This report was prepared by Kathy MacKinnon, Karen Luz, Claudia Sobrevilla, and Elisson Wright (Biodiversity Team), with contributions from Beverley McIntyre (ARD); Jessica Mott, Emilia Battaglini, Marjory-Anne Bromhead, Agi Kiss, and John Frazer Stewart (ICA); David Bonnardeaux and Marea Hatzisios (ENV); Tim Brown, Valerie Hickey, Bryony Morgan, Stephen Ling, Tony Whitten, and Robin Broadfield (EAP); Paula Agustini, Christophe Crepin, Indu Hewawasam, and Chris Warner (AFR); Isabel Braga, Carter Brandon, Douglas J. Graham, Adriana Moreira, Gunars Platais, Juan Pablo Ruiz, Keiko Ashida, and Jocelyne Albert (LAC); Malcolm Jansen (SAR); J.B. Collier, Allan Rotman, and Dahlia Lotayef (MNA); and Catherine Cassagne, Mark Eckstein, Richard Kagumba, and Jeff Liebert from the International Finance Corporation. David Bonnardeaux, Bryony Morgan, and Elisson Wright prepared the portfolio data for this update of the biodiversity portfolio review. Valerie Hickey undertook the data analysis. Jim Cantrell was responsible for the design and layout. 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.

The Environment Department
The World Bank
Washington, D.C.
## Contents

### Chapters

1. The Bank Biodiversity Portfolio  
   - Introduction 1  
   - Methods 2  
   - Investment Trends 4  
   - Regional Trends 8

2. Implementing the Biodiversity Convention  
   - Supporting Protected Area Networks 13  
   - Maintaining Biodiversity in Threatened Ecosystems 18  
   - Freshwater Ecosystems, Wetlands, Rivers, Lakes, and Regional Seas 18  
   - Marine Conservation 23  
   - Island Biodiversity 28  
   - Madagascar — A Megadiversity Island 29

3. Mainstreaming Biodiversity in Development  
   - Natural Resource Management Programs 33  
   - Agriculture and Biodiversity 34  
   - Mainstreaming Biodiversity in Infrastructure Projects 37  
   - Valuing Ecosystem Services 40  
   - Strengthening the Knowledge Base 42

4. Working with Civil Society  
   - Indigenous Peoples, Protected Areas, and Conservation 47  
   - Working with the Private Sector 49  
   - NGO Partnerships for Conservation 51  
   - Public-Private Partnerships 53  
   - Engaging the Scientific Community 55  
   - Focus on Youth and Learning 57

5. New Challenges and Opportunities  
   - Invasive Alien Species 60  
   - Climate Change and Biodiversity 64  
   - Forest Law Enforcement and Governance (FLEG) 66

Wildlife Trade  66
Improving Land Management  68
Monitoring for Impact  69

**APPENDIX**
The World Bank Group Biodiversity Portfolio  73

**BOXES**
1.1 Laying the Foundation for Biodiversity Conservation in Mongolia  3
1.2 Innovation in Conservation — The Development Marketplace Way  5
2.1 Conservation Production Landscapes — Ecology and Economics  14
2.2 Conservation Achievements in Protected Areas in Honduras  15
2.3 Vietnam Conservation Fund — Supporting Protected Areas Network  16
2.4 Making Protected Areas Relevant to the Development Agenda  17
2.5 Mainstreaming Conservation in the Cape Floristic Region  19
2.6 Management of Aquatic Resources in the Amazon Region  21
2.7 Management of Marine and Coastal Invasive Species  25
2.8 Marine Resources Are Big Business in the Philippines  26
2.9 San Andreas Biosphere Reserve — Caribbean Jewel  27
2.10 Conserving Lowland Forests on Buton Island, Sulawesi  30
3.1 Doing No Harm — World Bank Policies and Safeguards  37
3.2 Water, Livestock, and the Mongolian Wild Ass  38
3.3 Nakai Nam Theun — Forest Conservation to Protect Hydropower  39
3.4 Ecomarkets in Costa Rica  41
3.5 Can Collecting Flies Benefit Conservation?  43
3.6 Partnerships for Progress — Brazil National Biodiversity Project  44
4.1 Conservation and Sustainable Development in the Matavén Forest  49
4.2 Civil Society Advocacy and Influence on Policy and Development  54
4.3 From Flamingos to Penguins — Partnerships for Conservation in Chile  56
5.1 An Invasives Information Network in Latin America and the Caribbean  61
5.2 Making Bereavement Bearable — Invasive Trees for Coffins  63
5.3 Carbon Sequestration via the BioCarbon Fund  65
5.4 After the Tsunami — Integrating Forest Protection into Recovery  67
5.5 Aral Sea — Rehabilitation at a Site of Ecological Catastrophe  70

**FIGURES**
1.1 Annual biodiversity investments, including co-financing, FY1988–2005  6
1.2 Biodiversity investments by type of funding, FY1988–2005 (US$ 5.1 billion total)  6
1.3 Annual biodiversity investments and leveraged co-financing  7
1.4 Percentage of total Bank biodiversity investments, excluding co-financing, by funding source (1988–2005)  7
1.5 Percentage of GEF funds by type of project  7
1.6 Total biodiversity investments by region (1988–2005)  8
1.7 Number of Bank-GEF biodiversity projects by project type and region (1988–2005)  8
1.9 Total investments and co-financing for biodiversity projects by region (1988–2005)  10
1.10 Co-financing by region (1988–2005)  10

**TABLES**
1.1 Total biodiversity investments by year and funding source  6
1.2 Total biodiversity investments by region (1988–2005)  9
1.3 Biodiversity investments by region and funder, excluding co-financing (1988–2005)  9
Introduction

The World Bank’s overarching mission is to alleviate poverty and support sustainable development. The conservation and sustainable use of natural ecosystems and biodiversity are critical elements of this mandate. Biodiversity is the foundation and mainstay of agriculture, forests, fisheries, soil conservation, and water quality. Biological resources provide the raw materials for livelihoods, sustenance, trade, medicines, and industry. Genetic diversity 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, tsunamis, and hurricanes. Forests, grasslands, freshwater and marine and other natural ecosystems provide global environmental benefits such as carbon sequestration, biodiversity conservation, and nutrient and hydrological cycling. Sound ecosystem management provides countless streams of benefits to, and opportunities for, human societies, while also supporting the web of life. Biodiversity conservation contributes to environmental sustainability, a critical Millennium Development Goal (MDG) and a central pillar of World Bank assistance.

The World Bank Group has a rich portfolio of biodiversity projects. Through lending and grant support to client countries, it is one of the largest international funding sources for biodiversity (World Bank, 2004a). This portfolio review and update shows that between July 1988 and June 2005, the World Bank approved 492 projects that wholly or partially support biodiversity conservation and sustainable use. This biodiversity portfolio represents a $5-billion investment, including Bank contributions and leveraged co-financing. Although this investment is a very small part of the Bank’s overall lending, this biodiversity funding has made a substantial contribution to helping client countries meet their obligations under the Convention on Biological Diversity (CBD) and to implementing work programs and priorities agreed by the CBD. A substantial amount of that investment has been dedicated to protected areas (World Bank, 2003a) but there is an increasing focus on improving natural resource management and mainstreaming biodiversity into forestry, coastal zone management, and agriculture. Beyond these “traditional” biodiversity sectors, the Bank is also supporting innovative modalities for protection and improved management of natural habitats through Bank-funded energy and infrastructure projects, Carbon Fund projects, and Development Policy Lending (DPL).

Bank projects directly support biodiversity conservation and sustainable use in a range of natural habitats, from...

Mountains to coral reefs and from tropical evergreen and monsoon forests to savanna grasslands and unique dryland, limestone, marine, and freshwater ecosystems. Many are in centers of recognized global importance for biodiversity: megadiversity hotspots, remaining wilderness areas, the Global 200 Ecoregions described by World Wide Fund for Nature (WWF), and Endemic and Important Bird Areas (EBAs and IBAs). By promoting investments in these locations the Bank is helping countries to meet the 2010 targets of the CBD.

This portfolio review is a report for the Eighth Conference of the Parties to the CBD in Brazil in March 2006 and to the GEF Assembly in South Africa in August 2006. It provides an update on previous reviews, which focused on specific ecosystems (forests and mountains) and themes (protected areas), as well as previous overviews of the whole portfolio (World Bank, 2004a). It includes information on some of the most recent highlights of the portfolio, including initiatives to mainstream biodiversity into regional and national development programs as well as innovative financing mechanisms for biodiversity conservation.

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 (alternatively, WBG, the World Bank, or the Bank) over the past 17 years (1988–2005) to promote the conservation and sustainable use of biodiversity. This period spans ratification and implementation of the Convention on Biological Diversity 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). As an Implementing Agency of the Global Environment Facility, the Bank has played a major role in supporting the objectives of the Biodiversity Focal Area program, especially in promoting the sustainability of protected area networks and in mainstreaming biodiversity in production landscapes.

This portfolio update incorporates both stand-alone biodiversity projects and biodiversity-related sectoral projects—for example, a hydropower project in Lao PDR, an irrigation project in Iran, and ship-generated waste management project in the Eastern Caribbean—that clearly describe and include biodiversity activities. It includes all such projects financed through the International Bank for Reconstruction and Development (IBRD), the 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 arm, the International Finance Corporation (IFC), contributes to biodiversity conservation through private sector lending and GEF grants; only the latter are included in this analysis. In addition to projects and project components with specific and direct biodiversity objectives (the biodiversity portfolio), the Bank funds many other development 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.

Additionally, a small but growing source of funding for protected areas and other biodiversity activities comes from special World Bank trust funds (see Box 1.1). The Bank contributes to biodiversity conservation through innovative programs funded by the Development Grant Facility (DGF) and the Bank Netherlands Partnership Program (BNPP). The Development Grant Facility, sourced from Bank income, provides support to global partnerships such as the World Bank/WWF Alliance for Forest Conservation and Sustainable Use, the Critical Ecosystems Partnership Fund (CEPF), and the Global Invasive Species Programme (GISP). It has also contributed approximately $50 million annually to the Consultative Group for International Agriculture Research (CGIAR)
networks for critical research to improve crops and increase agricultural productivity. The DGF also provides cofunding to projects such as the Millennium Ecosystem Assessment, Global Coral Reef Targeted Research project, and the International Assessment of Agricultural Science and Technology for Development (IAASTD).

Since 1998 the Bank-Netherlands Partnership Program has contributed $50 million through its Environment Window to mainstream the environmental dimension of sustainable development into overall World Bank assistance by supporting the implementation of the Corporate and Regional Environmental Strategies of the World Bank. Currently, the Environment Window of BNPP has a total of 49 active or recently approved projects. For CY04, 17 projects were approved totaling $7.2 million, for CY05, 23 projects totaling $10.13 million and for CY06, 9 proposals totaling $3.39 million. More than 50 percent of these projects are in Africa. The BNPP funding has supported upstream analytical work to strengthen poverty-biodiversity linkages and Bank lending; provided resources to strengthen new partnerships, e.g. with Global Witness.
and the Alliance on Forest Governance; and resourced capacity building through initiatives to address invasive alien species and local language field guides. Another Bank program, the Development Marketplace (DM), is providing seed funding for innovative development ideas. An increasing focus on environment in the Development Marketplace has afforded the opportunity to support new biodiversity initiatives and small grants in some of the poorer countries. Several projects in 2004 and 16 of the 2005 winners were biodiversity projects (see Box 1.2).

The Annex lists all Bank biodiversity projects included in the portfolio for the fiscal year in which they were approved by the Bank Board or, in the case of GEF medium-size projects (GEF MSPs), by the country management unit. The source of funding, whether WBG (loans, credits, or grants) or co-financing from non-Bank sources, is noted for each project. Where there is more than one source of WBG financing in a project, these components are assessed separately to avoid double counting. Co-financing amounts include contributions from borrower governments, local beneficiaries, non-governmental organizations, bilateral donors, regional development banks, and United Nations agencies. As in previous reviews, biodiversity costs are determined by itemizing each activity component. For each project, figures have been estimated for total project cost, total biodiversity costs (WBG funds plus associated co-financing), and Bank biodiversity funding. The Annex provides a listing, by region, of all biodiversity projects with their funding and key activities.

**Investment Trends**

The biodiversity portfolio of the WBG has shown steady growth over the past 17 years, especially since 1992 when GEF funding became available. Between 1988 and 2005, the Bank approved 492 projects that fully or partially supported biodiversity conservation and sustainable use. These biodiversity initiatives are taking place in 105 countries and through 39 multi-country efforts. More than half of these projects (255) were approved since 2000, with 43 projects in FY05 alone. Many of these projects benefit from GEF funding.

Bank biodiversity projects directly support biodiversity conservation in a range of natural habitats, from temperate forests to freshwater rivers and lakes, from large marine ecosystems to high mountain habitats, and from some of the most expansive tropical forest wildernesses to some of the most unique limestone landscapes. During the period between 1988 and 2005, the WBG committed over $2.8 billion in loans and GEF resources and leveraged almost another $2.3 billion in co-financing, resulting in a total investment portfolio exceeding $5 billion.

Table 1.1 shows the total World Bank commitments for biodiversity projects by year and funding source from 1988 to 2005. Cumulative WBG biodiversity funding for biodiversity projects during that period totaled over $5.1 billion. Figure 1.1 summarizes biodiversity investments from all funding sources.

Figure 1.1 gives an indication of the normal fluctuation of the funding cycles. Apparent surges in funding between years are explained by bunching of a few large projects in some years or postponements 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 2005–07 figures lead us to believe that this characteristic pattern of annual variability in WBG biodiversity investments will continue. Comparisons between years are thus difficult to interpret and necessitate a longer-term view of biodiversity portfolio trends. Preliminary qualitative assessments of the portfolio suggest that funding reflects and responds to the diverse strategic conservation priorities of Bank clients.

Partner governments have borrowed 32 percent (down from 39 percent in 2000) of the $5 billion investment
The Bank Biodiversity Portfolio

Grants comprise 23 percent ($1.2 billion) and were facilitated through Bank-executed GEF projects ($1.1 billion) and several trust funds ($87 million). The remaining 45 percent of total funding ($2.3 billion) represents co-financing and parallel financing.

through IBRD loans or IDA credits, representing a total of $1.6 billion. Grants comprise 23 percent ($1.2 billion) and were facilitated through Bank-executed GEF projects ($1.1 billion) and several trust funds ($87 million). The remaining 45 percent of total funding ($2.3 billion) represents co-financing and parallel financing.

**BOX 1.2 Innovation in Conservation — The Development Marketplace Way**

Development problems often require new solutions. The Development Marketplace provides seed funding for innovative, small-scale development projects that offer creative, cutting-edge solutions to some of the most pressing social, economic, and environmental concerns of our time. Winning projects in 2005 ranged from providing nest sites to encourage rodent-eating barn owls in Chile to livelihood projects linked to protection of Ugandan gorillas and Russian tigers. Examples of DM projects include:

**Ha Tien: Habitats and Handbags** — The acid soils of the Ha Tien Plain in Vietnam support a mosaic of grassland and wetland ecosystems, which are being destroyed due to increased shrimp pond development and subsistence rice farming. The Khmer people live in poverty in the area—although they may work at the shrimp ponds, they see little of the profit. A DM project in 2003 sought to improve the benefits the Khmer people receive from woven household goods while encouraging the sustainable harvesting of rushes. The project has had direct positive impacts on the Sarus crane, an important symbol to the Buddhist Khmer people. The project established a wetland protected area of 2,890 ha in Phu My commune, Kien Luong District, Kien Giang Province, conserving the last remnant of Lepironia (Lepironia articulata – Cyperaceae) grassland in the Mekong Delta. Human disturbances and encroachment in the new protected area have been reduced and cranes are on the increase. The annual Sarus crane count, carried out in March 2005 in Cambodia and Vietnam by the International Crane Foundation, recorded 45 cranes in the project area, significantly more cranes than the year before. The project area is now included in the Kien Giang Biosphere Reserve being nominated to UNESCO by the Government of Vietnam.

**Chilis: Cash and Crop Protection** — Rural farmers in many parts of Africa suffer severe losses when wildlife such as elephants and buffalos raid their crops. Current farming practices serve to increase the risk of crop damage, as many crops are highly palatable to wildlife. Current crop protection is often ineffective, and killing problem animals is an option that both farmers and conservationists want to avoid. Chili peppers have proved to be a valuable cash crop that also effectively repels wildlife, including elephants and buffalos. A DM 2003 project has helped over 250 household farms in Zimbabwe, Zambia, and Mozambique to cultivate chili as a robust, and affordable, system of crop defense that is controlled by the community. At all the sites, crop depredations went down by at least 37 percent from the previous farming seasons. At the same time, on average each participant in the project reported an increase in income by as much as 52 percent owing to the sale of chili peppers.

**Duck Rangers** — Rice farming and raising mallard ducks are important livelihoods in the Philippines. Snails are an important food source for the ducks; otherwise farmers must rely on expensive commercial feed. In rice-growing areas, infestations of the invasive golden snail can destroy up to 60 percent of a crop. Rice farmers rely on chemical inputs like molluscicide (snail killer), fertilizer, insecticide, and herbicide, resulting in environmental degradation and significantly increasing the cost of production. Traditionally, rice and ducks are raised separately, but significant gains can be realized by raising both in the same field. The ducks can control the golden snail population, which will in turn improve rice field productivity. Duck farmers will benefit from cheaper duck feed, while rice farmers will gain from an environmentally friendly and inexpensive way to fight the destructive snail. The production of the “Duck Ranger”—a movable duck shed that will house the free-ranging ducks as they move from one place to another—will facilitate this integrated farming model. The project estimates that 17,340 farm families will benefit from this innovation.
approximately equivalent to an additional 82 cents for every dollar the World Bank invests in biodiversity (up from 70 cents per dollar invested by FY99). Figure 1.2 presents the total biodiversity investment by funding source. Figure 1.3 represents the total annual biodiversity investments by the Bank including the leveraged co-financing.

The total number of biodiversity projects or projects with biodiversity components funded by IBRD and IDA is 99 and 106 projects, respectively. Some $272 million of IDA funds (34 percent) and $247 million of IBRD funds (30 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 in the coming years countries will remain interested in using IDA credits and grants to supplement grant-based conservation.

**Table 1.1 Total biodiversity investments by year and funding source ($ millions)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total GEF</th>
<th>IDA</th>
<th>IBRD</th>
<th>Trust Funds</th>
<th>Total Bank Funding</th>
<th>Total Co-financing</th>
<th>Total Biodiversity Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>0.00</td>
<td>2.86</td>
<td>3.79</td>
<td>0.00</td>
<td>6.65</td>
<td>8.95</td>
<td>15.60</td>
</tr>
<tr>
<td>1989</td>
<td>0.00</td>
<td>3.93</td>
<td>3.16</td>
<td>0.00</td>
<td>7.09</td>
<td>5.21</td>
<td>12.30</td>
</tr>
<tr>
<td>1990</td>
<td>0.00</td>
<td>14.22</td>
<td>129.26</td>
<td>0.00</td>
<td>143.48</td>
<td>91.00</td>
<td>234.48</td>
</tr>
<tr>
<td>1991</td>
<td>23.20</td>
<td>125.97</td>
<td>91.21</td>
<td>0.00</td>
<td>240.37</td>
<td>130.17</td>
<td>370.55</td>
</tr>
<tr>
<td>1992</td>
<td>29.75</td>
<td>28.37</td>
<td>17.13</td>
<td>0.00</td>
<td>75.25</td>
<td>42.93</td>
<td>118.18</td>
</tr>
<tr>
<td>1993</td>
<td>51.27</td>
<td>54.01</td>
<td>27.94</td>
<td>0.00</td>
<td>133.21</td>
<td>63.75</td>
<td>196.97</td>
</tr>
<tr>
<td>1994</td>
<td>44.06</td>
<td>34.80</td>
<td>55.61</td>
<td>36.66</td>
<td>171.13</td>
<td>176.26</td>
<td>347.40</td>
</tr>
<tr>
<td>1995</td>
<td>73.95</td>
<td>5.07</td>
<td>40.89</td>
<td>0.00</td>
<td>119.91</td>
<td>79.98</td>
<td>199.89</td>
</tr>
<tr>
<td>1996</td>
<td>89.88</td>
<td>99.54</td>
<td>38.86</td>
<td>0.00</td>
<td>228.28</td>
<td>160.75</td>
<td>389.03</td>
</tr>
<tr>
<td>1997</td>
<td>90.47</td>
<td>132.30</td>
<td>39.02</td>
<td>0.20</td>
<td>261.99</td>
<td>290.79</td>
<td>552.79</td>
</tr>
<tr>
<td>1998</td>
<td>45.10</td>
<td>40.15</td>
<td>15.87</td>
<td>3.00</td>
<td>104.11</td>
<td>98.57</td>
<td>202.68</td>
</tr>
<tr>
<td>1999</td>
<td>52.11</td>
<td>13.85</td>
<td>49.68</td>
<td>6.90</td>
<td>122.54</td>
<td>53.58</td>
<td>176.12</td>
</tr>
<tr>
<td>2000</td>
<td>164.15</td>
<td>24.06</td>
<td>72.28</td>
<td>27.00</td>
<td>287.48</td>
<td>330.56</td>
<td>618.04</td>
</tr>
<tr>
<td>2001</td>
<td>144.55</td>
<td>38.99</td>
<td>21.35</td>
<td>4.33</td>
<td>209.22</td>
<td>144.57</td>
<td>353.79</td>
</tr>
<tr>
<td>2002</td>
<td>100.98</td>
<td>37.09</td>
<td>33.33</td>
<td>0.00</td>
<td>171.40</td>
<td>157.70</td>
<td>329.10</td>
</tr>
<tr>
<td>2003</td>
<td>100.81</td>
<td>57.32</td>
<td>38.95</td>
<td>4.39</td>
<td>201.47</td>
<td>269.72</td>
<td>471.19</td>
</tr>
<tr>
<td>2004</td>
<td>89.64</td>
<td>55.45</td>
<td>49.40</td>
<td>4.78</td>
<td>199.27</td>
<td>67.44</td>
<td>266.70</td>
</tr>
<tr>
<td>2005</td>
<td>89.64</td>
<td>55.45</td>
<td>49.40</td>
<td>4.78</td>
<td>199.27</td>
<td>67.44</td>
<td>266.70</td>
</tr>
<tr>
<td>Totals</td>
<td>1,099.92</td>
<td>803.44</td>
<td>824.89</td>
<td>87.25</td>
<td>2,815.50</td>
<td>2,301.87</td>
<td>5,117.37</td>
</tr>
</tbody>
</table>

**Figure 1.1 Annual biodiversity investments, including co-financing, FY1988–2005**
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, where funding in the early period focused on large environmental projects such as the Brazilian 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 indicates improved mainstreaming of biodiversity conservation into broader development lending.

The number of biodiversity projects as a whole has steadily increased over the review period, with 43 added in 2005, worth over $266 million. While the number of 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. More than half of all projects are GEF-funded or projects with GEF components blended with IBRD and IDA lending. GEF accounts for 39 percent of all financing (see Figure 1.4), with most of the financing going to full-sized projects (see Figure 1.5).
Regional Trends

The WBG is supporting conservation and sustainable use of biodiversity worldwide. Table 1.2 and Figure 1.6 show the cumulative biodiversity funding ($5.1 billion) from all sources by region. The major share (39 percent) of all funding for biodiversity projects went to Latin America and the Caribbean ($2.0 billion), with 9 percent to South Asia (SAR), 26 percent to Africa (AFR), 14 percent to East Asia and the Pacific (EAP), and 6 percent to Eastern Europe and Central Asia (ECA). Just over 2 percent of total biodiversity funding went to the Middle East and North Africa (MNA). A further 4 percent represents biodiversity financing through global initiatives, such as the IFC Small and Medium Enterprise Fund, the Critical Ecosystems Partnership Fund, Coral Reef Targeted Research, and projects funded under the BNPP Forests and Biodiversity windows. Over 65 percent of all biodiversity funding has gone to the LAC and AFR regions.

**Figure 1.6 Total biodiversity investments by region (1988–2005)**

Table 1.3 shows IBRD and IDA funding by region, totaling $825 million and $803 million respectively. Among the regions, LAC still has the largest share of IBRD biodiversity funding with $559 million (68 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 47 percent (or $376 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, and regular GEF grants, both through the Bank and the IFC. The Bank’s biodiversity investments through GEF grant windows have more than doubled over the last five years to $1.1 billion in all regions. By the end of FY05, the Bank had 148 full or regular GEF projects, as well as 29 biodiversity EAs (up from 19 in FY99) and 75 MSPs (up from 17 by FY99), spread across all Bank regions (see Figure 1.7). As shown in Figure 1.8 GEF funding for biodiversity mirrors regular lending. Together the Africa, EAP, and LAC regions jointly absorb 73 percent of all biodiversity investments made through the GEF windows. Latin America and the Caribbean is the region with the highest GEF funding overall, a reflection of the high biodiversity value of the region’s ecosystems and country capacity to prepare and implement projects.

More than half of these GEF investments have gone toward protected area projects, but the Bank is increasingly seeking to promote the GEF mandate on mainstreaming biodiversity in production landscapes, especially where there are opportunities to integrate GEF-funded activities within Bank sector lending. To date the Bank has given less attention to the biosafety agenda of the GEF, though pilot projects have been developed for India and Colombia. The Bank is also increasingly looking at best practice and lessons learned, to improve both the effectiveness of the GEF portfolio and overall Bank lending efforts.

**Figure 1.7 Number of Bank-GEF biodiversity projects by project type and region (1988–2005)**

The introduction of GEF MSPs in 1997 made mid-sized grants more readily available to NGOs.
Table 1.2 Total biodiversity investments by region (1988–2005)

<table>
<thead>
<tr>
<th>Region</th>
<th>Total Bank Investments ($ millions)</th>
<th>Total Co-Financed Investments ($ millions)</th>
<th>Total Biodiversity Investments ($ millions)</th>
<th>Percent of Total Investments (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFR</td>
<td>664.06</td>
<td>691.28</td>
<td>1,355.34</td>
<td>26</td>
</tr>
<tr>
<td>EAP</td>
<td>475.84</td>
<td>240.44</td>
<td>716.28</td>
<td>14</td>
</tr>
<tr>
<td>ECA</td>
<td>203.47</td>
<td>107.3</td>
<td>310.76</td>
<td>6</td>
</tr>
<tr>
<td>LAC</td>
<td>1,034.82</td>
<td>941.42</td>
<td>1,976.24</td>
<td>39</td>
</tr>
<tr>
<td>MNA</td>
<td>77.41</td>
<td>51.71</td>
<td>129.12</td>
<td>2</td>
</tr>
<tr>
<td>SAR</td>
<td>277.34</td>
<td>167.85</td>
<td>445.19</td>
<td>9</td>
</tr>
<tr>
<td>Global</td>
<td>82.55</td>
<td>101.88</td>
<td>184.43</td>
<td>4</td>
</tr>
</tbody>
</table>

Figure 1.8 Bank-GEF investments by region (1988–2005)

Table 1.3 Biodiversity investments by region and funder, excluding co-financing (1988–2005) ($ millions)

<table>
<thead>
<tr>
<th>Region</th>
<th>GEF MSP</th>
<th>GEF REG</th>
<th>GEF IFC</th>
<th>GEF EA</th>
<th>GEF total</th>
<th>IBRD</th>
<th>IDA</th>
<th>Trust funds</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFR</td>
<td>12.80</td>
<td>256.62</td>
<td>0.48</td>
<td>0.95</td>
<td>270.83</td>
<td>16.73</td>
<td>376.07</td>
<td>0.43</td>
<td>664.06</td>
</tr>
<tr>
<td>EAP</td>
<td>12.71</td>
<td>136.66</td>
<td>15.19</td>
<td>1.22</td>
<td>165.78</td>
<td>175.52</td>
<td>133.32</td>
<td>1.23</td>
<td>475.84</td>
</tr>
<tr>
<td>ECA</td>
<td>5.03</td>
<td>118.61</td>
<td>0.00</td>
<td>3.15</td>
<td>126.79</td>
<td>47.68</td>
<td>28.42</td>
<td>0.59</td>
<td>203.47</td>
</tr>
<tr>
<td>Global</td>
<td>0.50</td>
<td>36.00</td>
<td>7.00</td>
<td>43.50</td>
<td>3.00</td>
<td>36.05</td>
<td>0.00</td>
<td>206.26</td>
<td>82.55</td>
</tr>
<tr>
<td>LAC</td>
<td>27.51</td>
<td>335.69</td>
<td>5.00</td>
<td>0.86</td>
<td>369.07</td>
<td>559.13</td>
<td>57.66</td>
<td>48.96</td>
<td>1,034.82</td>
</tr>
<tr>
<td>MNA</td>
<td>2.24</td>
<td>49.73</td>
<td>0.00</td>
<td>0.89</td>
<td>52.86</td>
<td>22.84</td>
<td>1.71</td>
<td>0.00</td>
<td>77.41</td>
</tr>
<tr>
<td>SAR</td>
<td>0.00</td>
<td>70.88</td>
<td>0.00</td>
<td>0.20</td>
<td>71.08</td>
<td>0.00</td>
<td>206.26</td>
<td>0.00</td>
<td>277.34</td>
</tr>
</tbody>
</table>

and non-governmental stakeholders and as a result allowed a rapid expansion of the biodiversity portfolio. LAC is also the region with the most MSPs (34). The MSPs have proved to be useful and cost-effective instruments under the Biodiversity Focal Area to test new management models and demonstrate tangible biodiversity impacts at key sites even though it may be difficult to scale up successful pilots into larger programs. MSP activities with an effective local partner (e.g., NGOs) have proved especially useful for site-based conservation even within countries riven by civil strife and weak governance. The MSP grants have also provided the opportunity for greater community involvement in biodiversity management.

Fourteen of the 29 EAs implemented thus far have been in the Eastern Europe and Central Asia region. 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 important in developing a dialogue, which has often led to Bank investment in broader biodiversity or natural resource management projects, often focusing on sustainable forest management.

As a result, the Bank has become the largest financier of biodiversity conservation in the ECA region, mainly through investment projects. A recent review lists 54 Bank biodiversity projects in ECA for the period 1991–2002 (World Bank 2003b). The total financing for these projects is $1.23 billion, of which the biodiversity investments from all sources totals $255 million (20 percent). GEF has been the major source of financing for biodiversity conservation (42 percent), with smaller but equal (29 percent) financing from IBRD/IDA and other sources, which includes the borrowers/recipientns, bilateral organizations, and communities. Forest ecosystems received nearly half of the investments, with substantially less but still important financing for biodiversity in wetland and marine ecosystems. Investments in grassland and desert ecosystems and in agrobiodiversity have been relatively modest, though it is expected these will increase in the future.

Overall, co-financing from client governments and other donors makes up 45 percent of the total biodiversity investment; this reflects strong commitment for biodiversity conservation at the national level and good support from other donors. Figure 1.9 shows total regional investments including co-financing.

Support in WBG-funded projects covers the entire range of globally important ecosystems (see Figure 1.12). Forest ecosystems received a majority of the investments, with more than half of all projects (262) focused on forest systems, including dry forests and rain forests. Fewer projects dealt with wetland ecosystems (149), coastal and marine ecosystems (118), drylands (75), and mountain ecosystems (72). Many projects provide use in the LAC and Africa regions (see Figure 1.10). This is consistent with previous portfolio reviews.
support to protected areas and other conservation initiatives across more than one major ecosystem. 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 wider landscape.

**Figure 1.12 Ecosystem occurrence in WBG biodiversity portfolio (1988–2005)**

The scale and variety of Bank financing instruments provides multiple opportunities to integrate biodiversity concerns into development assistance and to address the root causes of biodiversity loss. The Bank’s leadership and coordinating role within the donor community, complemented by access to trust funds and lending resources, can help to introduce biodiversity within national agendas as a critical part of sustainable development. To date, the Bank is the major international funding source for biodiversity projects as well as a source of technical knowledge and expertise. Additionally the Bank has the convening power to facilitate participatory dialogue between client countries and networks of other relevant stakeholders on matters of regional biodiversity concern, such as forest law enforcement and governance, wildlife trade, and overharvesting of natural resources.
Supporting Protected Area Networks

The 168 nations that are signatories to the Convention on Biological Diversity (CBD) recognize that protected areas (PAs) are the cornerstones for biodiversity conservation. Accordingly, at the Seventh Meeting of the Conference of the Parties in Kuala Lumpur in 2004, they adopted an ambitious work program for protected areas. The goal is to support a global network of representative and effectively managed terrestrial protected areas by 2010 with a similar target for marine protected areas by 2012. The WBG has an important role to play in helping client countries achieve these targets (World Bank 2003a, 2004). Bank projects have financed creation of new reserves and expansion and strengthening of protected areas in forests, mountain, and dryland systems with increasing attention being paid to freshwater and marine ecosystems. This 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 to create effective and representative protected area networks (e.g., Brazilian Amazon, Laos, Madagascar); improved management of “paper parks” and existing protected areas (e.g., India, Pakistan, Uganda, Bolivia, Ecuador, Venezuela, Russia); buffer zone activities to reduce pressure on conservation areas (India, Indonesia); control of invasive exotic plants and animals that threaten native species and habitats within protected areas (India, Mauritius, Seychelles, South Africa); and, where appropriate, promoting greater community involvement in conservation management, through community management areas, indigenous reserves, and sacred groves (Colombia, Ecuador, Ghana, Peru). Other projects target landscape-level efforts to strengthen linkages between protected areas and surrounding forest, mountain, and production landscapes, including transboundary projects in the West Tien Shan of Central Asia and the Maloti-Drakensberg mountains of southern Africa. Several national and regional initiatives are under way to encourage more sustainable land use and strengthened forest protection in biological corridors that link parks in the Mesoamerican Biological Corridor (MBC). In the forests of the Brazilian Amazon, Congo Basin, and the Russian Far East, the Bank is supporting investments in some of the world’s most extensive, and biologically rich, remaining wilderness areas. Offshore, the Bank is supporting community management of coral reefs and marine protected areas in Samoa, Vietnam, and Indonesia, as well as conservation efforts in large marine ecosystems along the Mesoamerican Barrier Reef, the coast of East Africa, and in the Indonesian seas.

Many of these PA projects target areas recognized as global priorities for biodiversity, including World Heritage sites, such as Komodo (Indonesia), Cape Peninsula (South Africa), Galapagos (Ecuador), and wetlands of international importance and Ramsar sites, such as Berbak-Sembilang (Indonesia) and Sultan Salzigi wetlands.

Many sites lie within the Biodiversity Hotspots identified by Conservation International, the Global 200 Ecoregions promoted by World Wide Fund for Nature and/or Endemic Bird Areas (EBAs) and Important Bird Areas (IBAs) recognized by BirdLife International. In Colombia the 10,019 hectare Selva de Florencia, an IBA, was declared a national park, marking the first time in Colombia that an IBA has received formal protection under this designation.

Box 2.1

Conservation Production Landscapes — Ecology and Economics

There is growing recognition that sustainable development and protected areas are both necessary and reinforce one another. This is especially true in Brazil, which is a mega-diverse country with globally critical ecosystems, yet which has a large population of poor people who depend on natural resources for their livelihoods. The concept of conservation mosaics is relatively recent. It involves creating large areas that combine different types of protection regimes—for example, a national park next to a private game reserve, a large farm employing ecologically friendly practices, an indigenous reserve, and a small factory employing sustainable techniques.

Systematic conservation planning requires strategies for managing whole landscapes, including areas allocated to both production and protection. Protected areas alone are not adequate for nature conservation, but they are the cornerstone on which regional strategies are built. They must be complemented by off-reserve management. The combination of areas with different usage regimes can meet the needs of a wide range of actors while ensuring the conservation of critical habitats and species.

Conservation mosaics are especially important in the Brazilian Amazon and Atlantic Forest ecosystems. These ecosystems are of critical global importance but under pressure from numerous demands for land use by a variety of stakeholders. In the Atlantic Forest, the Ecologic Corridors Project was an early pioneer in testing the mosaic approach to conservation and has achieved important successes in building conservation corridors utilizing a range of protection regimes. Based on this experience, the Bank has supported the mosaic approach in the Amazon through the Amazon Region Protected Areas Project (ARPA).

ARPA was established in 2004 with the catalytic support of the GEF, World Wildlife Fund (WWF)/World Bank Alliance, federal and state authorities, NGOs, and the Pilot Program to Conserve the Brazilian Rain Forest. KfW later joined as a major donor. ARPA works with federal, state, and municipal governments, local communities, protected areas management, and NGOs to ensure that a mix of strict protection and sustainable use areas address the needs of local people while effectively conserving Amazonian ecosystems and species. Strict preservation areas are dedicated to conservation and scientific research. Sustainable use protected areas have the twin goals of biodiversity conservation and livelihood provision for the communities living in them. The overall goal of the project is to add 25 million hectares in new protected areas over the next 10 years, helping to consolidate the protected areas system. Within a decade, the project will result in a total of 70 million hectares, nearly 30 percent, of Amazon forested ecosystems under some form of effective protection and sustainable use.

To date, the first phase of ARPA has created over 15 million ha of new protected areas, far exceeding expectations. A Protected Areas Fund has been established and endowed with $8.5 million. These funds will be dedicated to covering the recurrent costs of the protected areas created under ARPA, so that protection of these critical sites continues. Perhaps just as important, ARPA has established relationships with diverse stakeholders throughout the Brazilian Amazon and created processes that allow funding to reach isolated protected areas, permitting much-needed conservation and development activities. The partnerships established under ARPA tie together numerous actors that might otherwise have been in conflict over conservation and land use strategies. Because the mosaic approach addresses the needs and priorities of many different stakeholders, and because all actors form an integral part of the decision-making process, ARPA has contributed to a coalition dedicated to conserving the Amazon forest, one of the greatest natural resources on earth.
Two of the greatest challenges for protected areas are lack of capacity and lack of sufficient financing, especially for regular operations. Most of the protected area projects, in all regions, are investing in early capacity building for strengthened PA management. In Vietnam, Pu Luong-Cuc Phuong Limestone Conservation has significantly raised staff capacity of the two nature reserves as well as the conservation consciousness of neighboring communities. The Cambodia Biodiversity and Protected Areas Management Project has been able to strengthen PA capacity so that there have been no major illegal logging activities within Virachey National Park in the last six-eight months. At the national level in Cambodia, preparation of a protected area management and financing strategy are well advanced and will further strengthen national capacity.

Financial sustainability for long-term protection and management is a challenge for protected areas worldwide. Several projects provide innovative financing mechanisms, both for protected area management and conservation activities for buffer zone communities (Bhutan, Bolivia, Peru, Vietnam, Uganda, and the Table Mountain Fund in South Africa). Endowment funds and other financing mechanisms have helped to cover recurrent operational costs (see Box 2.3) but it is clear that few protected area networks can be self-sustaining from tourism or other direct revenues and that most protected areas will always

---

**BOX 2.2**

**Conservation Achievements in Protected Areas in Honduras**

The Honduras Biodiversity in Priority Areas Project (PROBAP) was funded by GEF but linked to the IDA-financed Rural Land Management Project (PAAR) to promote conservation of biodiversity within the Honduran segment of the Mesoamerican Biological Corridor. At the local level, it was expected that sustainable natural resource management would generate increased income, particularly for marginalized rural communities, as well as protect important environmental services. The project was expected to boost ecotourism, thereby diversifying local incomes and supporting the financial sustainability of the protected areas system. Then the unexpected happened. Honduras was ravaged by Hurricane Mitch, one of the worst natural disasters in Latin America in the twentieth century, and this was followed by a financial crisis as Honduras struggled to rebuild a devastated economy.

In spite of these setbacks, the project achieved significant results in the Atlántida, La Mosquitia, and Olancho regions, including departments, where development assistance has traditionally been scarce. PROBAP made specific investments in 12 important protected areas, 38 percent of the total protected areas under SINAPH. The second and third-largest protected areas in the country were established (Patuca National Park and Tawahka Indigenous Reserve, respectively) and important advances were made in protecting biodiversity in all the key Honduran sites of the Mesoamerican Biological Corridor.

Capacity was developed at the Department of Protected Areas and Wildlife (DAPVS) and the Honduran National Council of Protected Areas (CONAPH) for strategic planning, priority setting, and identification of co-funding. During the life of the project, PROBAP constituted more than half of the national government’s operational budget for the management of the entire SINAPH system, but the project also laid the foundation for financial sustainability by establishing a Protected Areas Fund that will finance a decentralized PA system.

Collaborative networks of partners were established to work toward the protection and sustainable use of biological corridors in Atlántida, along the northern Caribbean coastline, and in the area of the proposed Corazón Transboundary Reserve. Deforestation rates in the Patuca, Tawahka, and Rus-Rus Reserves have stabilized at 0.81 percent per annum, well below the national average of 1.21 percent. The project increased community participation in protection of selected protected areas and introduced biodiversity-friendly natural resource management practices through local community organizations and NGOs. Many of the local communities which benefitted from the project are located in remote areas with high levels of poverty and little institutional presence of the national government.

require a basket of funding sources, including some government support. Enlisting public support will also depend on increased awareness of the multiple goods and benefits from protected areas and their relevance to sustainable development: ecosystem services, research, recreation, and even spiritual values (see Box 2.4).

Southern Africa offers an almost unique opportunity to link biodiversity conservation and protected areas with sustainable economic development through tourism. Tourism investment is growing rapidly, particularly involving “bush and beach” packages that depend on healthy natural ecosystems and abundant wildlife. Moreover, much of the best remaining wildlife areas are poorly suited for alternative uses such as agriculture. The Bank and other development partners are assisting southern African countries to realize this potential by establishing transfrontier linkages aimed at creating a diverse and integrated regional tourism circuit to rival any tourism attraction in the world. To ensure environmental sustainability and poverty alleviation impacts, the emphasis is on spatial planning and management at an ecosystem level and on community participation and benefits.

**BOX 2.3**

**Vietnam Conservation Fund — Supporting Protected Areas Network**

Most of Vietnam’s protected areas are underfinanced and struggle to meet operational costs. The Vietnam Conservation Fund (VCF), launched in 2005, is a pilot financing mechanism for conservation areas or special use forests (SUF) nationwide. The fund will provide small grants ($20,000–25,000 annually) on a competitive basis to improve management in SUFs of high biodiversity value. Grants from the VCF can be used to support a wide range of conservation-related activities, including engaging with local communities, developing co-management agreements, developing environmental education and awareness, habitat and species management, strengthening the implementation of laws and regulations for SUF management, capacity-building, management planning, and ecological monitoring. A linked Dutch-funded technical assistance fund will provide the necessary and complementary technical assistance to support the conservation and management activities in selected SUFs. The VCF is a sinking fund, initially expected to be utilized over six years, but it is being established as an efficient long-term conservation financing mechanism (with the expectation that donors and government will replenish the fund if it proves successful).

The VCF is expected to provide support throughout Vietnam to the management of around 50 national parks (vuon quoc gia), nature conservation areas (khu bao ton thien nhien) and species/habitat conservation areas (khu bao ton loai/sinh canh) that meet specific eligibility criteria. Initially it will be tested in around 20 SUFs, including all eligible SUFs in the provinces of Thua Thien Hue, Quang Nam, Binh Dinh, and Quang Ngai. To access funds from the VCF, SUF management boards must submit proposals for activities that address priority issues defined in their operational management plans. Screening will ensure that funds are focused only on sites supporting biodiversity of global importance, priority conservation activities and cost-effective proposals with high likelihood of impact. Sites will be eligible for additional grants based on performance. It is expected that most funding will go to provincially managed SUFs since centrally managed SUFs already have access to considerable funding. An Operational Manual guides the operations of the VCF and describes the procedures for grant proposal review, approval, disbursement of funds, and reporting.

The fund is designed to avoid the current “feast or famine” situation of short-term donor funding targeted at just a few sites. It will provide small grants for operations, more consistent and manageable within “normal” PA budgets. The monies are for essential conservation operations, not infrastructure, and will go directly to the PA management. The competitive nature of the fund and performance-basis for additional grants are designed to provide incentives to PA managers to use funds effectively. If this pilot fund proves successful, it could provide a useful model for strengthening other national PA networks.
The multi-phase, multi-donor Mozambique Transfrontier Conservation Areas (TFCA) program builds on the fact that Mozambique has large areas of rich biodiversity (but high poverty) adjacent to well-established conservation and tourism areas in neighboring Zimbabwe and South Africa. A first phase project, financed by the GEF, laid the political and institutional groundwork for the multi-sectoral and inter-state cooperation needed for the TFCA approach. A second phase, supported by IDA, GEF, and bilateral partners, will focus on implementing improved management of the TFCAs, including embedded protected areas, and tourism development on the ground. Similarly in Mozambique a project focusing on coastal and marine biodiversity management is helping to provide the crucial “beach” element by promoting environmentally and socially sound tourism in the context of integrated coastal zone management, including marine protected areas. The Swaziland Biodiversity Conservation and Participatory Development project will provide support for participatory spatial planning within two broad “tourism and biodiversity” corridors whose endpoints fall within transfrontier conservation areas. The success of these initiatives should be considerably enhanced by an IFC-supported South East African Integrated Tourism Investment Program (SEATIP), which will help to create incentives for appropriate tourism investment based on environmental sustainability and partnership with local communities.

**BOX 2.4**

**Making Protected Areas Relevant to the Development Agenda**

Increasingly conservationists are seeking ways to convince policy makers of the relevance of protected areas to sustainable development. Thus many mountain protected areas can be justified through provision of ecosystem services such as water, soil conservation, and protection of downstream and vulnerable communities from natural hazards such as floods and unstable hillsides. Except for cloud forests, it is not always possible to demonstrate clear linkages between forest cover and water quantity, but there does seem to be a direct relationship between forests and water quality. A number of Bank biodiversity projects have provided funding to protected areas in forest watersheds that safeguard the drinking supplies for some of the world’s major cities. Thus a panda reserve in the Qinling mountains, China, protects the drinking water supplies for Xi’an. The Gunung Gede-Pangrango in Indonesia safeguards 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 N.P. in Sumatra safeguards water supplies for more than 3.5 million people and 7 million hectares of agricultural land, while two of the Andean protected areas in Ecuador provide drinking water supplies for 80 percent of Quito’s population. 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 the Working for Water programs as well as biodiversity investments through the World Bank.

Economic analysis can be a useful tool for demonstrating the benefits of PAs and conservation. A World Bank study showed that the economic benefits of biodiversity conservation far outweigh costs in Madagascar. Sustainable management of a network of 2.2 million hectares of forests and protected areas over a 15-year period was costed at $97 million (including opportunity costs forgone in future agricultural production) but would result in total benefits of $150–180 million. About 10–15 percent of these benefits are from direct payments for biodiversity conservation, 35–40 percent from ecotourism revenues, and 50 percent from watershed protection (primarily from averting the impacts of soil erosion on smallholder irrigated rice production). The study considers the political economy of potential winners and losers from forest conservation and points to the needs for equitable transfer mechanisms to close this gap, but it emphasizes that conservation will help to maintain or improve the welfare of at least half a million poor peasants.
Maintaining Biodiversity in Threatened Ecosystems

Although the global area in official protected areas has increased in recent years, it has become increasingly clear that protected areas alone will be insufficient to conserve all of the world’s biodiversity. Growing human populations, continued expansion of agriculture, and increasing natural resource use will greatly limit the possibility of strict protection in the future. Even where species are limited to a particular area that can be strictly protected, the ecological processes that support them—fire, flood regimes, migration routes of seed dispersers—require management at a broader landscape scale. Effective biodiversity conservation across all ecological regions will require greater conservation efforts beyond the boundaries of protected area networks. This is especially true for some of the most threatened, fragmented, and remnant terrestrial habitats, such as limestone habitats and Mediterranean-type vegetation, but even more significant for wetlands and freshwater ecosystems that are often neglected or poorly represented in protected area networks.

In the Cape Floristic Region (CFR) in South Africa, the Bank is supporting explicit efforts to integrate biodiversity issues into land use decisions and bioregional planning to better protect the unique fynbos vegetation and endemic flora. Landscape conservation planning efforts hinge upon a combination of social, economic, and political factors and cooperation between multiple stakeholders. The Cape Action Plan for the Environment (C.A.P.E.), created through a partnership between government agencies, NGOs, research institutes, individual landowners, and the private sector, 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 (see Box 2.5).

Freshwater Ecosystems, Wetlands, Rivers, Lakes, and Regional Seas

The conservation of aquatic or freshwater biodiversity has lagged considerably behind conservation of biodiversity in terrestrial or even marine sites even though freshwater habitats are key providers of food and livelihoods to many of the world’s poorer communities. Expanding agriculture destroys, degrades, and fragments habitats, modifies hydrological systems, degrades aquatic ecosystems with runoff of agricultural chemicals, depletes freshwater supplies through irrigation, and introduces invasive alien species. Wetland drainage and infrastructure development destroy key natural habitats. The Red River Delta in the north of Vietnam once supported a highly productive fishery but is now almost devoid of fish due to extensive flood control infrastructure and the closure of floodplain fish breeding and nursery areas. Freshwater biodiversity is poorly studied in many areas of the world, and impacts on water bodies near major cities have probably been so severe that much biodiversity has been lost before it was even identified. Lakes are particularly sensitive, due to the long time period required for water to circulate through them. Lakes without outlets, such as Lake Victoria in East Africa, are doubly threatened due to high rates of endemism combined with an inability to flush out pollutants or dilute the impacts of exotic invasive species.

The threats to freshwater biodiversity and wetlands are often very difficult to address because of the diffuse nature of water resources and the impact of activities far beyond the immediate boundaries of the water body. Non-point sources of pollution, particularly agricultural runoff, are notoriously complex to control. Even point sources, such as factory discharges or untreated municipal sewage,
Implementing the Biodiversity Convention

have their greatest impacts downriver from the origin of the problem, so that the costs are borne by others than the polluters. Downstream communities may demand action on issues such as water quality, but the impacts of pollution on aquatic biodiversity are both poorly recognized and have a very small constituency to demand redress. Some impacts of development on hydrological systems, such as modified flood regimes or changes in water temperature, have little or no impact on human health but can alter aquatic and riparian ecosystems enormously. For all these reasons, the conservation of freshwater biodiversity is a challenging field that is often overlooked in the general conservation landscape.

Several projects in the Bank’s portfolio have begun to address these complex issues, for instance by changing agricultural practices to better address agricultural pollution from fertilizers and agricultural waste as in the Bulgaria wetlands. Others are targeting agricultural practices in important watersheds in Rwanda and Turkey or attempting to integrate freshwater biodiversity concerns into regional policies and programs (see Box 2.6).

Several projects have focused on wetland protection and wetland restoration. The Indonesia Berbak-Sembilang Ecosystem project helped to establish the new Sembilang National Park, which protects some of the most important freshwater and mangrove swamps in Sumatra. The park adjoins the Berbak N.P, Indonesia’s first Ramsar site, protecting the area of swamp forests available for populations of endangered Sumatran rhino, tiger, and tapir. Coastal mudflats provide critical

---

BOX 2.5

Mainstreaming Conservation in the Cape Floristic Region

The Cape Floristic Region, is the smallest of the world’s six floral kingdoms, protecting unique Mediterranean-type vegetation known as fynbos. It covers an area of 90,000 square kilometers and is the only floral kingdom to be located entirely within the geographical confines of a single country. The CFR is rich in species, with 9,600 species of vascular plants, many of them endemic. Some 127 mammal species, 300 birds, 142 reptiles, and 144 amphibians have also been recorded and the region is considered an endemic bird area. The invertebrate fauna is also very rich and notable for containing an assemblage of ancient taxa that have largely been extirpated elsewhere.

The rich biodiversity of the CFR is under serious threat as a result of the conversion of natural habitat to permanent agriculture and to rangelands for cattle, sheep, and ostriches, inappropriate fire management, rapid and insensitive infrastructure development, overexploitation of marine resources and wild flowers, and infestation by alien species. Some important habitats have been reduced by over 90 percent, and less than 5 percent of land in the lowlands enjoys any conservation status. The region has therefore been identified as one of the world’s “hottest” biodiversity hotspots.

The C.A.P.E. Biodiversity Conservation and Sustainable Development Project is building institutional capacity and collaboration between multiple stakeholders, including government agencies, private landowners, and local communities to mainstream biodiversity conservation into the area’s economic activities and enhance conservation of the Cape Floristic Region. The project will support the design of market-based mechanisms for conservation management, such as payment for environmental services, as well as micro-enterprise opportunities for conservation-related businesses, including small enterprises that improve livelihoods and social conditions for local communities. Biodiversity concerns will also be integrated into the activities of five watershed management agencies. On the protection side, management capacity will be strengthened for more effective management of protected areas, tourism development plans will be implemented, and stakeholders will receive direct and indirect benefits from protected areas. The project aims to expand the conservation area of the CFR by over 4,000 square kilometers, both in formal protected areas and through partnerships and conservancy agreements with private landowners.
feeding sites used by migrating waterbirds. Coastal mangroves protect nursery sites for marine fishes and prawns. Forest fires and encroachment in the park area have been reduced and the project helped to establish good working relationships between local NGOs and local government, which increases the likelihood of sustaining conservation outcomes.

In Yunnan, China, a team from the provincial university is working to restore and manage habitats around Lake Dianchi to secure the conservation of the remaining endemic species of the lake and its immediate tributaries. The Dianchi basin is a “hotspot” of freshwater biodiversity with 24 indigenous fish species, at least 11 of which are endemic, and dozens of endemic mollusk and crustacean species, found both in the lake itself and adjacent springs, often next to Buddhist temples. Since the 1950s, however, some 31 exotic fish species and a variety of plant species have been introduced, although not all of these have persisted. Declining water quality (especially high phosphorus and nitrogen), loss of natural habitats, competition for food and living space, and possibly introduced diseases and parasites have combined to threaten the indigenous fauna and flora, resulting in the apparent extinction of some endemic species. Environmental improvements in Lake Dianchi and its watershed are a major national priority, with water quality data reported to the State Environmental Protection Agency (SEPA) on a monthly basis.

An integrated wetland restoration plan and baseline survey and monitoring program have been prepared including detailed activities for habitat restoration, bivalve restocking, endemic fish re-introduction, and monitoring. Emergent macrophyte species have been planted in the pilot sites under a small works contract. While searching throughout the province for endemic and indigenous aquatic species for reintroduction to Lake Dianchi, the team recorded two invasive species (golden apple snail and Louisiana crayfish) for the first time in Yunnan. With support from the Water Resources Agency of Yunnan Province, steps are being taken to eradicate the snail from the most sensitive areas. Monitoring of lake ecosystem health will include surveys on fish, macrophyte, bivalves, and plankton species as well as water quality.

A project supported under the Critical Ecosystem Partnership Fund (CEPF) in Madagascar focused on the Madagascar fish eagle and the wetland habitat it shares with indigenous people. The eagle, one of the rarest birds of prey, is making a tentative comeback thanks to the guardianship of local fishing communities. The Peregrine Fund is assisting with the legal transfer of control and management of natural resources from the Malagasy government to indigenous communities and the associations created to represent their interests. Recent surveys in the three adjoining freshwater lakes of Ankerika, Befotaka, and Soamalipo have identified 18 male and 9 female Madagascar fish eagles and now also 7 fledglings. Two community associations recently won approval from the government of Madagascar to manage wetland sites that provide important natural resources for their local villages and habitat for the fish eagle. The official handover from the Ministry for Environment, Water
Implementing the Biodiversity Convention

and Forests for a 10-year period marked a major success for both the communities and The Peregrine Fund.

In the Hovsgol region of Mongolia, the IFC is supporting a private conservation initiative in the Eg-Uur watershed, working with Sweetwater Travel to promote an ecotourism project with many dimensions, including species conservation of the six-foot taimen fish, river protection, angling tourism, scientific research, and conservation education. Support and participation of the nomadic herders grazing their livestock in the valleys of the upper Eg-Uur drainage is critical to conservation success. In addition to ensuring that communities benefit from some of the revenues from the ecotourism lodges, the company is encouraging donations from sport fishermen and other partners to fund restoration of ancient monasteries. This unique project, funded through the GEF, IFC, and the Bank’s Development Marketplace, was featured in National Geographic Adventure magazine in December 2005.

The Eastern Europe and Central Asia (ECA) region includes six major regional seas, many highly polluted but still sustaining a high number of endemic fish species, as well as over 152 Ramsar sites (wetlands of

---

BOX 2.6

Management of Aquatic Resources in the Amazon Region

From a biodiversity perspective, the Amazon basin is unequalled; it is home to the world’s richest assemblages of freshwater flora and fauna, including 3,000 fish species, approximately one third of the world’s entire freshwater ichthyofauna. Many of the region’s economic activities are based on the use of these freshwater resources, but they are increasingly at risk due to the uncontrolled and poorly planned expansion of high-impact activities in the basin. Such unchecked developments affect water quality, biodiversity, and the availability of fish resources. In addition, they lead to a growing number of conflicts among resource users, with fewer income generation opportunities for riverine dwellers (ribeirinhos), reduced employment, and impacts on health and quality of life of local communities, especially indigenous groups, from water contamination and poorer nutrition due to reduced availability of fish.

The AquaBio project will support involvement of multiple stakeholders in an integrated management approach to the conservation and sustainable use of freshwater biodiversity through public policies and programs in the Brazilian Amazon River Basin. The objective is to reduce threats to the integrity of freshwater ecosystems in the Brazilian Amazon and to assure the conservation and sustainable use of its freshwater biodiversity. Lessons and results generated would identify good practices to mainstream aquatic biodiversity concerns into production landscapes and sectors and ensure proper attention to conservation and sustainable use of freshwater biodiversity in the decisionmaking processes of local watershed or sub-basin committees.

A few activities will target all the states in the Brazilian Amazon, but most would focus on parts of three sub-basins selected to illustrate the main problems that afflict freshwater ecosystems in the Brazilian Amazon: (a) the lower and middle Negro River (high fishing pressure and presence of ornamental fisheries trade); (b) the headwaters of the Xingu River (impacts of land degradation on freshwater ecosystems); and (c) the lower Tocantins River, where construction of the Tucurui hydropower dam has impacted freshwater fisheries. The AquaBio Project will promote the adoption of a decentralized approach to ecosystem management, including support for participatory development and partial implementation of action programs in the three sub-basins, with institutional arrangements negotiated with users of natural resources. A strong training and environmental education program will strengthen capacity and improve stakeholder participation in implementation monitoring. The project will provide opportunities to better understand problems related to aquatic biodiversity and water resources management, to establish information and dissemination systems, and to set priorities and determine social and technical measures for handling water, biodiversity, and land and soil-related issues. Small investments and technical assistance for demonstration projects to promote sustainable land use and fishing practices will engage farmers, fishermen, indigenous people, and other resource users, to test new methodologies and technologies and determine what works and what does not.

high international significance) covering an area of 13.6 million hectares. The Bank has supported several programs and projects that have targeted some of these high biodiversity areas. A major program focuses on the Black Sea and its coastal wetlands, which are important resting and feeding sites for migratory birds and include the Danube delta wetlands, one of the world’s best temperate wetlands. On the opposite shore of the Black Sea, 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.

Four of Russia’s freshwater ecosystems and three of its marine ecosystems are Global 200 Priority Areas, including Lake Baikal, the planet’s oldest and deepest lake (1,637 m) and with a surface area of 31,500 km² one of the largest. It contains 20 percent of the world’s fresh water, 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.

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 successful competitive small grants fund engaged more than 110,000 participants in 750 conservation-focused projects, ranging from replanting of riverine forests to restoration of grayling spawning grounds. The engagement of civil society has created 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 that is expected to provide new livelihood options in the region.

The Aral Sea and surrounding wetlands provide important habitat for many endemic species and migratory waterbirds in Central Asia as well as those in the deltas and river valleys of the Amu Darya and Syr Darya that feed it, which are now severely degraded by excessive 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 collapse of the fisheries and desiccation of the river delta wetlands and have 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. The Kazakhstan Forest Protection and Reforestation project is accelerating the spread of vegetative cover by planting up to 79,000 hectares of dry seabed in the southern section of the Aral Sea, thereby stabilizing the sands and creating additional habitat for native wildlife (see Box 5.5).

Marine Conservation

The Bank is addressing marine conservation issues through a portfolio that covers all aspects of resource management—from integrated coastal zone development (Black Sea, Mozambique, Tanzania) to targeted interventions to support community-managed fisheries (Philippines, Samoa), marine protected areas (MPAs) (Indonesia, Vietnam, Yemen), public-private partnerships for park management (Komodo, Indonesia), and international transboundary cooperation (Mesoamerican Barrier Reef). Projects directly contribute to the objectives of the Convention on Biological Diversity, including the Jakarta mandate, and to COP work programs on marine ecosystems, protected areas, islands and invasive alien species.

The World Bank’s Board recently approved a $51-million IDA Credit and $10-million GEF Grant for the Tanzania Marine and Coastal Environmental Management Project. This project aims to strengthen sustainable management and improve governance and use of Tanzania’s 200 nautical mile Exclusive Economic Zone (EEZ), territorial seas, and inshore coastal resources. It will result in enhanced revenue collection, reduced threats to the marine environment, and better livelihoods for communities living in coastal districts and improved institutional arrangements. Linked to project preparation,
the Bank prepared a book, *Tanzania: Blueprint 2050: Sustaining the Marine Environment in Mainland Tanzania and in Zanzibar*. The blueprint helped to raise awareness at all levels of government and on both the mainland and Zanzibar of the value of marine biodiversity and the links between poverty, growth, and ecosystem management. This enhanced awareness led to strong support for the project and mobilization of the $61-million funding. The project will help to develop an ecologically representative and financially sustainable network of marine protected areas, building on a pledge that the government made at the Durban Parks Congress. This network will comprise government-supported MPAs, privately-run MPAs, co-managed MPAs, and community-based marine conservation areas, with an innovative Marine Legacy Fund to ensure the sustainability of these conservation areas. The project will also build capacity in the United Republic of Tanzania to monitor and manage transboundary fish stocks. A coastal village fund will promote diversification of livelihoods to ease the pressure on the near-shore ecosystem and to promote enterprise development to reduce poverty in coastal communities.

In the Middle East and North Africa Region, the GEF provided funding for the preparation of the Strategic Action Program (SAP) for the Red Sea and Gulf of Aden, involving the nations of Djibouti, Egypt, Jordan, Saudi Arabia, Somalia, Sudan, and Yemen. The SAP developed a regional framework for the sustainable development of coastal and marine resources by identifying both preventative and curative measures required at the regional, national, and local levels to maintain the rich and diverse coastal and marine resources of this unique region. The Bank was responsible for implementing two components: improvement of coastal and marine environments by reducing navigation risks and integrated coastal zone management (ICZM). The ICZM model has been used to develop the Master Plan for Aden ICZM, being prepared under the Bank’s Yemen Port Cities Development Program.

Elsewhere in Yemen support has been provided for conservation of coastal and marine biodiversity in the two pilot sections of Balhaf-burum and Sharma-jethmun along the Gulf of Aden, with development of site-specific participatory management plans and community development plans. The project has also supported technical assistance and participatory workshops to strengthen the national framework for coastal zone management, including the legal and regulatory framework and a cooperating network of organizations. Training included development of a curriculum for Yemeni universities and increasing the capacity and awareness of government and non-government institutions and local stakeholders.

A new Bank- and GEF-funded project for protection of marine and coastal resources of the Gulf of Gabes, Tunisia, addresses both site-specific and regional threats to biodiversity. Part of the southern Mediterranean Sea, the Gulf of Gabes is a large shallow bay with relatively warm waters and high marine diversity, including extensive and unique sea grass beds that covered most of the seabed until the late 1970s. In the last decades, destructive fishing practices, over-fishing, and urban and industrial pollution have been the main threats contributing to the decline of the general sea grass cover. This is having negative implications for the entire ecosystem, as sea grass beds provide habitat to numerous bottom-dwelling species and help to stabilize the sediments. Four Tunisian institutions will collaborate to ensure inter-sectoral cooperation on marine and coastal management issues. Collaboration will be enhanced through common training and field experiences, as well as by integrated policy and strategic studies. A regional program will improve baseline scientific knowledge, including inventory of sea grass beds, assessment of the status of marine species of national and international significance, and an assessment of the impacts of alien invasive species. Six pilot sites will benefit from participatory preparation of management plans to address integrated coastal management issues. These management plans will focus on protecting natural resources while promoting socioeconomic development of local communities. New information on sea grass beds will be used to delimit the boundaries for one site which will be closed to fishing. Guidelines
will be prepared for improved fishing practices, and for dealing with vessel ballast waters and their risks for the introduction of new alien species (see also Box 2.7).

A growing body of empirical evidence suggests that marine reserves and “no fishing” zones 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. Based on this premise, the Bank is supporting a national effort in Indonesia 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, COREMAP, will be implemented in 12 coastal districts, including 1,500 coastal villages and 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 which also focused on marine protected areas and community management of coral reefs.

Elsewhere new marine protected areas have been established and existing MPAs strengthened. Although

**BOX 2.7**

**Management of Marine and Coastal Invasive Species**

For the first time in East Africa, a pilot training course on the management of marine and coastal invasive species was held in Tanzania in November 2005. The course was run under the auspices of the Global Invasive Species Programme (GISP) with Bank funding from the BNPP program and in collaboration with the UNEP Regional Seas Programme. The training was attended by 24 participants from all the contracting parties to the Nairobi Convention (Comoros, Reunion, Kenya, Madagascar, Mozambique, Mauritius, Seychelles, Somalia, South Africa, and Tanzania) and included scientists and managers as well as representatives from ports authorities. Participants from non-IDA countries were sponsored by the Nairobi Convention.

The training course consists of eight modules covering an introduction to invasive alien species (IAS), goals and principles, detection, prevention, response, incursion management, international response, national strategies, and communication and awareness. Each module included exercises. A field trip visited three sites at possible risk from marine and coastal invasives in the Bagamoyo area north of Dar es Salaam: a seaweed farm run by a community co-operative and using a seaweed species introduced from the Philippines; a fishing boat harbor where there is the risk of bio-fouling; and a salt pan, with the risk of pathogenic invasion carried in migratory birds, e.g. bird flu. The participants were also given the opportunity to discuss national cases of IAS and were asked to bring documentation, publicity documents, legal provisions, etc., on IAS in their respective countries.

This course is the latest in a series of capacity building initiatives in East Africa on the prevention, management, and eradication of invasive alien species through the GISP secretariat. GISP has a mandate from the CBD to raise awareness of IAS issues and build capacity to address IAS at the national and regional level. The Bank has been supporting the work of GISP since 2003 with funding from the BNPP and Development Grant Facility (DGF). Training modules, regional reports on national IAS priority needs, and other information can be found on the GISP Web site www.gisp.org. GISP has also released three reports to highlight the issue of IAS in Africa, Asia, and South America. The latest *South America Invaded* was released at the Eighth Meeting of the Conference of the Parties to the CBD in Brazil in March 2006.

---

**BOX 2.8**

**Marine Resources Are Big Business in the Philippines**

The Philippines is an archipelago of 7,100 islands, with a coastline of more than 39,000 km and a coastal population of more than 65 million. The marine and coastal ecosystems provide goods (fish, oil, gas, minerals, salt, construction materials) and services, such as shoreline protection, biodiversity, transportation, and recreation. Total fisheries yields are estimated to be worth $2.5 billion a year, 4 percent of the gross domestic product (GDP), with more than 1 million people employed in the fishing industry. The Philippines’ beautiful beaches and rich coral reefs are favorite tourism and diving sites, with 2.43 million tourists generating almost $2 billion in tourist receipts in 2004 and providing employment for 6.2 million people.

The economic values of these natural assets are considerable. Coral reefs are estimated to contribute at least $1.064 billion annually to the Philippine economy through sustainable fisheries, coastal protection, tourism, and recreation. Marine turtles provide an average revenue of $580,000 per year for consumption (meat, shell, eggs, bones, and leather for handicrafts) as compared to revenue of $1.6 million a year from turtle tourism, so turtles are worth far more alive. Direct benefits from mangroves (fish nurseries, construction materials) are estimated to be worth $600/ha annually or a total of $83 million. Sea grass beds are vital feeding grounds for fish, shrimps, crabs, sea urchins, sea cucumbers, dugongs, and marine turtles.

All of these assets are threatened by degradation, overexploitation, and mismanagement. Annual catch per fisherman has probably declined by 30 percent since 1991. Economic costs of degradation and unsustainable harvesting are estimated at $125 million annually from lost catch due to overfishing and low recruitment. Net losses due to overfishing of 1 square kilometer of coral reef over 25 years is estimated to be $108,900. Costs of restoring the reef in Apo Reef N.P. were estimated at $517,000 after the MV Island Explorer ran aground.

---

the Cape Peninsula Biodiversity Conservation Project focused primarily on strengthened management of the Cape Peninsula national park, it also established a pilot marine protection program and MPA, after detailed scientific and socioeconomic studies and extensive public consultation. As part of the Mozambique Coastal and Marine Biodiversity Management Project, macro-zoning plans have formed the basis for strategic analysis of the districts’ natural resource–based potential and to initiate the investment activities based on biodiversity conservation and private sector development. An integrated development planning process has identified pilot micro-projects that combine poverty reduction and coastal and marine biodiversity conservation, as part of sustainable development. A manual has been prepared for sustainable use of coastal resources and two NGOs are assisting communities to identify, design, and implement demonstration projects. It is expected that two new conservation areas will be gazetted. A first draft of the management plan for Matibane Reserve has been produced, and construction of a field station for biological monitoring and other scientific and academic activities has begun.

Bank and GEF support helped to establish the first MPA in Vietnam. A key feature of the Vietnam Hon Mun Marine Protected Area Project, financed through a GEF MSP, has been effective coordination between the community and municipal, provincial, and national governments. This has led to the establishment of a sustainable Marine Park Authority for the Nha Trang Bay MPA. The MPA covers 16,000 hectares and includes Hon Mun and eight other islands. Vietnam’s coral reefs contain almost 400 species of reef-building corals with 90 percent of the hard coral species of the Indo-Pacific found in Vietnamese waters. The greatest species richness is in the south, and the waters of Nha Trang bay have more than 300 species. Village advisory committees have been established in each village in Nha Trang Bay, and regular meetings are held to discuss management approaches and changes in access to
fishing grounds. A conservation fee has been introduced for every visitor to the MPA. These fees will be used to provide operational funds for the MPA but at least 10 percent of all fees collected will be re-allocated to villages within the MPA for appropriate development activities.

Spanning national borders, the Mesoamerican Barrier Reef System (MBRS) project, involving Mexico, Belize, Guatemala, and Honduras, has put in place a highly participatory process to address use of shared resources and conservation of valuable transboundary ecosystems. Multi-sectoral National Barrier Reef Committees reflect diverse stakeholder interests in the sustainable use of the MBRS, 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 between 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.

Local fishermen have been trained for alternative livelihoods in the tourism and fisheries subsectors (e.g., sea kayaking, recreational diving, catch-and-release sports fishing, and sustainable mariculture) to relieve pressure on marine protected areas. The project is supporting monitoring of Spawning Aggregations (SPAGs) of economically important and threatened reef fish, like Nassau grouper and snapper. Recommendations for restricted fishing during spawning events have been implemented through the collaborating fisheries departments. Sustainable tourism centered on the MPAs is being promoted through a regional tourism forum, as well as development and adoption of a regional certification system for marine-based tourism enterprises.

In the Pacific, the Aleipata and Safata Marine Protected Areas in Samoa were established as community-based marine protected areas. The MPAs have been planned and managed by village committees working with the World Conservation Union (IUCN) under a GEF MSP. Though it is too early to quantify biodiversity gains, there is general agreement that the abundance and size of fish and turtles, and the health of coral reefs and mangroves have substantially improved since the MPA establishment. Local fishermen now report being able to fish closer to the 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.

---

**BOX 2.9**

**San Andreas Biosphere Reserve — Caribbean Jewel**

A medium-sized GEF grant to CORALINA (the local environmental corporation) for the Caribbean Archipelago Biosphere Reserve Project culminated in the establishment of a 65,000-square-kilometer marine protected area in Colombian waters. One of the largest MPAs in the world, it protects unique marine species and spectacular coral reefs. Comprehensive biodiversity and socioeconomic assessments of the Archipelago’s northern, central, and southern sections provided essential inputs to the MPA’s design. Participatory zoning agreements were obtained with local stakeholders, demarcating no-take, no-entry, special use, and artisanal fishing zones. Conservation action plans and monitoring action plans were developed with high levels of community involvement to support the conservation of key species and MPA enforcement. To build local capacity, the project team designed and taught a college-level MPA program, graduating 18 students from local communities, some of whom will work in the MPA’s management. An International Advisory Board (IAB) with various experts on MPA management and design met annually to support the entire process of the MPA’s design and establishment. The IAB contributed valuable expertise and lessons on best practices, as well as support through training and equipment donations and outreach to scientific circles.

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.

Overharvesting of reef fish is a major threat to tropical coral reefs. An innovative project in the Philippines and Indonesia aims to reverse overharvesting and provide livelihoods through training local fisherman in the protection and sustainable harvesting of ornamental reef fish for the marine aquarium trade. The Marine Aquarium Market Transformation Initiative (MAMTI) project uses a combination of market-based incentives, scientific information, public-private partnerships, government policy and regulation, and active local community involvement to bring about certification of the entire supply chain on a global scale. There is unmet demand for certified reef fish for the aquarium trade, especially in Europe, so the project has focused on building up a critical mass of certified exporters. Community stakeholders learn to develop and implement certified collection area management plans and are organized by local NGOs into collectors groups to market their harvests. In November 1995, the first MAC certifications were awarded to two collection areas in Indonesia that had developed satisfactory management plans.

Island Biodiversity

Islands play a critical role in the world’s overall biological diversity, due to their high rates of endemism and unique ecosystems. Because of their isolation and restricted ranges, island species and habitats are especially vulnerable. Islands are prone to natural disasters such as hurricanes, whose impacts are exacerbated by climate variability and climate change. Invasive alien species can be particularly devastating on islands, often wiping out a large part of the endemic species. Human habitation leads to problems with water use and waste management, as well as outright habitat destruction, and economic development in the form of mass tourism can have severe impacts on the very resources that attract tourists in the first place. Because of their unique contribution to global biodiversity and their extreme ecological vulnerability, the protection of island ecosystems has been given special emphasis under the CBD and in the wider conservation community.

The Indonesian archipelago consists of more than 17,000 islands spanning two biogeographical realms, the Indomalayan or Oriental and Australian realms. The Greater Sunda islands (Sumatra, Java, and Borneo) have strong biological affinities to mainland Asia whereas New Guinea has strong links to flora and fauna of the Australian continent. The islands in between, Sulawesi (formerly Celebes), Nusa Tenggara (Lesser Sundas), and the Moluccas (the fabled Spice Islands) lie in a special biogeographical region named Wallacea after the scientist Alfred Russel Wallace, a key contributor to the theory of natural selection. The numerous islands of Wallacea have been separated from one another and the mainland for a long time and show high levels of species endemism. The Bank is supporting several projects in this remarkable biogeographical region, helping to conserve island forests and the unique species they harbor. Two projects with BirdLife International focus on strengthening protection of conservation areas in Halmahera and the islands of Sangihe and Talaud, part of the stepping stone bridge of islands from Sulawesi to the Philippines. Off southern Sulawesi, Operation Wallacea is working with local communities to test a new model of forest governance on the island of Buton (see Box 2.10).

As noted, island ecosystems are especially vulnerable to invasive alien species. The Bank has supported several island projects designed to manage or eradicate alien species and restore native flora and fauna, for instance in the Seychelles (including Aldabra), Galapagos, and

---
Implementing the Biodiversity Convention

Mauritius. The Mauritian Wildlife Foundation has successfully used a GEF MSP for restoration of the small Round Island ecosystem. Populations of endemic species on Round Island have increased through habitat improvement, erosion control, selective weeding, and re-establishment of populations of plants and animals that had vanished due to human intervention. Five hectares were restored (30 percent replanted), with 4 native species reintroduced successfully, and 11 endangered plant species were also introduced to Round Island. Intensive monitoring programs have been put in place to monitor population dynamics, dispersal, and breeding success of key species such as boas and island petrels. To avoid further introduction of invasive species, a quarantine procedure was developed that is now also being used for other islands. Although the project closed in February

BOX 2.10

Conserving Lowland Forests on Buton Island, Sulawesi

The Lambusango Forest Conservation Project focuses on the protection of 60,000 ha of lowland evergreen forests in central Buton, S.E. Sulawesi. These lowland rain forests include two conservation areas—the Kakenauwe Nature Reserve forest and the Lambusango Hunting Reserve forest (total 25,163 ha)—under the provincial-level Conservation Agency, as well as protected watershed and production forests (total 36,365 ha) under the jurisdiction of the District. The forests within this Lambusango Forest Management Area complex have been shown to have outstanding conservation value, with 21 vertebrate species new to science described here in the last three years. The proposed conservation area harbors populations of many threatened species, including one frog previously believed extinct plus numerous other reptile and amphibian species, 12 threatened birds, and two bats rarely recorded elsewhere. There also appear to be viable populations of flagship endemic species such as the Buton macaque and the anoa, a dwarf buffalo unique to Sulawesi.

Most of central Buton’s forests remain intact and are not subject to the commercial logging and planned oil palm plantations that so threaten the forests in the rest of Indonesia. Even so, the District-managed forests are being encroached by local agriculturalists and resettled refugees, while the adjacent conservation areas are threatened by illegal, small-scale selective logging, rattan collection, and hunting. The Lambusango project is testing a new forest governance model by bringing both conservation and production forests together under a single management system, the Lambusango Community Forestry Forum formed in August 2005. With the support of the Head (Bupati) of Buton District, the Forum brings together representatives from government agencies, NGOs, universities, the media, and community coordinators for each of the six subdistricts encompassing the Lambusango forests.

A GEF MSP through the Operation Wallacea Trust is supporting development of management and enforcement schemes for the forests in collaboration with the Forum members. New legislation in Indonesia allows granting of 35 year leases to local communities for forest areas adjacent to their villages. The leases only permit exploitation of the production forest areas and are tied to reciprocal commitments that require sustainable forest management and no hunting or logging in the PA or limited production forests. A rattan licensing scheme is also being developed to ensure that extraction of this resource is sustainable. A training and mentoring program for the forest ranger team is linked to recruitment of community Forest Guardians, an education and outreach program, and a chain saw amnesty and buy back scheme to reduce illegal logging.

Operation Wallacea is a research tourism company involved in research at Lambusango since 1995. The research program is run by university academics and funded by visiting research students (primarily undergraduates or Masters students). This research program and annual surveys provide quantifiable economic, social, and biological performance indicators to assess the success of management. A grant system enables participation of Indonesian graduate students in surveys and monitoring alongside international specialists. This will contribute to building capacity within Indonesia to expand the forest monitoring programs to other districts.

2005, both the local authorities and National Park and Conservation Service have extended funding for the island. Additionally, the Mauritian Wildlife Foundation (MWF), the implementing NGO, intends to continue the restoration of the island for another year. The good progress on Round Island was a direct result of a strong working relationship between the NGO, government departments, the private sector, and other partners.

Madagascar — A Megadiversity Island

Madagascar is the world’s fifth largest island, a unique natural laboratory of evolution. Once a part of the African continent, the island of Madagascar drifted into the Indian ocean millions of years ago, creating an evolutionary laboratory in the process. Today over 80 percent of the animals and plants found in this megadiversity hotspot are unique to the island nation. The World Bank and other donors have been supporting a three-phase, 15-year Environmental Protection Program to mainstream environmental management into Madagascar’s development agenda. Under the second phase of this program, the Bank provided IDA and GEF funds to strengthen the country’s new protected area system, including institutional support to the national park service (ANGAP). The project helped to create 10 new protected areas and strengthen many “paper parks.” Thirty-eight of these areas have been recognized as major tourist venues and 10 new ecotourism circuits have been laid out. Arrangements have been put in place for active participation of communities in park management and revenues. A third phase of the program, now under implementation, will further strengthen management in another 21 protected areas and strengthen linkages between conservation and development for local communities.

The Malagasy Minister of Environment, Water, and Forests officially created three new protected areas on December 30, 2005, bringing a further 875,000 hectares of unique natural habitat under protection. Makira in the northeast of the island, the Ankeniheny-Zahamena corridor in the east, and Anjozorobe in the central province of Antananarivo are home to some of the island’s most threatened species of fauna and flora, including populations of many of Madagascar’s endangered lemurs such as the Indri (Indri indri) and the black-and-white ruffed lemur (Varecia variegata variegata). These areas also play vital roles in connecting isolated habitat necessary for the survival and continued evolution of the species that make up some of the world’s richest biodiversity.

Madagascar is one of the 25 original biodiversity hotspots identified by Conservation International and one of the...
first to receive grant funding under the Critical Ecosystem Partnership Fund (CEPF), a Bank partnership with Conservation International. Under this program grants to the Wildlife Conservation Society (WCS) and Conservation International supported participatory planning of two of the newest protected areas. Earlier in 2005, a CEPF grant to Association Fanamby helped in the creation of the 72,000-hectare Daraina reserve, officially known as the Loky-Manambato Forest Station. Together, these areas have helped the Malagasy government reach its 2005 target of 1 million hectares of new protected areas, an important milestone on the way to fulfilling President Marc Ravalomanana’s pledge of bringing 10 percent of the country under protected area management by 2008.

CEPF’s strategy in the region is to integrate local groups and individuals in the management of protected areas and reserves to ensure that biodiversity conservation is integrated with the sustainable use of natural resources. The CEPF approach has been to complement protected area creation by enhancing private sector conservation initiatives that support small-scale enterprises. Around Zahamena National Park and the Daraina reserve, for example, grants to local NGOs MATEZA and Association Fanamby supported efforts to help local communities farm sustainably, improve public health, and manage their natural resource bases. Conservation groups working on the island are looking at different ways to support sustainable financing for conservation for parks and local people. An IDA grant from the Bank will contribute to the endowment of a conservation trust fund, while carbon financing from the Bank’s biocarbon program is being used to maintain the Makira forest corridor, which links the major Masoala reserve to other important forest reserves.