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Biodiversity and Environmental Assessment

Many sectors of national economies and local communities depend upon the diversity of biological resources and the functions they protect and sustain. The irreversibility of species extinction, and loss of genetic strains, natural habitats and ecosystems through degradation and over-exploitation compromise options for present and future generations. Accordingly, the functions and services of natural habitats and ecosystems should be systematically assessed and evaluated as part of the cost/benefit analysis of programs and projects.

This Environmental Assessment (EA) Sourcebook Update *provides an introduction to the policy framework for protection or enhancement of biodiversity, the relevant project contexts where biodiversity may be adversely impacted (or conversely, projects which offer opportunities for conserving or enhancing biodiversity), and guidelines for integrating biodiversity concerns into EA. This* Update *compliments Chapter 2 of the* EA Sourcebook.

Introduction

Natural habitats and ecosystems and their biodiversity are linked to most World Bank sector projects either as resources which may be damaged or eliminated as a result of direct or indirect impacts of a project, or as resources upon which the needs of a project may depend. The usefulness of environmental assessment to ensure the environmental sustainability of these projects has been amply demonstrated and valuable experience has been gained in its application to all development sectors. However, recent reviews of the project portfolio have revealed that a number of mistakes or oversights are being repeated and often impair project quality, including benefits. These include: inadequate determination of the spatial context of the project; poor or insufficient baseline information and treatment of biodiversity as simple "lists" of species found in a project area; lack of rigor in the analysis of costs / benefits; and insufficient attention to implementation and monitoring of mitigation measures and environmental management plans, including institutional arrangements. Building capacity for integrating biodiversity conservation into EA and strengthening public involvement also receive insufficient attention. The reviews also suggest that efforts should be expanded in the selective employment of strategic (sectoral and regional) EAs.

With these and other challenges in mind, this *Update* offers guidance for improved performance in undertaking EA as a means to protect the functional performance and resilience of natural habitats and ecosystems (and thereby their biodiversity) during project preparation and implementation.

Relevant project contexts

Many Bank-financed projects have the potential to either positively or negatively affect biodiversity at the ecosystem, species, or genetic levels. Accordingly, the functions and services of natural habitats and ecosystems should be systematically assessed and evaluated, and the ecological, social, and economic value of such functions quantified as part of the cost / benefit analysis of programs and projects. Examples of development activities likely to have significant adverse impacts on biodiversity are outlined in Box 1. As the Bank supports projects in all of these categories, it can influence the management and protection of biological resources and promote conservation of biological diversity through the application of EA and other environmental policies (such as O.P. 4.04 on Natural Habitats) during project preparation, appraisal, and implementation.

Environmental impacts on natural habitats and ecosystems are often intersectoral and interrelated

Box 1. Development activities likely to induce significant impacts upon biodiversity

The following development activities may adversely affect biodiversity:

- Agriculture and livestock projects involving land clearance, wetlands elimination, water diversion and inundation for storage reservoirs, displacement of wildlife by domestic livestock, use of pesticides, or planting of monoculture crop systems
- Fisheries / aquaculture projects involving conversion of important natural migration, breeding or nursery sites, over-fishing, introduction of exotic species
- Forestry projects that meet the conditions for Bank involvement (defined in OP 4.36) but nevertheless may involve clear-felling, or other forms of intensive forest harvesting or conversion of natural habitats, construction of access roads, establishment of forest products industries which may induce development
- Transportation projects involving construction of highways, bridges, rural roads, railways, airports, or canals that penetrate natural habitats and ecosystems and open them to colonization and immigration; also, channelization of rivers for navigation and dredging and coastal land reclamation for ports
- Power projects involving (i) hydroelectric development that inundates or transforms natural habitats and ecosystems, alterations of rivers because of dams or water diversions, and construction of power transmission corridors through undisturbed natural areas, and (ii) projects that depend upon fossil fuels from which airborne pollution may threaten or destroy vegetation or from which heated effluents may elevate the temperature of receiving waters
- Oil and gas projects involving land clearance, pipeline construction, coastal storage, transfer and handling facilities, or offshore activities
- Industrial development involving thermal pollution from cooling water discharges or chemical pollution of aquatic and terrestrial environments via air or water
- Large-scale loss of natural habitat to mining and mineral exploration
- Urban and tourism development in sensitive areas such as coastal zones.

and may require particular attention. For example, wetlands and headwaters are vulnerable to industrial or municipal wastewater discharges, agricultural runoff, siltation from forestry operations, or dredging and filling for transportation projects or shoreline development. If such biological resources are not protected, fishery productivity and revenue may be diminished. Further, while defining the physical limits of a development site is invariably straightforward, defining the area affected by all significant impacts (e.g., atmospheric pollutants) often requires an in-depth study.

There are also linkages to regional or global conditions. Natural habitats and ecosystems can serve as breeding, resting, or wintering sites for fish or bird species which migrate long distances to other such areas. Large tracts of forest can have a moderating effect on regional climate and their destruction may contribute to global warming.

Policy and legal frameworks in support of biodiversity conservation

The Bank's Operational Policy on Environmental Assessment OP 4.01 requires the systematic screening of all proposed programs and projects for significant environmental impacts. Project screening and subsequent environmental assessment must consider the possible positive and negative impacts on biodiversity and, where negative impacts are confirmed, mitigation measures may be proposed. In this regard, the emphasis of OP 4.01 is on preventing or minimizing adverse impacts on biodiversity.

A number of other Bank policies help to guide project preparation and implementation with respect to biodiversity conservation. The most important of these is the policy on natural habitats (OP 4.04 – see Box 2), followed by policies on forestry (OP 4.36), water resources management (OP 4.07), and indigenous peoples (OP 4.20). Investment projects in such sectors as agriculture, forestry, fisheries, energy, tourism, and urban and infrastructure development would be expected, where appropriate, to explicitly include biodiversity conservation in project objectives. Indeed, where the success of a project depends upon the environmental characteristics of certain natural habitats and ecosystems, specific measures should be incorporated to conserve their functions.

National legislation in most countries includes definitions for protected natural habitats, e.g., national parks, reserves, or other protected areas. Such areas may be protected based on functional considerations associated with the provision of water, energy, or the protection of soils; others may contain important cultural or archaeological sites with a special legal or customary status, such as sacred groves. The legal framework and terminology for natural habitats, or sub-units of natural habitats, may vary by country, depending on local practice, traditional usage, and other factors.

A number of international and regional agreements also afford some measure of protection to biodiversity

Box 2. Main features of the Bank's Natural Habitats Policy (OP 4.04)

The policy on natural habitats contains two major provisions with respect to biodiversity conservation and EA. Firstly, it prohibits Bank involvement in projects which involve significant conversion or degradation of critical natural habitats. These include: existing protected areas and adjoining or linked areas or resources (such as water sources) on which the protected areas depend; and sites identified as meriting protection. Secondly, where natural habitats outside protected areas are within a project's area of influence, the project must not convert them significantly *unless:*

- There are no feasible alternatives
- The EA demonstrates that benefits substantially outweigh the costs
- Mitigation measures acceptable to the Bank are implemented, which would normally include support for one or more compensatory protected areas that are ecologically similar to, and no smaller than, the natural habitats adversely affected by the project.

including: The Convention on Biological Diversity (Rio de Janeiro, 1992); The Convention on International Trade in Endangered Species of Wild Flora and Fauna (Washington, D.C., 1973); and The Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (Ramsar, 1971). For a more thorough discussion of such agreements, refer to *EA Sourcebook Update* no. 10, *International Agreements on Environment and Natural Resources: Relevance and Application in EA*.

Integrating biodiversity conservation into projects

The Bank's support for efforts to conserve biodiversity and to implement the provisions of the Convention on Biological Diversity has hitherto focused on traditional biodiversity conservation initiatives such as the establishment and management of protected areas. While these activities are critical, they do not ensure the integration of biodiversity conservation into environmentally sustainable development. Much biodiversity is located in agricultural and forest landscapes outside protected habitats and ecosystems and subject to economic production. Likewise, urban, industrial and infrastructure developments affect biodiversity. Hence, the prospects for conserving biodiversity will depend greatly upon how well biodiversity concerns are integrated into projects in sectors which traditionally have not addressed biodiversity issues (see examples in Box 3).

Box 3. Examples of integrating biodiversity conservation

EA can often open up opportunities in the project cycle for conserving biodiversity:

Indonesia
In Northern Sulawesi, a convergence of conservation and agricultural interests led to the establishment of the 300,000 ha Dumoga-Bone National Park as part of $543 million irrigation scheme to promote agriculture development in the Dumoga valley. For a modest investment in park protection and management (less that 10 percent of the loan), the project secured protection of catchment watersheds and protected the irrigation investment. The forested hillsides not only protect an area of globally important biodiversity but ensure low siltation loads in the Toraut River, thus extending the life of the irrigation canals.

Ghana
Urbanization and related infrastructure development in Greater Accra and other coastal towns threaten the ecological health of coastal wetlands essential to the livelihood of many local people and that provide a critical refuge for tens of thousands of migratory birds. Without making biodiversity conservation an explicit objective of urban infrastructure development, the sewage and industrial effluent and intensive recreation activity on the intra-urban coastal lagoons would rapidly deplete their viability as habitat. Bank and GEF assistance is being provided to redesign sewage treatment and effluent disposal, reduce user pressure on lagoons, and support community initiatives for sustainable use of lagoon biological resources.

Argentina
Resolving conflicts between human and ecological needs in the Parana, Uruguay, and Paraguay River floodplains was critical to the success of the Argentina Flood Protection Project. The floodplains are among Argentina's richest biodiversity areas, and their ecological stability depends on conserving the natural interactions between floods and habitats. Floodplain biodiversity has been threatened by agricultural expansion, interference with flood processes and natural wetlands, and illegal hunting and felling of gallery forests. Based on the findings of a regional EA, the project adopted a "living with floods strategy," which enhanced the local community's capacity to deal with periodic flooding, while conserving the natural ecological processes essential for maintaining biodiversity. The regional EA helped design components to improve the environmental and economic benefits of the project, including protection and management initiatives for wetlands and other ecosystems.

Effective integration of biodiversity conservation requires that potential impacts on biodiversity be identified during the screening stage of the EA, that the magnitude of potential impacts be adequately assessed, and that their significance be accurately determined. This requires qualified and experienced biodiversity specialists drawn from such disciplines as ecology, wildlife biology / management, limnology, conservation, and so forth. The choice of expertise should be undertaken by the task manager in consultation with a Bank biodiversity or environment specialist.

Screening for EA category

It is essential that potentially significant impacts of project siting and design on biodiversity (and other environmental and social factors) are identified at the beginning of an assessment through the screening process, and taken into account in determining the appropriate type and scope of analysis. This may be achieved through environmental screening into one of three categories according to the nature and extent of potential impacts (category A for significant impact, category B for limited impacts, and category C for minimal or no impacts). The following two questions should be considered during screening, and answered more fully during project preparation:

1) Is biodiversity likely to be affected significantly by the project? This question should be addressed initially as part of the screening process whereby projects are assigned EA category A, B, or C (see *EA Sourcebook Update* no. 2, *Environmental Screening*). What is the likely area of influence of the project—both direct and indirect? Are any species, natural habitats or ecosystems likely to be impacted significantly within this area of influence and, if so, which types, e.g., tropical forest, wetland, or grassland? Are there any sites of special concern or designated as having national or international importance, such as World Heritage natural sites, wetlands of international importance (Ramsar sites), endangered species / habitats, national parks, or protected areas? What are the critical biological features of the natural habitats and ecosystems within the area influenced by the project, e.g., habitat and / or breeding area for rare or endangered species, or wild races of crop plants?

2) What, in broad terms, will be the impacts? Does the project involve land clearance or other disturbances likely to affect species, natural habitats or ecosystems such as forests or wetlands? Are there any species, natural habitats of local, regional, or global significance likely to be affected? Will hydrological regimes be influenced, with possible impacts on wetlands, inundation of areas of potentially high biodiversity value, or changes in flooding regimes? Will the project result in immigration, and attendant problems of increased demand for natural resources (including fuelwood, wildlife, water, or land)? Are any solid, liquid or gaseous effluents / wastes produced as a result of the project likely to adversely impact biodiversity? Will the project alter the existing carrying capacity of land, and result in potential pressures on soils or adjacent land areas?

Scoping

Based on the results of the screening exercise, proponents and analysts should agree on significant impacts for assessment. This can greatly improve the efficiency of subsequent data collection and management. Three basic methods for determining impacts are: checklists, matrices, flow diagrams or networks, and overlay mapping / GIS (refer to *EA Sourcebook Update* Nos. 3, 9, and 16). This "scoping" normally requires public consultation to determine the utility values attached to affected ecological features (see section on public involvement below).

The use of maps or geographic information systems is essential in determining the spatial context of the project and in relating proposed development actions and their potential impacts to natural habitats and ecosystems. An initial map should be constructed giving a total picture of the project site and likely area of influence at different stages of project operation, including relationships to protected areas, critical ecosystems and habitats (such as wetlands, forests, grasslands, and coral reefs), and bird and plant endemic areas. Such a map (at an appropriate scale) also provides the foundation for calculating possible loss of, or damage to, habitats (directly and indirectly) under the project and for determining mitigation measures, including compensation. It may also be used to monitor and evaluate the effectiveness of the implementation.

Projects located in or near critical natural habitats and ecosystems and involving development activities such as those outlined in Box 1 are normally screened as EA category A and should be "scoped" accordingly. Project-specific EA is normally the most relevant approach when the Bank is involved at a relatively advanced stage where definition and preparation of investments are the main concern.

EA terms of reference for category A projects should encourage economic analysis of environmental costs and benefits of alternative investment options. Sometimes the contribution of biodiversity to national, regional, and local economies may be mea-

sured in monetary or other terms and may be included in any consideration of the costs and benefits of a project's mitigation measures to conserve specific biological resources. However, economic evaluation of the existence of biological resources in some development contexts may not accurately reflect their inherent ecological value. When not measurable, or where measurement is likely to "undervalue" the resource (for a variety of economic or social reasons), they should be described in qualitative terms.

For category B projects, the appropriate type and scope of more limited analysis will depend greatly upon the nature of a project and its location. Often, a limited assessment of the effects of planned small-scale construction activities and a mitigation plan may be an appropriate analysis. In other instances, preparation and application of guidelines, criteria, or standards may be more appropriate (e.g., for construction and operation of small- to medium-scale agricultural facilities or social investment fund projects). In some circumstances, a limited regional analysis of the administrative framework in terms of institutional responsibilities, capacity, training, and resource needs may prove the better approach. Developing an environmental monitoring plan may also be part of a category B analysis.

Baseline information

Where there is a lack of information, EA reports should provide baseline data on the biodiversity in the project area and its area of influence relevant to: its local, regional, national, and international importance; its use by local communities; its functional roles, (e.g., in terms of resource yields or production, population trends of key species); and the application and impacts of national policy. As the impacts depend upon the nature and location of the project in relation to its ecological setting, effective baseline studies should use the impacts identified in scoping to guide data collection. There are many methods and techniques for the measurement of biodiversity; however, the relevance of the data is much more important than the amount, particularly as time and resources for data collection are typically constrained.

Qualified biodiversity specialists involved in EA must determine the range and type of baseline data needed to make defensible and robust impact predictions, and assessments of their significance (Box 4). Where uncertainties regarding the occurrence of potential impacts are large and the consequences of the impact occurring are significant (for example, adverse effects on a wetland of international importance), detailed data collection may be appropriate, (see *Update* no. 16).

Where data collection is justifiable, the Task Manager and implementing agency should allocate sufficient time to account for seasonal variations or longer-term trends. For example, in India the EA law requires that certain EAs be allocated at least one year to achieve this objective. Many projects have long lead times, and if ecological impacts are judged important (from screening), then in "data-poor" situations work can begin early enough to collect information for the main seasons. Likewise, detailed sampling may be required to assess the variability of inherently diverse and patchy habitats such as coral reefs. This variability may be critical for the overall sustainability of the affected area, especially for rare or endangered species. Biodiversity specialists working on EAs have a responsibility to ensure that they

Box 4. Baseline information and its collection

To predict the project's impact upon natural habitats and ecosystems, relevant data should be generated on:

- The status of biodiversity and natural resources, uses and threats, including both scientific and indigenous knowledge
- Ecosystem functions and values, including extent to which environmental thresholds or critical levels are being approached

Typical examples of methods and techniques for the analysis of potential impacts involve:

Ecosystem/habitat level

Targets	*Methods/Techniques*
• Distribution, richness and diversity of habitats and ecosystems	• Field surveys (transects / quadrants) inventories, maps of fauna and flora
• Patchiness, connectivity / fragmentation of habitat(s) / ecosystem(s); corridors; fragile habitats and ecosystems	• Remote sensing, landuse maps, field surveys
• Carrying capacity and community dynamics	• Measurement of standing crop / biomass or productivity

Population/species level

Targets	*Methods/Techniques*
• Population structure and dynamics, including harvesting pressure(s), abundance / composition of key species	• Inventories, field surveys, demographic analysis; use of biological indicators and indices (species sensitive to changing conditions)
• Existence of endemic, rare, vulnerable, and / or endangered species	• Inventories, field surveys

exercise best professional judgment as to the minimum data needed to characterize the environment and to make defensible impact predictions. The key challenge is to produce a sufficiently detailed impact analysis in the face of: insufficient data; inadequate knowledge of the affected ecosystem(s), habitat(s), or species; and uncertainties over cumulative impacts.

Within EA reports, the baseline biological resources should be described in terms of the species, habitats, or ecosystems of local, regional, national, or global significance in the project area. Information gaps, and their likely significance, should also be presented. Sources of information should be included and, where primary data have been collected, methods of sampling, measurement, and analyses should be briefly outlined.

Prediction of impacts

In helping predict impacts, the umbrella question ***"What is the significance of these impacts?"*** should be addressed. What are the utility and functional values of the species, habitats and ecosystems affected (including their economic importance), in a local, regional, or national context? For example, mangrove forests in Mozambique are under threat from a variety of development impacts, yet shrimp fisheries which are critically dependent on mangroves account for approximately 40 percent of foreign exchange earnings. What is the inherent ecological value (the existence value) of any habitats, ecosystems, or species adversely affected by the project (in a variety of contexts from local to international)? This will depend on factors such as the rarity and vulnerability of species (e.g. are any endangered species affected?), species richness, degree of endemism, and the aerial extent of habitat (area lost represents what percentage of the remaining habitat regionally, nationally, or globally). Can appropriate conservation or mitigation measures (as required under OP 4.04 on Natural Habitats) be implemented?

The cumulative impacts of development activities on biodiversity are important to consider. For example, if tidal wetlands are being lost in a given country at an annual rate of 3 percent, projects within the coastal zone could adversely impact a large proportion of the remaining wetlands. However, this aspect is not always possible to consider at the project-specific level and is best addressed at a more strategic level (see section on strategic EA below).

Predicted impacts, and their potential significance should also be described in a local, regional, national, or international context. In particular, the significance of residual impacts which are not avoided or mitigated should be highlighted.

Project processing should include a careful analysis of the functions served by the affected habitats and ecosystems and the geographical distribution of environmental and socio-economic costs and benefits of development at regional, national, and trans-national levels. A number of methods are available for valuing direct economic benefits and non-market benefits of natural areas, e.g., market price, replacement cost, willingness to pay, etc.—refer to section on Further Reading. The short- and long-term socio-economic impacts of the project on the environment and natural resources (including site and design alternatives, see *Update* no. 17, *Analysis of Alternatives in Environmental Assessment*) should be an explicit component of this calculation. The project should be rooted in a knowledge of its social, economic, and biophysical setting and be consistent with existing systems for natural resource management at both national and local levels, as long as these systems are judged to be viable.

Mitigation measures and environmental management plans

The EA should recommend options for eliminating, reducing to acceptable levels, or mitigating environmental impacts. Such recommendations should draw upon findings from analysis of policy, legal, and institutional issues as well as the analysis of impacts and the determination of alternatives. If an ecosystem or a natural habitat has to be unavoidably damaged or lost as a result of a development project, compensation should be reviewed in accordance with the Bank's Natural Habitats Policy (see Box 3). Opportunities for incorporating biodiversity conservation components as part of the project should also be explored. Mitigation and management measures which form part of the project's overall environmental management plan (EMP) should be developed in consultation with affected communities (see section on public involvement below).

Appropriate mitigation measures remove or reduce adverse impacts on natural habitats or their functions, keeping such impacts within socially-defined limits of acceptable environmental change. Specific measures depend upon the ecological characteristics of the given development site. They may include: full site protection through project redesign; strategic habitat retention; restricted conversion or modification; reintroduction of species; mitigation measures to minimize ecological damage; post-development restoration works; restoration of degraded habitats; and establishment and maintenance of an ecologically similar protected area of suitable size and contiguity.

Key questions which should be asked about the proposed mitigation measures, in addition to normal project appraisal procedures, include:

- Does the project address issues concerning the integrity of natural habitats and ecosystems and maintenance of their functions?
- Do the project boundaries encompass the relevant natural habitats ecosystems within limitations of political and administrative boundaries? Have adequate steps been taken to deal with issues affecting the ecosystems outside the project boundaries?
- Have local communities dependent upon the affected area(s) been included in the preparation and implementation of the project? Are arrangements agreed on compensation and / or concessions to groups adversely affected by the project?
- Is the project design flexible enough to manage the predicted changes? Does the project draw adequately upon scientific and local knowledge to inform adaptive management of the natural environment?
- Does the project involve all the relevant sectors and disciplines? Are there adequate mechanisms for coordination and collaboration among sectoral agencies? Are the roles and responsibilities of government, the private sector, and nongovernmental organizations (NGOs) clearly defined?

The institutional aspects of mitigation measures are critical—if there is little or no institutional capacity (human and financial) to implement EMPs, efforts spent on detailed baseline surveys and preparing plans will be compromised. Accordingly, consideration should be given to:

- Strengthening existing agencies with management responsibility for protected areas, other conservation areas, and biological resources in general;
- Establishing new institutions, procedures, and regulations;
- Promoting regional perspectives in development planning to avoid loss of biological diversity through cumulative or intersectoral impacts;
- Strengthening land use planning and control institutions and instruments; and
- Supporting scientific research relevant to biological diversity.

The multiple objectives of natural habitat management are best achieved through measures that are carefully designed early in the project cycle. For example, a natural habitat cannot conserve biological diversity, evolutionary processes, and environmental services if it is too small. Besides size, the specific location, shape, and connection to other habitat blocks can be important factors in determining the viability of a particular natural habitat. Equally, one of the greatest challenges may be to find income-generating opportunities for local communities likely to be affected by the proposed project. For each natural habitat, appropriate design features are best determined by conservation specialists working in multidisciplinary teams in close cooperation with local people and NGOs affected by the project. Such a team might include, for example, specialists in ecology, conservation biology, sociology / anthropology, law, and resource economics.

Natural habitat components of a project should be linked as appropriate to the implementation schedule for the project. The costs of mitigation measures should be included in the project's financing and mechanisms to ensure that adequate recurrent cost financing is incorporated into the project implementation (see Box 5).

The EMP should provide for environmental monitoring to ensure satisfactory implementation of agreed recommendations, building upon pre-existing data or the findings of baseline surveys, to measure progress in the mid-term review and final evaluation. It should also include examination of the effectiveness of the mitigation measures and study indicators to gauge the state of biodiversity, ecosystem productivity, and food chain characteristics. Where the management of natural resources is shown by socio-economic analysis to be in transition, a substantial monitoring and evaluation capacity should be built into the project to mitigate negative effects that may accrue to either the local community or resource base. In addition, longer-term monitoring, perhaps beyond the completion of project implementation, may be the only mechanism to determine the extent to which the project components are being sustained and contributing to conserving biological diversity. Such information should be fed back into country assistance strategies and economic and sector work to improve biodiversity components in future work.

Building capacity for integrating biodiversity

In assessing the borrower's ability to implement appropriate conservation measures, the Bank considers factors such as: institutional capacity (in areas such as management capability, monitoring, enforcement, and research) to implement site-specific measures; adequate controls over adjacent areas that may otherwise generate activities in conflict with the protection of natural habitat; and public support. Projects may include such capacity-building components as strengthening responsible institutions; developing policy and regulations; providing training and public education; and undertaking research.

Building capacity for integrating biodiversity conservation involves several elements: creating awareness among policymakers and technical staff;

Box 5. Benefits of adequately resourcing mitigation measures, Malaysia

The primary objective of the Sabah Land Settlement and Environmental Management Project (approved in 1989) was to consolidate agricultural development and settlement of some 61,000 hectares in the Dent Peninsula, Malaysia. This included development and maintenance of palm oil and coffee crops, and development of four settlement villages. Two wildlife reserves, the Tabin and Kulamba, which adjoin the project area were under threat from illegal logging and hunting. A component to prepare an environmental management plan (EMP) was included in the EA of the project, to address existing pressures on the wildlife reserves, and to ensure that the project did not exacerbate these threats.

The World Wide Fund for Nature, Malaysia, played a key role in preparing and implementing the EMP. The environmental component financed development of a Sabah Conservation Strategy (which provided guidelines and an operational framework for the sustainable management of Sabah's natural resources), is under implementation. Legal protection for wildlife was strengthened through the preparation and subsequent adoption of a Wildlife Conservation Enactment for the State of Sabah. The Sabah Wildlife Department was strengthened by additional staff and resources, and the deployment of staff at a new facility in the Tabin Reserve.

Results on the ground from these efforts were encouraging. Licensed logging in the Tabin Reserve ceased in 1992 and illegal logging was reduced to occasional incursions. Illegal hunting is also much better controlled. Surveys undertaken in 1994 showed significant regeneration of logged-out areas, and an increased abundance of wildlife. This demonstrates that where environmental management measures are adequately resourced, significant improvements may be achieved within a relatively short time frame.

enhancing skills and availability of "tools" for technical staff of government agencies; and, promoting effective linkages between government agencies responsible for environmental and national resource management and agencies responsible for agriculture, fisheries, forestry, tourism and other sectors. In addition, mainstreaming within sectoral development programs has to be accomplished through collaborative local partnerships.

Another approach to successfully integrating biodiversity conservation into development planning is for countries to apply EA more broadly than for only Bank-financed projects. To this end, the Bank is assisting many client countries in incorporating EAs as standard practice through projects aimed at building institutional capacity, including regulatory development and training.

The Bank is also strengthening its collaboration with other multilateral and bilateral donor agencies with respect to EA, helping to ensure that "good practice" standards for biodiversity conservation are complimentary across institutions.

Public involvement

The importance of local community and NGO involvement in conserving biological diversity is now well-recognized, especially for situations where conservation involves imposing restrictions upon the use of lands enjoyed by the public or considered the domain of indigenous peoples. With regard to identification and assessment of potential impacts, it is particularly important to pursue a dialogue with affected groups on: the importance of biological diversity and benefits to be gained from its conservation; realistic management options; and local customs, traditions and cultural values.

Consultation with affected communities and NGOs is a requirement of OP 4.01 during at *least* two stages of category A projects—shortly after the category has been assigned and once a draft EA has been prepared. This can yield significant benefits. For example, consultations during preparation of the Lower Guayas Flood Control Project in Ecuador resulted in changes to the project which helped to protect mangroves and an important wetland area. Participation of local communities and NGOs is usually vital to the long-term sustainable development of areas with high biodiversity value, both inside and outside protected areas.

For more detailed guidance on public involvement, refer to *Update* no. 5, *Public Involvement in Environmental Assessment: Requirements, Opportunities and Issues.*

Strategic (sectoral and regional) EAs

The cumulative effects of development activities within a given sector or region on biodiversity are best addressed through the use of strategic EAs. Sectoral EAs can be used to take account of biodiversity issues in sectoral investment projects, especially where sector or subsectors are confined to specific areas such as highway, industrial, or port and harbor developments. Regional EAs may be applied where the borrower is engaged in regional development planning at a stage when alternative development strategies can still be considered. For example, regional EAs undertaken for both the Argentina Flood Protection Project (see Box 1) and the Kerinci-Seblat

Biodiversity Integrated Conservation and Development Project (see *Update* no. 15, *Regional Environmental Assessment*, Box 2), influenced the design of both projects in ways which benefited biodiversity conservation. The latter contributed to a government decision to postpone plans for road and mining development until a park management plan is prepared so that biodiversity objectives may be fully integrated with regional development. Regional EAs can also be undertaken more downstream in the planning and investment process as a tool to assess cumulative impacts and relationships among multiple activities. Regional EAs provide a good base for project-specific EAs of individual investments.

The Bank encourages its client countries to adopt such new approaches to environmental assessments. For additional information on sectoral and regional EAs refer to *Update* nos. 4 and 15, respectively.

Longer-term initiatives supporting biodiversity and EA

Building baseline information and experience in client countries is essential to inform the decisionmaking process. Rapid assessment procedures are being deployed to establish baseline information in a short time frame in anticipation of development decisions, and appropriate technologies for information storage and retrieval are being established. These and other initiatives should be supported by the Bank, however, it is important that they link with longer-term monitoring efforts.

The Bank can also support the development of local expertise in methodologies, study techniques and procedures, analysis and case studies to enhance the practice of EA. This may be achieved in developing countries by supporting workshops and seminars on current research and techniques in biodiversity conservation, and helping develop training facilities through research exchange programs.

Sources of information on biodiversity

A detailed listing of protected areas according to a common classification can be found in the 1993 United Nations List of National Parks and Protected Areas, and modifications to the IUCN categories in the List are detailed in Guidelines for Protected Area Management Categories (see references below).

Useful data on biodiversity may be obtained through the Biodiversity Map Library supported by the World Conservation Monitoring Centre (WCMC) or increasingly via databases established and run by in-country government agencies or NGOs. The Environmental and Geographic Information Systems team (ENGIS) in the Bank's Environment Department can also provide such information. The Bank's Latin America and the Caribbean Environmental Division is collaborating with WCMC and Agriconsulting S.p.A. to produce a compendium of *Critical Natural Habitats in Latin America and the Caribbean*.

Additional information on the global importance of protected areas can be found in several documents: "The Convention Concerning the Protection of the World Cultural and Natural Heritage" (Paris, 1972); "The Convention for the Protection of Wetlands of International Importance Especially as Waterfowl Habitats" (Ramsar, 1971); "The UNESCO Biosphere Program: and the Regional Seas Programs." Numerous regional and bilateral conventions (such as the Western Hemisphere Treaty, the African Convention on the Conservation of Nature and Natural Resources, and the ASEAN Agreement on Nature and Natural Resources) also provide mechanisms for recognizing the international or regional importance of conservation sites at the national level.

Other sources of data include universities, museums, and research institutes; local and national government files and archives; NGOs; and local communities.

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