The Millennium Ecosystem Assessment showed that over the past 50 years human activities have changed ecosystems more rapidly and extensively than at any comparable period in our history. These changes have contributed to many net gains, but at growing environmental costs: biodiversity loss, land degradation, and reduced access to natural resources for many of the world’s poorest people. Habitat loss and fragmentation, overexploitation, pollution, the impact of invasive alien species, and, increasingly, climate change all threaten global biodiversity. Many of these factors are interlinked. Thus the warming of coastal waters and coral die-off impacts coastal fisheries due to loss of fish habitats and breeding grounds. Similarly, degradation and disturbance in terrestrial and aquatic ecosystems generate niches that can be exploited by invasive exotic species.

This biodiversity loss matters because species and habitats are the building blocks on which human livelihoods depend—the foundation for productive forests, fisheries, and agricultural crops. Biological resources provide the raw materials for livelihoods, sustenance, trade, medicines, tourism, and industry. Natural ecosystems provide a whole range of services, often unrecognized in national economic accounts, but vital to human welfare: regulating water flows, flood control, decontamination, and carbon sequestration, as well as providing nursery grounds for many species and products on which human communities depend. Enhanced protection and management of biological resources will also contribute to solutions as nations and communities strive to adapt to climate change.

New initiatives under the climate change agenda provide both opportunities and challenges for biodiversity conservation. Bio-energy plantations can substitute for fossil fuels and may also provide benefits to small farmers engaged in their production. However, without careful planning, biofuel production could lead to further clearance of natural habitats, either for biofuels themselves or for new agricultural land to replace converted crop lands. Similarly, wind, hydropower, and wave energy solutions require careful site selection and evaluation of likely impacts on habitats and wildlife, especially rare species.

How can improved biodiversity management enhance resilience to climate change and adaptation strategies? The Bank is already a major global funder of biodiversity initiatives, including support to more than 500 projects in over 100 countries during the last 15 years. Many of those projects are promoting sound natural resource management that could contribute to adaptation through maintaining and restoring native ecosystems and protecting large blocks of natural habitats across altitudinal gradients. Projects in the MesoAmerican Biological Corridor, support to the mosaic of state and indigenous reserves in the Amazon rain forests and the South African megareserves in the Cape Floral Kingdom, and maintaining corridors from the mountains to the coast all protect important ecosystems and species refuges. The large rain forest blocks in the Amazon notably influence global and local climates and rainfall patterns. Other projects are focusing on strengthened resource management to cope with greater climatic fluctuations, such as improved fire management in dryland and Mediterranean habitats and the Russian boreal forests.

It has been estimated globally that land and forest conversion contributes up to 18 per-
tourism industries, but also offers increased protection from sea level rise and extreme weather events.

The Bank’s emphasis on biodiversity conservation, both as a global public good and a means of adaptation, will be an important part of the new Climate Change Strategic Framework. Agricultural programs, for instance, will need to take account of climate change and changing rainfall patterns. An emphasis on community-driven development is encouraging more sustainable agriculture, avoiding overgrazing and land degradation, and developing new agroforestry systems and multi-species cropping. Increased attention is also being paid to conserving agrobiodiversity in crop gene banks and traditional agricultural practices to maintain diversity of varieties and crops for food security (see, e.g., Box on “Agriculture and Adaptation to a Changing Climate in Yemen,” page 50).

On the other hand, the introduction of new and adaptable exotic species for agriculture, biofuels, mariculture, aquaculture, and reforestation presents a particular challenge. Many of the attributes that make species useful for introduction (fast-growing, adaptable, tolerant of disturbance, and able to thrive in a wide variety of conditions) are exactly the same characteristics that can enable a species to become invasive. Invasive alien species (IAS) are a threat to both biodiversity and economic development, reducing crop and fisheries yields, choking irrigation canals, blocking hydroelectric dams, and reducing the lifespan of development investments. The economic impacts of IAS are expensive, an estimated $140 billion annually in the United States alone. The Bank is beginning to take action to address this much-neglected threat through a global partnership with the Global Invasive Species Programme. Assisting clients, especially the LDCs and Small Island Developing States, to better understand and manage IAS problems will be an important part of the adaptation and development agenda.

In response to climate change, many countries are likely to invest in more infrastructure to address energy needs, irrigation, and flood control. Such strategies are rational and needed responses, but could further threaten biodiversity if new development leads to unmitigated destruction of natural habitats through creation of dams, sea walls, and flood canals. Increasingly in the infrastructure sector, however, the Bank can draw on some good conservation experience. For example, protection of the forests around the Nam Theun2 Dam in Laos, and a 30-year conservation fund to manage the watershed, is a critical factor in extending the lifespan of the hydropower generation facility. Rehabilitation of upland watersheds and wetlands contributes to regulating water flow, regulating floods and sedimentation, reducing vulnerability, and improving water quality for downstream communities. This has already been shown on a large scale in the China Loess Plateau project through its positive impact on local agricultural productivity, household incomes, and biodiversity, as well as downstream sediment reduction.

Adaptation will increasingly become and has to be central to the development agenda. Enhanced protection and management of natural ecosystems and more sustainable management of natural resources and agricultural crops is a critical part of sustainable adaptation strategies. Biodiversity conservation can play an important, cost-effective, and efficient role in reducing vulnerability to climate change.

Further Reading


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