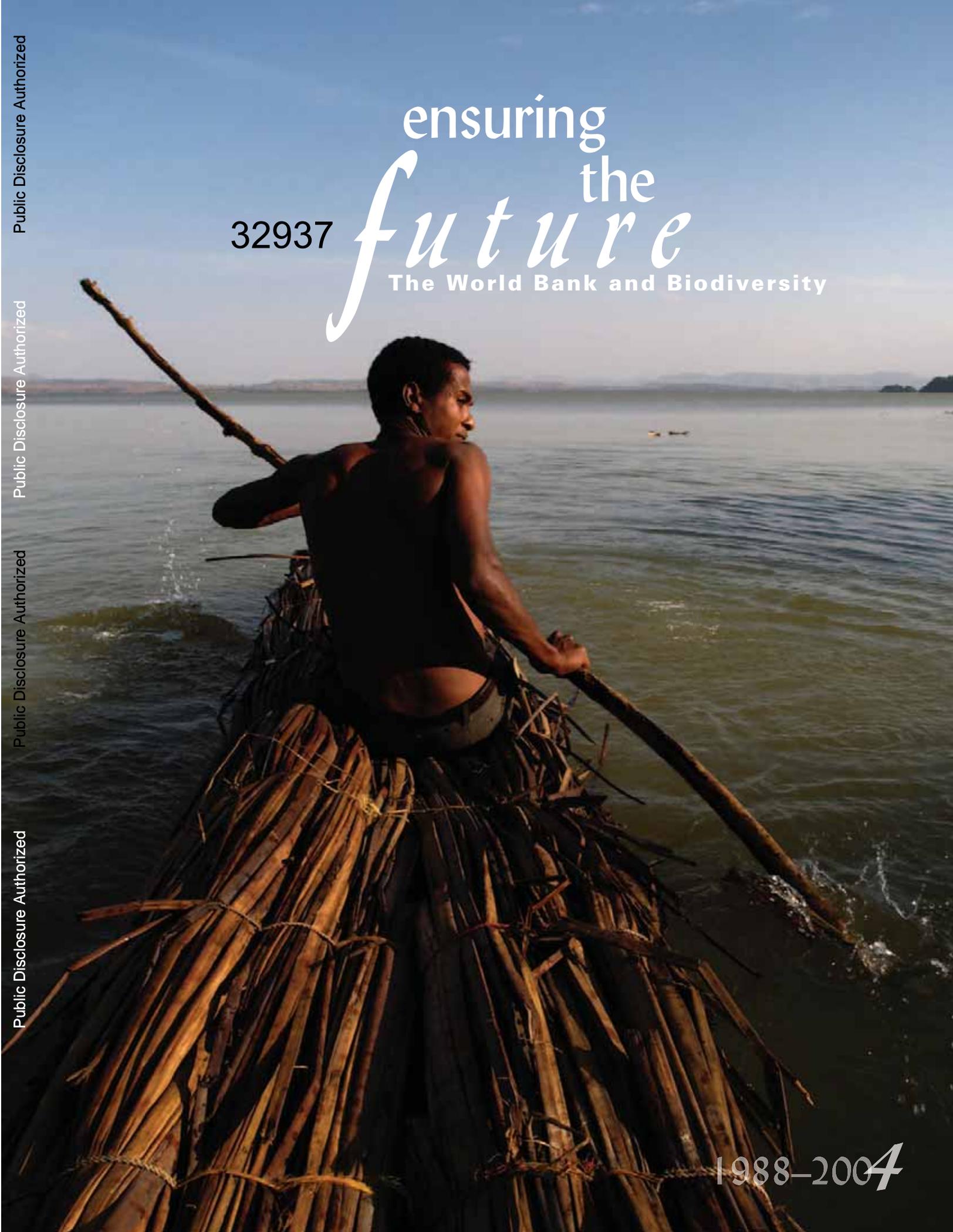


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The World Bank and Biodiversity



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This report was prepared by Kathy MacKinnon, David Bonnardeaux, Karen Luz, and Claudia Sobrevila (Biodiversity Team), with contributions from Phil Brylski, Vera Dugandzic, Marjory-Anne Bromhead, and Emilia Battaglini (ECA); Marea Hatzios, Leah Bunce, Stefano Pagiola, Benoit Bosquet, Elisson Wright, Jim Cantrell, and Anita Gordon (ENV); Nicole Glineur (MNA), Valerie Hickey and Robin Broadfield (EAP), Christophe Crepin (AFR), Jocelyne Albert (LAC), Malcolm Jansen (SAR), Dahlia Lotayef (MNA), and other regional Bank staff; and Catherine Cassagne and Sam Keller from the International Finance Corporation (IFC). Dirk Kloss, David Bonnardeaux, and Valerie Hickey prepared the portfolio data for this update of the 2000 biodiversity portfolio review, with input from Dinesh Aryal (ENV) and Josh Brann (GEF). Thanks are due for the comments provided by many of the regional GEF coordinators and project task managers. This paper is a contribution to the ongoing review of the biodiversity portfolio of the World Bank Group. It is a work in progress and has not been formally cleared by Bank management. This publication is available online at www.worldbank.org/biodiversity.

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The Bank's Biodiversity Portfolio



Introduction

The conservation and sustainable use of natural ecosystems and biodiversity are critical components of the World Bank's mission to alleviate poverty and support sustainable development. Biodiversity is the common factor that links agriculture, forests, and fisheries and provides the raw materials for livelihoods, sustenance, trade, medicines, and industrial development. At the genetic level, the diversity found in natural life forms provides the basis for new breeding programs, improved crops, enhanced agricultural production, and food security. Natural habitats and ecosystems provide services—such as water flow, flood control, and coastal protection—that reduce human vulnerability to natural hazards, including drought, floods, and hurricanes. Forests, grasslands, and aquatic habitats also provide benefits of global value such as carbon sequestration, nutrient and hydrological cycling, and biodiversity conservation. Careful ecosystem management provides countless streams of benefits to, and opportunities for, human societies, while also supporting and nurturing the web of life. Biodiversity conservation contributes to environmental sustainability, a critical Millennium Development Goal (MDG) and a central pillar of World Bank assistance.

To date, the World Bank Group (WBG) is the largest single international funding source for biodiversity projects. A previous review of the full biodiversity portfolio, covering the period from 1988 until 1999,

showed that the WBG approved \$2.6 billion for more than 200 projects worldwide to promote conservation and sustainable use of biodiversity in 85 countries and 10 regional, multi-country efforts (World Bank, 2000a). This update shows that by the end of June 2004 (FY04), the figure for total biodiversity investment has risen to \$4.7 billion, signifying that the World Bank remains committed to biodiversity conservation as a significant part of its sustainable development agenda. Although a substantial amount of that investment has been dedicated to protected areas, opportunities are increasingly being sought for biodiversity investment in the broader landscape and new approaches to the management of natural resources, land, and water to maintain native biodiversity.

The WBG's support for client countries' initiatives in the area of biodiversity follows the guidance of the Convention on Biological Diversity and fulfills the Bank's responsibility of assisting partner countries with the implementation of the Convention's goals and objectives in line with national priorities. Bank biodiversity projects are often developed in the context of participatory and national sustainable development initiatives, including decentralization, infrastructure, environmental governance and natural resource management programs, and implementation of Poverty Reduction Strategies (PRSPs). The biodiversity portfolio includes projects where the main objective is support to protected areas, as well as those that focus on improving natural resource management and mainstreaming biodiversity into forestry,

coastal zone management, and agriculture. Beyond these “traditional” biodiversity sectors, the Bank is supporting innovative modalities for protection and improved management of natural habitats under Bank-funded infrastructure projects; for example, the establishment of the Gra Gra Lagoon National Park under a loan to improve roads and municipal drainage in Belize.

In addition to projects, and project components, with specific and direct biodiversity objectives (the biodiversity portfolio), the Bank supports many other projects that may also have positive, albeit indirect, impacts on biodiversity. For example, pollution abatement, sewage treatment, and cleaning up pollution discharge may enhance water quality in freshwater ecosystems and benefit freshwater biodiversity. This update, however, does not cover such indirect support.

Methods

This paper is based on the most recent update of the World Bank biodiversity portfolio and summarizes the efforts of the World Bank Group (WBG) over the past 16 years (1988–2004) in providing assistance to protected areas and biodiversity conservation around the world. This period spans ratification and implementation of the Convention on Biological Diversity by more than 170 countries, as well as two major Earth Summits in Rio de Janeiro and Johannesburg, and more than a decade of experience with implementation of the Global Environment Facility (GEF). Since 1988, the World Bank has approved 426 projects that wholly or partially support biodiversity management, including investments in institutional strengthening, innovative governance arrangements, and sustainable financing mechanisms. This biodiversity portfolio represents a \$4.7 billion investment, including Bank contributions and leveraged co-financing.

This portfolio update incorporates both stand-alone biodiversity projects and biodiversity-related sectoral

projects that clearly describe and include biodiversity activities. It includes all such projects financed through the International Bank for Reconstruction and Development (IBRD), International Development Association (IDA), the Pilot Program to Conserve the Brazilian Rainforest (RFTF), and GEF projects executed through the World Bank. The Bank’s private sector partner, the International Finance Corporation (IFC), has contributed to biodiversity conservation—including protected area management—through private sector investments and GEF grants; only the latter are included in this analysis. Additionally, the Bank has contributed to biodiversity conservation through innovative programs and activities funded by the Development Grant Facility (DGF) and the Bank Netherlands Partnership Program (BNPP) (see Box 1).

The portfolio review involved the following five-step methodology: 1) *compilation of data* from relevant databases (WB, GEF, OED); 2) *updating project lists* by cross-checking with archived project documents; 3) *comprehensive database creation*; 4) *peer review* by Bank regional staff; and 5) *database analysis*, which included the production of summary tables and figures describing regional, annual, funding entity, and biodiversity activity. Projects are included in the portfolio for the fiscal year in which they were approved by the Bank Board or, in the case of MSPs, by the country management unit. For clarification and accuracy, the members of the biodiversity thematic group working in the Bank’s regional departments reviewed and commented on biodiversity project identification, classification, and interpretations.

The source of funding, whether WBG (loans, credits, or grants) or co-financing from non-Bank sources, was noted for each project. Where there was more than one source of WBG financing in a project, these were assessed separately to avoid double counting. Co-financing amounts include contributions from borrower governments, local beneficiaries, nongovernmental organizations (NGOs), bilateral donors, regional development banks, and United Nations’ agencies. As in previous reviews, biodiversity costs were determined by itemizing

Box 1

Biodiversity Funding through the Bank-Netherlands Partnership Program

Established in 1998, the Bank-Netherlands Partnership Program (BNPP) is an agreement between the Netherlands Ministry of Foreign Affairs and the World Bank to provide financing and a priority-setting framework for new projects and programs of a global and regional nature. The program finances regional and global activities in five priority windows that are executed by the World Bank. One of the five priority windows is the Environment Window, which has benefited greatly from BNPP funding and is the window through which financing for biodiversity, forests, and environmental analysis projects is obtained.

Previously, projects related to forests, biodiversity, and environmental analysis focused on five major strategic areas, including (1) mainstreaming biodiversity and sustainable forestry; (2) engagement in governance and law enforcement in forest management; (3) strategic alliances for biodiversity conservation and sustainable use; (4) poverty reduction; and (5) Environmental Assessment and Sectoral Environmental Assessment capacity building strategies.

Between 2000 and 2004, \$9 million has been committed for biodiversity projects through the Forests and Biodiversity Window. The projects relate to biodiversity, forests, and environmental analysis and have had impacts on policy relevance, innovation, flexibility of funding, capacity building, and developing new approaches.

During this period, capacity building activities were numerous and included the delivery of courses on *Markets for Biodiversity* (Central Asia, Russia, Ukraine, Brazil, Bolivia, Argentina, China, Cameroon); the publication of *Local Language Field Guides* to raise local awareness of local and national biological diversity; and support for the *Global Invasive Species Programme* (GISP) and the *Faith and Conservation Initiative*.

The BNPP also supported the Bank's *MesoAmerican Biological Corridor Project* (MABC), helping to mainstream the message of integrated multi-sectoral development and developing a strategy to put the MABC on the political and development map of Central America.

Another project, the *Functional Value of Biodiversity*, has helped inform the Bank and its clients about conditions under which maintenance of high-biodiversity tropical forests yields hydrological benefits, such as flood prevention. It has provided practical guidance to formulators of projects (especially natural resources management and environmental services projects) and Country Assistance Strategies (CAS) about when these biodiversity/vulnerability links are likely to be important.

each activity component (World Bank 2000a). For each project, figures have been estimated for total project cost, total biodiversity costs (WBG funds plus associated co-financing), and Bank biodiversity funding. Biodiversity cost allocations were also reassessed for projects from previous biodiversity portfolio reviews to maintain methodological consistency. Attributes of ecosystem types were derived from project document descriptions. In many cases, a project may have supported conservation in more than one ecosystem type. Annex 1 provides a listing, by region, of all biodiversity projects with their funding and key activities.

Portfolio Overview

The biodiversity portfolio of the WBG has shown a steady growth over the past 15 years, especially over the past decade. Between 1988 and 2004, the Bank approved 426 projects that fully or partially supported biodiversity conservation and sustainable use, with more than another 100 proposed over the next three years. These biodiversity initiatives are taking place in 102 countries, and through 17 regional multi-country efforts (Annex 1). This total reflects an addition of 200 projects to the portfolio since 1999. Projects financed through the GEF regular and

MSP grant windows have accounted for a substantial part of this increase.

These projects directly support biodiversity conservation in a range of natural habitats, from coral reefs to some of the world’s highest mountains, and from tropical evergreen and monsoon forests to savanna grasslands and unique dryland, limestone, and freshwater ecosystems. Many support activities in critical ecosystems, biodiversity hotspots, Endemic and Important Bird Areas (EBAs and IBAs), and the Global 200 Ecoregions. During the period between 1988 and 2004, the WBG committed over \$2.5 billion in loans and GEF resources and leveraged another \$2.2 billion in co-financing, resulting in a total investment portfolio of \$4.7 billion.

A small but growing source of funding for protected area and other biodiversity activities comes from special World Bank funds. The Development Grant Facility (DGF) and the Bank-Netherlands Partnership Program (BNPP) support key partnership activities such as the World Bank/Worldwide Fund for Nature (WWF) Alliance for Forest Conservation and Sustainable Use, the Critical Ecosystems Partnership Fund, and the Global Invasive Species Programme. Similarly, dedicated trust funds and a new environment window under the Development Marketplace afford the opportunity to support new

biodiversity initiatives and small grants in some of the poorer countries.

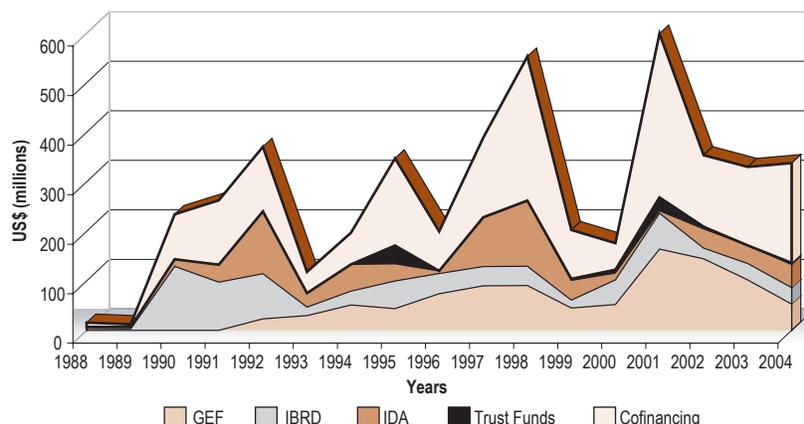
Table 1 shows the total World Bank commitments for biodiversity projects by year and funding source from 1988 to 2004¹. Cumulative WBG biodiversity funding for biodiversity projects during that period totaled \$4,699 million. Figure 1 summarizes biodiversity investments from all funding sources. Partner governments have borrowed 31 percent (down from 39 percent in 2000) of this total through IBRD loans or IDA credits, representing a total of \$1,487 million. Grants comprise 23 percent (\$1,045 million) and were facilitated through the Bank-administered GEF (\$964 million) and several trust funds (total of \$81 million). The remaining 46 percent (\$2,167 million)—an 8 percent increase since 2000—represents co-financing and parallel financing, approximately equivalent to an additional 85 cents for every dollar the World Bank invests in biodiversity (up from 70 cents per dollar invested by FY99). Figure 2 below represents the total biodiversity investments by funding source.

Preliminary qualitative assessments of the portfolio suggest that funding reflects and responds to the diverse strategic conservation priorities of Bank clients. Figure 1 gives an indication of the normal fluctuation of the funding cycles. Apparent surges in funding between years

Table 1. Total Biodiversity Investments, FY1988–2004 (US\$ million)

	GEF MSP	GEF REG	GEF IFC	GEF EA	GEF TOTAL	IBRD	IDA	Trust Funds	Cofinancing	Grand Total
1988						3.79	2.86		8.95	15.60
1989						3.16	3.93		5.21	12.30
1990						129.26	14.22		91.00	234.48
1991						97.17	35.48		129.94	262.59
1992		23.20			23.20	91.21	125.97		130.17	370.55
1993		29.35		0.40	29.75	17.13	28.37		42.93	118.18
1994		51.27			51.27	27.94	54.01		63.75	196.97
1995		44.06			44.06	55.61	34.80	36.66	176.26	347.40
1996		73.95			73.95	40.89	5.07		79.98	199.89
1997		85.01	2.00	2.87	89.88	38.86	99.54	0.00	160.75	389.03
1998	0.73	83.44	5.00	1.30	90.47	39.02	132.30	0.20	290.79	552.78
1999	12.13	32.04	0.75	0.18	45.10	15.87	40.15	3.00	98.57	202.68
2000	7.96	43.35		0.80	52.11	49.68	13.85	6.90	53.58	176.12
2001	11.59	151.59		0.96	164.15	72.28	5.09	27.00	330.56	599.07
2002	8.91	135.47		0.17	144.6	21.35	38.99	4.33	144.57	353.79
2003	7.65	93.08	1.00	0.26	102.0	32.93	36.69		158.50	330.10
2004	2.09	42.69	8.20		52.99	33.20	46.70	3.35	201.40	337.64
Total	51.06	888.50	16.95	6.94	963.5	769.3	718.00	81.44	2166.90	4699.14

Figure 1. Total biodiversity investments, including cofinancing, all funding sources, FY1988–2004 (US\$4,699 million)



are explained by bunching of a few large projects in some years or slippages of Board approval dates. Apparent decreases in overall funding levels in one year are usually compensated in the next. Longer preparation times due to the particular pace of country dialogue and the intricacies of biodiversity projects are also contributors to these fluctuations. Estimated 2004–07 figures lead us to believe that this characteristic pattern of annual variability in WBG biodiversity investments will continue. The general trend is nevertheless upwards, particularly as more co-financing is leveraged. Comparisons between years are thus difficult to interpret and necessitate a longer-term view of biodiversity portfolio trends.

Investment Trends

The total number of biodiversity projects, or projects with biodiversity components, funded by IBRD and IDA is 92 and 91 projects, respectively. Some \$280 million of IDA funds (39 percent) and \$201 million of IBRD funds (26 percent) are linked to GEF financing; this is a trend that has become more common over time. This indicates that a wide range of economies, including the poorer IDA-eligible countries, are borrowing for biodiversity conservation and sustainable use. It is expected that countries will maintain interest in using IDA credits and grants for conservation.

In the early stages of the review period (1989–1992), IBRD funded a few large projects. This is well illustrated by the Latin America and Caribbean (LAC) region, and Brazil specifically, where funding in the early period focused on large environmental projects such as the Rondonia Natural Resource Management, Mato Grosso Natural Resource Management, and National Environmental projects, whose cumulative biodiversity investment totaled \$200 million. The emphasis has since shifted to lending for a larger number of smaller-sized projects or components within larger projects, which may indicate improved mainstreaming of biodiversity conservation into mainline lending for development.

The number of biodiversity projects as a whole has steadily increased over the review period, with an addition of 200 new projects over the five years between 1999 and 2004 (see Figure 3). While the number of

Figure 2. Total biodiversity investments, including cofinancing by funding source, FY1988–2004 (US\$4,699 million)

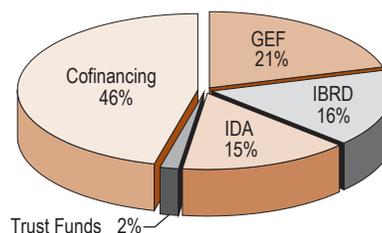
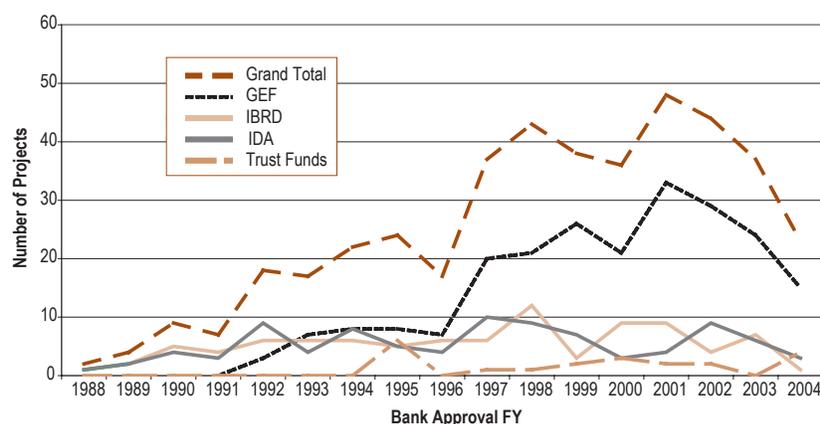


Figure 3. Number of biodiversity projects by funding source, FY1988–2004



projects has increased, the average investment per project has become smaller. Much of the increase is attributable to an increase in the number of GEF projects or GEF-blended projects, where funds are associated with other Bank funding such as IBRD and IDA. More than half of the total protected-area portfolio investment of \$3.2 billion, for instance, is associated with projects funded through the Global Environment Facility, with GEF contributing 25 percent of the financing.

The WBG is supporting conservation and sustainable use of biodiversity worldwide. Table 2 and figure 4 show the cumulative biodiversity funding (\$4,699 million) from all sources by region. The major share (39 percent) of all funding for biodiversity projects went to Latin America and the Caribbean (\$1,833 million), with 9 percent to South Asia, 26 percent to Africa, 14 percent to East Asia, and 6 percent to Eastern Europe and Central Asia. Three percent of total biodiversity funding went to the Middle East and North Africa (MNA). A further 3 percent represents biodiversity financing through global initia-

tives, such as the IFC Small and Medium Enterprise Fund and new Environmental Business Finance Program, the Critical Ecosystems Partnership Fund, and projects funded under the BNPP Forests and Biodiversity window. LAC and the Africa regions together are responsible for 65 percent of the total funding.

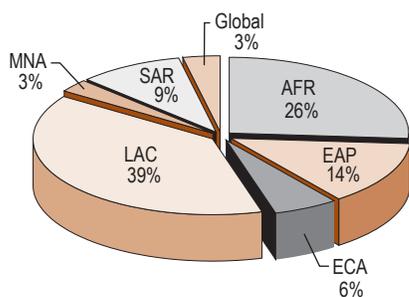
Table 2 shows IBRD and IDA funding by region, totaling \$769 million and \$718 million respectively. Among the regions, LAC still has the largest share of IBRD biodiversity funding with \$509 million (66 percent). Many of the LAC countries are among the mid- to higher-income developing countries and are not eligible for IDA credits. Conversely, the relatively poorer Sub-Saharan African countries have received the largest share of IDA funding, corresponding to 42 percent (or \$307 million) of total IDA biodiversity funds.

As an implementing agency for the GEF, the WBG channels GEF grants for enabling activities (EAs), medium-sized projects (MSPs), and regular GEF grants,

Table 2. Total biodiversity investments by region, FY1988-2004 (US\$ million)

		AFR	EAP	ECA	LAC	MNA	SAR	Global	Total
GEF	MSP	10.87	8.71	3.58	25.15	2.24		0.50	51.06
	REG	217.35	126.06	105.29	300.49	43.42	70.88	25.00	888.50
	IFC	0.75	2.60		6.61			7.00	16.95
	EA	0.95	1.22	2.83	0.86	0.89	0.20		6.94
	GEF Total	229.92	138.59	111.70	333.12	46.55	71.08	32.50	963.46
	IBRD	16.73	175.52	44.53	509.73	22.84			769.34
	IDA	307.23	127.02	18.12	57.66	1.71	206.26		718.00
	Trust Funds	0.43		0.15	45.91			34.95	81.44
	Cofinancing	672.62	198.02	99.62	886.98	48.23	167.85	93.58	2,166.90
	Grand Total	1,226.93	639.14	274.11	1,833.40	119.3	445.19	161.03	4,699.13

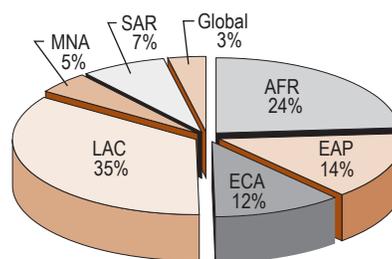
Figure 4. Total biodiversity investments by region, including cofinancing, FY1988–2004 (US\$4,699 million)



both through the Bank and the IFC. By the end of FY04, the Bank had 28 biodiversity EAs (up from 19 in FY99) and 64 MSPs (up from 17 by FY99) under implementation, spread across all Bank regions (see Figure 5). Latin America and the Caribbean is the region with the most MSPs (31). The introduction of the MSPs in 1997 made mid-sized grants more readily available to NGOs and non-government stakeholders and allowed a rapid expansion of the biodiversity portfolio. The MSP grants have provided the opportunity for innovation in conservation, including greater community involvement in biodiversity management.

On the other hand, 13 of the 28 EAs implemented thus far have been in the Europe and Central Asia region (ECA). In ECA, many of the client countries came into being with the breakup of the former Soviet Union; in those countries the Bank had little previous lending history. Assistance for drafting biodiversity EAs was

Figure 6. Total GEF biodiversity investments by region, FY1988–2004



important in developing a dialogue, which has often led to Bank investment in biodiversity or natural resource management, including forest management.

The cumulative biodiversity investments by GEF grant windows have more than doubled over the last five years to \$963 million across all regions. As shown in Figure 6, GEF funding for biodiversity is more evenly allocated across regions, reflecting the distribution of eligible countries across the world. Nevertheless, the Africa and LAC regions jointly absorb 59 percent of all biodiversity investments made through the three GEF windows. Latin America and the Caribbean is the region with the highest GEF funding overall for biodiversity, a reflection of the species richness and high biodiversity value of the region's ecosystems.

Co-financing from client governments and other donors makes up 46 percent of the total biodiversity investment;

Figure 5. Number of GEF projects by grant window and region, FY1988–2004

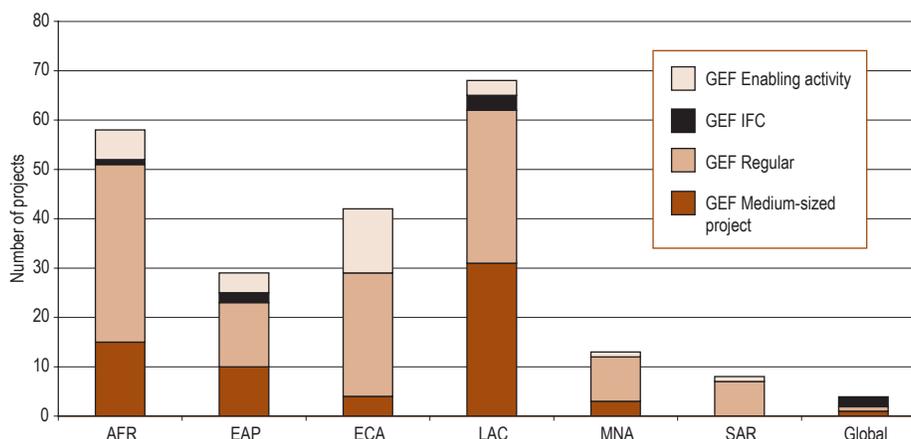
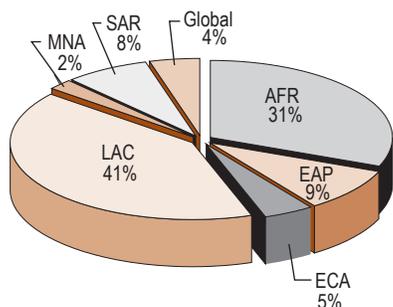


Figure 7. Cofinancing for biodiversity projects by region, FY1988-2004 (US\$ 2,166.9 million)



this reflects strong commitment for biodiversity conservation at the national level. In line with the findings for total investments, 72 percent of the \$2,167 million parallel and co-investment funding supports biodiversity conservation and sustainable use in the LAC and Africa regions (see Figure 7). This is consistent with previous portfolio reviews.

Overall, for GEF projects the ratio of leveraged funding against grant resources is 1 to 1.12. Specifically for MSPs, the ratio of leveraged co-financing is even higher, with \$1.38 leveraged for every dollar of GEF grant (see Table 3). The East Asia and Pacific (EAP) region has been particularly successful at raising cofinancing against non-GEF projects; for example, in the Vietnam Forest Protection and Rural Development Project, the \$21.5 million IDA funding from the Bank has leveraged an additional \$10.8 million from bilateral and government sources.

Support in WBG-funded projects covers the entire range of globally important ecosystems. Figure 8 illustrates the

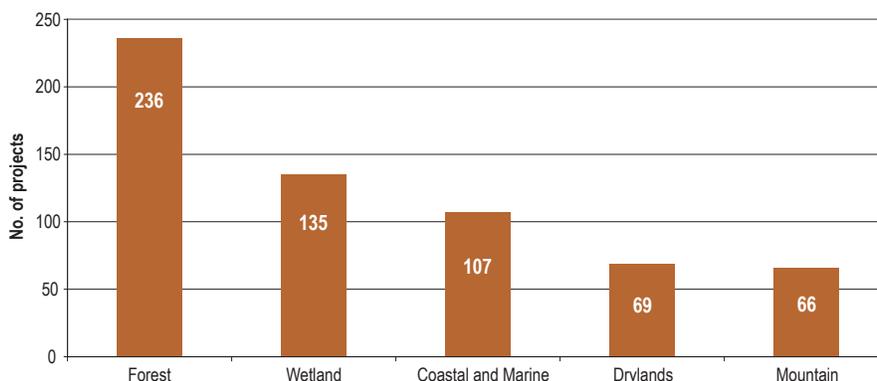
Table 3. Cofinancing leveraged for biodiversity projects by funding source (US\$ million)

	Total	WBG	Cofinancing	Ratio
GEF MSP	121.59	51.05	70.54	1.38
REG	1,823.71	888.50	935.20	1.05
EA	7.51	6.94	0.57	0.08
IFC	91.74	16.96	74.78	4.41
GEF Total	2,044.55	963.46	1,081.09	1.12
IBRD	1,245.69	769.34	476.35	0.62
IDA	1,209.30	718.00	491.30	0.68
Trust Funds	199.60	81.44	118.16	1.45
Grand Total	4,699.13	2,532.24	2,166.90	0.86

diversity of ecosystems represented in the biodiversity portfolio between fiscal year 1988 and 2004. Forest ecosystems received a majority of the investments with 236 projects (including dry forests and rainforests). Fewer projects dealt with wetland ecosystems (135), coastal and marine ecosystems (107), drylands (69), and mountain ecosystems (66). Many projects provide support to protected areas and other conservation initiatives across more than one major ecosystem.

The WBG biodiversity portfolio covers a range of activities that promote conservation and sustainable use across all major ecosystems and more equitable sharing of the benefits derived from biodiversity. Over the whole biodiversity portfolio, the largest amount of funding and support has gone to projects that include expansion and strengthening of protected areas, including conservation activities in park buffer zones. The Bank is committed to maintaining support for protected areas, but increasingly is seeking opportunities to link such support to sectoral development programs and biodiversity activities in the

Figure 8. Ecosystem occurrence in WBG biodiversity portfolio, FY1988–2004



wider landscape. The South Asia Region, and especially India, has already made excellent progress in this regard, with biodiversity conservation and sustainable management often fully integrated and mainstreamed into regular Bank lending.

The WBG mission and portfolio of activities entails two areas of comparative advantage relevant to the sustainable use and conservation of biodiversity. First, the scale and variety of Bank financing instruments is greater than is the case for most other donors. The Bank also provides leadership within the donor community and stimulates co-financing and donor coordination. This provides

multiple opportunities to integrate biodiversity concerns into development assistance and to address the root causes of biodiversity loss. Second, the Bank has access to considerable grant and lending resources to help introduce biodiversity within national agendas as a step toward mainstreaming biodiversity into sustainable development globally. To date, the Bank is not only the largest single international funding source for biodiversity projects, but also has an unparalleled capacity for facilitating political will, participatory dialogue, technical knowledge sharing, and networked coordination of relevant actors and partners within client countries and regions.

Highlights of the Portfolio



Protected Areas — Cornerstones for Conservation

Protected areas are the cornerstones of biodiversity conservation. This is recognized by the signatories of the Convention on Biological Diversity (CBD), who adopted an ambitious work program to support a global network of representative and effectively managed terrestrial and marine protected areas at the 7th meeting of the Conference of the Parties in Kuala Lumpur in February 2004. Between 1988 and 2003, the WBG provided more than \$3.2 billion of funding for protected areas (World Bank 2003a). During this period, Bank projects have worked to bring about more effective management of 135 million hectares of protected areas and established more than 33 million new hectares of protected areas around the world. The Bank remains committed to maintaining strong support for parks and reserves to assist client countries to meet their CBD obligations. Projects support the strengthening of protected area systems in forests and other vulnerable terrestrial ecosystems, with increasing attention also being paid to marine protected areas. WBG support is targeted at both individual reserves and whole protected-area systems, with particular emphasis on piloting innovative models of protected-area management and financing to ensure their sustainability.

Protected-area support includes conservation planning and establishment of new protected areas and biological corridors (e.g. Brazilian Amazon, Panama, Nicaragua,

Ghana and Madagascar); improved management of “paper parks” and existing protected areas (e.g. Laos, Pakistan, Uganda, Bolivia, Ecuador, Venezuela, and Russia); buffer zone activities and alternative livelihoods to reduce pressure on conservation areas (India, Ethiopia, Indonesia); control of invasive exotic plants that threaten native species and habitats (Mauritius, Seychelles, South Africa); and promoting community involvement in conservation management through community management areas, indigenous reserves, sacred groves and clan conservation areas (Colombia, Ecuador, Ghana, Peru, Papua New Guinea). New marine initiatives support local community involvement in coral reef management in Samoa, Vietnam, Indonesia, and the transboundary marine parks along the MesoAmerican Barrier Reef (MBR). Other projects target landscape-level efforts to strengthen linkages between protected areas and surrounding forest and agricultural production landscapes, including transboundary projects in Central Asia and the MesoAmerican Biological Corridor (MABC). In the forests of the Brazilian Amazon and Russian Far East, the Bank is supporting investments in some of the world’s most extensive and biologically rich remaining wilderness areas.

Several projects provide innovative new financing mechanisms, both for protected-area management and conservation activities for buffer-zone communities (Bhutan, Bolivia, Peru, Vietnam, the Table Mountain Fund in South Africa). Others are promoting financial incentives to encourage sustainable use in adjacent lands,

agroforestry, forest regeneration in park buffer zones, and strengthened forest protection in biological corridors that link major parks (Central America).

The Bank is engaged in a multitude of Integrated Conservation and Development Projects (ICDPs), which attempt to reconcile the legitimate needs of local communities with the conservation objectives of protected areas and the larger conservation landscape by using development to address some of the social and poverty needs that lead to biodiversity loss. There are some notable successes, such as the India Ecodevelopment Project, but often win-win situations and clear linkages between development and conservation are difficult to find. Ecotourism and sustainable harvesting of wildlife are useful livelihood opportunities in some localities, countries, and ecosystems, but are certainly not universally applicable. Moreover, many development options will be supplementary rather than true alternatives to current practices for many stakeholders. The greatest benefits to local communities from protected area projects are often not economic but greater empowerment and inclusion for previously marginalized or disenfranchised communities in decision-making processes. A major challenge for the future will be to avoid burdening protected-area managers with new obligations for poverty alleviation (for which many have no mandate or resources), while reinforcing awareness of the key role that many protected areas already play in sustainable development. This will require much greater emphasis on raising awareness of the multiple goods and services provided by protected areas and on how to capture recognition of these “values” to ensure their long-term sustainability.

For protected areas to be viable in the long term, sustainability needs to be achieved ecologically (through linkages in the landscape), socially (through local and national support), institutionally (through training and capacity building), and financially. Endowment funds and other financing mechanisms have helped to cover recurrent operational costs, but it is clear that few protected areas can be self-sustaining from tourism or

other direct revenues, and that most protected areas will always require a basket of funding sources, including some government support. Making the case for that support will increasingly depend on emphasizing the whole suite of benefits from protected areas: ecosystem services, research, recreation, and even spiritual values. In this regard, mountain protected areas have a unique advantage—they can be linked to downstream benefits through payments for environmental services such as water provision, soil conservation, and protection of downstream and vulnerable communities from natural hazards such as floods and unstable hillsides (see Box 2).

Conservation in the Broader Landscape

As human populations expand and development pressures increase, many protected areas are becoming increasingly isolated. Their long-term survival and value as reservoirs of biodiversity, will depend on landscape conservation planning efforts that hinge upon a combination of political, social, and economic factors. Working with multiple stakeholders and agencies, many with competing and conflicting development agendas, is a difficult challenge but increasingly necessary if biodiversity is to be maintained in the broader landscape.

Beyond park boundaries, Bank projects and programs promote sustainable use of biodiversity in ecosystems and buffer zones through more sustainable land management, establishment of biological corridors and monitoring of harvests in mountain forests (Cambodia, Papua New Guinea, Georgia); integrated livestock and pasture management of grasslands (China, Kyrgyz Republic); reforestation and natural regeneration of watersheds and degraded pastures (Morocco, Turkey, Colombia); promotion of agroforestry systems such as shade-grown coffee (El Salvador, Mexico); improved fire management in forest landscapes (Russia); and sustainable harvesting of non-timber forest products and medicinal plants (Ethiopia, Peru, Uganda). Several projects provide financial

Box 2

Upstream-Downstream Contracts — Protected Areas as Water Towers

Forest-water relationships are complex and, with the exception of cloud forests, it is not always possible to demonstrate clear linkages between forest areas and water quantity. There does, however, seem to be a direct relationship between forests and water quality. A number of Bank biodiversity projects have provided funding to protected areas and forest watersheds that safeguard the drinking supplies for some of the world's major cities.

In China, the Qinling Mountains—home to a major panda reserve—protect the drinking water supplies for Xi'an. In India, Periyar and Pench tiger reserves and Kalakad- Mundanthurai (KMTR) all protect the water supplies for major irrigation schemes, while Borivili National Park provides water for the reservoirs that feed Mumbai (Bombay). In Indonesia, Gunung Gede-Pangrango provides the drinking water supplies of Jakarta, Bogor, and Sukabumi, and generates water with an estimated value of \$1.5 billion annually for agriculture and domestic use. Similarly, Kerinci National Park in Sumatra safeguards water supplies for more than 3.5 million people and 7 million hectares of agricultural land.

In South America, the Santiago foothill forests in Chile provide more than 20 percent of Santiago's potable water, while two of the Andean protected areas in Ecuador provide drinking water supplies for 80 percent of Quito's population. The La Visite and Pic Macaya National Parks in Haiti safeguard water supplies for the cities of Port au Prince and Les Cayes respectively. In Mexico, the Monarch Butterfly Reserve protects an amazing biological phenomenon and the drinking water of Mexico City. The Aberdare Mountains and Mount Kenya National Parks in Kenya provide critical water to Nairobi, while the Udzungwas in the eastern arc mountains of Tanzania supply Dar es Salaam. In South Africa, the recognized value of the mountains of the Cape Peninsula and Drakensberg in providing water supplies for Cape Town, Johannesburg, and Durban has led to serious national investments in *Working for Water* programs as well as biodiversity investments through the World Bank.

incentives to encourage forest regeneration and strengthen forest protection (Colombia, Nicaragua, Costa Rica Ecomarkets). A notable feature of many of these programs is the increasing involvement of local community organizations in implementation, providing communities with a stake in sustainable resource management and biodiversity conservation.

Bank support is being targeted to protect biodiversity in some of the world's most threatened habitats through explicit efforts to integrate biodiversity issues into land use decisions and bioregional planning. South Africa's Cape Floristic Region (CFR) is the smallest of the world's six floral regions. However, it contains over 9,600 plant species, of which 70 percent are endemic. The marine environment harbors more than 11,000 known species. The Cape Action Plan for the Environment (C.A.P.E.) is



the first bioregional plan to identify conservation priorities for an entire floral region, including the marine, terrestrial, and aquatic environment. This includes the development of a system of large and smaller formally protected areas, as well as buffers and corridors, in order to ensure that evolutionary processes can continue in the CFR. Key to this program is the mainstreaming of biodiversity conservation into sectoral programs, as well as through integrated development planning. Another grant to South African universities and botanical institutes is allowing scientists to identify the minimum set of target areas that will capture the greatest biodiversity

value within Namaqualand, another botanical hotspot. The results of this conservation planning will be used to identify areas of land for purchase through private donations to ensure a fully representative system of conservation areas through public-private partnerships (see also Box 3).

A landscape approach to conservation can help to link protected areas by wildlife corridors through production landscapes, and encourage management systems that promote conservation and sustainable use. In Georgia, an IDA forest management project and associated GEF-

Box 3

Subtropical Thicket — The “Lost” Biome of South Africa

In the Eastern Cape Province of South Africa, planning efforts are under way to ensure adequate protection of bushveld, the Subtropical Thicket Biome of South Africa that was recently recognized as a distinct biome. Although this biome covers an area of some 48,000 km², less than 5 percent is covered by protected areas. This habitat is thought to contain the most species-rich formations of woody plants in South Africa, with 20 percent of these species found nowhere else on earth. People have occupied the Thicket Biome for at least 120,000 years, beginning with the San, then the Khoekhoen and Bantu-speaking agro-pastoralists (ancestors of the Xhosa people), and most recently settlers of European descent who entered the region in the mid-1700s. As a result, extensive areas have been destroyed through clearing for crop production and pasture creation and through over-grazing by domestic herbivores—mainly goats—in both communal and commercially farmed areas. Consequently, less than 50 percent of the original Thicket Biome is in pristine condition, while 13 vegetation types have endured extensive transformation.

The Subtropical Thicket Ecosystem Planning (STEP) project—co-financed by the GEF and the University of Port Elizabeth—aims to establish ecologically sustainable land management practices in the area in order to conserve, enhance, and sustainably use the area’s extraordinary natural resources. Themes key to achieving the project’s aims include:

- Enhancing partner involvement, cooperation and capacity
- Planning for conservation and land-use
- Enhancing the effectiveness of the protected-areas system
- Promoting megaconservancy networks.

The project has mapped important areas of remaining habitat and is working with regional planners, developers, and landowners to ensure that biodiversity conservation priorities are fully integrated into regional development planning and land management. Guidelines have been prepared and regional development planners trained and fully engaged in land use planning. There are strong links between this initiative and other GEF initiatives in the CAPE to maximize exchange of lessons and experience and to promote the role of conservation farming as part of national and regional strategies to conserve biological diversity. The project is strengthening biodiversity conservation by identifying new areas for protection within a more representative system, either through inclusion within the formal protected-area network or by promotion of more sustainable farming alternatives and “set asides” in the production landscape.

funded project will support biodiversity planning in the production forests of the Eastern Caucasus and adjacent alpine grasslands to maintain wildlife corridors in a recognized global hotspot. Corridor plans link management activities in the Tusheti and Vashlovani National Parks and Lagodhecki Nature Reserve with management on adjacent state forest lands, including protection of riparian corridors. In Croatia, “green bridges” have been created to allow wildlife to cross safely over roads that fragment habitats and divide species’ home ranges (see Box 4). Elsewhere in the ECA region, the Black Sea-Azov Corridor Project in the Ukraine is addressing the challenges of integrating the conservation of wetland areas within a landscape dominated by intensive agriculture.

In Colombia, the Andes GEF project has a specific component dedicated to building ecological corridors through the highly devastated cloud forest and paramo habitats of the mountain chain. The Andean paramo ecoregion in Colombia stretches across an altitude range from 500 to 5,000 meters, covering three parallel mountain chains and two river valleys. Climate and habitat ranges from hot and cold deserts to dry and wet high mountains. The project will increase conservation, knowledge, and sustainable use of biodiversity of the Colombian Andes by testing various conservation strategies, including regional systems of protected areas and establishment of private reserves and biological corridors in rural landscapes. The project will include the Los Nevados National Park, regional reserves, private

reserves, and agroecosystems, including shade and sun-grown coffee, mountain livestock systems, agroforestry, potato fields, and orchards of Andean fruit trees.

A Focus on Marine Areas

The Bank is addressing marine conservation issues through a portfolio that covers all aspects of resource use from integrated coastal zone development (Black Sea, Mozambique, Tanzania) to targeted interventions to support community-managed fisheries (Philippines), marine protected areas (Vietnam), and transnational cooperation (MesoAmerica).

A growing body of empirical evidence suggests that marine reserves can rejuvenate depleted fish stocks in a matter of years when they are managed collaboratively with the resource users and form the core of a wider multi-use marine protected area. In Indonesia, the Bank is supporting a national effort to manage and restore coral reefs in the world’s richest marine hotspots. Many of the archipelago’s coral reefs and the small-scale fisheries they support have reached a level and mode of exploitation where the only way to increase future production and local incomes is to protect critical habitats and reduce fishing effort. A six-year, \$80 million program, Coral Reef Management and Rehabilitation Project (COREMAP II), will be implemented in 12 coastal districts, including

Box 4

Making Way for Large Mammals in Croatia

Monitoring migration corridors and population dynamics of large carnivores is one of the 15 tasks of the Karst Ecosystem Conservation (KEC) Project in Croatia. The objective is to develop, within the main monitoring program, specific techniques and capacity to identify, and keep under observation, movement corridors. This information will feed into studies on population dynamics of bear and lynx in the KEC Project region (Risnjak National Park, Plitvice Lakes National Park, Paklenica National Park, Northern Velebit National Park, and Velebit Nature Park). Infrared sensors and video cameras will be used to track animal movements across 10 existing green bridges that span the Rijeka-Zagreb Highway. In other protected areas, animals will be radio-collared to track their movements and ranges. This information will be used to prepare guidelines for appropriate management of agriculture, forestry, and other human activities in the proximity of such wildlife corridors to minimize disturbance to the animals’ movements.

1,500 coastal villages and involving more than 500,000 residents. The centerpiece of these efforts will be collaboratively managed marine reserves, many within existing marine parks of recognized global value. The Government of Indonesia has committed to a target of 30 percent of the total area of coral reefs in each participating district to be set aside as collaboratively managed and fully protected areas. The project will target some of the richest coral reefs off Sulawesi, the Aru Islands, and Indonesian Papua and builds on lessons learned from an earlier project that also focused on marine protected areas (MPAs) and community management of coral reefs.

The MesoAmerican Barrier Reef System (MBRS) Project, a transnational project involving Mexico, Belize, Guatemala, and Honduras, has been under implementation for two years and has already achieved success in putting in place a highly participatory process to address issues related to use of shared resources and conservation of valuable transboundary ecosystem services. Multisectoral National Barrier Reef Committees reflect diverse stakeholder interests in the sustainable use of the MBRS in each of the four participating countries, while technical working groups at the regional level oversee project implementation, review annual work plans, promote

exchange of regional expertise, and sustain regional coordination. Transboundary commissions have been established on the border areas of the MBRS (between Mexico and Belize, and Belize, Guatemala, and Honduras) to address marine resource management concerns. A training program has been established for marine protected-area managers, enabling them to design and implement participatory management plans and monitor results using a common monitoring protocol.

Fisherfolk are being trained for alternative livelihoods in the tourism and fisheries subsectors—such as sea kayaking, recreational diving, catch-and-release sport fishing, and sustainable mariculture—to relieve pressure on MPAs. The project will support monitoring of spawning aggregations (SPAGs) of economically important and threatened reef fish, like Nassau grouper and snapper, and recommend policies for restricted use of these resources. Major SPAGs have already been closed to fishing during these spawning events as a result of project cooperation with the Ministry of Fisheries. The project will also promote sustainable tourism centered on the MPAs, through formation of a regional tourism forum that meets regularly to address key issues in the tourism industry, compilation of a manual on best practice, and development and adoption of a regional certification system for marine-based tourism enterprises.

In the Pacific, the Aleipata and Safata MPAs in Samoa were established as community-based marine protected areas to provide for the protection and sustainable use of threatened coastal marine biodiversity in Samoa. The MPAs have been planned and managed by village committees—a key element of a \$900,000 GEF grant to the World Conservation Union (IUCN) for the Marine Biodiversity Protection and Management Project in Samoa. Though it is too early to quantify biodiversity gains, there is general agreement that the abundance and size of fish, turtles, and health of coral reefs and mangroves has substantially improved since the MPA establishment. Local fisherfolk report that they are now able to fish closer to shore. Effective partnerships, particularly with the Peace Corps, led to the inclusion of



the MPAs in the national social studies curriculum and in expanding marine education programs in the two districts. The two District Committees have also shown, for the first time, that district-level governance can work in Samoa. The two MPAs are considered the model for a planned nationwide system of larger marine protected areas. The committee structure has also been used effectively by local chiefs to lobby the government for wider development services in the two districts. The committees have further been successful in banning sand mining and scuba fishing, influencing national policies on these issues.

Wetlands, Rivers, Lakes, and Regional Seas

Freshwater systems and regional seas are particularly vulnerable to the impacts of pollution and degradation of the terrestrial habitats that surround them. They are also often a critical natural resource for local populations, providing drinking water, transportation, hydroelectricity, fisheries, and other environmental services. The Bank has supported projects to improve the situation of these important habitats in a number of areas.

Eastern Europe and Central Asia (ECA) includes six major regional seas, many highly polluted but still sustaining a high number of fish species (many of them endemic). There are over 152 Ramsar sites (wetlands of high international significance) covering an area of 13.6 million hectares. Riverine and coastal wetlands in the Black Sea and its hinterlands are especially high in biodiversity, and the Danube delta is one of the world's top temperate wetlands. Accordingly, the Bank has provided major funding to an International Waters program focusing on the Black Sea as well as targeted biodiversity projects along the Danube River and in both the Romanian and Ukrainian parts of the Danube delta.

The coastal wetlands of the Black Sea cover about 10,000 km² and provide important habitat for many rare and

commercially valuable fish species, including six species of sturgeon—four of which are endangered. The Black Sea fauna includes 160 species of fish and four marine mammals (one seal and three dolphins), all of which are either endangered or declining in numbers. Fisheries have collapsed over the last decade as a result of habitat degradation and loss and past overfishing. Additional related problems for Black Sea biodiversity are (a) pollution from point sources (municipal wastewater, industry, and shipping) and nonpoint sources (agricultural runoff), which contribute to biodiversity degradation; and (b) conversion of wetlands to agricultural lands, although currently state financing for habitat conversion is much lower than before the transition. The Danube River carries discharges from 10 riparian countries along its 2,700 km length and accounts for 50 percent of the nutrient pollution load flowing into the Black Sea. Reduction of nutrient flows into the Black Sea has been identified as the highest priority for restoring its ecosystems. Balancing coastal zone management with tourism, shipping, industry, urban development, and ecosystem conservation has been difficult. To address the issue of riverine pollution, the Bank is working with the WWF and other partners to restore natural wetlands along the Danube River. These wetlands will act as filter beds to remove pollutants and provide habitats for native wildlife. Similarly, as part of the Georgia coastal management project, GEF is providing support to strengthen management of the Kolkheti wetlands, a Ramsar site that contains a mosaic of sphagnum and reed bed marshes and humid forests, which provide critical habitat for nearly 400 species of migratory and wintering birds.

The Aral Sea and lakes—such as Issyk-Kul, Sasykkol, Alakol, Zaisan, Tengiz, and Karakul—provide important habitat for many endemic species and migratory water birds in Central Asia, while Russia has major wetland resources. Four of Russia's freshwater ecosystems and three of its marine ecosystems are 200 Global Priority Areas, including Lake Baikal (see Box 5). In Central Asia, the wetlands around the Aral Sea, as well as those in the deltas and river valleys of the Amu Darya and Syr Darya that feed it, are now severely degraded by excessive

Box 5

Conservation in Lake Baikal

Thirty-million-year-old Lake Baikal is the planet's oldest, deepest (1,637 m), and at 31,500 km², one of the largest lakes. It contains 20 percent of the world's freshwater, sustaining 2,635 species of plants and animals, two-thirds of which are endemic. Underwater "reefs" of giant sponges—a unique biological phenomenon—support a great diversity of fish, crustaceans, mollusks, and other invertebrates. Several large endemic fish inhabit the waters and form part of the prey of the endemic Baikal seal, the only land-locked seal species in the world. The diversity of adjacent landscapes, from alpine tundra, mountain and boreal coniferous forests to steppe and semi-desert, together with the lake itself, constitute an area of exceptional biological diversity, with 800 species of vascular plants and over 200 species of terrestrial vertebrates. The Baikal watersheds have a small human population, hence pressure from economic activities is less than in many other lake regions. Nevertheless, there are threats from pulp, aluminum, and other industrial enterprises that dump pollutants into the lake via its tributaries. Forest clearing, fires, agriculture, and grazing also pose significant threats.

Under the Russia Biodiversity Conservation Project, a common biodiversity policy and action plan was developed and implemented for three administrative units within the Baikal Natural Territory (BNT). Among the program's innovations was the establishment of an environmental services market in the Baikal region, the first time in Russia that the value of ecosystem services had been estimated in terms of carbon sequestration and recreational value. A competitive small grants fund engaged wide participation of stakeholders and encouraged numerous community initiatives. New breeding places were established for white-tailed eagles and osprey, while measures were put in place to better protect waterfowl in the Selenga and Goloustnaya river deltas, as well as local populations of bird cherry, Siberian apricots, and wild liquorice. A shoal of juvenile sturgeon was bred at the Selenga fish farm for reintroduction to the wild, and a flock of reindeer were re-introduced on the north Baikal coast. Eight new protected areas covering 21,700 hectares and a refugium network to preserve wetland and flood-land communities were established in the deltas of the Selenga, Goloustnaya and Zunduk rivers. Natural landscapes were restored in Myengei locality and mechanical scrap cleared from coasts and river beds of over 30 rivers and lakes. New technologies were introduced to detoxify oil waste with biological agents in the Lake Baikal watershed, and 200 tons of sludge were detoxified at the Ulan-Ude oil base. Project funds were also used to replant more than 150,000 native saplings to restore coastal forests, while the Khilok watershed and grayling spawning grounds were cleared of obstructions and sunken logs in the Goloustnaya River.

Between 1997 and 2003, 110,000 people were directly involved in the implementation of more than 750 small projects, a remarkable engagement and partnership between government officers, scientists, and local NGOs. An extensive media campaign reached out to millions of residents through regular radio programs, newsletters, and a series of television programs dealing with environmental problems in the Baikal region. Environmental advice units were established in major cities with mobile extension units for rural areas and establishment of seven resource and information centers. Over 30 environmental camps benefited 3,000 children through integrated programs offering excursions, practical training, cleanup activities, and wildlife studies. A major outcome of the project was the creation of a constituency for conservation that is likely to sustain project outcomes into the future. A specially established and publicly accessible ecotourism site (<http://baikal.net/travel>) provides information on nature-based tourism, which is expected to provide new livelihood options in the region.

diversions of river water for irrigation. The reduction of the Aral Sea, from 67,000 km² to 30,000 km², and a rise in salinity have led to the collapse of fisheries and desiccation of the river delta wetlands (once globally significant ecosystems) and adversely affected the livelihoods of 3.5

million people living around the sea. To address this problem, the Syr Darya Control and Northern Aral Sea Project is financing infrastructure to improve water flows to the Aral Sea and thereby restore the ecology of the Syr Darya delta and its associated wetlands and wildlife.

In a similar intervention, the Croatia Reconstruction Project for Eastern Slavonia is financing irrigation, wastewater, and flood control infrastructure, and also supports protection of Kopacki Rit, a Ramsar wetland of global importance financed partly by GEF. This ecological orientation has not generally been a focus of the irrigation and flood control portfolio, which so far has emphasized restoring irrigation to croplands and improving flood control infrastructure to mitigate natural disasters. However, the Uzbekistan Drainage, Irrigation, and Wetlands Improvement Project is also mainstreaming biodiversity by conserving one of the few remaining tugai (riverine) forests on the Amu-Darya as part of its environmental mitigation strategy. Further opportunities for wetland restoration in ECA are being explored in new wastewater projects under preparation, such as in Albania.

Agriculture and Biodiversity

Agriculture is one of the greatest threats to biodiversity worldwide. Expanding agriculture destroys, degrades, and fragments habitats, modifies hydrological systems, degrades freshwater and marine ecosystems with runoff of agricultural chemicals, depletes freshwater supplies through irrigation, and introduces invasive alien species. Because of the threat posed by agriculture, including cattle production, biodiversity conservation projects often target agricultural practices as one part of a threat mitigation strategy. Some of the most common ways that projects seek to change agricultural practices include reducing or eliminating the use of agro-chemicals (Poland, Ukraine); substituting crops perceived as more environmentally “friendly,” for example, planting tree crops instead of annual crops (Zambia, Central America); intensifying production and raising yields on existing plots to reduce the incentive to clear primary forest (Panama); introducing income-generating activities that rely on standing forest and substitute for more extensive cultivation, such as beekeeping; and by diversifying



agricultural production and other farm management techniques to provide better habitat for biodiversity on farms themselves (South Africa).

Several GEF medium-sized projects in Mexico and Central America have employed tree crops to enhance biodiversity conservation. In Costa Rica, small farmers are encouraged to cultivate organic cacao in the Talamanca Caribbean corridor and assist with the certification and marketing of their higher-value product. The project has also carried out assessments on farms to evaluate the use of farmland as biological corridors by animal species, especially mammals, birds, and butterflies. In Belize, the community-managed Sastoon Temash Project also assists farmers in the protected area’s buffer zone to cultivate organic cacao. Similarly, a project in Nicaragua aims at slowing land conversion for fuel-wood by substituting the latter with renewable energy sources—such as solar and biomass dryers—in the processing of allspice and coffee. The project has the objective of adding significant value to these more biodiversity-friendly crops in order to improve farmers’ income while also benefiting biodiversity.

Good examples of how to mainstream biodiversity in agricultural practices come from several projects in Africa that have promoted the use of packages of biodiversity-friendly agricultural practices, referred to as “conservation farming.” In South Africa, a targeted research project is examining the ecological and economic costs and benefits of different conservation farming techniques. This research has been carried out on working farms and disseminated to other area farmers who are using the results to improve their own land use practices. In Zambia, a land management project in the Miombo woodland ecosystem includes targeted on-farm research on sustainable agricultural practices. The project will train local extension agents as trainers, who in turn will organize a series of field schools to train farmers in the most promising techniques.

Improved management practices can be particularly important in maintaining grassland ecosystems, since these areas are often used for the grazing of cattle and other livestock. In Slovakia, a GEF-funded medium-size project is maintaining representative samples of unique grassland ecosystems and their biodiversity through restoration, conservation, and sustainable management practices. Research to establish optimal management methods for grasslands restoration identified several important lessons. It is clear that much deeper consultation with farmers on changing practices is needed than was envisaged at the start of the project, and that financial incentives are critical for achieving behavior change. Without such incentives, it is much more difficult to convince farmers to adopt new practices. In China, the Gansu and Xinjiang Pastoral Development Project aims to maintain natural grassland ecosystems by establishing improved (and sedentary) livestock production and marketing systems to remove pressure on fragile ecosystems, and to improve rangeland management practices on high summer pastures used by migrating herds.

As modern agricultural and animal husbandry systems have spread around the globe, traditional crop and animal varieties have increasingly been abandoned in favor of generally higher-yielding “improved” varieties. While

optimal conditions, many traditional varieties—while lower-yielding—are more tolerant of less ideal conditions, have better resistance to diseases and insect pests, and greater resilience under drought conditions or in poor soils. Traditional varieties therefore represent an important repository of genetic variability that can both protect small farmers by diversifying their production and can provide important genetic traits to improve “modern” varieties through breeding or genetic engineering. In addition, wild relatives of domesticated crops and animals often still exist in remaining natural ecosystems within the historic centers of origin. A few Bank projects are explicitly designed to conserve and use this agrobiodiversity. Thus one objective of the Ghana Northern Savanna Project is to support the cultivation and protection of indigenous and threatened farmer crop varieties. The project has identified 87 crop varieties (36 varieties of roots and tubers, 16 legume varieties, 28 cereal varieties, and 7 species of wild fruits), and it is in the process of identifying local farmers interested in growing these threatened varieties on their own farms.

The ECA region includes two of Vavilov’s eight global centers of crop origin. These cover Central Asia and



Turkey and the Caucasus subregions and support natural populations of the wild ancestors of cereals (wheat, barley, and secale), legumes (lentils, chickpea, faba bean, and pea), forage species (*Trigonella*, *Trifolium*, *Vicia*, and *Lathyrus*), vegetables (cabbage, onion, garlic, and melons), fruit trees (almond, apricot, apple, pear, pistachio, cherry, plums, walnut, pomegranate, quince, hazelnuts, azarole, cornelian cherry, Russian olive, grape, fig, chestnut, and mulberry), industrial crops (safflower, flax, and cotton), and countless medicinal and aromatic plants (*Man-*

dragora, *Achillea*, *Glycyrrhiza*, *Valeriana*, and *Ferula*). Many of the wild fruit trees form unique natural forests, important for both ecological and socioeconomic reasons. Many of these species have been domesticated and selected by local populations who have patiently developed thousands of valuable varieties, highly adapted to a broad range of climatic conditions. Projects in Turkey (In-Situ Conservation of Genetic Biodiversity), Central Asia and Georgia have focused on protection and sustainable use of these native varieties (see Box 6).

Box 6

Grapevine Genetic Resources in the Caucasus and Black Sea Region

Grapes and wheat are two of the oldest crops, first cultivated at least 4,000 years ago in the Trans-Caucasus around the eastern part of the Black Sea. Since that time, wine and grapevines have spread throughout the world. Wine production, based on proper knowledge-based use of grapevine genetic resources and on sustainable viticulture practices, provides a major potential source of income for the local populations in the low-income transition countries of the Caucasus and the northern Black Sea region. This region is considered to be the primary center for the domestication of grapevine, with high relevance for the further distribution of the crop toward the Mediterranean basin, and for the development of the modern European cultivars. The wild species of grapevine, *Vitis vinifera* ssp. *silvestris*, the putative ancestor of the cultivated grapevine, still occurs throughout this region. The exact number of local grapevine varieties occurring in the Caucasus and Black Sea region is uncertain, but is estimated at between 600 and 1,500. Wild grapevine contains genetic material that is resistant to pests and disease affecting grapevine production. In Azerbaijan, for example, some wild *Vitis* populations are known to possess high fungal resistance.

Long-term maintenance of *Vitis* genetic resources—both cultivated and wild varieties—could improve local viticulture and contribute to the future sustainability of the wine-making industry. The Georgia Agricultural Support Services Project supports conservation and use of indigenous grapevine cultivars. Georgia is widely recognized as a leader in the conservation and use of grapevine genetic resources in the ECA region. There are several important grapevine collections in Georgia, which include not only an indigenous genepool (400 local varieties), but also a significant number of varieties from Central Asia, Armenia, Moldova, the Ukraine, and the Russian Federation. Coordinated and led by Georgia's national program, first steps have been taken to establish a new centralized field genebank in the Telavi area. Despite the high level of local grapevine diversity, very few varieties are cultivated in the Telavi region, which instead relies on modern introduced varieties less suited to local conditions. The conservation and increased use of local grapevine genetic resources could be of considerable socioeconomic importance as a source of income for local communities.

Linking Conservation and Development



Achieving the WBG's mission of eradicating poverty for lasting results depends on humankind's ability to maintain a planet that can provide the environmental services and functions upon which life and economic development can be sustained. Achieving poverty reduction in the short and medium term is not acceptable if the cost of biodiversity loss, and ensuing social capital deficit, occurs in ways, and on scales, that will prevent further sustainability, or which may increase poverty and social exclusion in the long term. The WBG recognizes that biodiversity conservation and sustainable use is fundamental to human welfare, and that many sectors of national and local economies depend on biological diversity, natural ecosystems, productive landscapes, and the environmental services they provide. For many countries, the sustainable use and conservation of biodiversity is crucial to economic development and human well-being. A key challenge, therefore, is to find ways to promote development that encourages both biodiversity conservation and poverty alleviation, linking environmental protection to sustainable livelihoods.

Building on Traditional Knowledge

Many biodiversity-rich ecosystems correspond to areas where indigenous peoples are living according to their own centuries-old culture and traditions. The WBG is supporting numerous projects with indigenous people,

both through GEF and regular Bank lending—the majority of projects are in the Latin America and Caribbean region. In some countries, these areas of high biodiversity have already been titled to indigenous people, and the WBG has been assisting them to manage biodiversity (Brazil, Peru, Mexico, Bolivia). In other countries where indigenous lands legislation is not clearly defined, governments have established protected areas in territories claimed by indigenous peoples, causing overlaps and conflicts between protected-area managers and indigenous groups. Territorial rights are a central claim for indigenous people throughout the world—rights that form the basis for their ability to survive as peoples, uphold their spirituality and culture, maintain and develop their organizations and productive systems, and conserve their natural resources.

The original World Bank Operational Manual Statement on “Tribal Peoples in Bank-Financed Projects” (OMS 2.34) and its current Operational Directive on “Indigenous Peoples” (OD 4.20) have been key instruments for protecting the land and other rights of indigenous peoples. In OD 4.20, *Indigenous Peoples* are defined as social groups with a social and cultural identity distinct from the dominant society, which makes them vulnerable to being disadvantaged in the development process. OD 4.20 states the requirement for borrowers to prepare an Indigenous Peoples Development Plan (IPDP) for any project impacting on indigenous people.

New management models for conservation are being supported through indigenous reserves or co-manage-

ment agreements with indigenous communities in Peru, Bolivia, Colombia, Panama, Costa Rica, Honduras, Nicaragua, Guatemala, and Mexico. Many of these projects address issues such as land tenure and resource rights, traditional knowledge, participation, protected areas management and monitoring, gender, tourism, capacity building, alternative sources of income, and infrastructure needs of remote populations. In the Philippines, community lands and indigenous territories have been mapped within protected areas and are part of recognized park zoning. Similarly, in the Mataven project in Colombia, 16 indigenous communities lead the land planning process to establish a conservation area as an extension of their already demarcated indigenous territory. Through capacity building activities that included visits to other conservation areas managed by indigenous communities (such as the Kuna lands in Panama), the Colombian indigenous organization has prepared an ecological zoning plan that includes biodiversity conservation.

In Bolivia, through the Sustainability of Protected Areas Project, the Bank/GEF has been financing Kaa-Iya National Park, the largest protected area in Bolivia, covering almost 3.5 million hectares. Adjacent to the western boundary of this park, the government has established the indigenous peoples' territory of the Isozu-Guarani indigenous population, covering 1.9 million hectares. The indigenous organization, the Capitania de Alto y Bajo Izozog (CABI), has been designated as the co-management agency to manage the park, in partnership with the protected area agency, SERNAP. The GEF provides 70 percent of the annual recurrent costs for park management and financial support to the management council and for capacity building programs. In addition, this indigenous territory has also benefited from \$3.7 million of external financing for the implementation of an Indigenous People's Development Plan, as part of the mitigation package for a gas pipeline (financed with a Bank loan) that crosses their territory. The IPDP—itself implemented by CABI—covers issues of land tenure resolution and community-based social and economic development projects such as irrigation projects, education facilities, and construction and refurbishment of a hospital.

In North Africa, the protected areas project in Morocco has successfully used a small grants program to launch 13 micro projects on communications, awareness-raising, and environmental education, working with local associations affiliated with the Al Hoceim, Toubkal, and Eastern High Atlas National Parks. The Akhiam Association for Economic and Social Development (AADES)—located in Imilchil, within the Eastern High Atlas National Park—is raising awareness about the destruction of the area's natural heritage through the voice of the influential Inchaden (Berber poets). Audio cassettes will be disseminated at a nominal value throughout the participating park villages. The messages will touch upon the comparison between the species diversity and richness in the past and the current state of the local environment, thus allowing the population to reflect on the negative impact humans have inflicted on nature. The Inchaden themselves will support the distribution of the audio cassettes and will be present at the launching of reforestation campaigns where indigenous forest species will be planted.



In the highlands of northeastern Cambodia, Bank/GEF financing is supporting the protection and management of Virachey National Park (VNP) in the province of Ratanakiri. Encompassing 350,000 hectares of forest and mountain habitats, VNP is one of the largest expanses of intact forest left in Cambodia. It also adjoins protected areas in neighboring Laos and Vietnam to form part of a tri-national conservation triangle. The region is home to numerous ethnic minorities who have lived in the project area for many generations, but moved settlements many times during the political strife and warfare that ravaged the region during the Vietnam War and subsequent Khmer Rouge regime. These communities are now settled along the rivers at the edge of the park. Park staff and the indigenous Brou, Kravet, and Krueng communities are working together to articulate and implement long-term community resource management plans in lands that overlap park boundaries. These plans will assist the communities to assert their rights against large-scale timber interests, which are moving into the region.

Bringing Benefits to Communities

Ecodevelopment opportunities associated with key conservation areas are enabling local communities to break out of the poverty trap and develop alternative livelihoods consistent with conservation objectives. In India, the “ecodevelopment” approach uses appropriate development as a conservation tool to support the dual goals of conservation and poverty alleviation in contexts where there is competition between wildlife and communities for land and resource use (see Box 7). Recipient communities commit to conservation agreements with contributions of cash or labor and measurable actions to improve conservation efforts. Approximately 40 percent of the project beneficiaries are tribal peoples, the poorest of the poor and the most dependent on biological resources. In Sri Lanka, Jordan, and Ethiopia, medicinal plant projects in buffer zones of protected areas aim to reduce wild harvesting and support community efforts to cultivate medicinal plants to meet rural health needs.

Finding and exploiting such linkages across the whole WBG investment portfolio will provide opportunities for mainstreaming biodiversity into national and regional sustainable development agendas.

In Africa, several projects focus on sustainable and improved land use consistent with biodiversity conservation. In Cote d’Ivoire and Burkina Faso, the West Africa Pilot Community-Based Natural Resource and Wildlife Management Project is promoting community management of wildlife and wildlands, with local communities working to protect wildlife outside national parks and benefiting from revenues generated from ecotourism and safari hunting. Similarly, in Namibia, Bank support is enabling local communities to benefit from decentralization and improved habitat management (see Box 8).

Working with the Private Sector

Outside the formal protected area network, the International Finance Corporation (IFC) is promoting the establishment of conservation initiatives through private sector partnerships. For instance, the Small and Medium Enterprise Fund (SME) has assisted private landowners in Belize to dedicate their properties to wildlife conservation and tourism. Natural habitats and native wildlife populations are recovering and local communities benefit from increased employment opportunities at tourist lodges and through associated community-run tourism enterprises, such as model villages and handicraft sales.

With IFC financing, Conservation International encourages small farmers to grow certified shade coffee in the buffer zone of the El Triunfo Biosphere Reserve, Mexico; one of the last remaining cloud forest areas in MesoAmerica. In Costa Rica, the IFC is supporting reforestation and natural regeneration of forests in the buffer zones of national parks within the conservation area of the Central Volcanic Cordillera through advance wood purchases from small landowners. Another SME grant through ForesTrade is promoting spice production

Box 7

Reconciling Conservation and Human Needs in India

The India Ecodevelopment Project (IEDP) provides development opportunities to address some of the social and poverty needs that lead to pressures on seven of the country's most important national parks, including six tiger reserves and Gir – the home of the last remaining Asiatic lions. From Gujarat to West Bengal and Jharkand to Kerala, park managers are working with more than 350,000 villagers, including tribal peoples, in innovative partnerships that reduce conflict and provide new livelihood opportunities:

- At Ranthambhore, in drought-stricken Rajasthan, villagers are rehabilitating ancient step wells—*baori*—at ancient historical sites within and around the park, providing new water supplies for wildlife and village livestock.
- In Kerala, ex-poachers have become forest protectors, working with park staff to develop a new ecotourism venture where they use their forest knowledge to guide tourists on exciting camping treks that tour key wild lands.
- At Periyar, local user groups are being allowed to harvest thatch, reed, and firewood in specific regulated zones in return for forest protection.
- Also at Periyar, village ecodevelopment committees have taken on the responsibility to provide food, water, and garbage removal for the 5 million pilgrims who worship at the Sabarimala temple within the reserve during special festivals—an innovative and income-earning solution to a complex visitor management problem.
- In Buxa, West Bengal, villages have clubbed together to upgrade community facilities, establish insurance schemes to cover wildlife damage to crops and homes, and to spread the use of low-fuel *chulas* to reduce demand for firewood.
- Countrywide, ecodevelopment committees have empowered villagers, enabling them to access additional development resources through local government (panchayat) schemes, and to develop self-help groups and youth and women's literacy programs.

The IEDP has helped to free tribal communities and other poor villagers from moneylenders, greatly increased understanding and cooperation between communities and forestry officers, and improved the incomes, welfare, and status of local people. Often, the original project investments have generated new opportunities and improved the quality of life in unexpected ways, including providing greater empowerment of women in village debate and decision-making.

All seven states have passed new ecodevelopment legislation and adopted the ecodevelopment model for other parks. At the village level, communities are ensuring sustainability through self-help savings plans and creation of “user-pays” schemes to pay for maintenance of village water storage facilities. At Kalakud Mundanthurai, local communities have shown unyielding commitment and ownership to the ecodevelopment approach and continue to act as forest stewards even though project funding ended two years ago.

in park buffer zones in Indonesia and Guatemala. The company has sourced contracts for organically grown spices (cassia cinnamon, cardamom black pepper, ginger, and nutmeg) and essential oils, like patchouli, in over 60 areas involving some 3,000 individual producers and their families. Many of the partnerships are located in the buffer zones of national parks such as Kerinci-Seblat N.P. and Way Kambas N. P. (Indonesia) and Maya Biosphere Reserve, El Peten, and Sierra de Las Minas Biosphere

Reserve (Guatemala). Suppliers must commit to forest conservation. In turn, ForesTrade provides incentives to farmers through training opportunities and payment of a small premium over market prices for certified products that are organically produced and sustainably harvested.

In the Philippines and Indonesia, the marine aquarium industry is widely regarded as the main threat to coral reefs, due to the prevalence of cyanide-based fishing

Box 8**Conservation and Sustainable Use of
Namibia's Biodiversity and Resource Base**

Direct and indirect use—crop cultivation, woodlands, drylands, wetlands and marine fisheries, non-consumptive tourism, and trophy hunting—of Namibia's biodiversity contributes to over 40 percent of its GDP. The most important wild products include meat, thatching grass, medicinal products, and veld foods (from nuts, fruits, leaves, roots and bark), firewood, and wood for construction and woodcarving. Wildlife harvesting represents the basis of subsistence economies in rural areas; an estimated 33 percent of total household consumption in rural areas comes from wild foods. These livelihood options depend greatly on ecosystem characteristics.

While Namibia's southwest arid savanna systems and dry woodland areas have reverted to savanna-type systems as a result of land degradation processes and extensive deforestation, northern Namibia has highly diverse ecosystems, particularly at the interface of wetlands, riparian belts, and dry woodlands. They support important populations of globally threatened species, including desert elephants, wild dogs, wattled cranes, and slaty egrets. While 14 percent of Namibia has been set aside as state-controlled parks and reserves, only 4 of 13 vegetation types are well-protected, and increasing human population and encroachment threaten natural resources. Without an integrated ecosystem management planning framework, human settlers and livestock may compete with wildlife for sparse sources of water and grazing in highly fragile ecosystems that could most appropriately be managed as wildlands for Namibia's rapidly growing and high-value ecotourism market.

Seventeen registered community-run wildlife conservancies lie adjacent to protected areas, thereby increasing the wildland area and the viability of their wildlife populations. The Integrated Community-Based Ecosystem Management Project will support priority conservancies in biodiversity-rich target areas, building on the decentralization process to empower communities and strengthen local development capacities, and to assist in the creation of regional and national conservancy associations. Notably, the project will support the shift from wildlife-focused management to an integrated ecosystem approach by strengthening the legal and policy framework for community-based natural resource management (CBNRM); reforming the CBNRM institutional framework; investing directly in ecosystem restoration and rehabilitation measures; undertaking targeted capacity building; and identifying and implementing viable ecosystem-based income-generating activities. The ultimate global objective is to restore, secure, and enhance key ecosystem processes in targeted conservancies and promote conservation and sustainable use of biodiversity and community lands.

methods and the lack of ecosystem management practices. However, the IFC has recently received GEF approval for a \$6.6 million grant for an initiative that seeks to shift a substantial portion of the marine aquarium industry in these countries toward sustainable practices that contribute to marine conservation, poverty alleviation, and food security. The project—known as the Marine Aquarium Market Transformation Initiative (MAMTI)—aims to undertake this shift toward sustainable practices by carrying out a strategic combination of supply-side and demand-side interventions. On the supply side, this initiative will build the capacity of over 50 fishing communities to sustainably manage their marine resources and will train more than 2,000 fisherfolk

to adopt sustainable harvesting of ornamental fish. It will also work with local stakeholders to provide scientific monitoring of coral reefs and to establish more than 70 marine protected areas. On the demand side, this initiative will seek to substantially raise the awareness of, and demand for, sustainably harvested marine ornamental fish among consumers in the United States, Europe, and elsewhere.

The Bank is also working with the private sector to promote biodiversity and business. In the marine environment, the Egypt-Red Sea Coastal and Natural Resources Management Project has promoted environmental awareness among stakeholders and the develop-

Box 9

Harvesting the Fynbos Flora in the Agulhas Plain

Harvesting of wild fynbos is a traditional activity of rural communities in the Cape Floristic Region of South Africa (CFR), with fynbos accounting for 70 percent of the country's flower exports. Due to the seasonal nature of European demand, most of the rural communities involved in fynbos harvesting are employed on a seasonal six-month basis, usually with no contracts, low salaries, and no benefits. In some cases, this is the only source of income to rural communities owning land. Flower harvesting from the wild poses a significant risk to biodiversity, due to over-harvesting of commercially important species. Poor harvesting techniques and excessive off-take of fynbos (and hence seed) resources severely reduce post-fire recruitment of sensitive species. The alternative—flower farming—leads to clearance of natural habitats for planting of a few popular species, does little to protect biodiversity, and is capital intensive and thus beyond the reach of poor communities. Driven by international demand for perfect flowers on long stalks, many farmers have been forced into planting cultivars and hybrids and using a large amount of pesticides, which have resulted in killing of Cape sugar birds; a CFR endemic. Such cultivation effectively disrupts many natural processes in fynbos, eliminates native species, and introduces weeds into pristine vegetation.

The Flower Valley Conservation Trust (FVCT) aims to improve the livelihoods of the local communities in the Cape Floristic Region (CFR) and to strengthen fynbos conservation by implementing a commercially viable, environmentally sound, and socially beneficial model of sustainable harvesting of fynbos. With support from the Bank's Development Marketplace, FVCT and its partners are promoting an international certification scheme and improved marketing strategies, which will combine increased benefits to rural communities with more sustainable harvesting of wild fynbos.

Research shows the existence of a niche market willing to pay premium prices for certified products that will demand year-round supply. To access these markets, the fynbos operations have to comply with internationally acceptable labor, social, health, housing, and safety standards. Flower Label Program (FLP), an international certification scheme combining social and environmental standards, has approved FVCT to market under its label. A supply network of 20 farms employing 800 people with more than 3,200 dependents presently provides FVCT with fynbos from the Agulhas Plain. Using the Bank grant, FVCT will assess the environmental practices and social conditions of six fynbos operations—four owned by poor communities—to develop and implement a training program to meet the requirements of the FLP. The social and environmental standards will be audited by FLP and the sustainable harvesting guidelines by the provincial conservation agency, Western Cape Nature Conservation Board. These efforts, combined with an aggressive marketing strategy, will contribute to increased profitability for certified fynbos, which will directly contribute to improving the living standards of the rural poor. In the next four years, FVCT will target an additional 14 farms to build capacity among farm labor and contract pickers and spread sustainable practices through all the farms of its supply network. By increasing economic incentives, landowners can be encouraged to retain land under wild fynbos, rather than converting it to other land uses, and hence ensure the conservation of biodiversity. Through this initiative, minimum wages and additional social benefits, such as proper housing and water supplies, are guaranteed. In addition, women fynbos workers will receive permanent contracts and paid maternity leave for the first time.

ment of public-private partnerships through the involvement of NGOs (Hurghada Environmental Protection for Corals Agency—HEPCA, and Safaga EPCA), private hotel operators, and dive boat operators. The Tourism Investors Environmental Group, which includes all the major hotel operators, participates in the management of the

international visitor center, financed under the project, to promote best practices in environmental design and resource management, and to help ensure sustainability of tourism based on the Red Sea coral reefs and marine protected areas.

Mainstreaming Biodiversity in Development

The Convention on Biological Diversity requires state parties to integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programs, and policies. A major challenge for the Bank is how to mainstream biodiversity into government programs, normal development assistance, and poverty alleviation programs by promoting positive synergies, while minimizing the negative impacts to biodiversity of potentially damaging infrastructure and other investments.

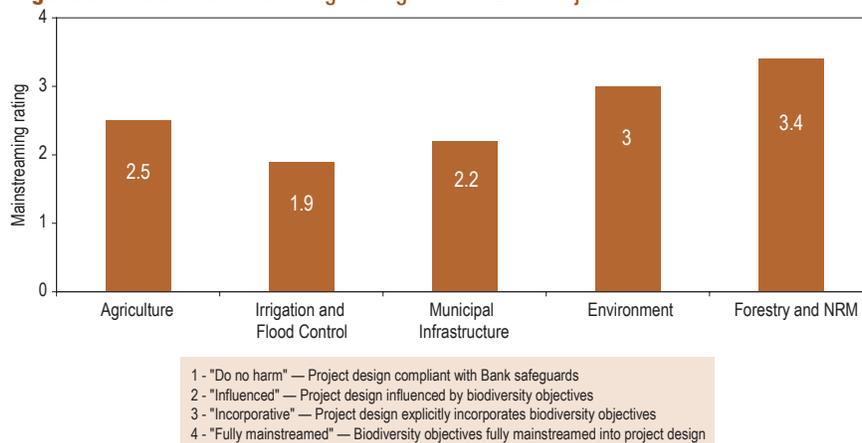
Bank safeguard policies focus on “do-no-harm” strategies, which govern implementation of development projects. These policies are important because the impacts of rural development and infrastructure programs and projects, and of economic adjustment measures, must be carefully formulated to avoid serious negative impacts on biodiversity within and outside protected areas. In addition to the Bank’s current Operational Policy to protect “Natural Habitats” (OP 4.04), a new “Forests Operational Policy” (OP 4.36) now ensures appropriate attention to forest ecosystems and forest-dependent peoples, placing increased emphasis on issues of governance and participation.

In addition to such formal project requirements, however, there is a need to bring biodiversity conservation and protected areas into the development mainstream. This will require additional commitment from Bank staff and management, and also from client governments, NGOs, the private sector, and other stakeholders in the development community. It will also require greater recognition of the links between biodiversity and human welfare, and a need to move from a “do-no-harm” to a “do-some-good” mentality, by actively seeking opportunities to promote conservation and habitat protection in development projects and programs in support of the Millennium Development Goals.

A recent analysis of the ECA Biodiversity portfolio examined the extent to which biodiversity has been mainstreamed in 43 projects investing in coastal resources protection and management (Georgia, Romania, Lithuania, Latvia); management of international waters (Caspian, Aral, and Black Seas, Lake Ohrid); fisheries production and management (Azerbaijan, Albania); sustainable forest management (Albania, Belarus, Bosnia-Herzegovina, Croatia, Georgia, Poland, Russia); range and watershed management (Armenia, Kyrgyz Republic, Turkey); irrigation and flood control (Kazakhstan, Croatia), and improved agriculture and wastewater treatment. Generally, the agriculture and water management projects have included fewer biodiversity mainstreaming elements than the forestry and watershed management projects. The mean mainstreaming scores for these categories of projects are summarized in Figure 9. The average score for all projects was 2.4 (a score of 4 means fully mainstreamed), and two thirds of all projects scored higher than the “do no harm” score of 1.0. The subsectors with the best mainstreaming record are forestry and natural resources management projects (forestry, fisheries, etc) and environment projects, followed by agriculture and municipal infrastructure. Even projects designed for irrigation and flood control are providing opportunities for biodiversity conservation (see Box 10).

The Bank’s agriculture portfolio has provided opportunities to mainstream biodiversity through investments for agricultural support services and land titling. Agricultural support service projects promote on-farm business development and have usually mainstreamed biodiversity through investments such as integrated pest management (Indonesia), organic farming (IFC Small and Medium Enterprises), and soil conservation measures (Oaxaca, Mexico). The Estonia Agriculture Project developed a strategy to conserve and manage wetlands and re-establish natural habitats on previously drained wetlands. In Moldova, rural credits under the Rural Investment Advisory

Figure 9. Mean Mainstreaming Ratings for 43 ECA Projects



Box 10 Mainstreaming Biodiversity in Infrastructure Projects

Large infrastructure projects financed by the Bank in the ECA and LAC regions have begun to implement innovative approaches to natural habitat protection and mitigation. These approaches range from creating protected areas and integrating natural wetlands into planned flood control measures, to restoring degraded wetlands and supporting ecological research and in-situ protection of endangered species.

In Belize, for example, during construction for storm water drainage of the Dangriga Township—supported by the *Belize Roads and Municipal Drainage Project*—a small part of the Gra Gra coastal mangrove ecosystem was affected. As mitigation, the project helped to establish a new protected area—the Gra Gra Lagoon National Park. The project has gone well beyond the creation of the protected area by supporting the management plan for the park and strengthening a local NGO (Friends of the Gra Gra Lagoon) that will co-manage the park. Similarly, the *Argentina Flood Protection Project* supported the creation of many natural reserves in the flood plain of the Parana River, including reserves that have been designated by UNESCO as biosphere reserves in the Formosa Province.

Some projects in the ECA region have also been designed for explicit environmental benefits. The *Georgian Municipal Infrastructure Rehabilitation Project* provided opportunities for protection and restoration of wetlands and coastal and aquatic ecosystems, as well as reduced pollution in the biodiversity hot spots of the Black Sea coast. In Estonia, the *Haapsalu and Matsalu Bays Project* was designed to improve water quality and ecological conditions in the Baltic Sea, but also supported coastal land use planning and an ecosystem management program to maintain key wildlife habitats and reduction of agricultural nonpoint-source pollution. Similarly, the *Albania Integrated Water and Ecosystems Management Project* includes traditional investments in wastewater treatment plants, but will also create artificial wetlands to further reduce the pollution of coastal wetlands and the Adriatic Sea.

Services Project are supporting biodiversity-friendly activities that are co-financed by two GEF projects: the Agricultural Pollution Reduction Project and the Biodiversity Conservation in the Lower Dniester River MSP. The Moldova projects are the first in the ECA portfolio to use GEF financing to encourage entrepre-

neurial risk-taking that can have positive global environmental benefits.

Land cadastre and tilting projects support establishment of property boundaries of private farms and issuance of land titles to the individual owners. While much of the

agricultural landscape is dominated by cultivated farmland, it can also contain wetlands, forests, and other natural habitats that have high biodiversity values and important “public good” functions. There is thus an opportunity for mainstreaming biodiversity by addressing the land management and land degradation issues. In the Ukraine, the Rural Land Titling and Cadastre Project is taking inventory of the country’s environmentally sensitive lands, excluding some of these from

privatization, and providing assistance to farmers and public sector departments on land management. In biodiversity-rich southern Ukraine, the project is working with the World Bank/GEF Azov Black Sea Corridor Biodiversity Project to address the land management issues, including landscape-level inventory of natural habitats, competitive small grants for improved management of on-farm habitats and soils, and support to protected areas.

New Challenges and Opportunities



The last decades of the 20th century saw a substantial increase in the establishment of protected areas as the cornerstones of biodiversity conservation, but protected areas alone will be insufficient to protect global biodiversity. Moreover, at the dawn of the 21st century, new challenges are emerging that threaten the ecological and social sustainability of existing protected areas and biodiversity conservation efforts to date. The world's population continues to grow, and this population growth increases pressure on natural habitats and systems. At the same time, as developing countries move out of poverty, their citizens are increasing their consumption of natural resources toward the much higher per-capita levels of developed countries. The greatest challenge of the new millennium is to prevent protected areas and other natural habitats from becoming fragile islands of biodiversity within vast seas of development.

The best way to do this is to ensure that biodiversity conservation does not remain a marginalized activity, but rather becomes a part of the development scenario. “Mainstreaming” biodiversity into development means clearly identifying and capitalizing on the many linkages between conservation and human welfare. Explicitly valuing ecosystem services economically can demonstrate just how much those services contribute to the health and vitality of economic production, especially around issues of water quality and management and agricultural production. The issue of invasive alien species—a new biodiversity challenge with profound economic impact—is an emerging concern in the developing world. Many of these species impact not only native biodiversity but also agriculture and hydrological systems, resulting in real economic costs that can be particularly devastating for the poor.

Recognizing these challenges, the Convention on Biological Diversity has identified specific biodiversity targets for 2010. Meeting, and monitoring, these targets will require new tools and new ways of doing business. It is now widely understood that the job of conserving the world's biodiversity is far too big for any one institution to tackle alone, and partnerships with a variety of other actors are clearly a critical element in addressing these goals. At the same time, there is a need for much better information about what works and what does not, so that scarce resources are applied more effectively. Finally, the perennial problem of raising adequate funds for conservation requires the testing of new ideas and new instru-



ments with the goal of establishing a varied and vibrant portfolio of financing sources to face the challenges ahead.

Valuing Ecosystem Services

Protecting forests and other natural ecosystems can provide social, economic, and aesthetic benefits, both directly through sustainable utilization of biological resources and indirectly through protection of the environment and ecosystem services. Protected areas, and the natural habitats within them, can protect watersheds and regulate water flow; prevent soil erosion, influence rainfall regimes and local climate; conserve renewable harvestable resources and genetic reservoirs; and protect breeding stocks, natural pollinators and seed dispersers that maintain ecosystem health. Floodplain forests and coastal mangroves act as safety barriers against natural hazards such as floods and hurricanes, while natural wetlands filter pollutants and serve as nurseries for local fisheries. Although ecosystem services are rarely credited in national accounts, many protected areas can be justified on the basis of traditional economic cost-benefit criteria.

In Romania, the annual direct consumptive value of fruits and mushrooms collected from the forest has been estimated conservatively at around \$9 million. Capitalizing this value at 5 percent yields an estimated value of Romania's forests for fruit and mushroom production of \$185 million. The annual direct value of hunting and fishing in Romania is estimated at \$21 million, yielding a capitalized value of around \$420 million. By considering the known direct and indirect uses of Romanian forests, analysts can ascribe a Total Economic Value to forest conservation and management. A 1999 Bank study concluded that the total annual value of direct uses of Romania's forests is \$13 million, with a capitalized value of \$260 million. The corresponding values for indirect uses such as soil and water protection were estimated at

more than an order of magnitude higher (i.e. \$3.1 billion and \$62 billion, respectively) than direct use values.

An increasing number of projects are making explicit linkages between sustainable use of mountain and forest ecosystems, biodiversity conservation, carbon sequestration, and watershed values associated with erosion control, clean water supplies, and flood control (see Box 11). In China, the Bank is supporting the Natural Forest Protection Program, which is designed to ensure the long-term protection of national forests in watershed catchments and to reduce the vulnerability of downstream villages and towns to flooding. After the severe floods of 1998, the Chinese Government introduced a

Box 11

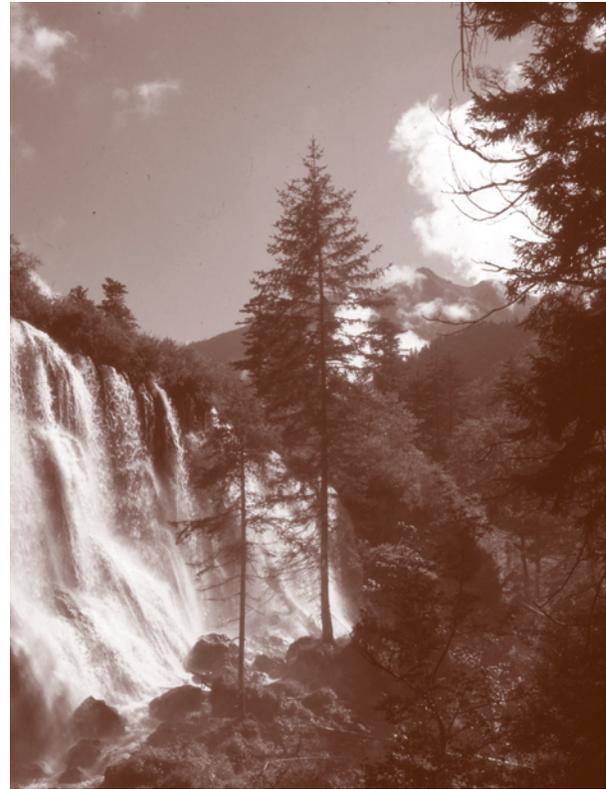
Payments for Butterflies and Water

In Mexico, a special fund has been established to pay private landowners to protect the highland forests, which are hibernation sites for monarch butterflies. Millions of butterflies engage in a yearly journey that can cover the distance from the Great Lakes in Canada to the highlands of central Mexico; a round trip that can take up to five generations. A series of sanctuaries were established in 1986 to protect the hibernating monarchs in the Mexican highlands. The hibernating area is not only biologically important, but also a major watershed that ensures the water supply for one of the largest cities in the world—Mexico City. In 1999, the area under protection was extended to accommodate the butterflies' habitat needs through a 56,259-hectare Biosphere Reserve, with no extraction activities allowed in the 13,551-hectare core area. This core covers a biological corridor along a watershed with most of the registered monarch butterfly colonies. The 38 owners of the core area lost their logging rights. An endowment fund—the Monarch Butterfly Conservation Fund—has been established to compensate the owners of the core area with \$18 for every cubic meter of wood included in the logging permits but not felled. Communities in the core area also receive additional payments for undertaking conservation activities on their properties, such as restoration, watershed, and pest management.

moratorium on logging and is now re-assessing its forestry programs. Approximately 50 million hectares—more than half the country's natural forests—will now be re-assessed for designation as nature reserves, forest parks, watershed forests, or areas for selective logging, according to their biological and protection values. The program will promote biodiversity conservation, more sustainable forest management, and a better understanding of the critical ecosystem service role of watershed forests.

Coastal forest projects in Croatia, Bangladesh, Honduras, Lithuania, and Vietnam are improving management of coastal forests, swamps, floodplains and mangroves, including restoration of degraded habitats. Forest services such as coastal protection and nursery grounds for quality fisheries are increasingly being recognized as essential to these countries' coastal economies. In Ecuador and Argentina, flood control projects utilize the natural storage and recharge properties of critical forests and wetlands by integrating them into "living with floods" strategies that incorporate forest protected areas and riparian corridors.

There is a great deal of interest in the world community in the potential of providing direct payments for the provision of environmental services. In Costa Rica, the Ecomarkets Project is already implementing systems to pay for such ecosystem services, but most countries still lack the enabling legislation and appropriate institutions for assessing and processing such payments. In Ecuador, an integrated watershed management project is being prepared with a specific component to capture payment for environmental services provided by Andean forests. In Colombia and Nicaragua, an innovative project is using payments for ecological services to encourage farmers to adopt silvopastoral practices in degraded pastures and enhance local biodiversity (see Box 12).



Climate Change and Carbon Sequestration

Providing financial incentives to slow the process of climate change has obvious benefits for biodiversity. About a third of the build-up of greenhouse gases in the atmosphere is derived from land-clearing and other land management practices. Activities to retain or increase the amount of carbon in vegetation or soils—referred to as "sinks"—can make a significant contribution to combating climate change. Many of these activities have additional benefits, such as improving soil fertility, improving crop growth, providing non-timber forest products, and maintaining biodiversity.

The Prototype Carbon Fund (PCF)—a World Bank-administered carbon finance initiative—is a new instrument that provides concessional financing for activities that sequester carbon or reduce carbon emissions (for example, afforestation, improved range management, or improved heating systems). In Romania and Moldova, PCF is supporting afforestation projects that will yield

Box 12

Payments for environmental services to protect biodiversity in agricultural landscapes

Protecting biodiversity in agricultural landscapes is important both in its own right and as a means to connect protected areas, thus reducing their isolation. The challenge is finding ways to do so. The Regional Integrated Silvopastoral Ecosystem Management Project, which is being implemented with financing from GEF, is testing the use of the Payments for Environmental Services (PES) mechanism to encourage the adoption of silvopastoral practices in three countries of Central and South America: Colombia, Costa Rica, and Nicaragua.

Adoption of improved silvopastoral practices in degraded pasture areas is thought to provide valuable local and global environmental benefits, including biodiversity conservation. The problem is that these practices are insufficiently attractive to individual land users for them to adopt spontaneously, particularly due to their high initial costs. To overcome this obstacle, the project has created a mechanism that pays land users for the global environmental services they are generating, so that the additional income stream increases the profitability of the proposed practices to land users.

An “environmental service index” was developed that assigns points to each land use according to the degree to which it contributes to biodiversity conservation. More complex land uses with diverse and multi-layered vegetation structures that are relatively more hospitable to biodiversity are assigned higher point values. Participating land users are paid according to the increase in points of all land uses on their farm. The greater the improvement in land use, from the perspective of capacity to support biodiversity, the greater the payment. An important challenge was the need to avoid creating perverse incentives (for example, for land users to cut down existing trees so as to qualify for additional payments for tree planting). This challenge was met partly by basing payments on point totals over the entire farm (so that an adverse change elsewhere in the farm would result in points being deducted) and partly by paying for the baseline level of services being provided at the project’s start (albeit at a lower rate than incremental services).

As this is a pilot project, its impact is being closely monitored to allow lessons to be drawn on the ability of this approach to help mainstream biodiversity conservation in agricultural landscapes. Monitoring includes (a) changes in land use by participating farms; (b) the resulting impact on biodiversity conservation in the area; and (c) the impact on the well-being of participants. Control groups are also being monitored to allow the effect of the project to be distinguished from that of other factors.

carbon trading benefits, as well as improved habitats for wildlife. A new forestry project in Guanxi, China will use PCF and IBRD funding for reforestation efforts on critical watersheds adjacent to biodiversity-rich but highly threatened forest reserves in karst habitats.

The BioCarbon Fund is the latest in a family of trust funds created by private companies and governments and administered by the World Bank. This fund provides carbon finance to demonstrate and test projects that sequester or conserve carbon in ecosystems (see Box 13). The fund will help poor farmers and rural communities find new value in their agricultural lands and forests as they earn income from sequestering or conserving carbon.

The Fund is capitalized at around \$200 million and will finance learning projects in areas such as reforestation of degraded grasslands, landscape rehabilitation through planting of corridors, and improved fire management. The fund provides new resources to explore options for carbon credits that are achieved by activities other than afforestation and reforestation. Projects in this stream may include rehabilitation of degraded drylands by establishing shrubs and improving soil carbon, low-impact logging, restoration of swamp forests, or the protection of forest fragments within a wider landscape management plan.

Box 13**Carbon Financing as a Conservation Incentive in Madagascar**

The majority of the primary forests of Madagascar, which harbor large numbers of endemic species, have disappeared, leaving only small remnants that are steadily being destroyed by slash-and-burn agriculture and logging. In conjunction with local people, a project has been developed that aims to restore a mosaic of functioning ecosystems, comprising both natural forests in the form of corridors linking fragmented habitats and cultivated “forest gardens.” These gardens would, at the same time, provide products of value to local people, especially food and income, and a shift in land-use practices from slash-and-burn agriculture.

The project, which was designed by the Malagasy park management agency ANGAP and Conservation International, is expected to sequester around 524,000 tons of carbon dioxide equivalent over 14 years. What makes this project so special is its multiplier effect—the project area is around 5,000 hectares but it will effectively double the existing natural habitat for a number of species (including the endangered Indri lemur) by reconnecting two protected areas, severed over time by human activities. In addition, the project is expected to save in excess of 10 million tons of carbon dioxide-equivalent over 14 years through conservation activities, protecting forests against further encroachment by migrant agriculturists. The Bank intends to purchase a portion of these tons on behalf of the BioCarbon Fund investors (the Governments of Canada and Italy, Agence Française de Développement, Okinawa Electric Power Company, Tokyo Electric Power Company of Japan, and Eco-Carbone of France).

Invasive Alien Species

A newly recognized and insidious threat, invasive alien species (IAS) are widely regarded as the second greatest threat to biodiversity after direct habitat destruction and fragmentation. Invasive alien species are among the most significant drivers of environmental degradation and change worldwide. They are both a global and national threat with clear and explicit linkages to land degradation, water flow, and agricultural productivity. IAS reduce crop yields, choke irrigation canals, block hydroelectric dams, and reduce the lifespan of development investments. They contribute to social instability and economic hardship, placing constraints on economic growth, poverty alleviation, food security, and biodiversity conservation. Their spread and effects are exacerbated by other drivers of environmental change, including climate change.

Invasive alien species are spread through trade, tourism, transport, agriculture, forestry, land and water management, both accidentally and through deliberate introductions, sometimes linked to development and humanitar-

ian assistance. Their costs to national economies can be enormous in terms of agricultural loss; reduced fisheries production; human, plant and livestock health; costs of herbicides and other control mechanisms; reduced hydrological flows and degraded landscapes. It has been estimated that the annual cost of IAS to developing countries such as Brazil and India is \$50 billion and \$116 billion respectively. Soy bean rust alone is estimated to cost Brazil \$1 billion a year, while the spread of the Black Sea comb jelly has led to losses of \$1-2 billion a year in lost fisheries production for the region. The deliberately-introduced golden apple snail costs the Philippines some \$40 million a year in lost agricultural production while seven African countries are spending up to \$50 million annually to control invasive aquatic weeds. In South Africa, the spread of exotic trees in the mountain catchment areas surrounding Cape Town—if it continues at current rates—could reduce water resources for this rapidly growing city by 30 percent. These losses could mean that more (and expensive) dams have to be built much earlier to meet water demands, with serious economic impacts. Additionally, invasive plants in indigenous grasslands and scrublands increase fuel loads

and fire risk, which leads to increased soil erosion, degradation, and biodiversity loss in mountain catchments. Recognition of these costs has led the South African government to initiate the very successful *Working for Water* program to eradicate IAS.

In response to this emerging global problem, the Bank has formed a new partnership with the Global Invasive Species Programme (GISP)—www.gisp.org. With grant funding through the Bank Netherlands Partnership Program and the Development Grant Facility, the Bank will provide four years of seed funding to support a dedicated GISP secretariat in South Africa. GISP is working with *Working for Water*, the South African National Biodiversity Institute (SANBI) and global partners such as IUCN, The Nature Conservancy (TNC), and the Commonwealth Agricultural Bureaux International (CABI) to raise awareness of the serious environmental and economic costs from the spread of invasive species. The GISP secretariat is working with government and its NGO partners worldwide to build capacity and apply tools and methodologies for containing, and combating invasive alien species, especially in developing countries where biodiversity loss and environmental degradation undermine efforts to attain sustainable development.

In several countries in the Africa region, the Bank is also supporting site-based activities to eradicate and control exotic plants in mountain habitats in South Africa and Mount Mulanje, Malawi. World Bank and GEF funding is enabling control and eradication programs for invasive plants in key protected areas such as Table Mountain, the Cape Peninsula National Park and the Maloti-Drakensberg Mountains. In the Cape Peninsula, unskilled laborers are being trained to remove invasive alien species that threaten the region's endemic species. The Table Mountain Fund provides resources for training and eradication efforts within the park and on adjacent private and community lands. It is expected that these trainees will be able to set up small businesses to service alien species eradication programs in natural parks and watersheds throughout the region. In the Seychelles and Mauritius, the Bank has supported eradication of alien

species and restoration of native vegetation in the small island ecosystems. Increasingly these efforts are being linked to ecosystem services and watershed management, as in the Seychelles.

Partnerships for Conservation

The World Bank recognizes the importance of partnerships and coordinated action in bringing about the changes that are needed to successfully conserve the world's biodiversity. Accordingly, the Bank is increasingly entering into partnerships with nongovernmental organizations, academic institutions, and others to pursue common goals. Many of these partnerships support activities which will directly contribute to the specific biodiversity targets set by the world's governments for 2010. Several of these partnerships are described below.

The World Bank/WWF Alliance for Forest Conservation and Sustainable Use was formed in April 1998 as a response to both the continued depletion of the world's forest biodiversity, and to the loss of goods and services essential for sustainable development. The Alliance is working with governments, the private sector, and civil society to achieve three targets by 2005:

- 50 million hectares of new forested protected areas
- Another 50 million hectares of existing forested protected areas under effective management
- 200 million hectares of production forests under independently certified sustainable management.

The Alliance is now working in 30 countries—including Brazil, where the government has committed to protect an additional 28.5 million hectares of Amazon rain forest through the ARPA Program, and in Papua New Guinea, where the Alliance is fundraising for the Mama Graun Conservation Trust Fund to support landowner conservation activities as an alternative to commercial logging.

The Critical Ecosystems Partnership Fund (CEPF) is an international funding partnership among Conservation

International (CI), the GEF, the World Bank, the Government of Japan, and the John D. and Catherine T. MacArthur Foundation. It will provide \$125 million in grant funding and technical assistance to conservation efforts in high biodiversity areas, especially tropical forests. The relatively small grants (typically \$100,000 to \$300,000) from the CEPF have also enabled a range of important activities related to protected areas and other conservation initiatives. From its start in January 2001 until July 2004, the CEPF has committed more than \$44 million to support more than 180 community-based groups, nongovernmental organizations, and other civil society partners in safeguarding biodiversity in 11 hotspots in Africa, Asia, and Latin America. The support has come in the form of grants and technical assistance.

In the Brazilian Atlantic Forest hotspot, the Alliance for the Conservation of the Atlantic Forest established a small grants program with CEPF funds to assist landowners to create new reserves and better manage existing private reserves in Brazil. While more than 500 private reserves exist in Brazil today, many landowners need technical or financial support to effectively manage these areas and maximize the benefits for conservation. The new grants program, which has already received more than 40 applications, is focusing its efforts on Private Natural Heritage Reserves in the Central and Serra do Mar conservation corridors in Brazil.

A highly successful *Bank Local Language Field Guide Program* has collaborated with national and international NGOs and scientific institutions to produce more than 50 field guides in local languages. The program—now running for more than six years—was started in East Asia but has since expanded to cover all of Asia and Africa. It has supported local language guides for a variety of plants and animals, including the birds of Laos, China, Vietnam, Nepal, and India, and titles such as *Snails of Sri Lanka*, *Birds of South Africa*, *Trees and Shrubs of Thailand*, *Bamboos of Indonesia*, and *Tortoises of Cambodia*. These field guides have proven to be key tools for promoting environmental awareness and capacity building in developing countries, where lack of accessible information in local languages has hampered biodiversity

training, park ranger capacity, and opportunities for local communities to benefit from their rich biological heritage. They are being utilized at the local level by village ecotourism guides, including youth and women's groups, as well as teachers and young environmental professionals, to increase their own knowledge and strengthen the services and information they can provide to others. A recent call for new proposals elicited more than 170 submissions from Asia and Africa (covering everything from crabs to palms), reflecting the overwhelming demand for such field guides.

Measuring Impacts

One area that has been particularly challenging to the global conservation community is the monitoring of biodiversity trends and outcomes. While Bank support has focused on the most urgent priorities—arresting deterioration of ecosystems and involving local people in their management—there has also been support for the development of research, monitoring and information systems. The IABIN information system in LAC, for instance, is linking information networks throughout the region, while a MSP in the Galapagos is monitoring the impact of tourism on biodiversity. A new global targeted research project will look at threats and management issues in relation to coral reefs – see Box 14.

Objective measurement of biodiversity trends and impacts is difficult, in part because biodiversity management deals with ecological processes, which are generally long term (for example, changes in numbers of a population of a key species). Because of this, changes resulting from management may be slow to emerge. There is a growing concern that many protected areas and other conservation mechanisms around the world may not be achieving the biodiversity objectives for which they were established. One response has been an emphasis on the need to increase the effectiveness of protected area management. To help this process, a number of assessment tools have been developed to assess management

Box 14

Partnering to Conserve the World's Coral Reefs

The Coral Reef Targeted Research and Capacity Building program has been established to address fundamental information gaps in our understanding of coral reef ecosystems, so that management options and policy interventions can be strengthened globally. For the first time in history, this project will join the collective effort of many of the world's leading coral reef scientists to coordinate research efforts and address key outstanding questions about the health of coral reefs. Partners include the World Bank, the GEF, the University of Queensland, Australia, UNESCO-Intergovernmental Oceanographic Commission, and NOAA, as well as centers of excellence in critical coral reef ecosystems around the world. The program is being developed in phases over 15 years and, through focused and systematic research, is working to effectively support management and policy, and to better integrate resulting information with other disciplines, such as economics and law. The program will also enhance the capacity of researchers, students, and managers within developing countries, so that a global network can effectively share the most up-to-date research to benefit regional, national, and local management actions and policy.

The program is coordinated across geographic nodes that reflect the regional distribution of coral reefs and management initiatives under way to conserve them. The regional nodes will be the focal points for research carried out by international scientific working groups, and will be integrated within an overall research framework consisting of three strategic elements:

- Addressing knowledge and technology gaps
- Promoting learning and capacity building
- Linking scientific knowledge to management.

practices. The World Commission on Protected Areas (WCPA) has developed a “framework” for assessment that aims to provide some overall guidance in the development of assessment systems and to encourage standards for assessment and reporting.

The WCPA Framework is based on the idea that good protected area management follows a process that has six distinct stages, or elements. It begins with (1) understanding the **context** of existing values and threats, (2) progresses through **planning** and (3) allocation of resources (**inputs**), and (4) as a result of management actions (**processes**), (5) eventually produces products and services (**outputs**) that (6) result in impacts or **outcomes**.

The World Bank/WWF Alliance has set a target of establishing 50 million hectares of more effectively managed protected areas around the world. In order to monitor the progress toward meeting this target, it has developed and tested a simple site-level tracking tool

entitled *Reporting Progress in Protected Areas: A Site Level Management Effectiveness Tracking Tool*. Based on the WCPA framework, this tool is designed primarily to assist protected-area managers to identify and address management needs. It has now been tested at more than 200 World Bank and WWF project sites, and WWF has set up a database to collate results. The tool has been adopted by the GEF and other agencies and has been translated into French and Spanish as well as Chinese, Lao, Khmer, Vietnamese, Mongolian, and Indonesian.

The original tracking tool was developed for forested protected areas, but it has now been adapted for use in marine protected areas through a partnership between the Bank and the U.S. National Oceanic and Atmospheric Administration (NOAA). It is currently being field-tested in marine protected areas in the Caribbean. The tool is available on the Bank's biodiversity website (www.worldbank.org/biodiversity).

Challenges for the Future

Over the last two years—through the Earth Summit, the World Parks Congress, and the CBD commitments—the Bank’s client countries have taken on an ambitious biodiversity work program that will require much greater levels of effort, financing, commitment, and capacity building. The Bank has a large, and expanding, protected-area portfolio and is exploring a wide range of new resource management and financing models that support conservation initiatives. Lessons are being learned and applied. Nevertheless, biodiversity—especially (but not only) in the developing world—still faces many threats, often from the very development that is designed to improve livelihoods and address poverty alleviation. A major challenge for the future is thus to mainstream biodiversity into government programs, normal development assistance, and poverty alleviation programs by promoting positive synergies, while minimizing the negative impacts to biodiversity of potentially damaging investments such as infrastructure development.

In order to maximize development opportunities yet minimize biodiversity costs, it will be important to

increase awareness of the multiple benefits that biodiversity goods and services provide and to explore the opportunities in Bank projects of going beyond the “do-no-harm” paradigm to actively promoting conservation and habitat protection. As with poverty alleviation, conservation is not the preserve of the technical specialists alone. Bringing biodiversity conservation and protected areas into the development mainstream will require additional commitment from Bank staff, economists, and management, but also from client governments, NGOs, and other stakeholders in the development community. It will require greater effort to consider all options in development scenarios and seek ways to reorient development planning away from short-term returns and toward better biodiversity conservation and long-term sustainability. Environmental sustainability has been recognized as one of the Millennium Development Goals (MDGs). Achieving a healthy environment, however, will require greater understanding of the interlinkages between environment and human welfare, and greater advocacy and capacity building, to create awareness both of the benefits that biodiversity can provide and of better ways to harness, and maintain, those benefits for the future.

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World Bank Biodiversity web site: www.worldbank.org/biodiversity



The World Bank
1818 H Street, NW
Washington, DC 20433 USA

Tel: 202-473-1000
Fax: 202-477-6391
Internet: www.worldbank.org/biodiversity

