto Humboldt and the National Planning Department (NPD), with the collaboration of the MoE. The second stage required the proposal to be consulted widely at the national and state level, in order to discuss and modify the proposal, to finally approve the National Biodiversity Strategy and Action Plan.

The development of the technical proposal.
The development of the technical proposal was coordinated by the Instituto Humboldt and the NDP. The purpose of the task was to further develop the NBP into an action plan proposal, by specifying the goals, objectives and means by which the strategy could be implemented. Therefore, the proposal was built using the same principles and strategies of the NBP. For its development, nine expert working groups where set in place, one per strategy of the NBP[4]. Each group had a co-ordinator who was responsible for the group's work. Each group was composed of approximately 9 members who where selected jointly by Humboldt, the MoE and the NPD. The persons composing the groups where selected because of their technical expertise and knowledge about the topic to be discussed, and their understanding of different interests. Nevertheless, because the purpose was the development of a technical proposal, meant to be consulted afterwards in a political process, the persons in the working groups participated as individuals, and had not the obligation to represent particular stake holder interests. Also, during the selection, people having different perspectives regarding the same topic where chosen.

These working groups where given terms of reference, in order to orient their work in the development of the nine strategies. Also, there were discussions between the co-ordinators of the groups in order to agree on the scope and content of the strategies. These groups worked for a period of eight months, and as a result a proposal of a biodiversity strategy was produced. Since there were proposals within the strategies that were duplicated, as well as some activities that could be contradictory, a team of editors from Humboldt and DNP, further polished the proposals and edited them to produce a final document. This document was published in 1998 under the title "Colombia: Biodiversidad siglo XXI. Propuesta Técnica para la Formulación de un Plan de Acción en Biodiversidad" (Colombia: XXI century Bioviversity Technical proposal for the formulation of a National Biodiversity Action Plan).

The action plan proposal is very comprehensive and was meant to provide decision-makers with the alternatives they face to promote the conservation, sustainable use and equitable distribution of benefits of biodiversity. The document is fairly detailed in its content, and is divided into four sections. The first part provides an updated brief diagnosis of biodiversity in Colombia[5], its importance and the main direct and indirect causes of biodiversity loss. The second section provides a long-term vision of what are the expectations and priorities for biodiversity in the next 25 years. This is a key piece of the action plan because it provides an orientation for the decision making process, regardless of political and institutional changes. The third chapter provides a summary of the action plan for the medium- (10 years) and short-term (4 years). For each strategy the goals and objectives are specified, as well as their respective result indicators to measure the effectiveness of their implementation. Each objective is then developed, indicating the required activities to achieve the objective, the achievement indicators, the responsible institutions or stakeholders that need to be involved, the duration, and geographical scope. Also, for each strategy, the priority goals for the short term were laid down.

For the purpose of the environmental assessment system (EAS), it is worth noting that most actions regarding this topic where developed in the strategy of "Reduction of the

[4] / The strategies of sustainable development of the economic potential of biodiversity and Biodiversity valuation systems of biodiversity components, where developed by the same working group.

[5] / Previous to the development of NBSAP, the Instituto Humboldt had done a national report on the state of Biodiversity in Colombia ("Informe nacional sobre el Estado de la Biodiversidad en Colombia – 1997", Humboldt 1998), which was a key input for the whole process.

processes that deteriorate biodiversity". The main related goals of this strategy are the following:

- To prevent the deterioration of habitats caused by sector activities, through their planning processes.
- Prevent the deterioration of biodiversity caused by the agricultural sector.
- Prevent the deterioration of biodiversity due to activities of the energy mining sector.
- Prevent the damage of biodiversity caused by infrastructure development: roads, gas ducts, pipelines, transmission lines and irrigation systems.
- Reduce the process of damage of biodiversity due to illicit crops.
- Reduce biodiversity loss due to the introduction and transplant of species in natural ecosystems, including genetically modified organisms.

Several of the activities were aimed at affecting the EAS process, either during the planning stages, or developing more specific requirements for environmental licensing procedures.

Political Phase

As described below, the second phase of the process was meant to involve a consultation of the proposal at both the national and state level. Also, more specific consultations with different sectors and Ministries where supposed to happen. Unfortunately this process never occurred due to institutional and political circumstances.

The technical proposal of the action plan was developed during the last year of a government period. At the time the proposal was finished, there was a new government in place with a new minister of the environment and new senior staff. Even though assigning the responsibility of developing the proposal outside the MoE was decided by this entity, they finally opted not to take it into account and not to undertake the required political consultations. At that time, the Ministry, as well as the rest of the government, was developing the National Development Plan, which is the main policy document of a government in Colombia. There where several factor that may have lead to this outcome:

- The fact that there was a new political establishment that received the process already developed, and that may of being reluctant to undertake a consultation on a proposal that was developed "outside" the Ministry.
- Political priorities different from biodiversity. In fact their environmental priority at the time was water, and the whole environmental policy is supposed to evolve around water, including biodiversity actions.
- Lack of understanding of the scope of a biodiversity strategy and action plan. At the time, the government did not perceive the need to develop and implement a strategy and action plan focusing only on biodiversity. They preferred to put all their environmental goals under a sole policy document, which is much more general than an action plan.
- Lack of clarity of the role of the different institutions. Unlike other countries, like Peru for example, that has an institution devoted to the development and implementation of NBSAP, in Colombia there is confusion around the institutional responsibilities. Even though the law is clear that the MoE is in charge of approving environmental policies, and that the Humboldt Institute is a research institution that can't assume political responsibilities, the prominent role that this last has played, has created some confusion. Therefore the Ministry doesn't perceive biodiversity as main responsibility, even though a large amount of their work is about biological resources.

The result of these circumstances and situations is that Colombia does not have to date an officially approved National Biodiversity Strategy and Action Plan. Neither does it have a governing body directing and following up its implementation. Nevertheless the published document of the proposal has been key in orienting the country's priorities in biodiversity conservation and sustainable use, as will be described in the following section.

4.3 Progress in the Implementation of NBSAP

As described in the previous section, Colombia doesn't have an officially approved strategy, nor does it have a responsible party of following up its implementation. Nevertheless, the Colombian government and others in the country are undertaking numerous policies, programs and projects related to biodiversity.

In fact several proposals of the proposed action plan where introduced in the government's national environmental policy which is called the "Proyecto Colectivo Ambiental" (PCA) ("Environmental Collective Project"). Even thought it is difficult to compare the two documents, because the proposed action plan is much more specific, an attempt was made by the Humboldt Institute. The result of the analysis is that the PCA includes several major proposals regarding Protected areas, the economic development of biodiversity, the protection of traditional knowledge, and actions regarding endangered species. Other proposals where not taken into account at all, like the ones to promote more equitable distribution of benefits. Other where not considered in their strategic dimension, like the ones related to increasing the knowledge of biodiversity components, or promoting *exsitu* conservation. In any case, the strategic scope of the action plan was completely lost in the process.

Because the PCA is the closest thing to an officially adopted Action Plan and Strategy, it will be described. Nevertheless its worth pointing out that many actions regarding biodiversity that contribute to the implementation of the proposed action plan, have been undertaken by other institutions of the National Environmental System.

The centre-piece of the PCA policy is water and all other priorities are subordinated or evolve around this main topic. Also, it is noteworthy, that the actions regarding biodiversity are scattered around several policy objectives. Chart 1 provides a simplified description of the PCA. These following are the PCA programs (except Urban quality), a brief analysis of their content in terms of biodiversity, and a description of their more relevant results:

Water Program
The program is aimed at advancing in the adequate management and restoration of land and aquatic ecosystems, augmenting their water retention capacity, promoting efficiency in their use and reducing the contamination levels.

The program is very related to biodiversity since it is aimed at improving watershed management and undertaking ecosystem restoration activities. Nevertheless, the focus of the ecosystems to be restored is water and not biodiversity. Therefore their selection is based on water use priorities and not because of their relevance in terms of biological resources.

The "Plan verde" (Green Plan) is currently being implemented with the regional corporations. It will lead to the reforestation and restoration of critical areas in terms of watershed protection. The main results up to date are related to the co-financing

agreement between the MoE and the state corporations. Other watershed management projects have been undertaken by the Natural Resource Management Program financed by IDB and WB. The results in terms of biodiversity haven't been assessed.

Biodiversity Program
As in the case of the Water Program, the objective is to contribute to the conservation and restoration of priority forest and non forest ecosystems in strategic ecoregions. It aims at strengthening the knowledge and innovation systems and optimize their social and economic benefits. There are also actions regarding the system of natural protected areas, and strengthening the country's capacity in *ex-situ* conservation.

The program is about biodiversity but is subordinate to the main program's priorities in terms of the management and restoration activities. The other topics represent only a small part of a National Biodiversity Action Plan.

This program is also been implemented by the MoE through the "Plan verde". Other advances have taken place in the development of a policy proposal to protect wetlands. Also, there is an important amount of activity relating to the protection of endangered species. There are also other significant progresses in terms of biodiversity research mainly produced by the Instituto de Investigación en Recursos Biológicos "Alexander von Humboldt", the "Instituto de Investigaciones Marinas y Costeras - Invemar" and the academic community. There is a full report from Humboldt's research report in the web page **WWW.HUMBOLDT.ORG.CO**. The progresses have evolved around four areas: Inventories, Conservation Biology, Use and Valuation and Policy and Legislation. Also, a 5 year project called Biopacifico, financed by a donation of the Dutch government, produced impressive results to increase the knowledge of the Colombian pacific coast. Finally, Colombia has undertaken a consistent effort to maintain and conserve its system of natural protected areas, which faces severe difficulties because of the civil unrest in most rural areas in the country.

Forests Program
The purpose of the program is also to contribute to the conservation and restoration of priority forest and non forest ecosystems in strategic ecoregions. It seeks to promote the conservation and sustainable use of forest ecosystems, motivate their restoration and increase their incorporation in the national economy, and in increasing the quality of life.

The program is completely related to biodiversity since it deals with restoration and sustainable use. Nevertheless again the priority areas are not selected because their relevance in biodiversity terms, neither are other management activities.

There are two main projects to implement this program: the "Plan Verde" and the "Plan Nacional de Desarrollo Forestal" (National Plan of Forest Development). This last plan was recently approved and is currently in its initial implementation stages. There are other relevant advances related to developing a system of forest management indicators, and assessing the overall conservation and sustainability of the use of mangroves.

Sustainability of endogenous productive processes
"The objective of the program is to promote and impulse the sustainable use of biological diversity and of the cultural heritage through conservation and sustainable production processes, for the economic and social benefit of regions, and as a strategy for their endogenous strengthening"[6].

[6] / Exact translation from the PCA.

The program is related to biodiversity since it seek its sustainable use. The purpose is similar to the one of promoting the economic development of biodiversity, but with a more regional and developmental focus. Also, is it worth noting that there is no mention to promotion of biodiversity markets, which is in another program.

There are no clear results in this area. The main related advancement, close to biodiversity interests, is the development of policy guidelines for land use planning. These guidelines have been developed at the national level, and are being scaled down to be implemented at the regional and local level. On the other hand, by law each municipality has to present a land use plan for the short term, which requires an environmental component. These plans had to be approved by the environmental authorities at different levels. Since the process is really in its initial stages no evaluation whatsoever has been done in terms of biodiversity. Nevertheless, the resulting land use plans are in most cases controversial, because of environmental aspects, and because of lack of institutional coordination between municipalities.

Cleaner Production
This program is aimed at promoting clean production of the main sectors of the economy and with greater environmental impact, such as energy production, tourism, agroforestry and construction; as well as to promote the environmental dimension in the planning of the national infrastructure and in the growth of the main economic sectors.

This is a key program of environmental policy. It is noticeable that it is a key topic for biodiversity conservation purposes, and extremely relevant for all related topics to Environmental Assessment Systems. Therefore this program should have a biodiversity component across its implementation, in order to incorporate key biological resources variables in the different activities.

This is one of the areas with clearest results. So far the MoE has developed several agreements with the different ministries involved and with the main sectors of the economy. Even though biodiversity issues are not explicit in these agreements, there is space during their implementation to include the relevant variables.

Green markets:
This program is aimed at promoting the production of environmentally friendly goods and services, and to increase the offer of competitive ecological services in national and international markets. The following market lines will be promoted: non timber forest products, ecological agriculture products, fishing and aquaculture, recreation and tourism.

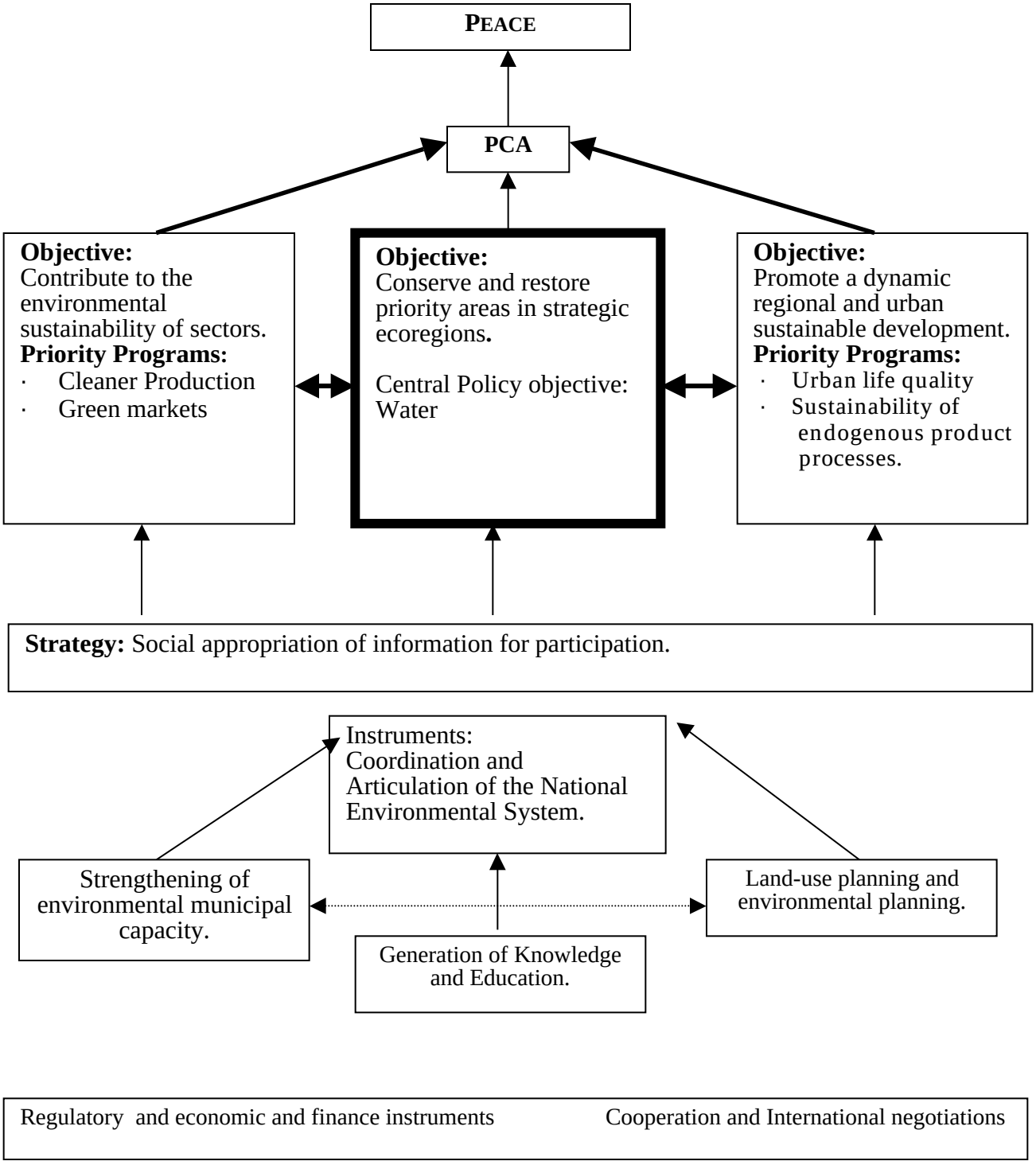
The main focus of the program is around biodiversity components. Therefore the purpose of the program is extremely related to the promotion of the economic potential of biological resources.

There are several noteworthy results in this program area. First of all they have developed criteria and tools to identify “green products”. Also, a national program on eco-labelling for educational purposes is under the way. Additionally, there are plans to set a risk capital fund for environmental enterprises, and the fund design has already been developed. Finally, the Instituto Humboldt, with the support of the MoE, has a Bio commerce Initiative, which is a mechanism of promotion of commerce initiatives of biodiversity products.

Finally, it is necessary to mention that a GEF grant was recently approved in order to implement a project aimed at the conservation and sustainable use of biodiversity in the Colombian Andes. This project is to be implemented by the Humboldt Institute, and has

almost all of the main components of the proposed Biodiversity Action Plan at the Andean scale. Also, the project is perceived as an implementation of such a plan. Therefore, this will be the first coherent effort to implement the proposed plan, but at a regional scale. The project should begin its implementation during the course of this year. There are other efforts under place to develop similar projects in the Orinoco and Amazonian river basin.

Chart 1. The PCA. Adapted from Plan Nacional de Desarrollo "Proyecto Colectivo Ambiental" (Ministerio del Medio Ambiente, 1998)



4.4 The Environmental Assessment System

4.4.1 Legal historic overview

In 1974 the Colombian Congress approved a major environmental regulation called the Code for Renewable Natural Resources and Protection of the Environment[7], which was considered at the time the most comprehensive piece of legislation regarding environmental protection in Latin America. Even thought the piece of legislation is very valuable, and certainly well intended, it surpassed the country's capacity to implement it because of several reasons including low institutional and technical capacity, insufficient economic funds and weakness of environmental causes in front of other development priorities.

Later on in 1993, after the Rio Conventions, the Colombian Congress passed a law (Law 99 of 1993) creating the Ministry of Environment and the National Environmental System. This law generated a major change in the way environmental management was pursued. Several factors are worth highlighting:

- The Ministry of the Environment (MoE) was created as an independent office at the higher government level, thus having the possibility to affect policies at the highest level possible. The Ministry's major responsibility is to determine national policies and regulations, as well as to administer the national parks.
- Thirty four (34) Regional Corporations where transformed or created, and made responsible for the implementation of environmental policy at the regional and local level. Also, as for 1993, environmental responsibilities can be delegated to municipalities. These were major changes in environmental management, that before 1993 was mainly centralized in a single government agency[8].
- Four support research institutes where transformed or created, thus providing for scientific and technical expertise for policy making and decision taking of environmental issues.
- The basis for the modern EA where established by:
  - giving the MoE the responsibility to regulate the behavior of all other sectors of the economy,
  - providing the basis for land use planning,
  - creating the current framework for environmental licensing.

In development of Law 99 of 1993, the MoE developed a decree (1753 of 1994) specifying the environmental licensing process, including Environmental Impact Assessment (EIA) requirements. The legal content and procedures that this legislation establishes will be described in the following section.

4.4.2 The EA System

The EA system is a set of policies, laws and guidelines adopted by the Colombian government in order to reach sustainable development. Even though decree 1753 of 1994 is the major piece of legislation regulating EA, the importance of other non legal policy elements is crucial, and will also be treated.

Environmental Policies

[7] / "Código de Recursos Naturales Renovables y de Protección al Medio Ambiente".
[8] / A few regions in the country had Regional Corporations before 1993.

The EA system can be viewed as an ensemble of elements that should ideally be complementary and coherent. At the base are Environmental Policies, some of which have already been mentioned. For the purpose of the EA system it is worth elaborating three of them:

1. The *Cleaner Production Policy* is aimed at promoting "cleaner production" of the major productive sectors of the economy such as energy, construction, agriculture and tourism. It also intents the incorporation of environmental elements in the development of the national infrastructure and the major sectors of the economy. Even though it is a government policy, it was agreed and developed with major actors from the different production and infrastructure sectors. In the context of the EA system, this policy can induce the sectors to increase their environmental responsibility.

2. The *Joint Agendas* with other ministries, The joint agendas are agreements between the MoE and the other Ministries. There are such joint agreements with the Ministry of Economic Development, Ministry of Mining and Energy, the Ministry of Agriculture and the Ministry of Transportation. These agreements are meant to incorporate environmental issues in other government policies related with production sectors, particularly those that have a major impact on the environment. It is worth highlighting that they include the introduction of environmental variables in the whole planning and development processes of these sectors. If this process is successful, key environmental issues could be introduced in the early planning stages of the sectors, thus contributing positively to the effectiveness of EIA.

3. The *Environmental Land Use Planning Policy guidelines*, are a major effort to lay down the principles for land use planning at different scales. As it was previously said, these guidelines already have a legal support, and as a result all municipalities in Colombia are obliged to present a "Plan de ordenamiento territorial Municipal" (land use planning of the municipality) that has an environmental component, and has to be approved by the environmental authority. Therefore setting the framework for land use planning in the area in question, including zoning for different types of activities. It is worthwhile noticing that this is a new legislation, and therefore the results have not been evaluated, neither in development or environmental terms. This legal obligation is very related to the EA system since it is aimed at anticipating the different types of programs and projects that can be developed in a given area, taking into consideration, among others, environmental variables. Therefore, the land use planning process is supposed to anticipate the location of projects by determining which activities should be developed in a given area. In this context land use planning could play a vital role in the EA system.

4.4.3 Environmental guidelines

At a more specific level, and as a development of the Cleaner Production Policy, the MoE has developed environmental guidelines for different sectors. These guidelines are a core piece of the EA system, since their major goal is to promote best practices for environmental management. Table 2 summarizes the existing environmental guidelines so far. They are the result of an agreed process between the environmental authorities, the productive sectors, the academia y expert consultants. They are voluntary guidelines, aimed at being an element of consultation and orientation, that contain the conceptual guiding principles, the methodologies and the procedures for environmental management of different activities. The main purposes of the guidelines are the following:

- expedite the elaboration of environmental impact studies.
- unify the criteria of evaluation y follow up of projects, works and activities.
- optimize the use of resources of the owner of the project, and of the environmental authorities.

- propose technological options for environmental management.
- incorporate social management in works, projects and activities.

Table 2 Published environmental guidelines

Sector	Environmental Guidelines
Mining	· Small and medium gold mining · Open coal mining · Underground coal mining · Coal exploration · Coal harbors · Coal- electric energy production
Electrical	· Electrical transmission · Thermos · Hydro · Distribution
Hydrocarbon	· Land seismic exploration · Hydrocarbon and gas well drilling · Transportation ducts · Gas stations and gas storage facilities
Transport	· Maintenance of the primary and secondary road network
Urban	· Urban projects · Reconstruction projects

4.4.4 Environmental Licensing

Finally the last element of the EIA system is environmental licensing. This is a legally binding authorization that is required before undertaking the project for a group of activities that are determined by law. The activities that require an environmental license are those that can cause severe damage to the environment or introduce considerable damage to the landscape. The activities that require environmental license are listed in Annex 1.

Regarding the environmental licensing procedure the petitioner can request three different types of licenses: an ordinary environmental license, a unique environmental license and a global environmental license. The unique environmental license includes all the permits, concessions and other authorizations required to undertake a project, and therefore eliminates the problem of dealing with different environmental authorities. The global license is only given for the exploration of oil and gas fields.

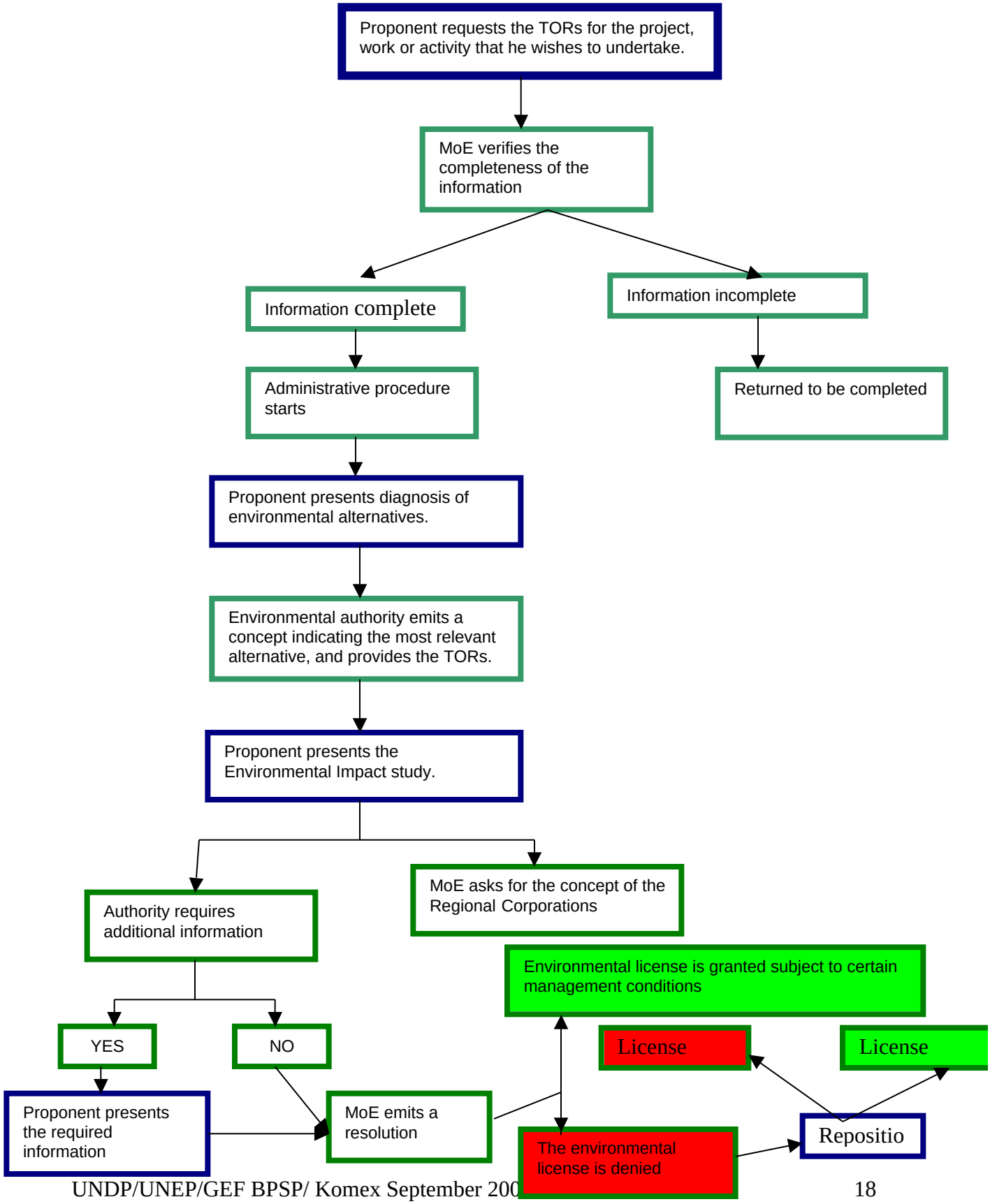
Chart 2 summarizes the procedures involved in the licensing process. The process starts by asking the competent environmental authority (MoE or Regional corporation where the project is located), for the terms of reference (TORs) for the environmental impact assessment study, which corresponds to the work or activity that the petitioner wants to undertake. In this first step the petitioner must also indicate a description of the project that is going to be developed, a general environmental description of the area where the project is going to be located, information about the population and existing human communities in the area of interest, and indicate if the project is near Natural Parks or their buffer zones (when these have been determined). Then the Authority must provide the TORs which indicate whether the study requires a diagnostic of environmental alternatives or not. The petitioner presents the relevant documentation to the environmental authority to initiate the administrative procedure. After that, he must present the diagnostic of environmental alternatives (if it is required), which will be evaluated by the environmental authority. After the authority accepts the proposed alternative, the petitioner has to develop and present the EIA study for the chosen

alternative. Based on this information the authority determines whether the environmental license will be granted or denied. The environmental license is granted by a legal statement that specifies the terms under which the project must be developed regarding environmental management. In case the petitioner disagrees, he can appeal to the Minister of the Environment in the case the MoE acted as the environmental authority; and to the MoE in the case the environmental authority was a regional corporation. Regarding the timeline, a project requiring diagnostic of environmental alternatives, takes approximately six months to obtain an environmental license. If this diagnostic is no required, the license can be obtained in three months.

In the case the project affects ethnic minorities, there is a special consultation requirement that was established by the decree 1320 of 1998, and therefore is mandatory. During the consultation the petitioner exposes the project and its effects, and the affected community(ies) expose their points of view regarding the impacts of the project the ways and means to reduce them or mitigate them, the way they will be affected, and the compensation measures that can be established. The environmental authority acts as a neutral party and gathers the information presented by the different parties under an official record. The presence of the communities is mandatory. In case they don't attend the consultation meeting under justifiable terms, it is understood that they accept the conditions under which the project is presented by the proponent. If there is a justifiable cause for not attending, the environmental authority must re-schedule the consultation. The information presented by parties is considered during the evaluation process by the environmental authority to determine whether they grant or not the license, and under what conditions. Also, the environmental authority is under the obligation to communicate to the communities whether the license was granted or not.

Regarding monitoring and review of the project or activity, the petitioner is obliged to present periodical reports on its development, and the environmental authority can do visits whenever it considers it relevant. The grantee of the license is obliged to pay for all the costs of follow up of the project or activity by the environmental authority.

Chart 2. The environmental licensing procedure when the environmental authority is the MoE and analysis of environmental alternatives is required. (Blue boxes represent acts of the proponent, and green boxes the acts of the MoE).



4.5 Environmental Assessment Implementation

A thorough evaluation of the environmental system has not taken place in Colombia, neither is there a monitoring system in place to follow up its activities and results. Nevertheless some of the tools, particularly the licensing process, have been in place long enough to have a general perspective on their effectiveness. For this section of the paper only the environmental guidelines and the environmental license will be considered.

4.5.1 The environmental guidelines

The environmental guidelines have been a key element of the EIA system, and are a constructive and well thought approach to environmental management. Nevertheless, they have had some problems in their effectiveness. Since they are voluntary guidelines, jointly developed with the responsible sectors, the government is dependent on the sector's good will for their implementation. In the opinion of experts in the field, these guidelines haven't been sufficiently adopted by the sectors.

In order to impose their adoption, the MoE has evaluated the possibility of converting them to a norm. Nevertheless, this can be problematic because they may become very rigid and thus difficult to change, which is undesirable when regulating topics that are continuously evolving and subject to technological change. Another alternative that has been considered, is to develop them as technical guidelines certified by a private conglomerate of certification: Icontec. Even though this alternative would be ideal in terms of flexibility, it could leave the government with insufficient leverage, because Icontec is 100% private. Nevertheless, it is expected that the owners of the projects will be increasingly willing to accept and adopt the guidelines as they see that the MoE respects them, and that their adoption expedites and facilitates the environmental licensing process required by law.

Also, it is worth while noticing that several of the activities that cause greater environmental damage in terms of biodiversity do not have environmental guidelines. Such is the case of major road construction and irrigation projects. Likewise, much of Colombia's productive activity is informal and does not take in consideration guidelines such as these, neither do they petition environmental licenses.

In terms of biodiversity, the guidelines are very weak, as will be highlighted in section VI. This is due to the lack of appropriate analytical frameworks, evaluation criteria and procedures to consider the biodiversity dimension. This problems has arisen out of the fact that biodiversity experts haven't been able to correctly transmit their expertise in terms of the impacts of the different types of projects or activities. Even though substantial research has been undertaken to have a better understanding of biodiversity in the country, none of these efforts have been systematically directed towards the development of methodologies and frameworks to connect environmental assessment to biodiversity. As a result, scientists in the field opt for a precautionary approach and for a case by case basis, which has resulted in a weaker consideration of biological diversity concerns. Therefore, the usefulness of the guidelines in terms of biodiversity is weak. Nevertheless, their sole existence provides a space for the inclusion of biodiversity in the process. The GEF project for the conservation and sustainable use of the Andes, that will be implemented by the Instituto Humboldt, will initiate this needed line of work.
In any case, experts in environmental management believe that even though the guidelines haven't been a thoroughly evaluated, they have been very useful. They have promoted improvements in environmental management, they have gathered the state of the art of institutional experience, they have reduced administrative time, and in the cases the private sector has participated, they have reduced their workload and their costs. In

synthesis, when they have been used, they have streamlined some elements of the planning process. Even though they may face difficulties, they are a very valuable effort to promote collaboration between environmental and other development stakeholders. Finally, they have been very useful in increasing the environmental awareness and responsibility of the sectors that have participated in the process. This is particularly true in the case of the energy sector. Regarding their follow up, expert opinions indicate that its being insufficient because of lack of institutional and economic resources. Also, most of the existing guidelines are very recent.

4.5.2 Environmental licensing

As stated before a comprehensive evaluation of the licensing system hasn't taken place yet. Nevertheless there have been positive and tangible results in several areas that will be highlighted in this section, as well as the major difficulties.

The first relevant result of the environmental licensing process and of the overall EA system, is the substantial increase in awareness of environmental issues by production and infrastructure sectors. As these sectors have been faced with the need to get an environmental license to undertake their projects and activities, they have had to learn about the impacts that their activities have on the environment. Furthermore, as other EA tools become operational, they are also incorporating environmental variables in the planning process of their projects. Unfortunately, this is not true for specific concerns regarding biodiversity, mainly due to the lack of criteria and frameworks to analyze it. The second relevant result, is the decrease on impacts on the environment. The main benefits have been perceived in water resources, air and soils. Also, there has been a substantial improvement in the prevention of natural disasters and on decreasing the damage due to seismic exploration. Regarding biodiversity, some benefits have accrued from the fact that no environmental licenses are given in National Natural Parks or in ecosystems considered as strategic[9].

Regarding planning and development of consent procedures, the system has slowed down their development because the licensing process is still too slow and bureaucratic. Also, because of the lack of understanding of the importance of environmental concerns, it is common that the licenses are blamed for the delay of economic development in certain areas of the country. In fact, the MoE is continually pressured by other Ministries, sectors and the high government to approve environmental licenses.

Also, because a substantial portion of the economy is informal and constituted by small producers who do not ask for environmental licenses, many environmentally damaging activities are developed without any control. The environmental authorities are seeking to change this situation by a variety of approaches, including agreements with the sectors, or with associations of producers.

In general terms, the MoE has the capacity to follow up the environmental licensing process, particularly since the proponents are obliged to pay for the follow up costs. The technical expertise of the MoE is usually good in engineering and development aspects, and technicians are well prepared to asses environmental issues regarding air, water and soil. This is not the case for biodiversity. The personnel in this area of the ministry, usually have no training in biology or related fields, nor do they understand how biodiversity should be incorporated in the licensing process. The lack of analytical frameworks, criteria and guidelines regarding biodiversity is a result, as well as a consequence of this situation, which is a critical failure that needs to be overcome.

[9] / Nevertheless strategic ecosystem is a general qualification.

Regarding regional corporations, there a few that have a high capacity to undertake the licensing process, they are usually in the jurisdiction of highly populated cities. Nevertheless, more than two thirds of the Corporations are very weak technically, and politicized. Most of the highly bio-diverse areas of the country face this situation.

4.6 Biodiversity and environmental assessment

As stated in previous sections Colombia does not have an officially approved Biodiversity Strategy and Action Plan. With respect to the proposed action plan, "Colombia: Biodiversidad siglo XXI", section III describes how it has been incorporated in the different government policies. As for the other elements of the EA system, they will be evaluated for their content in terms of biodiversity in this section.

4.6.1 The Environmental Guidelines

The environmental guidelines provide a framework, to guide environmental management and to facilitate the licensing process. These guidelines usually contain the following information:

- Policy and legal framework.
- Explanation and description of the activity in question: description, classification of the activity or project and the components it entails.
- Guidelines for a system of environmental management.
- Framework to analyze environmental variables: area of study, biotic system, a biotic system, and socioeconomic system.
- Identification and monitoring of environmental impacts.
- Management of environmental impacts: biotic a biotic and socioeconomic.
- Monitoring and follow up.
- Contingency management.
- Ex post evaluation of projects.

Regarding their content in terms of biodiversity three main conclusions can be drawn. First of all, their approach to biological resources is mainly focused at the species level, and aimed at protecting the national system of natural parks. Secondly, there is no consideration of the ecosystem approach and how it should be taken into account during the different stages of a project. Finally, the environmental guidelines are still very general and do not provide guiding principles of how biodiversity should be incorporated in the planning, design and operation of the project or activity.

To illustrate the previous conclusions, let us analyze the content of the environmental guidelines for hydro electric generation projects:

- In the information regarding the description of the activity of hydro electric generation, specific considerations or constraints in terms of biodiversity are not even mentioned, only environmental guidelines in general terms. It is stated that during the planning phase, environmental limitations and constraints should be taken into account, and an analysis of environmental alternatives should be undertaken. During the design stage, it is stated that a characterization of the environment is required, as well as a comparative environmental evaluation, leading to developing of the environmental management plan. During the operation phase, importance is given to the implementation of the proposed programs of environmental monitoring and mitigation. There is no information on how biodiversity is related to the different activities of hydro electric generation projects.

- In the guidelines for a system of environmental management, neither are their specific references to biodiversity. It is stated that environmental variables should be taken into consideration environmental variables during all the life cycle of the project. It is also highlighted that the environmental management plans should fully take into consideration the TORs provided by the environmental authority. In the specific section regarding to methodological tools and instrument for environmental management, neither are there references to biodiversity. It is clear, that several aspects are missing, such as information about the potential impacts that hydro electric projects can have on biological resources, and particularly aquatic resources; and how these potential impacts can be addressed or taken into account in the diagnostic of environmental alternatives and other environmental management tools.

- In the framework to analyze environmental variables it is stated that terrestrial biological elements as well as aquatic ones should be taken into consideration. For the terrestrial biotic elements the following products should be gathered: location of natural parks, and reserves, map of main ecosystems; listings of plant species present including their distribution and phenological characteristics; forests inventories; listings of terrestrial fauna including criteria of structure and compositions of the populations; and migratory corridors of species. As for the aquatic biological components the following information should be gathered: map of ecosystems and predominant aquatic habitats, listings of species that are present in the area of study associated with water quality measures, and identification of migratory corridors for migrating fish species. The net intended use of the information gathered is to determine the environmental vulnerability, which is the capacity of a given system to assimilate a given action. The guidelines provided to determine vulnerability are very general and do not consider biological resources, or how vulnerability should consider biological resources. As it can be seen, the biological information is more substantial than in the other sections, but there are strategic deficiencies in the way it is approached. The main deficiency is that biodiversity is still viewed partitioned and not in a holistic manner, as a result there is a total lack of consideration of the ecosystem approach. Even though useful information may be gathered if the guidelines are followed, it is not clear how this information will be used to improve biological resources management in the presence of the project. Also, several components of biodiversity are completely left out such as the landscape and genetic levels. Again, its necessary to highlight the lack of practical analytical frameworks to address biodiversity concerns while evaluating environmental variables. Furthermore, the petitioners and users of environmental licenses often express their concerns that the biological information they gather is not useful, and they do not see its connection with the project they are going to undertake.
- In the section regarding identification and monitoring of environmental impacts, there is an ample description of the different environmental impact methodologies and their application in the case of hydro electric projects. It is also stated that the identification and monitoring of environmental impacts should be done on a case by case basis. There are no specific references to particular measures of identification and monitoring of impacts on biological resources. This constitutes a major deficiency given the potential impacts on biodiversity of hydro electric generation projects, such as the effects on migratory aquatic species, or the damages caused when forest clearing is required. Here again it is worthwhile noticing that there is no consideration of how the ecosystems will be affected by the implementation of the project.
- In the management of environmental impacts there are two suggestions on how to manage the biotic resources. Flora management in the project area should include reforestation actions, promotion of succession of the original vegetation, forest management activities and removal of the plant mass that is not going to be used. As

for the management of fauna, the strategy should include actions as fauna recovery and protection measures. Here its worth highlighting that biodiversity is also viewed in a fractional manner, and not in a holistic way. Neither are their management considerations at the ecosystem level.

4.6.2 The environmental licenses

There are two main components that are crucial to analyze how the environmental licenses incorporate biodiversity. The first are the TORs provided by the environmental authority so the petitioner can undertake the relevant studies to apply for the license, including the environmental management plan. And secondly, the resolution by which the project is granted an environmental license, that also sets the environmental conditions upon which the project must be undertaken. Since resolutions are specific for each project, this aspect will be considered when analyzing the case studies in section VII. This section will thus focus on the TORs.

Since all the activities that require an environmental license should have terms of reference[10], and there are 47 of them, the current analysis results from an interview with three experts in the field[11] (both from the environmental management perspective and a biological one) and from the knowledge of the authors.

Screening

The potential impacts on biodiversity are taken into consideration when determining which activities require an environmental license. Even though this is done under very general terms, the main activities that may cause damage do require an environmental license, as it can be seen in annex 1. It is also worth noting, that the MoE has adopted the policy to deny environmental licenses for proposals that affect the system of National Natural Protected Areas.

With respect to the availability of information, there is updated information of national protected areas at the national scale, and in several regions of the country of regional and local protected areas. There is also recent information (1998) of the different types of ecosystems and their coverage, produced by the Instituto Humboldt. This information can be updated, when required, with satellite imaginary that is usually available, except for areas of high guerrilla concentration for reasons of national security.

The Instituto Humboldt has also developed red lists of endangered species. The development of the lists is uneven depending on the taxonomic groups, with the main progress for plants and mammals. Nevertheless there is an important effort to continue their updating and development. Several of the inventory efforts are also being mapped, constituting useful information to assess species distributions. The most advanced mapping effort has been done in ornithological collections[12]. There is also an ongoing effort to construct the Atlas of Colombian Biodiversity (ABC), by the Humboldt Institute, that will be a very useful tool for screening purposes.

Scoping

[10] / If a petitioner requests an environmental license, the environmental authority must provide the terms of reference. Nevertheless there are some activities that require license that are not common in the country (e.g. nuclear energy projects) and therefore terms of reference haven't been fully developed for them.

[11] / The following persons where interviewed: Gerardo Viña (Director of Sector Policies, Ministry of the Environment), Carlos Herrera (Director of Environmental Affairs, National Association of Industries – ANDI), and Fernando Gast (Director of the program of Inventories, Humboldt Institute).

[12] / Colombia's high biodiversity in birds is noticeable, and particularly in endemic species.

The terms of reference provided by the environmental authority do require that the impacts on biodiversity be taken into account. Unfortunately this is done in very general terms and mostly at the species level. The genetic level has almost never been taken into account. Some consideration of the ecosystem level is also intended, but with a fractional approach regarding biodiversity variables. The terms of reference usually require listings of species to be produced, description and location of the main ecosystems and migration patterns in some cases. But here again, as it was observed for the environmental guidelines, the connection between this information and how the project should be undertaken is very weak. This weakness arises out of the same reasons stated above.

Due to this weakness of the TORs, the resulting studies are very variable in their content and quality in terms of biodiversity. Usually, for large projects involving multi nationals or important government agencies (such as the oil producing companies) they may be very comprehensive in terms of biodiversity. This is not the case for small and medium sized projects. Often "recycled" information regarding biodiversity is presented, failing to capture the possible impacts and management practices that are required.

Impact prediction

In large projects, field studies are usually undertaken and new biodiversity information is gathered. Nevertheless it is not clear whether this necessarily results in better practices regarding biological resources. Also, the information produced is not always useful for the goal of increasing biodiversity knowledge, since there are no standards or direction from the relevant research institutions, in order to incorporate this information into the country's biodiversity collection efforts. This also causes over costs to the productive sectors. Since there is no track or systematic gathering or analysis of the information that is being collected during the impact studies, there is substantial overlap and inefficiency in the studies.

For small and medium projects, the information is usually taken from secondary sources, either research institutes or universities, or even other environmental impact studies. It is not completely unusual that petitioners of small present environmental impact studies "recycled" from previous projects, with questionable usefulness. The MoE is trying to prevent this practice from going on through more stringent supervision of the studies, and narrowing down the information that is asked for. Since license users often do not see the use of the information they are required to gather, it is important to overcome this perception. One idea is to develop regional research plans, and to ask petitioners to contribute to this plan through their particular project, and therefore contribute to a greater, more useful, cause.

When a project requires a diagnostic of environmental alternatives, biodiversity is a variable that should be considered in the evaluation of the alternatives. Even though some experts question the use of these studies, because petitioners often present an obvious desirable alternative, they are a mechanism to predict the impacts on biodiversity under different scenarios.

Biodiversity impacts need to be predicted as established in the TORs, in the environmental impact study, which may be more demanding for projects located in areas of particular importance for their environmental characteristics. Nevertheless, because standards have not been established to predict the impacts on biodiversity, their assessment also varies depending on the petitioners and the scope of the project. In any case, since the environmental authorities do not have the appropriate tools, analytical frameworks, indicators or know how to properly evaluate the impacts that may occur on biodiversity, these are not always thoroughly predicted. In most cases, the impacts are

considered at the species level, but not taking into account their relation with the surrounding environment. Occasionally impacts are assessed at the ecosystem level, but in very general terms (e.g. area to be deforested).

Mitigation
Mitigation measures are established for all predicted impacts in the environmental impact study, as well as for other impacts that the environmental authority may consider important to include. These measures are established in the resolution granting the environmental license and therefore are legally binding, as well as the environmental management plan that the petitioner presents. When the area of influence is of particular environmental sensibility, the MoE can ask for more stringent mitigation measures. This is also true for impacts affecting biodiversity. There are some standard mitigation measures that can and are usually requested, such as reforestation, or establishment of forest management plans. Nevertheless, the problem is not the lack of willingness by the environmental authorities to request the appropriate measures, but the unavailability of biodiversity information to indicate which are the right ones. This arises out of mainly the following causes: the lack of suitable information regarding biodiversity at the scale of the project, the deficiency of tools to indicate the appropriate mitigation measures, the weak technical capacity of the environmental authorities regarding these topics, and finally our poor understanding of the complexity of biological resource's behavior when affected by different types of projects or activities. As indicated before, substantial efforts have been made in the country to increase biodiversity knowledge at different levels, but few studies have addressed this last particular topic. Particularly, it is necessary to have a better understanding of the ecosystem approach, and how it can be used to evaluate the impacts on biodiversity and design effective mitigation measures. The MoE is currently working in this direction in order to improve the environmental licensing process in this critical aspect.

Impact evaluation
For the case of impact evaluation, the situation is pretty much the same as described previously. Biodiversity values are taken into account into decision making when the information is available. In general terms, projects having impacts on national natural parks, wetlands, affecting directly forested areas and "páramos" are not granted. Also, as for all the other impacts they are described in the environmental impact statement, but often in a very simplistic manner.

Review
There are no review criteria available to take into account the impacts on biodiversity, the projects are analyzed in a case by case basis, and using the information of research institutes and universities.

As indicated, the MoE is under the process of reviewing the licensing process, and has agreed to do with several sectors. During this process there is a unique opportunity to incorporate biodiversity variables.

In the case ethnic minorities are involved and a previous consultation process has taken place, biodiversity considerations are often under more stringent consideration and review.

Decision making
Biodiversity issues have usually played an important role in decision making, but mainly in the case of large projects that may cause a substantial evident damage to a critically known area. Such was the case for example of tourism developments in national natural

parks. Nevertheless because of the lack of evaluation criteria, this is not always true for smaller projects, in less known or studied areas.

4.7 Illustrative case studies

Here are presented two case studies that illustrate several of the aspects of the EA system previously described.

4.7.1 Construction of a pipeline "Cusiana – Coveñas"

Location
Located in the departments of Casanare, Boyacá, Santander, Antioquia, Córdoba and Sucre.
Proponents/petitioners
Oleoducto Central S.A. – Ocensa. Partners: Ecopetrol[13], BP Exploration Company-Colombia, Triton Pipeline Colombia Inc., TPCL International Investments Inc, IPL Enterprises Colombia.

Proposal
Construction of the pipeline Cusiana – La Belleza and Vasconia – Coveñas for the transportation of petroleum, and related installations for the exploitation of petroleum in the port of Coveñas.

Alternatives presented: Three route alternatives where presented, two of which were the adaptation or expansion of existing routes, and another one the construction of a new route, including an international portion in Venezuela. The later one was eliminated because it may have caused more environmental damage. The route was chosen because of the reduced costs of transportation of the petroleum.

Characteristics of the proposed development in terms of biodiversity.
The different impacts on biodiversity where considered in the environmental management plan, which is developed for the selected alternative. The information presented is extensive of river basins that the pipeline crosses, aquatic biological resources present in these basins (primary data where obtained), status of the fauna (from field observations, secondary information and interviews), and information regarding vegetation and forest cover (from the previous license and some primary information). Nevertheless there is very little analysis of how the project will affect them.

Biodiversity data that were available.
Some biodiversity data were directly obtained by the proponents. Also, information from the previous licensing process to construct the original pipeline was used, as well as expert's interviews. Some of the areas of the project, such as Serranía de San Lucas , are generally considered to be critical in terms of biodiversity because of their endemisms, but haven't been studied much because of public unrest in the area.

The Colombian legislation requires this category of projects to have an environmental license. The TORs require an evaluation of the impacts on biodiversity, but the information available to measure impacts was very scarce. This was particularly true in relation to deforestation of a corridor of 300 hectares to be caused by the pipeline. Nevertheless several activities that were proposed and that could cause damage were not approved by the MoE. Such was the case of the extraction of construction materials in some areas, and the use of organochlorine substances and asbestos in the project. Neither

[13] / Ecopetrol is a government agency.

was any authorisation given for extraction of natural resources in the area of the project, or the capture of specimens of wildlife fauna and flora.

Even though the original management plan did not stipulate the need for reforestation, it was imposed to the petitioners, as a required measure to compensate the environmental damage caused by the construction and operation of the project. Also the MoE required the proponents to implement a set of activities to monitor the water resources affected by the project, as well as the biological aquatic resources.

According to the environmental impact study that was presented, most of the impact on biological resources could be caused during the construction phase of the project, of short term and easy to overcome if the proposed mitigation measures where undertaken (environmental and earth stabilization works). The main predicted impact was upon the morphology of the landscape due to land-slides, that where easily predicted and considered in the mitigation actions.

Regarding evaluation of impacts, the main consideration was the possible cumulative impacts on water quality, that may affect aquatic life. Therefore, the management of residual waters was proposed both of domestic settlements and oily produces, from the land terminal and the vessels in the port. A monitoring system of water conditions and aquatic life forms was designed to operate during the construction as well as the operation of the project.

Were biodiversity values considered?
The biodiversity values that were specially considered in the project were those related to the aquatic life forms, and therefore the establishment of a monitoring system was imposed on the petitioner. Other biodiversity values, such as the possible effects on local fauna due to hunting activities during the construction of the project were also considered, and therefore the MoE didn't authorize their exploitation. Landscape values were also considered to some extent.

Were biodiversity survey techniques acceptable? This question is difficult to respond, since their are no standards set, and a general judgement would be superficial.

Where there any obvious omissions in terms of biodiversity impacts?
There were important omissions in the proposed management that was presented by the petitioners. This plan did not take into account measures to mitigate or compensate the effects of the deforestation along the pipeline (300 hectares), or the effects on water quality and consequently aquatic life, due to the development of the project. The MoE detected these deficiencies and therefore imposed the need to undertake a reforestation of 1760 hectares, in given specific locations, as a compensation measure for the deforestation that the project caused. Also the aquatic monitoring system was requested to grant the environmental license. As it can be seen biodiversity concerns where not taken into account when evaluating the possible damages of the forest cover removal that the project requires. Nevertheless, the MoE designed a straightforward compensation measure: reforestation of a much larger area.

Was the actual outcome positive or negative in terms of biodiversity?
There is insufficient information to answer this question.

4.7.2 Hydro electric project "Arrieros del Micay"

Area: The project is located in the lower are of the Micay watershed, in the department of Cauca, in the occidental slope of the occidental Andes cordillera, pacific slope.

Proponents/petitioners: Regional corporation for the reconstruction and development of Cauca - CRC.

Proposal: The construction of a dam in a river of average flow of 281M3/sec, the dam was to be located in the place called “Angosturas” and would have an altitude of 180 meters. The dam was planned to operate during 50 years, with a sedimentation totaling 2 to 3% of its volume. An area of approximately 4,000 hectares was to be flooded, for a Dam of a total volume of 2,000 million cubic meters, and useful volume of 1,332 million cubic meters. The installed capacity would be of 700 MW, and the mean energy 3420GWh/a. Additionally two transmission lines where to be built with a length of less than 100 Km each. The cost of the project in 1988 was of US$660 million.

Alternatives presented
The alternatives where not presented by the proponents, which was one of the causes to deny the environmental license.

Characteristics of the proposed development in terms of biodiversity
The project was to be located in a very important, as well as sensible area in terms of biodiversity. The Micay watershed was in excellent environmental conditions when the proposal was submitted. The area of influence of the project was: Andean forests 21,2%, and sub Andean forests 33,59%. These forests are of special importance because of the presence of the genus *quercus*, *podocarpus*, *ocotea* and *cedrella*. In lower area that the project would affect, where present more homogeneous plant associations such as “natales” and “guandales” (*Carapa guyanensis, Irianthera uleii, Ardisia granantensis*), and the transition zone with predominance of “naidi” or *Euterpe cuatrecasana*, that even though intervened, constitutes an important habitat and food source for a great number of species in the area. The project would affect ecosystems that are considered strategic and fragile, and it was feared that the works would lead to deforestation and land use change, causing a total transformation of the landscape. This main threat could be caused by colonization process triggered by the project.

Biodiversity data that were available.
There was information on the forest cover and the main characteristics of the main ecosystems types, including information about composition and abundance of different species. There was also information about the presence of endemic species.

The EA process.
- The Colombian legislation requires this category of projects to have an environmental license.
- As planned, the project affected one of the most important biodiversity areas in the country: the Colombian pacific coast, which is also considered to have a strategic value at a global scale. It has unique bioclimatic characteristics. It has one of the higher rain falls known world wide and is covered by pluvial tropical forests, which shelters numerous endemic plants and animals. Also, other critical Andean and sub Andean landscapes where to be affected. The most critical environmental aspect of the project was the intervention of a unique biological corridor that links Andean and sub Andean ecosystems with very wet tropical forests.
- The proponents did not present any alternatives for the development of the project.
- Impact assessment. Since there is very little information regarding the way the Micay watershed functions, the impacts of the project where difficult to predict. The operation of the project would cause dramatic daily flow variations between 40 cubic meters per second at night and 500 cubic meters per second during the day, which

would also cause major variation in nutrient contents. This could also cause unpredictable effects on the marine and estuarine ecosystems. Also the project could have major impacts on the biodiversity of the watershed, which could not be prevented or diminished through mitigation or other measures. Additionally the construction of small roads would promote colonization, and the extraction of natural resources in the area.

- The project did not present mitigation measures commensurable with the impacts it would cause.
- It was considered that there is not sufficient information on the impacts caused by this type of mega projects in order to evaluate their environmental feasibility. They are projects that can produce large scale impact in the location areas.
- Since the environmental license was not granted, there is no information on monitoring and follow up.

Were biodiversity values considered?
Biodiversity values were the main reason the environmental license was denied

Where biodiversity survey techniques acceptable?
Apparently not.

Were there any obvious omissions in terms of biodiversity impact?
Yes, as described earlier

Was the actual outcome positive or negative in terms of biodiversity.
Yes it was positive in terms if biodiversity.

4.8 Future actions to improve effectiveness of biodiversity conservation and sustainable use through EIA

The key actions required to improve effectiveness of biodiversity conservation have been identified through the development of this paper. They are of very varied nature, and will be summarized in this section.

4.8.1 Improving the planning process

As described in section II-B, several of the proposals of the biodiversity action plan, "Colombia: Biodiversidad siglo XXI", are related to planning processes. The strategy for the reduction of negative impacts on biodiversity proposes to decrease the deterioration caused to biodiversity by several sector activities, by affecting their planning processes and including the environmental dimension. As explained in section II, this has already been initiated, and the government and sectors have taken steps to reach this goal. Nevertheless, as it was noted in sections V and VI, the net results are still far from satisfactory. Therefore, it is necessary to continue these efforts, as well as to develop the appropriate tools in terms of biodiversity, to successfully include these issues in the agendas of the different sectors.

At another scale, it is necessary to continue improving environmental land use planning as a tool for biodiversity conservation and sustainable use. Even though environmental licenses are a necessary and generally effective tool to promote environmental protection, it should be complemented with land use planning at least at a regional scale. It is necessary to be able to imagine a region under different scenarios, and how its development will be changed or transformed by a given project or infrastructure development. This scenario analysis, should of course include biodiversity. Under this analytical framework, the limitations and terms under which a given project or

development should be undertaken could be identified. If these criteria where also included in the planning process of the sectors, there could be substantial improvements on biodiversity conservation and sustainable use.

Because reaching this goal may be difficult and take time, there are some actions that can be initiated to direct the planning processes. These actions are proposed in "Colombia: Biodiversidad siglo XXI", and are two fold. First of all, to get the government planning efforts to act as a unity, and therefore to jointly develop the planning process of the main infrastructure sectors driven by the government and of the MoE. The development priorities of the different ministries dealing with infrastructure development and production should be well known and understood by the MoE. Likewise, these ministries should also be aware of the relevance of the different protected areas and understand the projections for their expansion and management of the MoE. Sharing and discussing this information, would be the first step to agree on planning processes. Further actions would require to reach agreements on the developments that each sector has. Secondly, and as an operational tool for the previous action, it is necessary to accelerate the development of the Biodiversity Information System. This topic will be developed in the following section.

4.8.2 Accelerating and enhancing the development of the biodiversity information system

Colombia is currently developing its Biodiversity Information System. There have been significant results in its development, such as an online database of more than 500 biodiversity experts in the country, and important developments in organizing information of biological collections. There have also been advancements in its conception as a system of systems, where different areas of expertise require diverse ways to organize and analyze the information. Despite the efforts, the economic and technical resources devoted to the development of the system are insufficient, given the complexity and size of the task.

In terms of the EA system, a Biodiversity Information System could play a critical role in providing biodiversity information to be used during the different stages of the process, both for land use planning and for environmental licensing. The information required is very varied in nature, and a exhaustive list is out of the scope of this paper. Here are some examples of what information could be useful:

- Location of critical ecosystems and biological corridors that should be prioritized for conservation, outside the system of natural national parks.
- Updated information on threatened species and their distribution.
- Information on the distribution of species, resulting from analysis of biological collections.
- Distribution of known endemic species, resulting from analysis of biological collections and expert opinions.
- Case studies exemplifying how different types of projects or activities may affect biodiversity.
- Example models to predict and evaluate impacts on biodiversity.
- Areas of the country that have been surveyed in terms of biodiversity and what information is available.
- Synthetic gathering of the biodiversity information that has been collected from environmental impact studies.
- Practical examples on how to use the ecosystem approach for land use planning and environmental licensing.

Some of this information exists, and is partially available. Such is the case of the lists of threatened species. Nevertheless, some of the key elements do not exist under the presentation required for practical use in EA, or do not have been processed to the extent needed. Such is the case of the distribution of species: currently there is an effort to systematize the country's biological collections but few studies producing knowledge on the distribution of species. Also, some of the information is simply not available and needs to be developed. Such is the case of examples on how to use the ecosystem approach for land use planning and environmental licensing: there are no studies or methodologies developed for Colombia[14].

Because of these reasons it is critical to continue efforts to build the biodiversity information system and to devote more resources to the task. It is also very important to continuously update new information as it becomes available so that it can be used for planning and decision-making.

4.8.3 Increasing understanding of how different types of activity or project affect biodiversity

As stated on several other occasions in this chapter, there is a critical deficiency in understanding how biodiversity will be affected by different types of activities or projects. From an historical perspective, the term biodiversity is rather novel, as well as the integrated way to approach biological resources. Before the Convention on Biological Diversity, Colombia legislation considered almost all of biodiversity components but in a fractional manner. Neither was there any reference to the ecosystem approach. It is therefore understandable that our knowledge is still very basic with respect to biodiversity and EA.

Ideally, to have a better understanding of how different types of activities or projects affect biodiversity, the ecosystem approach should be used. Also, the development of models would be very useful. Therefore it is necessary to invest in research in this direction. Because reaching this target may be costly and time consuming, at least the following information should be produced with the highest priority:

- Criteria to evaluate biodiversity information, its usefulness and required scope for predicting impacts on biological resources.
- Analytical frameworks to address biodiversity concerns under different types of activities or projects.
- Guidelines to flag up situations under which biodiversity could be critically affected.

4.8.4 Modify environmental guidance and terms of reference of environmental consent and licensing procedures to include biodiversity

As described in section VI, the environmental guidelines and the terms of reference have deficiencies in the way they address biodiversity because of the lack of criteria and analytical frameworks. It is thus required to introduce this criteria in the different stages of the EA system, making use of the information described in section VIII- C.

Also, it is necessary to improve the way biodiversity information from environmental impact studies is gathered and processed. The new information resulting from the studies could contribute substantially to increasing the knowledge of biological resources, which is one of the key objectives of Colombia's National Biodiversity Policy. Also,

[14] / The MoE is aware of the importance of this issue and is currently developing a study in this topic.

appropriately gathered and analyzed, it could be useful for future environmental impact studies. Therefore, there are a set of measures that need to be undertaken:

- Develop, discuss and adopt standards and guidelines for the collection of biodiversity information resulting from environmental impact studies.
- Develop, discuss and adopt analytical tools to incorporate biodiversity variables in the different stages of environmental licensing, starting from the conception of the project through its operation and termination.
- Create the capacity within the MoE and the regional corporations to evaluate and analyze biodiversity data.
- Generate the capacity, and provide the appropriate budgets so the research institutes can process and make good use of the biodiversity information generated by environmental impact studies and monitoring efforts.

Finally, compensatory measures that can be imposed to environmental license petitioners, need to be strategically designed. First of all, it is necessary to develop methodologies and criteria so that the compensatory measures imposed can be commensurate with the damage they are intending to compensate. This would help not only the fairness of environmental licensing, but also as an incentive for the petitioners to present more sensible projects in terms of biodiversity. It would also be educational for them. The development of these criteria and methodologies is not an easy task, but an effort needs to be done, and valuation techniques could provide a first approach. Secondly, it would be desirable that the investments from these compensation measures would be strategic and tangible in their positive impact for biodiversity conservation and sustainable use. For example, they could be aimed at protecting flag endangered species and their habitats, or concentrated in the conservation of a key protected area of national importance. This approach to compensation measures would have benefits in terms of biodiversity, but would also generate less resistance from petitioners since they would feel they are contributing to a greater cause.

4.8.5 Increasing awareness of the importance of biodiversity

Even though Colombia is an internationally recognized mega biodiverse country, there is very little awareness of its importance within the country. More worryingly, there is insufficient awareness within the environmental community. It is often perceived that biodiversity as a very specialized issue that worries scientists and that is unrelated to their everyday work and concerns. This is particularly true for mid level government employees involved in environmental licensing. Historically, the institutional setting has exacerbated this situation: the fact that there is a research institute devoted to biodiversity has caused in practice a dilution of responsibilities[15]. Fortunately, this situation has improved. Regarding other relevant ministries, such as agriculture, energy and development, biodiversity is not even in their list, or is roughly incorporated into the whole package environmental issues that they must deal with. It is therefore necessary to improve the understanding and capacity of the importance of biodiversity for the country through out the government.

As for the private sector, they are very unaware of what biodiversity is about, and how it affects their everyday life. There is a general perception that environmental causes slow down development, and for a country under economic crisis and civil unrest this is not an option. In general, they are very unaware of the way biodiversity affects their productive activities (e.g. pollination), or how their activities affect biological resources. The perception is that that's a concern for natural scientists and environmentalists. Also, there is very little knowledge of the business opportunities that biodiversity may offer.

[15] / Legally the responsibilities are very clear. The Instituto Humboldt must undertake research, but is neither an environmental authority or dictate policies. The MoE is responsible for these.

Three types of actions are required. First to launch a national biodiversity awareness campaign in order to illustrate the general public and the privet sector what is biodiversity and how it relates to them. The goal should be to make biodiversity a national pride. Second, to educate the private sector, And finally, to provide information about biodiversity businesses and opportunities. This last action is already been taken aggressively by the Humboldt Institute and the MoE through their Bio-Commerce initiative.

4.9 Annex 1 – projects and Activities Requiring an Environmental License

4.9.1 Licenses of competence of the Ministry of the Environment[16]

- Works and activities of exploration, exploitation, transportation, conduction y storing of hydrocarbons; construction of refineries, refinery of petroleum and development of petroleum derived chemicals as part of a refining complex.
- Major mining projects, understood as thus that include the exploration, set up, production, exploitation, storage, gathering, transportation, smelting and transformation of minerals.
- Construction of dams and reservoirs with a capacity higher than 200 million cubic meters, and construction of power plants exceeding 100.000 kW of installed capacity, as well as the tendering of transmission lines of the national system of power inter connection, and the exploration and use of alternative energy sources that are virtually contaminant.
- Construction or amplification of maritime ports of great draught, understood as those that can that can receive vessels of 10,000 tons or more, or with a taught superior to 15 feet, or those moving a load superior to a million tons per year.
- Construction for the installation, amplification or upgrading of international airports.
- Public works on the national fluvial, land or railway system, including the amplification of roads in the national road system.
- Construction of irrigation projects of more than 20,000 hectares.
- Imports and production of pesticides and of substances, materials or products, that are controlled by international treaties, agreements or protocols of which Colombia is a party.
- Projects that may affect the National Park System.
- Irrigation works and river redirection projects undertaken by a regional corporation.
- Transfer of waters from one watershed to other exceeding 2M3/second during the lower flow periods.
- Introduction of parent specimens for the reproduction of foreign species of wild life fauna and flora, that can affect the stability of ecosystems or of wild life.
- Nuclear energy generation.
- Fabrication of explosives or munitions.
- Projects or activities undertaken by regional Corporations and that require and environmental license.

[16] / The projects or activities that are considered to eventually cause more damage to the environment are of competence of the MoE, even though they may be located in the jurisdiction of only one regional Corporations.

4.9.2 Licenses of competence of the regional corporations

- Activities involving the exploration, exploitation, use, storage, transportation of non renewable natural resources, undertaken under the development of small and medium mining activities.
- Construction of dams and reservoirs with a capacity inferior or equal to 200 million cubic meters.
- Construction of power plants generating less or equal to 100,000KW of the installed capacity, as well as the tendering of transmission or conduction lines in the area of the corporation and not belonging to the national network system.
- Construction, amplification, adaptation and operation of ports and maritime terminals.
- Gas stations, storage of combustibles, packaging and storage gas plants.
- Construction, amplification, adaptation or operation of national airports, both public and private, and of air fumigation terminals.
- Works done in the road system not belonging to the national network.
- Transportation and storage of substances, dangerous wastes or other materials that may cause a damage to the environment, with the exception of hydrocarbons.
- Projects of exploitation of woods either leading to change in the land cover or not.
- Commercial reforestation and silviculture projects, in the case there is not a land use plan. If it exist the activity requires a permit and not a license.
- Establishment of commercial wildlife reproduction facilities, intensive floriculture, cattle, aquaculture, fish and poultry farms.
- Construction of aqueduct systems in urban areas for the provision of water for more than 5,000 people.
- Construction and operation of sewerage systems, and related activities.
- Construction and operation of solid waste disposal systems, including industry residues, domestic residues and dangerous substances, of activities under the area of the regional corporation and that are not regulated by international conventions, treaties or protocols.
- Design and establishment of free trade areas, and of industrial districts.
- Design and establishment of tourism complexes, recreational and sports facilities.
- Development of parceling, condominiums, or other habitation complexes in areas where there is not an approved land use plan, approved by the regional corporation.
- The construction and development of the following activities, when a land use plan hasn't been approved by the regional corporation: hospitals, cemeteries, centers for the gathering and distribution of food, massive transportation systems; construction, amplification, modification or adaptation and operation of terminals for land transportation of passengers or load.
- Manufacturing industry of food products.
- Manufacturing industry of textiles, clothes and leather goods.
- Manufacturing industry of wood products.
- Manufacturing industry of paper, printing and editorial facilities.
- Manufacturing industry of chemical products, petroleum derivatives, coal derivatives and rubber.
- Manufacturing industry of non metallic minerals, except petroleum and coal.
- Manufacturing industry of metals.
- Genetic manipulation y production of microorganisms with commercial purposes.
- Works or activities that require the authorization, license or permit of the Maritime authority (DIMAR).
- All activities and projects requiring environmental license and which are undertaken by municipalities and other territorial entities.

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