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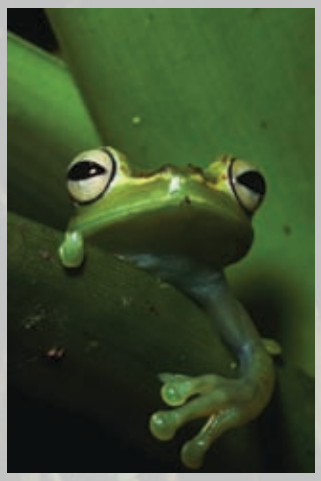
WORLD BANK GEF
A World Bank–Global Environment Facility Initiative for Conserving Biodiversity in Ecuador

Postimplementation Impact Assessment

The Ecuador Biodiversity Protection Project



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Global Environment Facility
Investing in our planet

WORLD BANK GEF

Postimplementation Impact Assessment

The Ecuador Biodiversity Protection Project

Global Environment Facility Program
The World Bank

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Contents

Foreword

Biological diversity—biodiversity—is the web of life on which all living things, large and small, depend. In 2005 the Millennium Ecosystem Assessment, an international appraisal of the health of the earth's ecosystems, found that changes in ecosystems during the preceding 50 years had been more rapid than in any comparable period of human history, and it warned that this degradation could worsen significantly.

Since 1991, the Global Environment Facility (GEF) has been supporting biodiversity conservation projects. To date, the GEF Council has approved 135 projects, accounting for over $1 billion in grants during 1991–2006, with the World Bank as the implementing agency. With over 50 projects now closed and generating global environmental benefits, the World Bank's GEF Coordination Team initiated in 2004 a series of in-depth postimplementation impact assessments of completed projects to assess the sustainability of outcomes and draw lessons for further development of the portfolio. Three projects designed to protect biodiversity and promote its sustainable use were selected for review:

- Ecuador Biodiversity Protection Project
- Indonesia Kerinci Seblat Conservation and Development Project
- Uganda Bwindi Impenetrable National Park (BINP) and Mgahinga Gorilla National Park (MGNP) Conservation Project

The project areas are significant from the standpoint of global environmental conservation. Ecuador, with its diverse habitats ranging from arid lands to high mountains and tropical forests, has one of the highest concentrations of biodiversity per unit area in the world. It is one of the few countries described as "megadiverse" because of the variety of its ecosystems and species. Indonesia has the third most extensive forest cover of any tropical-forest country but suffers from the second highest deforestation rate in the world, as a consequence of illegal logging,

setting of forest fires, and clearance of land for agricultural expansion. Uganda has the highest population densities in eastern Africa and some of the most densely populated agricultural landscapes in the region. A high level of poverty among the local population has led to excessive reliance on forest resources for subsistence and income generation in the project area. Hunting and other local extractive uses of forest products have combined with large-scale commercial activities such as logging and mining to threaten the biodiversity of these rich forests.

The assessments reported in these companion volumes involved extensive interviews with government officials, local communities, and World Bank and project staff and made use of direct or proxy measures to assess changes in the biodiversity of the project areas. The aim is to use the lessons from the reviews to improve the design of future projects and promote further integration of the global biodiversity agenda into country assistance strategies and lending programs while improving the measurement of development outcomes.

At its 33rd summit held in June 2007, the Group of Eight emphasized the importance of biodiversity and reiterated its commitment to the agreed goal of significantly reducing the rate of biodiversity loss by 2010. For their part, the GEF and the World Bank are working toward this goal by developing new environmental programs, building on project experience, and using the lessons learned from reviews such as these to replicate successes and strengthen the GEF-supported biodiversity portfolio.

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Abbreviations and Acronyms

BIC	Biodiversity Information Center
CIAM	Centro de Información Ambiental [Environmental Information Center]
CLD	Corporación Latinoamericana para el Desarrollo [Latin American Development Corporation]
FAN	Fondo Ambiental Nacional [National Environmental Fund]
GEF	Global Environment Facility
ICR	Implementation completion report
INEFAN	Instituto Ecuatoriano Forestal y de Áreas Naturales y Vida Silvestre [Ecuadorian Institute of Forestry, Natural Areas and Wildlife]
NGO	Nongovernmental organization
NSPA	National System of Protected Areas [Ecuador]
PCU	Project coordination unit
PPAR	Project performance assessment report
RBM	Results-based management
RCC	Regional consultative committee
SEC	Sistema de Educación y Capacitación
TRA	Threat reduction assessment
WWF	World Wide Fund for Nature

Note: All dollar amounts are U.S. dollars unless otherwise indicated.

Executive Summary

This report presents the findings of a post-implementation impact assessment of the Ecuador Biodiversity Protection Project. The project was funded by the World Bank and the Global Environment Facility (GEF) with a grant of $7.2 million and was implemented between 1995 and 2000. The assessment was conducted a little over five years after the project ended. A description of the study methodology is presented in chapter 1.

The project was one of three biodiversity projects selected for long-term impact assessment. The aim of this type of assessment is to identify the long-term impacts, sustainability, and replicability of projects and the lessons to be drawn to improve the design and implementation of World Bank—GEF biodiversity projects.

The Biodiversity Protection Project was a response to the persistent constraints for the effective protection and appropriate sustainable use of biodiversity in Ecuador. The constraints identified during the project design included (a) lack of definition of national policy on protected areas ; (b) an inadequate institutional framework for addressing biodiversity protection; (c) inconsistent enforcement of laws and regulations; and (d) insufficient budgetary allocations to support the management of the National System of Protected Areas (NSPA) at the central and regional levels. Accordingly, the project aimed at supporting the restructuring and strengthening of institutional capacity and of the overall policy and legal framework so as to ensure the adequate management and financial sustainability of the NSPA.

Project outcomes

The overall conclusion of the assessment is that some capacity for biodiversity conservation was built through the project but that there is significant scope for further strengthening. Capacity was assessed in the following areas.

Policy making and planning for protected areas. The central authority—the Ministry of Environment—still lacks critical resources and capacity and is not well connected to the periphery. Feedback loops and mechanisms are weak, and the ministry has little authority at the park level.

The project did not achieve significant mainstreaming of global environmental concerns into national development and sector policies. At the time of the review, there were still no clear laws and policies for park management, for information sharing and collaboration, for natural resource extraction and use, or for environmental management in general, nor was there a clear definition of roles and responsibilities within the NSPA and in protected areas. Persistent economic and political instability appear to have impeded progress.

The project recorded some achievements in building capacity, but it worked principally with the Instituto Ecuatoriano Forestal y de Áreas Naturales y Vida Silvestre (INEFAN), and when that body was absorbed into the Ministry of Environment, much of the capacity that had been developed was not carried over. At the local level the project helped build planning capacity through the development of several protected area management plans. Although these plans were not put into effect, they were to be reviewed and updated under the follow-up National System of Protected Areas Project, cofunded by the GEF.

Revenue generation and financial sustainability of protected areas. The NSPA does not have enough resources to cover its basic costs. The project contributed to the development of the Fondo Ambiental Nacional (FAN), which now assists with meeting the basic operational costs of some parks. Although FAN has demonstrated capacity to pool resources, it cannot underwrite the financial sustainability of the system as a whole. Tourism holds potential for bringing in additional revenue, as some NGOs and local communities have demonstrated.

Protected area management. The NSPA faces many systemic challenges, including a weak enabling environment. Pressures from oil, mining, and timber companies to gain concessions in protected areas are growing, and institutional weaknesses have made enforcement difficult. Parks lack sufficient guards to cover the areas for which they are responsible, and park management has consequently lost much of its ability to punish violators in recent years.

Management capacity of staff. There is no systemic capacity development program for park management and enforcement staff, and data gathered in the course of park monitoring are not utilized, shared, or followed up regularly. Significant management capacity, encompassing knowledge, skills, commitment, influence, and ability to foster and maintain good relationships, exists at the local level, particularly among

NGOs, park management and staff, and municipalities and local communities. Part of this capacity can be traced to the project; notably through the SEC program and the project's infrastructure and equipment investments.

Many examples of collaborative forms of management exist at the local level. Clarification of legislation would allow for better regulation and guidance of participation.

The project began to address some of the above challenges through the development of the NSPA strategic plan, but that plan was not put into effect. Follow-up activities in the biodiversity area would offer a good opportunity to address many of these issues.

Awareness raising. The overall marked positive change in local attitudes since the early 1990s cannot be definitely attributed to the project because other projects conducted during the same period had similar objectives. The project did succeed in increasing awareness of protected areas, but many of these gains have faded for lack of continued support. Project achievements such as the creation of the Biodiversity Information Center have not been sustained, and an institutional "culture of not sharing" persists. There is no biodiversity database and no mechanisms for sharing and disseminating relevant information. The SEC component of the project, however, did have clear impacts on local community awareness, knowledge, and capacity and on relationships between local communities and park staff.

The remaining findings relate to the impact on local beneficiaries, the global environment, and sustainability.

Impacts on local beneficiaries. The project engaged about 40 communities through participatory planning and implementation of resource management and biodiversity protection and through the SEC educational component, but there is little evidence of effects on livelihoods. The increased awareness of protected areas and biodiversity achieved through the SEC component and through demarcation of boundaries was not sustained at the national level, however.

Global environmental benefits. Immediate environmental changes were not an expected outcome of the project, which focused on changes in capacity for environmental management at the national and local levels.

Sustainability and replicability. Previous evaluations concluded that the project had not built the institutional and social support and ownership necessary to ensure the sustainability of project gains, and this assessment confirms this finding. It should be recognized that the project was one of the first GEF-funded biodiversity protection initiatives in the region and that sustainability now receives more attention. Replication of project activities was minimal except insofar

as other donors continued to fund SEC programming for a time.

Lessons and recommendations

Experience with the Biodiversity Projection Project offers lessons that will be beneficial for other protected area—related initiatives in Ecuador and the region.

Protected area policy making and planning, mainstreaming, management capacity, awareness raising, and financial sustainability

- Business administration and management skills throughout the system would increase the ability to deal with pressures on protected areas by extractive industries and other activities and to increase the protected areas' economic and financial potential.
- Poor collaboration, coordination, and communication between the center and the periphery weaken planning, implementation, and enforcement capacity.
- In a context of decentralization, local governments require training and adequate resources so that they can participate effectively in the management of protected areas.
- Clear and improved laws, policies, and regulations regarding management of protected areas and extraction of resources from them would provide a stronger enabling environment.
- It is important to demonstrate and publicize the link between biodiversity conservation and economic development, including improved livelihoods, as well as its cost-effectiveness, to mainstream environment in national development policy making.
- Political will is necessary to ensure the NSPA's financial sustainability. Wider dissemination of knowledge of the potential benefits from Ecuador's biodiversity and protected areas can promote commitment.
- Government agencies need not be responsible for all aspects of protected area management. NGOs can play a critical role in managing protected areas.
- Experiences and lessons from various forms of collaboration at the park management level should be shared among Latin American countries to improve the design and implementation of future biodiversity protection projects.

Project design, management and implementation

- The creation of a distinct project coordination unit hampered the project's integration, effectiveness, and ownership. In addition, such "enclave structures" often fail to transfer needed capacity at the national level.
- Consulting a range of stakeholders at all levels through participatory committees and other mechanisms promotes wide ownership of project goals.
- Projects aimed at achieving change at the system level are more efficient when they

have adequate resources, a sufficiently long time frame, and a realistic scale of activities.

- GEF and World Bank biodiversity projects would benefit from an emphasis on results-based management principles and ongoing measurement of performance. The project's intended objectives and the activities for achieving them should be clearly articulated.

Impacts on local beneficiaries

- Communication and capacity development programs in natural resource management can significantly raise awareness and improve local beneficiaries' capacities and benefits both immediately and in the long term.
- Participation by local communities and NGOs in conservation efforts is more effective when participants' thoughts and ideas are seen as being put in action by those who make decisions and implement programs.

Global environmental benefits

- Lack of key performance indicators for biodiversity can impede the ability of a project to track performance and assess sustained results. A well-developed system of monitoring and evaluation also facilitates an adaptive management approach during implementation.
- Long-term impacts in biodiversity conservation and protected area management require sustained efforts in awareness raising at the local level by donors, NGOs, and government. A public that is aware of environmental benefits may place a higher valuation on protected areas and support a higher government priority for them.

Impact assessment of biodiversity projects

- In selecting cases for impact assessment, the optimal projects are those that employed an adequate monitoring system capable of generating quantitative information on global environmental benefits.
- It is best to choose for study projects that targeted a single protected area, if the time allocated for assessment is short.

1
Background and methodology

The World Bank's project monitoring and evaluation policy (Operational Directive 10.70) recommends that impact evaluations be conducted for selected projects several years after project completion, to measure long-term effects. Similarly, the Global Environment Facility (GEF), under its own monitoring and evaluation policy, encourages its partner agencies to conduct impact evaluations of completed projects. Because the existing types of review (such as the project performance assessments carried out by the Bank's Independent Evaluation Group) do not focus on long-term impacts, a need for a new set of assessments was identified.

A new type of evaluation: Postimplementation impact assessment

In 2004 the World Bank's GEF team initiated a series of assessments that would address the long-term impacts, sustainability, and replicability of projects and the lessons relevant to World Bank and GEF policies and strategies. Each of these postimplementation impact assessments examines a cluster of projects in a specific GEF thematic area. Issues evaluated include

- Overall results at the outcome level
- Impacts on the global environment
- Impacts on institutional development
- Impacts on beneficiaries
- Sustainability
- Replicability of the outcomes achieved and the catalytic effect of the project
- Lessons for improving the design and management of future activities
- The extent to which the project contributed to mainstreaming global environmental concerns into the country's national development and sector policies.

The first reviews focused on four energy efficiency and climate change projects. The 2005 series, to which this assessment belongs, concentrate on biodiversity. Three projects were chosen: the Biodiversity Protection Project in Ecuador; the Bwindi

Impenetrable National Park and Mgahinga Gorilla National Park Conservation Project in Uganda; and the Kerinci Seblat Integrated Conservation and Development Project in Indonesia. The criteria for selecting projects for study were

- Elapse of at least five years since closure
- Coverage by the selected projects of three main biodiversity conservation topics: protected area management, conservation trust fund, and integrated conservation and development
- Distribution of the selected projects among different parts of the world

The postimplementation impact assessment of the Ecuador Biodiversity Protection Project was conducted between June and August 2005, a little over five years after project completion.

Methodology

Because the project framework did not establish standards for "biodiversity protection" or a time frame for improving performance, it was difficult to assess the effects of the project on biodiversity. Relevant indicators for capturing biophysical changes were not developed, nor were the data subsequently collected cast in a format that could be used to assess impacts. The assessment did however use indirect methods to estimate impacts.

The project operated both at the system level and at a number of target sites. To obtain system-level data, the assessment team conducted interviews with central government and local stakeholders, including staff of the Instituto Ecuatoriano Forestal y de Áreas Naturales y Vida Silvestre (INEFAN, the Ecuadorian Institute of Forestry, Natural Areas and Wildlife), which is now part of the Ministry of Environment. Particular attention was given to staff members who were involved in the project. In addition, the assessment team reviewed existing data on vegetation change from remote-sensing images and independent studies (see the section on global environmental benefits in chapter 3). This evidence, however, is inconclusive for evaluating project impacts.

At the local level, two approaches were used: interviews with local stakeholders, and assessment of data from physical measures. Since the latter data were rare, the report mainly uses proxy measures, as described next.

Questions for stakeholders, especially villagers, were largely based on threat reduction assessment methodology and were directed to individuals or to group sessions, depending on the time available.[1] As a supplementary surrogate measure of changes in biodiversity status, local stakeholders were asked when

[1] The threat reduction assessment (TRA) method measures in a participatory way whether threats to biodiversity in a given area have been reduced. If they have, biodiversity changes could be expected to follow, even though they may not yet be evident.

they had last seen certain rare or scarce species of animals and birds and whether they thought these species were more or less common than in the past. This methodology is in line with that suggested in a GEF working paper (GEF 2003a)—the use of effects on perceptions as a proxy for measuring project impacts on biodiversity conservation and sustainable use. The advantage of the chosen approaches is that they do not depend on the existence of baseline data, which the project documents did not provide. The data gathered were analyzed by site and by overall averages.

The following steps were used for this assessment:

1. The evaluation team conducted a preliminary review of documentation, including reports, Web sites, and other sources relevant to the project and to the long-term impact assessment of protected area projects. A bibliography follows the appendixes to this volume.
2. On the basis of the preliminary review, discussions with World Bank staff, and lessons from other impact assessments, the team developed an evaluation methodology.
3. Specific evaluation matrices were developed for each aspect of the project. The matrices included detailed questions, indicators of performance using results-based management (RBM) methodology, relevant data sources, data collection methods, and sampling approaches. Data collection tools were used to construct a baseline for comparing vegetation cover from which to measure sustained outcomes and impacts in the sector and the country.
4. The review team identified and contacted relevant stakeholders, especially original project implementers and beneficiaries.
5. An in-depth desk review of all available project-, country-, and sector-related documents allowed the evaluation team to better understand the project and its context.
6. The evaluation team then undertook a two-week field mission to Ecuador to interview key informants and collect both qualitative and quantitative data. The team interviewed informants from the project teams for the project under review and for the follow-up National System of Protected Areas (NSPA) Project; relevant persons from the Ministry of Environment and other ministries; representatives of environmental and international NGOs, donors, and the private sector; park heads and protected area personnel; and members of local communities and other relevant groups who were primary beneficiaries of the project. Focus groups with local communities and park staff in and around two protected areas provided information and allowed verification of findings from other sources. The team also collected further documentation,

including relevant reports, statistical analyses, sectoral documents, policies, and laws.

7. The final step was compilation and analysis of the data collected. Data triangulation allowed for verification of the findings.

2
THE PROJECT AND ITS OUTCOMES

Ecuador, with its diverse habitats ranging from arid lands to high mountains and tropical forests, has one of the highest concentrations of biodiversity per unit area in the world. It is one of the few countries in the world categorized as megadiverse because of the variety of its ecosystems and species (World Bank 2002e). Its globally important ecosystems include coastal and tropical humid forests, Andean slope forests, and tropical Amazonian forests. Ecuador is home to 10 percent of the world's plant species, and 20 percent of its 25,000 vascular plant species are endemic. The country harbors an estimated 800 species of freshwater fish, 450 species of marine fish, 422 amphibian species, 375 reptile species, 333 mammalian species, and 1,618 bird species. All this biodiversity is sheltered in a country of 256,370 square kilometers, equivalent to about 0.18 percent of the Earth's land surface (World Bank 2002e).

Strong pressures from economic activity constantly threaten Ecuador's protected areas. Many protected areas and buffer zones are occupied by indigenous groups and nonindigenous poor farmers, but until the early 1990s there were no government policies for involving local communities in the management of conservation units, and conflicts between indigenous peoples and park administrators were frequent. Multiple and sometimes contradictory laws, regulations, and property rights made natural resource management particularly complex. Indigenous people laid claim to 40 percent of the Amazon, including some protected areas. Exploration and drilling in the parks by oil and gas companies and the interaction of local and indigenous populations with these companies complicated the situation. In the absence of a complete and coherent environmental law, each sector regarded its own legal instruments as prevailing over others. Highly centralized but weak government institutions and cumbersome bureaucratic structures exacerbated these problems.

In the 1980s Ecuadorian civil society generated a variety of environmental initiatives and projects, and the government became more active in the sector. By 1991 the government had taken steps to begin managing tourism in the Galápagos, and in 1992 it formed a new agency for biodiversity protection, INEFAN (which, however, was given inadequate staffing and funding). Within INEFAN, a Directorate for Biodiversity and Protected Areas was accorded a position equal to a national forestry directorate. At the time of the appraisal of the Biodiversity Protection Project, the government had established the National System of Protected Areas (NSPA), which covered 15 conservation units that were of global importance for their endemism and high levels of biodiversity. Fourteen of these sites were located on the mainland; the 15th was the Galápagos Marine Reserve in the Pacific Ocean.

These advances occurred during a decade that was economically and politically difficult for Ecuador. During the period 1990–99 there was virtually no economic growth, the currency was devalued by three orders of magnitude, and annual inflation was more than 50 percent. Between 1996 and 2001 the country had five presidents. Economic issues dominated the work of the state, relegating environmental policy to a lesser place and rendering medium- and long-term planning very difficult (Albán and Barragán 2001).

In 1996, while the project was being implemented, the Ministry of Environment was created, and it absorbed INEFAN, which had been the primary participant in most aspects of the project. A consequence was some disruption of continuity and institutional memory.

Historically, civil society played an important role in the establishment of environmental institutions and practices. Various well-designed NGO initiatives contributed to improvements in specific areas, but coordination and systemwide focus were lacking. Mistrust existed among NGOs, particularly between national and international organizations. Many NGOs perceived a lack of transparency in large international donor projects, and some national and indigenous groups claimed that a small circle of organizations was hijacking biodiversity funding.

Although Ecuador was the third country to sign the United Nations Convention on Biodiversity, it was the last signatory to enact and implement a law for biodiversity management and sustainable use. This issue has led to significant tensions at the local level and some strains between NGOs and indigenous groups. The indigenous communities represented by the Confederación de Nacionalidades Indígenas del Ecuador (CONAIE, the Confederation of Indigenous Nationalities of Ecuador) view Ecuador's biodiversity as belonging to the community. They are convinced that the

proposed Biodiversity Law would put their natural resources on the market and that the law is being pushed by large NGOs and by U.S. organizations. The Alianza para la Biodiversidad (the Biodiversity Alliance) and the Comité Ecuatoriano para la Defensa de la Naturaleza y el Medio Ambiente (CEDENMA, the Ecuadorian Committee for Defense of Nature and the Environment), an umbrella environmental NGO, have advocated passage of the Biodiversity Law, but there is not much middle ground for discussion and compromise.

Project description

The Biodiversity Protection Project was a response to the persistent constraints on the effective protection and appropriate sustainable use of biodiversity in Ecuador. At the time of project appraisal, these constraints included (a) lack of definition of national policy on protected areas, (b) an inadequate institutional framework for addressing biodiversity protection, (c) inconsistent enforcement of existing laws and regulations, and (d) insufficient budgetary allocations to support NSPA management at the central and regional levels. A GEF grant of $7.2 million was approved by the World Bank on May 9, 1994, and became effective July 24, 1995. The project was scheduled to close on June 30, 2000, but closed three months early, on March 31, 2000.

The main objective of the project was to support the restructuring and strengthening of institutional capacity and of the overall policy and legal framework so as to ensure the adequate management and financial sustainability of the NSPA. This would entail improvement of the organizational performance of INEFAN and of the capacity of decentralized units to plan for and manage the protected areas. The project components comprised institutional strengthening, reform of the legal framework, outreach activities, and investments in protected areas (box 1).

The NSPA currently includes 33 protected areas covering nearly 4.6 million hectares, equivalent to 18.5 percent of Ecuador's national territory (see figure 1), as well as 14 million hectares of marine area. The system extends over 22 political provinces. Most of the country's ecosystems and vegetation provinces, as well as its four geographic areas, are represented.

Officially, the NSPA is coordinated by the Dirección de Biodiversidad y Áreas Protegidas (Directorate of Biodiversity and Protected Areas), which is under the subsecretary of natural capital in the Ministry of Environment. The system has recently undergone decentralization.

Managers of protected areas (*responsables*) report to regional biodiversity leaders, who report to the regional directors, who report to the Ministry of Environment. The Directorate of Biodiversity and Protected Areas has no di-

Box 1
Components and principal planned activities of the Biodiversity Protection Project

Institutional strengthening was aimed at enhancing the capacity of the Instituto Ecuatoriano Forestal y de Áreas Naturales y Vida Silvestre (INEFAN) to manage the National System of Protected Areas. Activities were to include (a) training for INEFAN staff and other public officials under the project's educational component, the Sistema de Educación y Capacitación (SEC); (b) review and updating of existing management plans for protected areas with the participation of local communities; (c) studies to determine the economic value of goods and services generated through use of protected area resources; (d) analysis of the relationship between local populations and protected areas, focusing on the population's use of resources and on ways to maximize the benefits accruing to communities; (e) design of a new system for collecting and allocating revenues from resource use activities; and (f) review of the role and responsibilities of tour operators in promoting conservation while allowing for sustainable revenue generation.

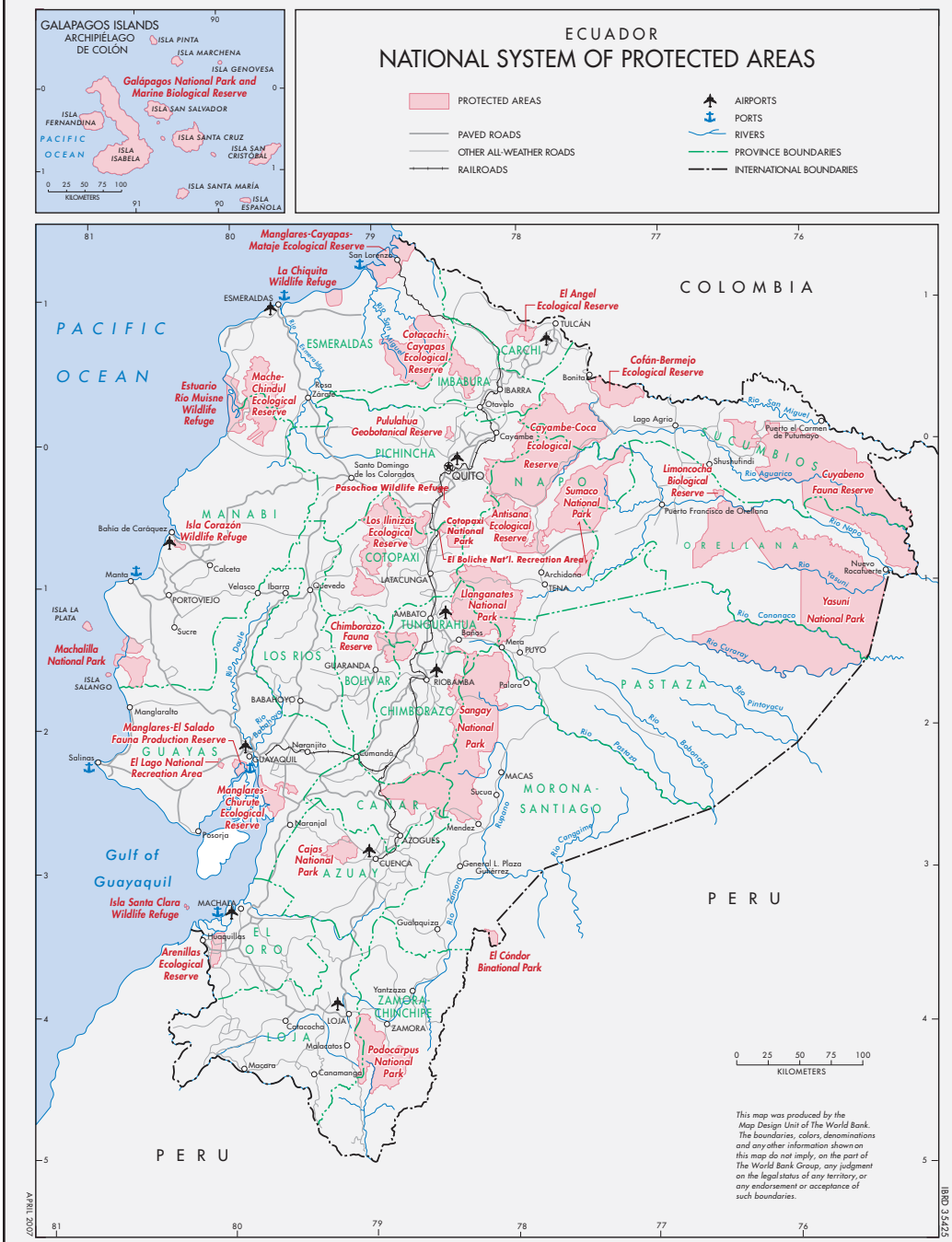
Activities relating to the *reform of the legal and regulatory framework* included (a) a comparative review of current legislation affecting protected areas; (b) identification and establishment of legal reforms for the protection and management of biodiversity; (c) drafting and promulgation of new regulations for granting operating permits to official and private users of the National System of Protected Areas and for limiting extractive activities within these areas; (d) development and establishment of regulations that would apply to both public and private property within a management regime and allow private property owners to participate in the management of the area; (e) development of regulations and a strategy to allow community participation in the administration of the protected areas and their buffer zones; and (f) analysis of the institutional, legal, and social problems related to landholding within protected areas, with a view to identifying effective legislation for solving these problems.

Outreach activities aimed at (a) conflict resolution among key target groups through a national forum to promote project activities and obtain the support of all interested groups; (b) creation of regional coordination committees to oversee the implementation of management plans and the conflict resolution process; (c) a study on problems of tenancy and resource use within protected areas; (d) public awareness campaigns at the national level to promote biodiversity conservation and the new legal system relating to protected areas; (e) development of a strategy at the national and regional levels to educate the public on the National System of Protected Areas; and (f) technical assistance and pilot studies for Chachi and other native communities located in buffer zones and areas surrounding the Cotacachi-Cayapas Reserve.

Investment activities included provision of financing for civil works and infrastructure for selected protected areas, border delimitation, establishment of trails for visitors, and the construction of visitor information centers. In addition, INEFAN field staff in the protected areas were to receive logistical support in the form of vehicles, motorcycles, survival equipment, and the like.

rect contact or authority regarding protected area management in the field. Municipalities are also involved in protected areas in many cases. Administration is further complicated because many protected areas extend over more than one municipality and even over

Figure 1
Map of Ecuador's National System of Protected Areas



more than one province or regional district (see appendix A).[2] The consequence can be a fragmentation of management of protected areas, with responsibility divided among several (regional) biodiversity leaders whose priorities may not be in harmony.

Findings of earlier evaluations

Three evaluations of the Biodiversity Protection Project preceded this postimplementation assessment: the 2000 implementation completion report, the 2002 project performance assessment report, and an independent evaluation undertaken by the Corporación Latinoamericana para el Desarrollo (CLD) in 1999.

The CLD independent evaluation concluded that the project was overambitious, undertaking too many activities that were not coordinated. Significant changes had been made in the original design, including a scaling down of capacity development activities, and the project failed to clarify the roles of the main players in the project execution structure (CLD 1999).

The project performance assessment report (PPAR) rated the project outcome as "moderately unsuccessful" (World Bank 2002a, 2002b, 2002c). Among the main factors affecting project implementation were poor design, lack of ownership by the implementing agency, and overly centralized decision making in the project coordination unit (PCU). The PPAR asserted that the project had not restructured and strengthened institutional capacity to manage the NSPA.

The PPAR and the independent evaluation pointed to two specific activities that led to significantly strengthened institutions: the training and education system implemented by the Sistema de Educación y Capacitación (SEC) and the development of protected area management plans. The project also supported the creation of consultative groups formed by local communities and other resource users to discuss problems, options, and strategies relating to park management. Although most of these groups have since disappeared, the attempt to incorporate stakeholder participation systematically in park management was a significant step.

All three evaluations found that the project supported the legal and regulatory framework through such activities as the design of a plan to decentralize the NSPA. That proposal was incorporated into the NSPA master plan and became part of the draft Biodiversity Law and of Special Law 278 of 1998. These accomplishments however, contributed little to the improvement of the management of protected areas (World Bank 2002c). The NSPA master plan was never approved by

[2] Regional districts are decentralized units empowered to make everyday decisions. Each such district coordinates the management of forestry activities and of protected areas within its jurisdiction. A regional district may include two or more provinces and protected areas (World Bank 1994).

INEFAN's management, and, at the time of writing the draft Biodiversity Law had not been enacted. The follow-up project includes a proposal for development of a Protected Areas Law to support sustainable management of the parks.

According to the implementation completion report (ICR), some dissemination of communication materials through mass media was carried out, and there was evidence of increased public awareness (World Bank 2000a). The PPAR and the independent evaluation, however, found that gains in outreach and citizen participation were modest; achievements were localized in a few protected areas and had little impact on the system as a whole. Much of the initial impact of the activities diminished because reinforcing messages were lacking.

Investments in protected areas—design, construction, and development of trails, construction of guard posts and basic park infrastructure, and provision of automobiles and equipment—exceeded the targets at project appraisal and significantly increased the ability of local staff to patrol protected areas and reach out to local communities. Under the project, studies were conducted for a protected area trust fund to be financed through tourist fees, tariffs, fines for illegal tree felling and wildlife harvesting, and allocations from the national budget. This fund would be used exclusively for biodiversity protection. The proposal, however, lacked the support of INEFAN's management. A trust fund was eventually established under the management of the Fondo Ambiental Nacional, using information developed by the project.

The ICR and the PPAR concluded that the project had failed to produce a functioning institutional and financial framework or to secure a sustainable source of financing for the maintenance and management of protected areas. The CLD evaluation found that the project had not developed an overall system for protected area management during its five-year lifespan. Continued and increasing pressures on protected areas from mining, oil, and timber interests and from uncontrolled tourism demonstrated the absence of a broad policy for protected area management and conservation. Most of those interviewed for this assessment confirmed the findings and recommendations of the previous evaluations.

All the evaluations stated that a follow-up project would be vital for achieving impacts from the project. According to the stakeholders interviewed, during the five to six years that elapsed after the end of the Biodiversity Protection Project, critical opportunities were missed. The delay was frustrating for stakeholders who had invested significant time and effort in developing management plans. Some initiatives simply ended, and the uncertainty led some NGOs to seek other projects to work with.

3
IMPACT ASSESSMENT

According to the PPAR, of the 35 activities planned for the Biodiversity Protection Project, 24 were completed or partially completed. The remaining 11, mainly related to the Galápagos protected area, were only partially undertaken, largely because of problems with government disbursements (World Bank 2002c).

This chapter discusses the impacts of the project according to the type of capacity targeted.

Policy making and planning

Table 1 summarizes the most important project impacts on capacity for policy making and planning and the outstanding challenges.

At the national level

The interviews carried out during the field mission made it clear that Ecuador's Ministry of Environment is generally understaffed and underfunded. The ministry's unit for Biodiversity and Protected Areas has only four staff members. Although these people are highly competent, they are overstretched. Constant changes in political power and in senior officials compromise the sustainability of the capacity that has been developed. The integration of INEFAN into the Ministry of Environment resulted in loss of institutional memory and of some of the capacity developed by the project.

There is evidence that some of the knowledge and skills developed through the project are still present in the ministry. For example, Antonio Matamoros, who was a biologist and wildlife expert in INEFAN, studied at Arizona State University, with support from the project. There, he earned a master's degree in natural resource management, with a specialization in biodiversity. He returned to the Ministry of Environment and eventually because head of the Directorate of Biodiversity and Protected Areas and national focal point for Ecuador to the United Nations Convention on Biodiversity.

Table 1 Capacity for policy making and planning: Project impacts and main challenges

Type of capacity	*Project impacts*	*Main challenges*
Policy making and planning	• Some capacity was developed in the Ministry of Environment through programming by the Sistema de Educación y Capacitación (SEC). • Some local planning capacity was built through development of protected area management plans. • A strategic plan for the National System of Protected Areas was formulated. • Important studies were completed. • The design of a plan to decentralize the NSPA contributed to the proposed Biodiversity Law and to Special Law 278, on decentralization. • Environment was mainstreamed into the government agenda and priorities and into public discourse for a time during the project.	• Human and financial resources are insufficient for adequate NSPA policy making and planning. • The enabling environment for protected area and environmental management is inadequate. • There is a need for business administration capacity and language training. • Environment and biodiversity are not mainstreamed into the national agenda and government operations. • Interministerial coordination and collaboration on environmental and biodiversity issues remain poor. • Laws and policies often conflict.

Nevertheless, the ministry, by its own admission, is missing some important skills needed to assist with and improve NSPA management. Among these is the ability to speak English, which would facilitate contacts with donors and others. Ministry representatives also stressed the need to build internal capacity in business administration and management so that they can deal more adequately with oil companies, mining companies, and other private sector actors that extract resources from the parks.

According to a World Bank report, by 2000 the Ministry of Environment's operating capacity had been improved through the development of legal and technical instruments—including the 1999 Law on Environmental Management—and through a slight increase in the government's environment budget and staffing (World Bank 2002d). Interviews conducted for this assessment suggest, however, that the increases have been insufficient. Most stakeholders interviewed did not believe that the new environmental law had had a significant influence on the institutional capacity of the Ministry of Environment or its ability to manage the NSPA, and most respondents did not give the Biodiversity Protection Project credit for the law.

The project contributed to the completion of the 1996 strategic plan for the NSPA, which is intended to lend clarity and focus to poli-

cies, vision, and the system as a whole. The plan's main elements are (a) to strengthen the administration of the NSPA; (b) to implement new regulations and programs that increase private and public capacity for protected area management; (c) to enhance public support for protected areas by strengthening governmental and nongovernmental communication and environmental education programs at the local, regional, and national levels; (d) to implement protected area management plans; (e) to establish a long-term financial mechanism for protected area management; (f) to strengthen mechanisms for the participation of local communities, NGOs, and the private sector in the administration of the NSPA; and (g) to implement new mechanisms for the participation of regional entities. The revision and implementation of the plan as part of the GEF-cofunded follow-up project offer an opportunity to address some of the institutional and systemic challenges in the NSPA.

Many stakeholders noted that the project gave impetus to discussion of a common strategy for the protected areas and that it set in motion the institutionalization of the system overall, at a time when many protected areas were only "paper parks." A comprehensive system now exists, partly because of project efforts, but lack of a common vision among stakeholders and even within INEFAN itself has hampered the effectiveness of the strategy. Internal political conflicts between the forestry unit and the Directorate for Biodiversity and Protected Areas have impeded progress and cooperation on these issues and have had negative effects on sustainability over time.

Capacity for NSPA planning seems stronger outside the central government structures, in particular among national and international NGOs, academic institutions, and park management. Most nongovernmental stakeholders noted that there is more participation and more cooperation with the Ministry of Environment now than in the past but that there is still room for improvement in integrating and utilizing existing knowledge and capacity for common ends. At the time of the assessment, according to the data collected, both the ministry and NGOs seemed willing to cooperate for protected area management planning. All recognized that the ministry should take the lead in NSPA planning but also that collaboration was necessary to achieve the ministry's goals.

Mainstreaming of global environmental concerns into national development and sector policies

Environment is the subject of several portions of Ecuador's 1998 constitution. Article 3 calls for the government to defend the country's natural and cultural patrimony and to protect the environment. Article 23 (in the chapter on civil rights) affirms the right to live in a healthy, ecologically balanced environment, free of pollution, and states that the law will establish restrictions on the exercise of cer-

tain rights and freedoms in order to protect the environment. A whole section of title III, on rights, guarantees, and duties, is devoted to the environment; article 86 in that section provides for the establishment of the NSPA.[3] These provisions demonstrate some mainstreaming of environment in the national agenda. Although there is little indication that the project contributed directly to their inclusion, it did have some effects on other legislation.

1. The project financed some of the first workshops on the Biodiversity Law, which envisioned the integration of biodiversity management, protection, and sustainable use into nonenvironmental sectors, and it contributed to the completion of a plan for decentralization that was subsequently incorporated into the master NSPA plan and the Biodiversity Law. (At the time of writing, however, the Biodiversity Law had not yet been approved by Congress, and capacity development in the decentralized system has been inadequate.)
2. The project contributed to the development and adoption of Special Law 278, which provides for decentralization and can be seen as facilitating participation in environmental management at the local level. The law has, however, had negative repercussions on the financial resources available for the NSPA, as discussed in the next section.
3. As noted in the PPAR, studies produced under the project were used as important inputs into the ministry's biodiversity strategy and other strategies and laws.
4. The project partly influenced the 1999 Law on Environmental Management, which is reported to have effectively separated the production-oriented forestry unit from the Directorate of Biodiversity and Protected Areas in the Ministry of Environment. The law also established a decentralized environmental management system that provided for involvement of municipalities.

The project achieved little in the way of coordination between the Ministry of Environment and other ministries such as energy, mining, and agriculture. This review supports the findings of the PPAR, which suggested that creating alliances with relevant ministries should have been more of a priority for the project in order to improve the effectiveness of regulations regarding extractive activities in protected areas.

The project helped bring biodiversity and protected areas into the government agenda and public debate. Most stakeholders interviewed noted that during and immediately after the project, environment was mainstreamed into government discourse for a time, but most also pointed out a deterioration since then. A slight majority of stakeholders believed that

[3] See Base de Datos Políticos de las Américas, "República de Ecuador: Constitución Política de 1998," http://pdba.georgetown.edu/Constitutions/Ecuador/ecuador98.html. For an English-language summary, see Lopez (2005), 344.

environment was less mainstreamed than before and could not be considered a cross-cutting theme or priority in Ecuador.

At the local level

Several protected area management plans were completed with the leadership or cooperation of NGOs, with assistance from the project.[4] According to most stakeholders, little management planning has been done in the protected areas since the project ended. A few management planning efforts spearheaded by NGOs were linked to or were a continuation of activities that took place during the project. Examples include the work of Fundación Antisana in Antisana and of Fundación Natura in Sangay. In most cases these activities were initiated by the NGOs with funding from other sources.

Most of the protected area management plans were shelved after the project ended, apparently for lack of funds. The plans were said to be too complex and theoretical, and most stakeholders stated that management planning in the project was not sufficiently participatory. According to the basic country assessment by the United Nations Development Programme (UNDP) and the GEF, "only six protected areas have their management plans up to date, while ten areas of the system do not have a management plan at all" (Galindo, Baus, and Aillón 2005, 9).

It is widely agreed that the studies and management plans completed through the project contained useful information that remained valid after the project ended. Once updated, as envisaged for the two parks targeted in the follow-up NSPA Project (Cotacachi-Cayapas and Machalilla), these studies and plans could become operational management plans.

Financial sustainability

Table 2 summarizes the most important project impacts on capacity in the financial area and the outstanding challenges.

The Ministry of Environment has one of the smallest budgets in the public sector, and even as the state budget has increased, the ministry's has declined. A financial gap analysis (Galindo and others 2005) demonstrated that the NSPA had not improved its financial situation since 1998 and noted significant shortfalls in personnel, transportation, and equipment in many protected areas. According to the ministry, financing for the NSPA in 2003 totaled $2.7 million, which was about 0.0004 percent of the 2003 budget for the government as a whole. This level of funding was significantly less than funding for protected area systems in other developing countries in the same year, according to an analysis by Bruner (2004). One reason was that under Special Law 278, approved in 1998, the funds available for the NSPA

[4] Protected area management plans are key management tools; they contain the baseline scenario for biodiversity, socioeconomic information, and information on zoning and park boundaries, and they define monitoring systems.

Table 2 Capacity to pool resources and generate revenue: Project impacts and main challenges

Type of capacity	*Project impacts*	*Main challenges*
Resource pooling and revenue generation	• The project contributed to the development of the Fondo Ambiental Nacional (FAN), which now covers operational costs of some protected areas. • Infrastructure investments in some protected areas under the project contributed indirectly to tourism.	• Resources are not sufficient to cover basic costs of the National System of Protected Areas. • The budget of the Ministry of Environment decreased even as the state budget increased. • Almost all of NSPA's financial resources come from 5 protected areas; 13 areas generate no funds. • The enabling environment for tourism and other revenue-generation activities in protected areas is unclear. • Greater capacity on the part of local communities and nongovernmental organizations for providing tourism activities is needed. • Awareness of the potential value of the resources that can be generated through tourism activities in protected areas is low.

were significantly reduced—the Galápagos protected area, which had previously sent more than two thirds of its revenues to the system, reduced its contribution to 5 percent and then, in 2004, to zero. The elimination of this major source of financial support created a wide gap between the NSPA's actual and required financial resources (box 2).

Establishment of the Fondo Ambiental Nacional (FAN, National Environmental Fund) and its protected area trust fund began as part of the project; FAN was created in 1996 and became operational in 1999. The trust fund was set up in 2002, with funding that included $2.9 million from a debt swap with the German government, $4.3 million from the GEF, and $700,000 from the Netherlands. An initial $1 million contribution from the government of Ecuador demonstrated the government's commitment to this private institution, but because of the national economic crisis, it was not until 2000 that FAN received these resources, in the form of national bonds with an amortization period of three years.

Throughout the history of environmental management in Ecuador, various projects have been negotiated but not implemented for lack of national counterpart support. FAN

Box 2
Financial profile of the protected area system

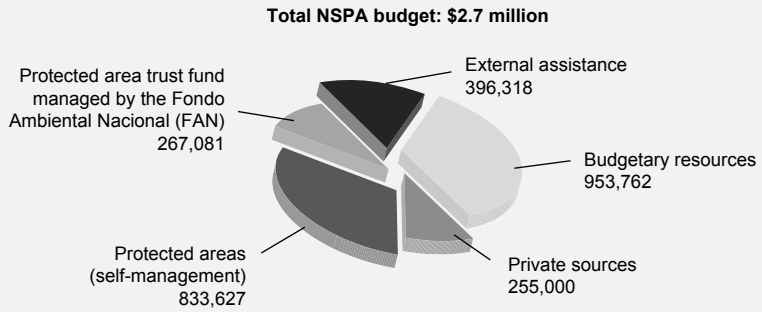
A financial analysis by Galindo and others (2005) estimated the financial requirements of the NSPA under two scenarios:

- A *basic scenario* focusing on the minimum necessary requirements for the management of the protected areas. Three objectives are envisioned: to consolidate the presence of the Ministry of Environment in the NSPA; to guarantee the preservation of the integrity of the heritage of the mainland areas of the NSPA; and to facilitate participatory management and greater involvement of community organizations and local government in the management of protected areas.
- An *integrated scenario* calling for the implementation of activities that would guarantee the long-term fulfillment of the NSPA's objectives and the sustainable use of the protected areas' intrinsic values. This scenario favors sustainable development principles in protected areas and outlines possibilities for using natural resources and encouraging the participation of the various social actors. It involves the development of initiatives and projects that aim to improve the quality of life of the population through the promotion of practices and alternatives compatible with conservation.

Under the basic scenario, Ecuador's 31 mainland protected areas require $5.9 million per year. Under the integrated management scenario, $15.2 million is needed. So, even in the most basic management scenario, funding for the NSPA—currently $2.7 million— would have to be increased more than 2.3 times.

As the figure shows, NSPA funds come from the government (35 percent), from the protected areas themselves, through entrance fees and tourism revenues (31 percent), from private sources (9 percent), from the protected area trust fund managed by the Fondo Ambiental Nacional (FAN) (10 percent), and from assistance provided through projects of international and bilateral donors (15 percent). Galindo, Baus, and Aillón (2005) note that 71 organizations and entities provide financial support to the NSPA: 8 international agencies and donors, 7 international NGOs, 15 national NGOs, 25 local NGOs, 8 government entities, and 8 private sector stakeholders.

Box 2 Figure A
Sources of financing for Ecuador's National System of Protected Areas, 2003
(U.S. dollars)



Source: Ministry of Environment 2005a.

has been able to increase the resources available and stimulate the investment of new resources. Donors see FAN as independent and transparent, with a long-term vision for financial sustainability. FAN currently provides $45,000—$50,000 per year for nine protected areas.

The project contributed to the development of funds that have been used to leverage further financing for FAN. A key component of the follow-up project is to increase FAN's funding to $12 million by 2005; this goal had already been achieved at the time of the assessment mission. The next target is $30 million by 2010.

The stakeholders interviewed generally agreed that much of the capacity to pool needed financial resources for protected areas in Ecuador resides not with the government or even with FAN but with the protected areas themselves. Most felt that the project had not adequately addressed the need for a system for autogeneration of funds for the protected areas.

Resource allocation in the NSPA, according to the basic country assessment (Galindo, Baus, and Aillón 2005), tends to follow a pattern and does not necessarily respond to current protected area needs and priorities. The financial analysis showed that in many cases the protected areas that generate the most funds are also the largest recipients of funding from the system. The reason is that financial resources are skewed toward the protected areas with the most tourism potential. This leaves other protected areas with inadequate resources to cover basic costs.

In 2003, according to the Ecuador Ministry of Tourism, mainland protected areas in the NSPA received more than 351,000 visitors. Five protected areas—Cotopaxi, Machalilla, Cuyabeno, Chimborazo, and Cotacachi-Cayapas—accounted for almost all the total generated by the protected areas (see table 3). Most protected areas do not currently have the capacity to produce significant financial resources on their own; 3 parks generate less than $1,000, and 13 generate no funds. The Biodiversity Protection Project had intended to address revenue generation but achieved little.

Stakeholders agree that significant capacity will have to be built in protected areas if tourism potential is to be tapped; that regulations governing tourism are needed; and that park management's capacity to collect fees has to be addressed. Issues of redistributive equity in the NSPA also need to be discussed.

Ecotourism and related capacities could be further developed. The protected areas with the greatest potential for financial revenues are those close to Quito; they include Cotacachi-Cayapas, Cotopaxi, and El Boliche, which are among the most visited parks in the country, aside from Galápagos. Guided

Table 3 Funding generated by the protected areas, 2003

Areas with self-generated budgets	*U.S. dollars*	*Percentage of total*
Cotopaxi National Park	328,864	39.45
Machalilla National Park	198,082	23.76
Cuyabeno Fauna Reserve	92,515	11.10
Chimborazo Fauna Reserve	62,306	7.47
Cotacachi-Cayapas Ecological Reserve	52,681	6.32
El Boliche National Recreation Area	33,047	3.96
Pasochoa Wildlife Refuge	25,000	3.00
Podocarpus National Park	7,678	0.92
Pululahua Geobotanical Reserve	7,555	0.91
Los Ilinizas Ecological Reserve	6,793	0.81
Sangay National Park	5,415	0.65
Cayambe-Coca Ecological Reserve	5,115	0.61
El Angel Ecological Reserve	4,259	0.51
Manglares-Churute Ecological Reserve	2,047	0.25
Antisana Ecological Reserve	1,415	0.17
Limoncocha Biological Reserve	403	005
Sumaco National Park	168	0.02
Llanganates National Park	284	0.03
Total	**833,627**	**100**

Source: Galindo and others 2005.

tours, opportunities for visitors to stay with communities in log cabins in the forest, and other tourist-related entrepreneurial initiatives could be undertaken or expanded, and fees could be raised. Cotacachi-Cayapas has the highest number of tourists in the country (almost 89,000 per year, according to the financial analysis), but it contributes only 6.32 percent of NSPA funds; entrance fees are among the lowest in the country and are not systematically collected. An example of a protected area with potential for significant tourism revenue is Machalilla, which offers a beach (El Freiles) with hotels, seasonal whale watching, humid forest, dry forest, cabin accommodations, various species of flora and fauna, local guides, and a visitor center.

The visitor centers built under the project are among the project investments that have had a long-term impact on the ability of certain parks to attract tourists and raise revenue. The assessment team visited the centers in Cotacachi-Cayapas and Machalilla. Both are well known and appreciated, according to most stakeholders; one respondent called

the visitor center in Cotacachi-Cayapas a "showpiece" of the project.

Stakeholders observed that limited awareness of the parks' potential capacity for generating funds leads to a low overall valuation of the protected areas. Relevant financial data related to the potential of protected areas for revenue generation are not kept in any systematized way in the NSPA. Indeed, Galindo and others (2005) conducted the first systematic collection and analysis of this data for the NSPA. The Biodiversity Protection Project included a study on the value of goods and services generated through the parks, but that study has not been well circulated. The links between conservation and economic development (such as benefits from development of tourism) should be discussed and shared with a wide variety of stakeholders. A study by Balmford and others (2002) notes that in many cases direct global and local economic benefits from protection of biologically important areas are greater than the costs of establishing and managing protected areas.

NGOs and donors have led the way in protected area management and, in particular, in pooling resources for this purpose during the past decade. One of the principal financial mechanisms for the NSPA has been international assistance from sources such as the GEF and from bilateral donors, including Germany, Italy, the Netherlands, Spain, and the United States. Such assistance has, however, been declining in recent years. NGOs that have been active in protected areas include national organizations such as EcoCiencia, Fundación Natura, and Fundación Antisana and international NGOs such as Conservation International, the Nature Conservancy, and the World Conservation Union. Private protected areas run by NGOs are successfully generating revenue in certain areas. Jatun Sacha, notably, raises outside funds, attracts volunteers, and is completely self-sustaining. (See box 3 in the next section.) The enabling environment for NGO activity—laws, policies, and rules—remains unclear and weak, however. There is much potential to expand and replicate NGO efforts throughout the NSPA and to cement these collaborative efforts with strong, clear legislation and regulations.

In many cases communities within or adjacent to protected areas have been able to generate revenues from tourism. For example, in Agua Blanca, a small community in Machalilla and perhaps the flagship case of good relations with communities living in parks, revenues raised from tourism have significantly helped park-community relations to evolve from antagonism to cooperation and mutual benefit. Archaeological findings on the Manta people in the protected area have led to the development of tourism, and the community has used both archaeological tourism and ecotourism to its advantage. The community offers guided tours of archaeological and natural sites and has a museum of artifacts and history. (Community members said that the project had no role in this success.)

Protected area management

Table 4 summarizes the most important project impacts on capacity for protected area management and the outstanding challenges.

Table 4 Capacity for managing protected areas: Project impacts and main challenges

Type of capacity	*Project impacts*	*Main challenges*
Implementation and overall management	• The project contributed to the process of decentralization, which was integrated into the strategic plan for the National System of Protected Areas.	• Coordination, collaboration, and communication between the center (the Ministry of Environment) and the periphery (regional level, park management, and local level) remain poor. • Feedback mechanisms and information sharing are inadequate. • Management practices and biodiversity-related priorities differ among regions and protected areas; some protected areas cut across regions. • Roles and responsibilities of stakeholders are unclear. • The enabling environment is weak or unclear. • The Ministry of Environment is not seen as having sufficient authority or leadership. • Human and financial resources in the ministry are inadequate.
Park management	• Programming by the Sistema de Educación y Capacitación (SEC) contributed to management capacity of managers (*responsables*), park guards, and local communities. • Protected area management plans completed during the project have assisted park management in some cases.	• Capacity levels differ among protected areas. • There is no systematized capacity development for park management in the NSPA. • Further capacity is required for business administration, for dealing with extractive businesses, and for tourism development and management.
Enforcement	• Park management capacity was enhanced through infrastructure investments such as management offices, visitor centers, and vehicles.	• Numbers of guards and staff in many protected areas are inadequate. • The enabling environment for managing protected areas is weak (e.g., absence of or lack of clarity in concession models and laws related to resource extraction); laws are not harmonized across ministries and sectors. • Mechanisms for recourse against violators are weak or nonexistent; powers of protected area managers have recently been effectively reduced. • Record keeping on violations is not systematized. • The decentralized system is not harmonized across regions.

At the national level

Capacity to implement decisions on protected area protection and management at the national level is hindered by various systemic constraints:

1. ***Communication and collaboration between the center and the periphery—that is, between the Ministry of Environment and the regional, park, and local levels—are inadequate***. The NSPA's increasingly decentralized governance requires both a strong center and close coordination and communication with the periphery. Most stakeholders reported that this was not the case and that there were significant blockages in the system.
2. ***Decentralization without good communication and collaboration among actors has given rise to divergent priorities and practices in particular areas***. Much decision-making power has devolved to regional directors and biodiversity leaders at the regional level; few mechanisms exist for maintaining close collaboration between regional districts and the ministry or between districts. As a consequence, decisions and implementation practices are usually not coherent or consistent. Regional districts are to some extent autonomous, and the degree to which priority is given to protected areas and biodiversity varies.
3. ***The Ministry of Environment is seen as lacking authority and as not providing strong leadership. It does not have sufficient human and financial resources to manage and monitor the protected area system***. At the time of the assessment, the ministry's unit for Biodiversity and Protected Areas had only four staff members, and, as noted in the preceding section, the allocation for the ministry was a very small proportion of the government budget.
4. ***The enabling environment (laws, policies, and regulations for guiding, regulating, and supervising protected area management) is weak or completely lacking***. The PPAR found that "the project achieved only a few changes to the most important institutional, legal, and social impediments to sound biodiversity management in Ecuador" (World Bank 2002c, 8–9). Proposed plans and legal reforms did not attract the necessary support within the government.
5. ***The organizational structure of the NSPA and roles and responsibilities are unclear.*** "More than one hundred legal bodies now exist to regulate the environment. A plethora of environmental 'institutes' compose a confusing alphabet soup . . . Few people know what these institutes do, how they are financed, or how they spend the money they receive" (Lopez 2005, 343).
6. ***Protected areas often cut across administrative units.*** The overlap of authority and the sharing of authority for protected areas between administrative regions and regional directors or biodiversity leaders, whose priorities may not be coordinated or coherent, can make collaboration difficult.

7. ***There is little coordination and collaboration among ministries*** (such as the Ministries of Environment and Economy and the sectoral ministries) on issues related to protected areas.

At the local level

In many cases, park staff and managers (responsables) have demonstrated good capacity for park management, and useful examples can be found of comanagement or collaboration between park staff and other stakeholders. Some NGOs, municipalities, and local communities are successfully managing, or collaborating with others to manage, protected areas. The Biodiversity Protection Project addressed management capacity at this level to a certain extent, catalyzed some collaboration, and achieved limited results in particular protected areas.

In most cases, managers' capacity cannot be directly linked to the project, but there are instances in which the project is credited with building individual capacity for protected area management. Some park responsables—among them, those currently in charge of Cotacachi-Cayapas and Cayambe-Coca—are products of the SEC component of the project, and many park guards, such as those met by the evaluation team in Machalilla National Park, benefited from the SEC capacity development program.

At the time of the assessment, there was no systematic capacity development program for park managers or staff. The SEC program could have served as a foundation for training, but neither the Ministry of Environment nor the Ministry of Education took ownership of it, making the continuation of capacity development questionable.

The reputation of Ecuador as a megadiverse country attracts external support to the government and to Ecuadorian NGOs. The NGO community has proved capable of effective action in support of the NSPA and protected area management (see box 3). Most stakeholders interviewed agreed that NGOs in Ecuador have "filled a void" in assistance to park management at the local level, and some believe that without their efforts many of Ecuador's parks would be in worse peril than now. The project brought NGOs and other actors together to discuss the system and implement various aspects of its management, and the CLD independent evaluation credited the project for its success in building the capacity of NGOs.

Many local community members benefited from the project's SEC capacity building and educational component, which helped develop their capacity for park natural resource management. Although local participation in protected area management planning did take place during the project, most stakeholders believed that management of protected areas was not participatory enough. The project attempted to promote participation at the local level through the creation of regional consultative committees (RCCs), but most of

Box 3
Models of NGO protected area management

Collaboration in the management of NSPA parks

In Sangay National Park, *Fundación Natura* has been working for the past eight years with municipalities, park management, local communities, and other NGOs on various aspects of park management, including review of management plans and monitoring. A management plan in Sangay was developed as part of the Biodiversity Protection Project. In 2005 Sangay was dropped from the Parks in Peril list maintained by the World Heritage Site program of the United Nations Educational, Scientific, and Cultural Organization (UNESCO), reflecting a marked improvement in park management, largely thanks to the support of Fundación Natura.

Fundación Antisana has been working in Antisana and Cayambe-Coca for 14 years, in cooperation with park staff and management, local communities, and relevant municipalities. The Ministry of Environment has approved the NGO's management, and many stakeholders view it as the administrator of the protected area. Fundación Antisana assisted with development of a management plan indirectly through the project and has since worked on training plans in the protected area. It has helped build municipal capacity, including knowledge, skills, and commitment to environmental and natural resource management, and it works directly with park heads and staff, municipalities, and communities to improve park management. Members of the NGO said its involvement has been successful because of good cooperation with responsables, long-term dedication and familiarity as a result of working in the same place, and a participatory approach involving all relevant players—municipalities, communities, and those living in buffer zones.

Private reserves

Some NGOs, such as the *Jatun Sacha Foundation,* the *Macipucuna Foundation,* and *Fundación Jocotoco* manage private protected reserves. The reserves currently have no legal status, but they are considered protected forest. The NGOs buy land and work with local communities to manage the areas and their resources.

Jatun Sacha, for example, currently operates eight biological stations; it also participates in the management of the Machi-Chindul Ecological Reserve and Gran Sumaco Biosphere Reserve in Amazonian Ecuador. In 2004, 800 volunteers worked on the foundation's reserves, injecting new resources. According to a representative of the organization, Jatun Sacha, as a private entity, tries to mediate between companies and indigenous groups or between the government and local groups while working directly with local groups and maintaining collaborative relationships. Jatun Sacha sees its private reserve initiatives as potential platforms for contributing to the management of larger protected areas and national parks.

these efforts were unsuccessful. In some cases indigenous local communities are managing areas themselves (see box 4).

Academic institutions also demonstrate capacity for park management; examples are Católica and San Francisco universities. These institutions bring the required technical knowledge and skills to bear in their initiatives, and they often provide resources and maintain good relationships with key stakeholders in the protected areas. The two

universities have conducted training in park management, including business administration. For example, the head of Yasuní National Park was trained through a distance learning program of the Universidad San Francisco.

Capacity to enforce legislation

Responsibility for enforcement in Ecuador is divided among different organizations. For example, a company seeking a permit for an oil or gas drilling concession would apply to the Ministry of Environment. Although the law permits concessions, there is no legal framework guiding their leasing or management. The Ministry of Energy is the lead agency for issues in the energy sector, and there is little coordination or consultation between it and the Ministry of Environment.

Box 4
Examples of park management by municipalities and indigenous communities

Although the cases described below cannot be attributed to the Biodiversity Protection Project, they may offer lessons for comanagement and participation by local communities in protected area management.

Cajas National Park is administered to some degree by the municipality of Cuenca and is maintained through small fees added to water bills by a private water company. People understand that high-quality protected area maintenance yields the benefit of good, clean water. According to stakeholders, the arrangement has worked well; at a time when most local governments are seeking funds, Cuenca is generating them. This example of municipal comanagement should be seen as an exception rather than the rule, as local governments and municipalities typically do not have the necessary capacity for park management. Some stakeholders suggested that a similar setup might work in Machalilla if tourism capacity is developed.

The *Cofán Bermejo Ecological Reserve* was established in January 2002 on 50,000 hectares of traditional lands of the Cofán people in the Ecuadorian Amazon. The reserve was created at the request of the Cofán communities, who were concerned that recently announced development plans would affect the integrity of their land. During negotiations for protected area status, the Ministry of Environment (the legal guardian of the area) offered protected area status if the Cofán organizations would create a boundary trail, conduct an accurate survey, and develop a management plan. This was done. Management of the reserve is entrusted to the Indigenous Federation of the Cofán Nation of Ecuador (FEINCE), which in turn delegates operations to an NGO, Fundación Sobrevivencia Cofán.

The *Yawa Jee Indigenous Reserve* is a self-declared community-protected area of the Yawa Jee indigenous organization in Pastaza Province. It was established through a long process of demarcation and inventory of traditional lands, in the course of which the communities recognized that the land was at risk from oil exploitation and ranching in adjacent areas. Demarcation of the land, which was supported by financial and technical help from external groups, was necessary to secure legal recognition of land titles. Currently, the German Society for Technical Cooperation (GTZ) supports the Yawa Jee community organization in managing its forest conservation areas so that their biological diversity is conserved and continues to provide livelihoods for local people. Yawa Jee runs small-scale ecotourism operations, but these are still improvised in many respects. The community wants to enhance its entrepreneurial capability for marketing and for cooperation with national tour operators and travel agencies.

Environmental licensing would offer an opportunity to seek better coordination.

With no general supervisory structures or procedures and little communication between levels of the system, there is no organized way for the Ministry of Environment to monitor or supervise activity in protected areas, making enforcement difficult. The government does not currently have systems and structures in place for tracking and controlling activity in protected areas, and the situation is exacerbated by a shortage of crucial capacity. Most stakeholders believe that lack of political will is a key factor in this weakness. The case of Vigilancia Verde, described in box 5, is an example of effective enforcement, although one that is not linked to the project.

Most of those interviewed said that resource extraction activity has been growing steadily since the end of the project. Pressure on protected areas is certainly increasing, and there are systemic and institutional weakness in the enforcement capacity of the Ministry of En-

Box 5
Outsourced surveillance: Vigilancia Verde

In 1999, after a nationwide participatory process, Ecuador's Ministry of Environment developed a new public forest policy and introduced substantial changes in the regulations for applying the Law on Forestry and Conservation of Protected Areas and Wildlife. Its "Standards for Sustainable Forest Management in Ecuador" enabled the forest authority to monitor logging activities on the basis of verifiable indicators. This gave Ecuador "a modern, coherent legal framework for forestry, geared toward making forest management transparent, clear, simple and predictable" and providing "a sound basis for encouraging the sustainable management of natural forests and preventing illegal or destructive logging" (ITTO 2002, 1).

In 2002 Ecuador initiated an Outsourced Forestry Supervision System, with the objective of combating corrupt and illegal practices by improving forestry administration services and making them transparent. The system would allow the Ministry of Environment to concentrate its human resources and capacity on law enforcement, the promotion of sustainable land use, and other strategic activities. One component of the system was Vigilancia Verde ("Green Surveillance"), a supervisory body made up of private and public institutions under the leadership of the Ministry of Environment, the armed forces and police, and five NGOs. It was responsible for controlling the transport of roundwood and timber between the forest and marketing and processing locations. Funded by a trust that received 50 percent of the value of all illegal timber that was detected, seized, and auctioned, Vigilancia Verde had seven checkpoints on roads throughout the country. It demonstrated its effectiveness in its first year by seizing five times the volume of timber seized by the government during the previous year.

Nearly half of those interviewed for the impact assessment cited Vigilancia Verde as a successful program for environmental and biodiversity protection. The program was not operating at the time of this assessment because of questions about the constitutionality of assigning enforcement (nominally a government activity) to nongovernmental organizations.

vironment and the NSPA. Most stakeholders believed that a well-managed concessional model could encourage better services and enhance park system revenues by charging higher fees. Some asserted that oil companies and others "are getting a good deal" and would be willing to pay more to gain access to protected areas.

The assessment measured progress in enforcement capacity by analyzing skills, resources, and equipment available within the protected areas.

Weaknesses in the enforcement process. Responsables who previously served as protected area chiefs (*jefes*) felt that they used to have much more power to stop damaging activities in the park. As the park manager in Machalilla observed, instead of taking immediate action on witnessing illegal or damaging activity, managers now fill out a form and submit a report to the relevant municipality, where the report apparently often just sits in the legal department. Lawsuits are supposed to ensue, but these legal proceedings do not seem to bear fruit, and acts often go unpunished except for a small fine. Since violators are generally aware of this systemic weakness, there is little deterrent to damaging activities in protected areas.

The ability of park management to enforce the laws has been significantly eroded in recent years. Decentralization, which was in the planning phase during the project and was subsequently implemented, was not accompanied by effective capacity development, and some negative consequences have resulted. As noted earlier, the Ministry of Environment now has no direct authority over protected area management in the field, and clear leadership from the state is consequently lacking. In addition, the authority of managers of protected areas has effectively been reduced. Before reorganization, a single jefe was responsible for an entire protected area, but now protected areas that extend across regional boundaries are under two or more responsables. Such important duties as law enforcement, formerly the responsibility of the jefe, now lie with regional directors, who are distant from local stakeholders and are much less likely to take effective action.

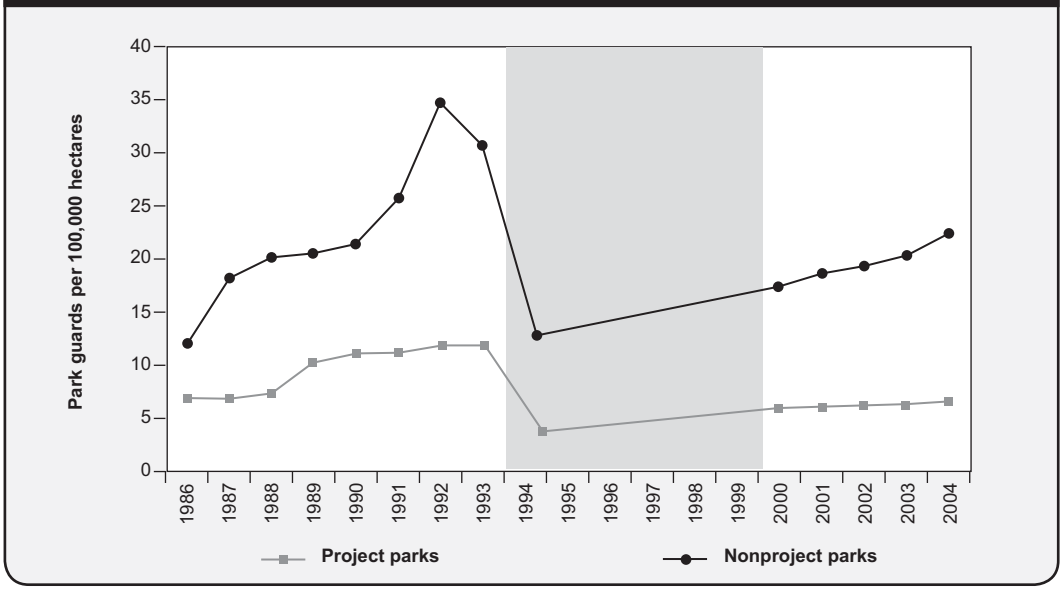
Staffing levels. The number of park guards can be expected to affect biodiversity conservation. Stakeholders in Machalilla noted that often donor projects temporarily pay for increased numbers of guards but that these are not retained after the project ends. According to the financial analysis, 268 persons are working in the protected areas; of these, 158 are paid by the Ministry of Environment and 110 by donors and related projects. At least five areas have no staff at all, and in some cases park guards are responsible for areas of up to 80,000 hectares. The overwhelming majority of park personnel interviewed agreed that there are not enough guards to control the entire park area.

The data in figure 2 can be interpreted to suggest some impact of the project in maintaining staffing levels in its sites while numbers continued to decline elsewhere—although the difference is minor. But even if there was a small effect during the project period, it proved unsustainable. By 2004 the number of park guards in project sites averaged only 6 per 100,000 hectares, but in nonproject sites the figure had climbed to 22 per 100,000 hectares. Machalilla, a project site, had 29 guards in 1996; it now has 12.

In any case, the data for project and nonproject areas shown in the figure are not directly comparable, for two reasons. First, because of economies of scale, large parks can achieve a given level of protection with fewer guards per unit area than small areas. Second (as shown in figure B-1 in appendix B), in small parks disturbance on the periphery affects a greater proportion of the park area than in large parks (edge effects).

Equipment and infrastructure. The project seems to have contributed to the availability

Figure 2
Number of park guards per 100,000 hectares in selected project and nonproject protected areas in Ecuador



Source: Authors' data.
Note: The middle shaded area shows the period during which the Biodiversity Protection Project was implemented.
a. Averages for four protected areas included in the project. Excludes Antisana and Cayapas Mataje, which had no park guards for much of the period covered by the data.
b. Averages for seven protected areas not included in the project. Excludes the Galapagos Marine Reserve, protected areas with no park guards, and areas smaller than 4,000 hectares.

of office and field equipment, although data are not available for the period preceding the project. The 1998 inventory conducted as part of the preparation of the NSPA strategic plan recorded, on average, one computer at each site compared with one computer at every 2 sites for the 14 nonproject sites. The differences are especially significant for field equipment. Total numbers of binoculars, cameras, and compasses for the 6 project sites averaged 13 units per site, but the 14 nonproject sites had only 3 units per site.

There are indications, however, that this level of support was not sustained. Figures for computers are difficult to analyze because of rapid technological changes. Llanganates National Park which had been a "paper park" in 1998, with no units of any equipment recorded in the inventory for that year, had a computer, scanner, and four memory sticks by 2004. Machalilla National Park, which had two computers in the 1998 inventory, apparently had eight by 2004, but several appear to have been old, nonfunctional machines. Field equipment is less subject to becoming outdated. Machalilla, which had 7 binoculars, 2 cameras, and 11 compasses in 1998, reported only a single camera in 2004. In 1998 Sangay National Park had four binoculars, five cameras, and eight compasses, but by 2004 it had only two binoculars, two cameras, and six compasses.

The project was instrumental in making investments that assist park management. These included, in addition to the construction of visitor centers and offices for park guards and management, the purchase of vehicles such as cars and boats, which are essential for patrolling. All stakeholders agreed that the project played a critical role in infrastructure investment in protected areas in Ecuador, especially since it was the only initiative on such a scale.

In some cases the original vehicles purchased for the parks through the project are still there. In Cotacachi-Cayapas and Machalilla these are the only vehicles at park management's disposal. They are in bad condition, however, and will not be usable or safe much longer. Park management stressed that although cars were purchased, funding was not provided for gasoline and maintenance.

The financial analysis (Galindo and others 2005) found that protected areas involved with the project were better off than other parks, as measured by investments in equipment and infrastructure. The study, however, also showed that investments made during the project period decreased or deteriorated significantly with time. This may signal a lack of commitment or political will to maintain the equipment. The project did lay a foundation, but it now has to be built on.

Awareness raising and monitoring

Table 5 summarizes the most important project impacts on capacity for awareness raising and monitoring and the outstanding challenges.

At the national level

Under the project, a communication strategy to support biodiversity protection was drawn up, and the project coordination unit, with the participation of the NSPA's technical staff, produced a number of publications.[5] According to the ICR, these publications enjoyed significant demand and public acceptance. Earnings obtained from their sale were used to cover a project component for which grant funds were not available. The new authorities of the Ministry of Environment have shown interest in pursuing a similar program.

Awareness raising at the national level requires not only government capacity but also political will. The Ministry of Environment is not currently involved in any significant awareness-raising efforts concerning biodiversity and protected areas. With inadequate staff and resources and limited authority, it lacks adequate capacity for awareness rais-

[5] The materials included a map of the National System of Protected Areas, a guide to Ecuador's national parks and reserves (book and CD), a guide to Ecuador's alpine meadowlands (páramos), a guide to tourism at urban sites in the Galápagos, policies for tourism in protected areas, and regulations for the administration of protected areas and biodiversity.

Table 5 Capacity for awareness raising and monitoring: Project impacts and main challenges

Type of capacity	*Project impacts*	*Main challenges*
Awareness-raising	• Programming by the Sistema de Educación y Capacitación (SEC) contributed to key awareness raising at the local level in some protected areas that still can be observed today. • Awareness-raising activities by nongovernmental organizations begun during the project have continued to have an impact (not solely attributable to the project).	• Human and financial resources in the Ministry of Environment are inadequate. • No programming is being done to build awareness at the local level regarding protected area and biodiversity issues. • No indication of follow-up support for the SEC (now the Centro de Capacitación de Conocoto) is forthcoming from the government or any other source.
Monitoring; information collection and dissemination	Not addressed by the project.	• There are no standardized tools, monitoring systems, or related data collection, storage, or dissemination activities within or among protected areas. • Interministerial coordination and collaboration on environmental and biodiversity issues are poor. • There is no feedback mechanism for sharing knowledge and lessons in order to improve management or address key issues.

ing (even though some individuals in the ministry may have the desire and knowledge to promote awareness).

Biodiversity leaders representing the Ministry of Environment are in charge of biodiversity- and protected area—related issues in their respective regions. Biodiversity leaders have a mandate to deal with issues such as protected area conservation and management, biosafety, species protection and trafficking, genetic resources, and marine and coastal issues. The purpose of this position, according to some stakeholders, is to serve as a "counterbalancing force to the forestry power in the country" at the regional level, with leaders linked by a network. Evidence, however, suggests that the network is not yet fully functional, and awareness-raising capacity is not yet apparent or operational.

At the local level

Other key stakeholders who promote awareness about protected area and biodiversity issues include national NGOs such as Fundación Antisana, Fundación Natura, and EcoCiencia, international NGOs such as Conservation International and the Nature Conservancy, and academic institutions.

At the local level, capacity for awareness raising lies with park staff and guards to some extent and with members of local communities who live in protected areas such as Cotacachi-Cayapas and Machalilla. Some of this awareness-raising capability can be attributed to project activities undertaken through the SEC, particularly in communities such as Agua Blanca and Casa Viejas in Machalilla (see box 6). Most local stakeholders noted that other, parallel initiatives could be equally responsible for positive effects, if not more so.

By 2000 the SEC had become an independent program, the Centro de Capacitación de Conocoto, formalized in an agreement between the Ministry of Education and the Ministry of the Environment and with independent sources of funding. From the end of the project until recently, the program received funding from the government of the Netherlands, but the assessment team found that the program is struggling to survive and that funding is about to end. At the time of the review, the government had no plans to utilize the center for continued awareness-raising activities; government staff noted that some of the training provided is outdated and may not fit well into future programming. Without funding from the government or another donor, this important service for raising awareness at the local level will no longer function.

Information management

Government capacity for collection, storage, and dissemination of data on biodiversity is weak, according to most of those interviewed in the government and NGOs. Under the project, an innovative idea for a Biodiversity Information Center (BIC) that would be a central repository of knowledge

Box 6
Case study: The SEC's contributions

Up to 2004 the Sistema de Educación y Capacitación (SEC) trained more than 1,700 people, mostly community members age 16–65, in 14 provinces and 17 protected areas in Ecuador. The SEC had an academic component and a technical and environmental component. Students completed local environmental projects and could progress through primary and secondary levels of education and even receive high school or bachelor's degrees for their multiyear studies. At first the SEC issued certificates to its graduates, but when it became part of the Ministry of Education, it was able to offer degrees and diplomas.

Many local graduates of SEC programs have become leaders in their communities, promoting awareness and sharing knowledge about management of environmental resources and protected areas. The educational programs for communities often included park staff and other local stakeholders. Evidence of the SEC's achievements can be seen in responses by local stakeholders in protected areas such as Machalilla who stated that at the community level, awareness of biodiversity and protected areas is high and people are more aware of the need to conserve biodiversity and understand the benefits of conservation and sustainable natural resource management.

for the country was pursued. Although some results were achieved, the information center quickly became ineffective and outdated. Some stakeholders noted that it was expensive to compile the database and even more expensive to update and maintain data with limited government funds. The database was absorbed into the Centro de Información Ambiental (CIAM) in the Ministry of Environment. Although CIAM does have recent data for mapmaking purposes, this information is outdated or does not cover the whole system, and the Ministry of Environment and other ministries rely on other sources for up-to-date information on biodiversity and protected areas. Management of the follow-up NSPA Project stated that the new project plans to build on CIAM.

Information on protected areas is maintained outside the government by NGOs such as EcoCiencia, Fundación Natura, and Birdlife International and by academic institutions. Universities, museums, and herbariums collect and store important biodiversity and protected area information as part of their research initiatives. Private sector firms such as Mentefactura now hold important information on the NSPA.

Failure to share information is a significant limitation on the use of information for decision making and planning at various levels. The project intended to promote biodiversity data collection and sharing but did not achieve much in this regard, perhaps because of lack of collaboration among key stakeholders during the project and the failure to build key alliances. This issue is exacerbated by the larger institutional and systemic challenges in the NSPA, including shortcomings in communication and sharing between the center (the

Ministry of Environment) and the periphery (the parks and NGOs). Some stakeholders claim that competition between NGOs (and other institutions) impedes information sharing even among NGOs themselves, although many say that this competition has diminished in recent years.

Local capacity for biodiversity monitoring was not addressed in the project, but it is a key aspect of biodiversity management. Ideally, up-to-date biodiversity information collected in the parks should be used in day-to-day park management. Good monitoring and performance measurement tools and a systematized monitoring system for tracking biodiversity and activities in the parks would allow information to be collected and shared within and among parks, to be fed into ongoing planning and decision making and to stimulate action on key issues.

The impact assessment mission looked at biodiversity monitoring and the use of data for management in Machalilla and Cotacachi-Cayapas. In neither case was monitoring being carried out systematically. Park guards said that they collected data on certain species of fauna and flora that they observed and on other biodiversity phenomena. Most said that they did not record this information in a database but instead filled out a simple checklist. The information was sent to the municipal government authority or to the national biodiversity directorate in the Ministry of Environment; it was not stored in any accessible system.

Copies of the raw data did not appear to be routinely maintained within the protected areas, and the protected areas never received the results of analyses of the data. The assessment team was unable to establish whether data collected by park guards were ever analyzed or interpreted. Effectively, therefore, there is no monitoring beyond the general impressions of park guards that a particular species is being sighted more or less often, and this type of data collection obviously depends on continuity of employment among the guards. The tools for collecting information are not standardized from park to park, and so any aggregation of data would be a laborious task.

Local beneficiaries, NGOs, and other stakeholders

Table 6 summarizes the most important project impacts on capacity of local beneficiaries and the outstanding challenges.

The project document (World Bank 1994) called for the project to "seek the active participation of local communities, in the decision-making process of managing reserve areas" in the Galápagos (where no activities actually occurred) and in the Chachi communities living around the Cotacachi-Cayapas reserve. At the latter site, the project was to "initiate a pilot effort to provide assistance in forest management and biodiversity protection to indigenous communities settled in buffer zones of project areas." In addition, the project's support for the preparation of management plans was to

involve the participation of local communities and NGOs. Its analysis of the relationship between local populations and the protected areas was to focus on communities' use of resources and on ways to maximize the benefits accruing to communities.

The project envisaged support for the creation of regional consultative committees composed of representatives of local communities, NGOs, and INEFAN's regional district staff. The committees' mandate was to "assist in the process of conflict resolution and oversee the implementation of reserve areas' management plans." The regional committees apparently never materialized. The project did secure citizen participation in protected area planning in Machalilla, Sangay, Yasuní, and Cayapas-Mataje, where community support groups were formed to assist in the formulation of management plans, but only in Machalilla did the support group develop into a permanent consultative body.

Some local community members in Agua Blanca and El Pital remember attending meetings and consultations at the time of the project to participate in developing management

Table 6 Capacity of local beneficiaries, NGOs, and other stakeholders: Project impacts and main challenges

Type of capacity	*Project impacts*	*Main challenges*
Awareness of and attitudes toward protected areas	• Attitudes of local communities toward protected areas have improved, although this cannot be solely attributed to the project. • Awareness of protected areas has improved; this is linked to programs of the Sistema de Educación y Capacitación. • Relationships with protected area management and staff have improved.	• Local awareness-raising and capacity building programming is ending; no such programming is foreseen to continue, aside from possible NGO initiatives. • Continued capacity building is required if communities are to reap benefits (in improved livelihoods, etc.) from protected areas. • Mechanisms for participation by local communities in park planning and management are inadequate.
Improved livelihoods of local communities	• No attributable impacts.	• Almost all NSPA's financial resources come from 5 protected areas; 13 areas generate no funds. • Capacity among local communities and nongovernmental organizations for providing tourism activities is needed. • Awareness of the potential value of the resources that can be generated through tourism activities in protected areas is low.

plans. These respondents noted that although they appreciated being consulted, they felt that nothing had been done since then and that their input was not utilized. Although participatory workshops have recently been held in Machalilla to discuss the terms of reference for the management plans for the park under the follow-up project, many key community members were skeptical, and more than half did not attend because of their experiences under the project.

The effects of the project are, however, evident among local communities that have benefited from having members participate in SEC educational and capacity development programs. Community members in areas such as Antisana, Cayambe-Coca, Cotacachi-Cayapas, Machalilla, and Sangay have shifted from unsustainable environmental management habits toward more sustainable ones—for example, toward sustainable management of trees, which are important for ecotourism. Stakeholders confirmed that commercials and advertisements during and after the project built awareness of biodiversity and protected areas. In some cases natural resource management practices and relationships with park guards have improved as people have come to understand not only the inherent value but also the social and economic benefits of sustainable resource management (see box 7).

The NGOs interviewed—most of which had been involved in some way with the project—were uniformly of the opinion that their inputs had been underutilized. In most cases there had been no attempt to sustain the results of the NGOs' activities except where they themselves sought subsequent funding to continue their efforts. For example, as part of the project, the NGO FUNDEAL undertook a socioeconomic and biological assessment of the lowlands of Cotacachi-Cayapas and the surrounding landscape. The study was of good quality, and it established a baseline of biological and socioeconomic information. But no attempt has since been made by FUNDEAL or other organizations to update this information or to monitor changes. Although NGOs such as Fundación Antisana and Fundación Natura have continued to work on management planning in the protected areas where they operated during the project, this sustained cooperation has been the result of their own initiatives and efforts.

The monitoring and evaluation component of the project was to look at such indicators as land use shifts in project sites and buffer zones and attitudes toward biodiversity to measure progress in empowerment and capacity development in local communities. Project assessments, however, found that this component was virtually ignored.

Global environmental benefits

Table 7 summarizes the most important project impacts on capacity for capturing global environmental benefits and the outstanding challenges.

Box 7
Grassroots responses: Findings from field visits to four communities near national parks

The assessment team visited two communities each in two locations: Cotacachi-Cayapas Ecological Reserve, where the project sought to assist local communities directly, and Machalilla National Park, where project support was indirect, through development of a protected area management plan.

Chilcapamba (Cotacachi-Cayapas) is geared toward cultural tourism, with an emphasis on traditional Chachi culture. Of about 120 families in the community, approximately half are Chachi, and 32 families are engaged in some aspect of the tourism industry. Five of these families manage tourist shelters that can accommodate up to 28 people at a time, at a cost of $12 per person. The community first began developing tourism in 1997 and claims to have received no external technical or financial assistance to date. Currently, tourism contributes 20–25 percent of household income for those involved; the figure is substantially higher for the families managing the accommodations.

At Agua Blanca (Machalilla) tourism is centered on the archaeological sites in the vicinity of the village, which has a small museum and several tourist houses. Interviewees named several sources of financial and technical assistance that had helped develop the tourism industry, but most did not cite the project, although its contribution in preparing an archaeological and cultural inventory was acknowledged.

At the other two communities visited by the assessment team—Morochos (near Cotacachi-Cayapas) and El Pital (Machalilla)—the development of alternative livelihoods was less evident. At El Pital there has been some attempt to develop an ecotourism and trekking center.

In all four communities local residents reported similar trends in attitudes toward the protected areas. Until the late 1980s or early 1990s the attitude was generally antagonistic, with the villagers seeing no benefits and several potential drawbacks in being associated with protected areas. In the mid- and late 1990s these attitudes started to change as interactions with protected area staff increased and local people (not necessarily from the communities themselves) were hired as park guards. In all the communities visited, the attitudes of village leaders were generally favorable. Villagers felt that they were more effectively represented than in the past and that associations of local stakeholders had been supported in building capacity to improve their livelihoods. In each community, village leaders were able to list a number of sources of external assistance and funding. In many cases village leaders did not list the GEF project until prompted to do so, and in no case were they able to ascribe relative quantitative impacts.

Assessment of biodiversity changes

Although the project document described the project's main expected benefit as "protection of biodiversity in areas of global ecological importance," immediate environmental changes were not an expected outcome of the project. As a result, while biological monitoring through remote sensing accompanied by on-the-ground monitoring was to be an essential element of the monitoring and evaluation system to be established under the project, there was in fact no systematic effort to collect and analyze remote-sensing data or to imple-

ment on-the-ground monitoring. According to the ICR, "the monitoring and evaluation system appears to have been designed so as to focus on the completion of the activities, with much less attention paid to the effectiveness of the models being developed" (World Bank 2000a).

Because the project never established quantitative indicators of global environmental benefits, baseline values, or a systematic monitoring system, it is virtually impossible to assess its impacts in this respect five years after project completion. The many studies funded by the project did provide data and information that could have served as the basis for an impact assessment, but in no case were the data subsequently collected cast in a format that could be used to assess impacts. It would have been possible to collect new data using methods that would allow comparison with the baseline, but this would have been very time consuming.

For this report, the assessment team sought comparative data that, although not collected or analyzed as part of the project, cast some light on its impacts. Studies of change in vegetation were reviewed, as discussed in appendix B. The generally unsatisfactory and troubling situation in Ecuador with respect to deforestation supports the impression that the project had minimal global environmental impact. Lopez, citing data from Fundación Natura, states that "deforestation is 45 percent in the lowlands, 48 percent in the highlands, and 8 percent in the Amazon basin. Thousands of acres of forest disappear daily, despite laws that prohibit the cutting down of trees and the exportation of wood. It has been calculated that deforestation amounts to 680,000 acres per year (approximately 2,000

Table 7 Capacity for realization of global environmental benefits: Project impacts and main challenges

Type of capacity	*Project impacts*	*Main challenge*
Natural resource management	• The project contributed to raising local awareness and improving capacity through Sistema de Educación y Capacitación (SEC) programs at the local level in some areas.	• Clearly demarcated boundaries (some completed through the project) improved awareness and knowledge of protected areas. • Awareness raising is low, and capacity-building programming is ending; no such programming is foreseen to continue, aside from possible NGO initiatives.
Protection of biodiversity and protected areas; measurable biodiversity and biophysical impacts	No attributable impacts.	• There is inadequate emphasis on biodiversity indicators and related monitoring and evaluation processes and tools. • All capacity challenges related to natural resource management are relevant here.

per day), and in less [than] forty years not a single forest will remain" (Lopez 2005, 341). Lopez also cites research by the Pontificia Universidad Católica del Ecuador on the disappearance of endemic plant species, as shown in table 8.

Local communities in Machalilla National Park say that there is noticeably less forest then 10 years ago. The situation in Machalilla, however, was affected by the activities of commercial timber companies, which encouraged communities to clear large areas of timber when it became apparent that enforcement within the park was about to be dramatically strengthened. Local respondents around Cotacachi-Cayapas Ecological Reserve reported that the extent of the forest had changed little from 10 years ago but that rural deforestation had weakened community management of forests outside the boundaries of the protected areas. The forest was consequently neglected and overutilized. Reports of trends in numbers of certain species, such as bear, within the park suggest, however, that forest cover is stable or may be increasing.

Awareness of protected areas and biodiversity

Stakeholders suggested that Ecuadorians are generally unaware of the benefits they derive from protected areas and therefore often assign little value to them. For example, few residents of Quito recognize that their water comes from the nearby protected areas of Cayambe-Coca and Antisana. As an NGO stakeholder noted, "protected areas need to become part of the Ecuadorian identity and culture" in order to raise awareness, enhance protection, and improve management of these areas.

In many protected areas, especially those that benefited from the project, there has been a substantial effort at boundary marking. Around Cotacachi-Cayapas, for example, most of the boundary has been marked except where natural features create obvious boundaries. Stakeholders who frequently enter the protected area therefore have a good understanding of its location. This, together with the local-level SEC components of the project, has led to significant awareness of the protected areas among many local communities that, in some cases, has been sustained. Nevertheless, interviews conducted in nearby communities indicate that some local stakeholders who do not actually enter the protected area are unaware of or only vaguely aware of its existence.

Sustainability and replicability

Previous assessments rated the sustainability of the Biodiversity Protection Project as "uncertain" (ICR) and "unlikely" (PPAR). The project did not address well the sustainability of NSPA-related initiatives, especially their continuing financial and capacity needs, but it did lay the groundwork for the creation of FAN, which is a significant player involved with the financial sustainability of the NSPA.

Table 8 Forest cover: Numbers of plant species and endemic plant species, Ecuador, 1998–2000

Geographic area and type of forest	*Original number of plant species*	*Number in 1998–2000*	*Percentage remaining*	*Number of species sampled*	*Number of endemic species*	*Percentage endemic*
Western Ecuador						
Dry	20,000	200	1	100	19	19
Semidry	40,000	1,500	4	100	14	14
Wet	12,000	90	1	170	34	20
Rain forest	8,000	3,200	40	230	59	26
Subtotal or average	80,000	4,990	6	600	126	21
Andean Region						
Slopes	61,000	18,000	30	850	213	25
Highlands	41,000	8,000	20	200	50	25
Subtotal or average	102,000	26,000	25	1,050	263	25
Amazon Basin (Eastern Ecuador)						
Andean lowlands	39,000	11,700	30	600	100	17
Amazon Basin	42,000	30,000	71	220	23	10
Subtotal or average	81,000	41,700	51	820	123	15
Total or average	263,000	72,690	28	2,470	512	21

Source: Valencia and others 2000, 35.

According to the ICR, the project did not produce a functioning institutional and financial framework, and the PPAR found that the project largely failed to build the institutional backing, stakeholder ownership, and social support necessary to ensure the sustainability of project accomplishments. This assessment confirms and reinforces these conclusions.

The Biodiversity Protection Project was the first GEF project in Ecuador and one of the earliest GEF projects in South America. As this review shows, the project's scope was too wide, and it did not address sustainability in the way that many GEF projects now do. In addition, the merger of INEFAN, the primary executor and recipient of the project, into the Ministry of Environment did not bode well for the continuance of activities and results.

4
Conclusions

Overall, there has been little replication of the project's activities. The funding by the government of the Netherlands of the SEC's outreach and educational activities immediately following the project did allow continuation of the programming that began during the project in many protected areas. (In fact, the Netherlands financed SEC programming twice.) Further replication of the SEC program would have made even greater impact from its activities possible.

Overall, the impact assessment confirmed the finding from previous evaluations that the Biodiversity Protection Project did not adequately strengthen the NSPA's institutional capacity. Some limited individual capacity was built through the project's SEC training and educational component and through a few other activities. The NSPA, however, still faces significant challenges in planning, implementation, and enforcement, in the enabling environment, and in financial sustainability, although progress is being made in some areas and good potential exists for addressing the challenges.

Policy making and planning

The Ministry of Environment lacks sufficient resources and some other key capacities in policy making and planning. There is some evidence of project impact in this area, but there is a need to further enhance collaboration with other players such as NGOs in order to strengthen ability at the national level to plan adequately for the system and its management.

The risks of selecting as the implementation agency a new organization, INEFAN, were not fully appreciated at project design. Most of the capacity developed in INEFAN by the project was lost when the agency was absorbed into the new Ministry of Environment. In addition, the project coordination unit (PCU) had a low status within INEFAN and was not well integrated into it, and little attention was paid

to whether INEFAN had incentives to adopt the PCU's recommendations.

The project contributed to planning capacity at the local level through the completion of protected area management plans. Although these were not used during or immediately following the project, there were plans, at the time of the review, for their review and updating.

Much like the situation 10 years ago, there are still no clear laws and policies for the NSPA as a whole, for managing individual parks, for roles and responsibilities in the system and in protected area management, for sharing and collaborating on park management, for natural resource extraction and use, or for environmental management. Even though the project contributed to important initiatives such as the proposed Biodiversity Law and Special Law 278, mainstreaming was limited. The country's economic and political instability contributed to the lack of progress.

Financial sustainability

At the time of the assessment, the NSPA did not have enough resources to meet its basic costs. The project contributed to the development of FAN, which now helps cover the basic operational costs of some parks in the system. Although FAN has demonstrated its capacity to pool resources, it cannot address the financial sustainability of the entire NSPA. Rising tourism offers potential for addressing the crucial financial issues of the system, as some NGOs and local communities have shown, but further capacity, and clear laws and rules governing the industry, will be required. Little information exists or is disseminated about the revenue-generating potential of protected areas. The government, as well as others, would benefit from this information, which could catalyze further investigation of such opportunities, contribute to the resolution of issues related to redistribution and resource allocation in the system, and perhaps promote state commitment to protected areas overall. The follow-up NSPA Project correctly intends to look at ways in which the system can thrive apart from the FAN protected area trust fund, considering options such as tourism fees and concessions and services in parks.

Protected area management

The NSPA faces many systemic challenges, including a weak enabling environment. Laws, policies, and regulations for the NSPA are lacking or unclear, and the roles and responsibilities of players at different levels of the system are not adequately defined. The central authority is not well connected to the periphery, and feedback loops and mechanisms are weak, hampering effective decision making and implementation. The Ministry of Environment has little authority at the park level. Addressing some of these challenges began in the Biodiversity Protection Project with the development of the NSPA strategic plan, which, however, was not put into effect. The goal of updating and

eventually implementing the plan, which is part of the follow-up project, presents a good opportunity to address many of these issues and the wider enabling environment.

Significant management capacity is found at the local level among NGOs, park management and staff, and municipalities and local communities. Some of these cases demonstrate impacts from the project, especially its SEC program, and offer potential ways for the NSPA to integrate comanagement and other collaborative forms of participation into protected area management at the local level. Clarifying legislation will be required to regulate and guide participation.

The legal environment relating to protected area management and resource extraction from protected areas is murky. This deficiency is exacerbated by decentralization and increasing pressures from oil, mining, and timber companies in protected areas. A weak or unclear concession model and law and a weak enabling environment have made enforcement difficult. The Ministry of Environment is not a deterring force in protected areas, and parks do not have enough guards to cover their areas. The project did help build the enforcement capacity of protected area management and staff through the provision of equipment and through key infrastructure investments. Some project sites have received more investments than nonproject sites in the past decade. Because impacts on biodiversity take many years to manifest themselves, the increased capacity of protected area management teams probably did not have a noticeable effect on biodiversity conservation.

Park management has lost much of its ability to punish violators in recent years. Small fines for violations and little follow-up of incidents result in weak deterrence within parks. There is currently no systematic program for developing enforcement capacity among park management and staff. The lack of information sharing and communication within the NSPA further weakens enforcement capacity, as up-to-date data are not utilized, shared, or followed up regularly.

Awareness raising and monitoring

The project and its SEC component succeeded in heightening general awareness of protected areas and their importance during the time of the project. At the national level, capacity and resources for this work are limited, and at the time of the assessment there was no programming by the government to sustain or enhance local awareness regarding management and protection of biodiversity and protected areas. NGOs do work in protected areas to raise awareness at the local level.

Project achievements such as the creation of the Biodiversity Information Center have not been maintained or pursued. An institutional "culture of not sharing" persists among many

key biodiversity and protected area stakeholders. At the national level, there is no updated database or systemic input, sharing, or dissemination of information related to protected areas and biodiversity. At the local level, monitoring within protected areas is weak, and the information collected (generally, in nonstandardized ways) is not used for management and decision making. There is no feedback mechanism and no information system or database that connects parks to the NSPA or to each other.

Local beneficiaries, NGOs, and other stakeholders

The project engaged about 40 communities in participatory planning and programs to build capacity and awareness, but little evidence was found of effects on livelihoods. Although since the early 1990s there has been a marked change in attitudes among local stakeholders, with the majority now viewing protected areas at least neutrally and many regarding them in a favorable light, it is generally not possible to attribute these changes to the project in most of the areas visited. Many protected areas in Ecuador have benefited from multiple external projects, most of which had similar objectives for building awareness and the capacity of local communities and institutions. The Biodiversity Protection Project was not unique in this regard and did not stand out in the minds of community leaders as being more significant than others. It did, however, have some clear impacts on local community awareness, knowledge, and capacity, in particular through the SEC program. There was a positive effect on the relationship between local communities and park staff in particular areas. Overall, NGO inputs appear to have been underutilized.

Global environmental benefits

Studies on land use change in project and nonproject sites over similar time periods by sources outside the project indicate that little impact on biodiversity conservation can be attributed directly to the project (see appendix B). Although the annual rate of disturbance to key vegetation types was substantially lower in project sites, the effects of park size and staffing levels can explain most or all of the observed differences. Other available data confirm that not much impact on biodiversity conservation can be attributed to the project specifically. Such assessment is, however, tentative, as it is based on imperfect data.

In fact, measurable environmental changes were not an expected outcome of the project, which had the "softer" goal of influencing key conditions for environmental management and protection and promoting the improvement of protected parks. Thus, alternative criteria such as awareness of biodiversity conservation, the effectiveness and capacity of protected area management, and enforcement were mainly used to estimate the impacts of the project and served as surrogate measures of progress in biodiversity

conservation. The project heightened awareness of protected areas, but this awareness has not been well sustained at the national level. The SEC component helped increase local capacity for sustained awareness raising in particular parks and among certain communities. In addition, the demarcation of boundaries has increased awareness of protected areas, especially some of the areas involved in the project.

Sustainability and replicability

As an early initiative, beginning in the mid-1990s, the project generally did not address sustainability in the strong manner that newer GEF projects now do. The merger of INEFAN, the primary executor and recipient of the project, into the Ministry of Environment was detrimental to the sustainability of activities and results. There was little replication of activities from the project except that donor financing of SEC programming continued for some time.

5
Lessons and recommendations

Many of the lessons from this assessment cannot be considered novel for the biodiversity focal area of the GEF—the Biodiversity Protection Project was the subject of previous assessments, including the CLD independent evaluation in 1999, the ICR in 2000, and the PPAR in 2002. This assessment, however, highlights a number of lessons that are worth noting or repeating.

Lessons

The main lessons that emerge from the project are presented next, followed by a discussion of general considerations concerning protected area project design and implementation. This pilot assessment also draws lessons for future impact assessments in the biodiversity portfolio.

Policy making and planning, management capacity, enforcement, awareness raising, mainstreaming, and financial sustainability

- Capacity in business administration and management throughout the system is needed in order to deal with pressures on protected areas by extractive industries and other activities and to increase the protected areas' economic and financial potential.
- Poor collaboration, coordination, and communication between the center and the periphery weaken planning, implementation, and enforcement capacity. Efforts to share lessons and experience and to secure the continuing participation of all relevant stakeholders can enhance system capacity.
- In a context of decentralization, local governments require training on protected area management and adequate resources so that they can participate effectively in the management of protected areas.
- A weak or unclear enabling environment can greatly exacerbate capacity challenges in the implementation and enforcement of a national system of protected areas. Clear and improved laws, policies, and regulations for activities in protected areas

and extraction of resources from them can greatly improve implementation and enforcement capacity.

- Demonstration and understanding of the mutually beneficial link between biodiversity conservation and economic development (and livelihoods) are important. Heightened awareness of this link at the national level can contribute to mainstreaming environmental issues into other sectors and into laws and policies. In Ecuador there is significant potential for increasing awareness about the protected areas' social, environmental, and economic value.
- The unsatisfactory financial sustainability of the NSPA may be a result of limited political will. Better knowledge of the potential social and economic benefits of protected areas may promote commitment and support.
- Sharing responsibility may be a sensible policy response. Government agencies need not be responsible for all aspects of protected area management. NGOs can play a central role in managing protected areas, as they do in Guatemala and Bolivia. In Ecuador some NGOs have provided long-term support to operations in particular protected areas. There may be legal constraints, however, on engagement of nongovernmental bodies in protected area management. Successful examples of comanagement by the government, municipalities, NGOs, and local communities, and of fruitful interactions between stakeholders in protected areas in Ecuador and in neighboring countries, provide lessons that should be disseminated and shared to improve learning and practice at all levels.

Project management

- The creation of a distinct project coordination unit hampered the effectiveness of the project because project management was not integrated into the operations of INEFAN and the PCU appeared to focus too narrowly on its own needs. More important, this structure inhibited sufficient ownership of the project. The "enclave operation" had negative effects on capacity development for government staff, as the needed capacity was not transferred at the national level. The follow-up project has incorporated this lesson into its design; for example, team members and ministry staff are operationally integrated.
- Targeting a wide variety of stakeholders at all levels through permanent consultative participatory committees and other capacity development outreach programs promotes wide ownership of project goals.
- Those involved in or associated with future biodiversity projects should be aware of the project goals and implementation strategy. Continuous consultation and collaboration between the project team and the ministry should be maintained to ensure ongoing capacity development and institutional strengthening and the sustainability of the initiatives.

- Projects that seek to make changes at the system level are more efficient when project design provides for adequate resources, allows sufficient time for implementation, and sets a realistic scale of field activities.
- Better accountability for results is needed. Future biodiversity projects would benefit by emphasizing results-based management principles and continuing performance measurement, clearly defining and articulating the objectives of the project, and ensuring that project activities are designed to achieve those ends. Decisions on these issues should be made in coordination with other projects and should take into account the broader context. Future projects would need more adaptive management and flexibility to meet changing circumstances.

Local beneficiaries

- Local-level communication and capacity development programs can have a significant immediate and long-term effect by increasing community awareness of and capacity in natural resource management. Such programs can have cumulative effects and can enhance cooperation between protected area staff and local communities.
- Participation by local communities or NGOs is more effective when participants' thoughts and ideas are seen as being put into action by those who make decisions and implement programs.

Global environmental benefits

- A well-developed system of monitoring and evaluation, able to measure performance continuously, is essential for tracking performance and allowing for an adaptive management approach during implementation. The project's failure to establish a viable monitoring program impeded its ability to monitor and assess performance throughout implementation and severely hampered its ability to measure global environmental impacts or sustained results.
- Long-term impacts in biodiversity conservation and protected area management require sustained efforts to raise awareness at the local level. These efforts can be supported by donors and local and international NGOs. Significant benefits can be reaped through government programming. Sustained awareness-raising and capacity development efforts can lead to changes in attitudes and behavior that translate into direct environmental benefits over time.

Impact assessment of biodiversity projects

Biodiversity conservation projects seek to influence social and ecological systems that are incompletely understood and are subject to numerous external influences. Changes in the ecological system are difficult to observe and usually occur only over time scales that are substantially longer than project lifetimes. For these reasons, quantifying impacts in biodiversity conservation projects is inherently difficult.

The most appropriate choices of biodiversity projects for impact assessment are as follows:

- Projects that used state-of-the-art monitoring and that therefore may have generated quantitative information on global environmental benefits. At a minimum, the projects should have used some performance indicators during the project that can yield baseline data for the impact assessment.
- Projects that achieved measurable biophysical results which can be used for assessing sustainability of results and measuring changes over time.
- Projects that targeted a single protected area; if the project attempted more, far more time should be allowed for assessment.

Recommendations

The following recommendations for the World Bank and the GEF pertain in particular to Ecuador, but the principles are generally applicable.

- Draw up clearly articulated coherent sets of short-term and long-term targets.
- Develop adequate and useful indicators for biophysical aspects, as appropriate, and for capacity development.
- Put in place and utilize a strong monitoring and evaluation system for project implementation and adaptive management.
- Assign an external monitor with detailed knowledge of protected area and biodiversity management in the Ecuadorian context.
- Ensure that the project team works in close collaboration with the Directorate of Biodiversity and Protected Areas in the Ministry of Environment in order to allow continued support and cooperation and to effectively transfer capacity.
- Use the updating of the NSPA strategic plan as an opportunity to clarify participation in protected area management, comanagement, and the roles and responsibilities of all stakeholders involved at the national, regional, municipal, and local levels of the NSPA system. Future initiatives should work to enhance communication, collaboration, and coordination at all levels of the NSPA.
- Create and maintain, in the two protected areas to be addressed in the follow-up project, consultative committees that include government representatives such as regional district representatives and biodiversity leaders, municipalities, a wide range of NGOs, protected area management, and local communities.
- Include long-term local capacity development and awareness raising that specifically targets local communities, as well as park management and staff.

The following recommendations pertain to future biodiversity projects in the region:

- Gather and analyze the experiences in comanagement and cooperation being amassed in protected areas. These experiences should be documented, dis-

seminated, and shared in order to improve learning and practice at all levels.

- Conduct a comparative study of experience with protected area systems in neighboring countries such as Bolivia, Costa Rica, and Guatemala to learn from their experiences, successes, and challenges in comanagement.

Appendix A. Protected areas in Ecuador

Protected area	Year created	Surface area (hectares) Land	Marine	Total	Location or province
Antisana Ecological Reserve	1993	120,000	0	120,000	Napo
Arenillas Ecological Reserve	2001	17,082	0	17,082	El Oro
Cajas National Park	1977	28,808	0	28,808	Azuay
Cayambe-Coca Ecological Reserve	1970	403,103	0	403,103	Imbabura/Pichincha/ Napo/Sucumbíos
Cayapas-Mataje Ecological Reserve	1995	51,300	0	51,300	Esmeraldas
Chimborazo Fauna Reserve	1987	58,560	0	58,560	Chimborazo
Cofán-Bermejo Ecological Reserve	2002	55,451	0	55,451	Sucumbíos
Cotacachi-Cayapas Ecological Reserve	1968	243,638	0	243,638	Imbabura/ Esmeraldas
Cotopaxi National Park	1975	33,393	0	33,393	Cotopaxi/ Pichincha/Napo
Cuyabeno Fauna Reserve	1979	603,380	0	603,380	Sucumbíos/Orellana
El Angel Ecological Reserve	1992	15,715	0	15,715	Carchi
El Boliche National Recreation Area	1979	400	0	400	Cotopaxi
El Cóndor Park	1999	2,440	0	2,440	Morona Santiago
El Lago National Recreation Area	2002	2,283	0	2,283	Guayas
Estuario Río Muisne Wildlife Refuge	2003	3,173	0	3,173	Esmeraldas
Galápagos Marine Biological Reserve	0	0	14,110,000	14,110,000	Galápagos
Galápagos National Park	1936	693,700	0	693,700	Galápagos
Isla Corazón Wildlife Refuge	2002	700	0	700	Manabí
Isla Santa Clara Wildlife Refuge	1999	5	0	5	El Oro
La Chiquita Wildlife Refuge	2002	809	0	809	Esmeraldas
Limoncocha Biological Reserve	1985	4,613	0	4,613	Sucumbíos

(*continued on next page*)

(*continued*)

Protected area	Year created	Surface area (hectares) Land	Marine	Total	Location or province
Llanganates National Park	1996	219,707	0	219,707	Tungurahua/ Cotopaxi/ Pastaza/Napo
Los Ilinizas Ecological Reserve	1996	149,900	0	149,900	Pichincha/Cotopaxi
Machalilla National Park	1979	56,184	0	56,184	Manabí
Machi-Chindul Ecological Reserve	1996	119,172	0	119,172	Esmeraldas/Manabí
Manglares El Salado Fauna Production Reserve	2002	5,217	0	5,217	Guayas
Manglares-Churute Ecological Reserve	1979	49,894	0	49,894	Guayas
Pasochoa Wildlife Refuge	1996	500	0	500	Pichincha
Podocarpus National Park	1982	146,280	0	146,280	Loja/Zamora
Pululahua Geobotanical Reserve	1966	3,383	0	3,383	Pichincha
Sangay National Park	1975	517,765	0	517,765	Chimborazo/ Tungurahua/Morona Santiago/Cañar
Sumaco National Park	1994	205,249	0	205,249	Napo/Orellana
Yasuní National Park	1979	982,000	0	982,000	Orellana/Pastaza

Source: Ministry of Environment 2005a.

Appendix B. Longitudinal analysis of studies of vegetation cover in Ecuador

Martinez (2005) used Landsat images complemented by published land use maps to compile vegetation cover data for undisturbed areas and for areas of light, medium, and high disturbance in Cotopaxi Province in 1979, 1991, and 2004. Within the province are four protected areas of the NSPA (percentages are the proportion of the park area that lies within the province): Los Ilinizas Ecological Reserve (81 percent), Cotopaxi National Park (33 percent), El Boliche National Recreation Area (56 percent), and Llanganates National Park (2.8 percent). Three of these areas had no direct Biodiversity Protection Project interventions; El Boliche received a visitor center. Because of the limited involvement with the project, the protected areas in Cotopaxi Province can (cautiously) be regarded as a baseline for comparison.

Table B-1 shows the trends in disturbance over the 25-year period covered by the study. In the entire province in 1979, a total area of more than 355,000 hectares was classified as undisturbed. By 1991 the figure had fallen by 30 percent and, by 2004, by another 26 percent. In the protected areas within the province, the undisturbed area declined by 27 percent between 1979 and 1991 and by 18 percent between 1991 and 2004. These figures suggest that in the period 1979–91 protection was ineffective, as the percentage declines in undisturbed vegetation were similar within and outside protected areas. By contrast, between 1991 and 2004, which includes the period of implementation of the project, the effectiveness of the protected area system improved; the rate of loss inside and outside protected areas was markedly different, 18 and 26 percent, respectively.

Fundación Antisana (2002) and Maldonado, Alvarado, and Cuesta (2003) undertook similar studies for part of the contiguous Cayambe-Coca and Antisana Ecological Reserves, located in the eastern Cordillera. Both protected areas were included in the project (table B-2). The Maldonado, Alvarado, and

Table B-1 Trends in undisturbed and disturbed area: Three vegetation types in protected areas in Cotopaxi Province, 1979, 1991, and 2004 (hectares)

Disturbance level	*Vegetation type*	*1979*	*1991*	*2004*
Undisturbed	Natural forest	175,263	103,186	84,050
	Páramo	145,940	127,310	86,510
	Shrubby vegetation	33,957	19,154	15,222
Low disturbance	Natural forest	9,503	45,485	36,416
	Páramo	8,566	20,005	15,652
	Shrubby vegetation	1,404	1,076	2,707
Medium disturbance	Natural forest	22,580	40,980	41,190
	Páramo	3,939	3,025	18,759
	Shrubby vegetation	65	2,146	1,343
High disturbance	Natural forest	36,347	38,816	39,556
	Páramo	1,384	751	10167
	Shrubby vegetation	1,929	10,778	4,089

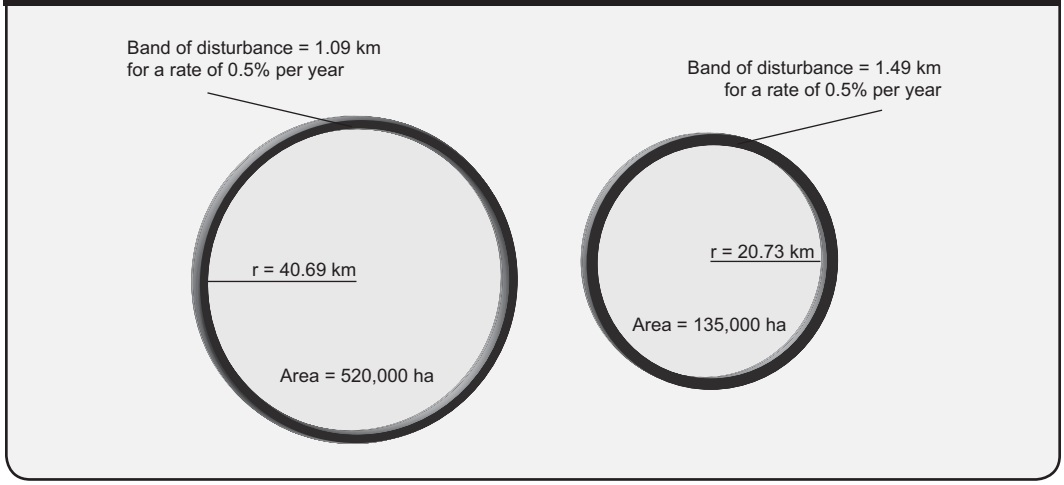
Source: Martinez 2005.

Note: Páramo is a high alpine ecosystem of grasslands, bogs, and meadows with a characteristic fauna and flora found in the Andes.

Cuesta study compared vegetation coverage in 1990 and 2001. Between those dates, the area of undisturbed vegetation in the study area declined by 5.5 percent, or 0.5 percent per year, compared with 1.26 percent per year for the protected areas in Cotopaxi Province studied by Martinez. Disturbance in nonproject sites occurred at about 250 percent the rate in project sites, suggesting that the project had some positive impacts on biodiversity conservation. The figures, however, require careful interpretation. The project sites, Cayambe-Coca and Antisana, form a contiguous area of over 520,000 hectares. Even the largest of the reserves in Cotopaxi Province is much smaller. Assuming that the greatest pressures occur around the boundaries of protected areas (edge effects), a higher rate of disturbance would be expected in the nonproject areas, as the diagrams in figure B-1 illustrate. The diagram on the left-hand side represents the contiguous project sites of Cayambe-Coca and Antisana; that on the right-hand side, the nonproject sites in Cotopaxi Province. Because of edge effects, disturbance rates are dramatically different, even though the bands of disturbance are about the same width. Using this comparison, the extent of the disturbed area in nonproject sites would be only 137 percent that in project sites.

In addition to the effect of the sizes of the protected areas, the number of park guards has to be considered. Two of the three contiguous nonproject protected areas in Cotopaxi Province had virtually no park guards during the study period—Los Ilinizas

Figure B-1
Bands of disturbance for areas of different sizes



Ecological Reserve had no guards; and Llanganates National Park received its first two park guards only in 1998, three years after the beginning of the project. Only Cotopaxi National Park had a reasonable number of park guards, and the number declined from 10 early in the study period to 6 midway through the study period and later. Of the two project areas, Antisana had no allocation of park guards, but Cayambe-Coca had 21 early in the study period, declining to 8 near the end. Since the two protected areas are managed as a single area, Antisana benefited from Cayambe-Coca's guards.

Taking into account the effects of park size and staffing levels, both of which would lead to an expectation of lower levels of disturbance in the project sites irrespective of any project impacts, these data cannot be interpreted as

Table B-2 Trends in undisturbed area: Three vegetation types in Cayambe-Coca and Antisana Ecological Reserves, 1990 and 2001 (hectares**)**

Vegetation type	*1990*	*2001*
Forest	437,731	407,036
Forest/páramo	62,195	61,952
Páramo	202,659	187,184

Source: Fundación Antisana 2002; Maldonado, Alvarado, and Cuesta 2003.

demonstrating global environmental impacts of the project. This is not necessarily to say that there were no impacts; rather, the failure to define and monitor quantitative indicators means that, at the time of study, any impacts were impossible to determine.

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