

# USAID BIODIVERSITY AND DEVELOPMENT HANDBOOK

## IV

## BIODIVERSITY AND DEVELOPMENT INTERSECTIONS



*Families rest in the shade while Northern Rangelands Trust community rangers pass by on patrol in Kenya. Nature-based enterprises and improved management earned about \$1.3 million in 2013, in an area with low annual incomes and few economic options.*

*Photo: Juan Pablo Moreiras,  
Fauna & Flora International*

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*Fishermen of the Hail Haor wetland in Srimongol, Bangladesh, have much to celebrate. After USAID helped local people participate in decision making and management of Hail Haor, fish diversity went up significantly, waterbirds that hadn't been seen for years returned, and fishermen regularly caught more fish in less time than they used to. This success with community co-management led the Government to change national policy on the rights of communities and initiated a large scale up in effort with USAID support.*

*Photo: Sirajul Hossein*



# IV BIODIVERSITY AND DEVELOPMENT INTERSECTIONS

## 4.0 OVERVIEW

This chapter supports Goal 2 of the Biodiversity Policy, “integrate biodiversity as an essential component of human development,” as well as Agency integration goals and emerging best practices. Virtually all USAID programs are integrated with other sectors, whether intentionally or not, because they operate within socioeconomic systems. Biodiversity conservation programs are no exception. Conservation activities impact other sectors and vice versa. This chapter provides information on these linkages and impacts, for consideration in increasingly common multi-sector programming. Programmers and managers may also find this information useful in considering how working in different sectors contributes to sustainability. In addition, biodiversity and environment experts need to know enough about other sectors to be able to engage appropriately, though they do not have to be experts.

Integration does not mean doing everything; it means being strategic. Resources presented in this chapter can help planners make these strategic choices – identifying entry points and actions in other sectors that can lead to and enhance biodiversity conservation outcomes. For example, in the context of a threats-based approach, planners and practitioners could engage with efforts to strengthen legal and justice systems and apply best practices to specific conservation challenges such as trafficking or illegal, unreported, and unregulated (IUU) fishing.

As explained in Chapter 3, it is also evident that conservation approaches require knowledge about and engagement with the sectors to be covered here. Broad-scale landscape and seascape approaches often dictate integration of agricultural considerations; these could involve a mix of ecoagriculture, agroforestry, and intensification techniques, as well as improved fisheries management in seascape settings. Community-based natural resource management (CBNRM) approaches can improve conservation impacts and results by

incorporating and facilitating the positive evolution of land tenure and property rights concerns. Similarly, many practitioners are increasingly realizing the importance of governance in biodiversity conservation programs: Integration of such basic principles as transparency and accountability can lay the foundation for more equitable, positive, and sustainable results. Finally, the crosscutting issue of global climate change has profound implications for natural resource management (NRM) and the conservation of biological diversity. Integrating climate change adaptation measures into conservation programs will be a necessity. At the same time, healthy and diverse ecosystems will provide resilience to climate change for other sectors.

## 4.1 HEALTH AND DEMOGRAPHIC CHANGE

### 4.1.1 Human Population and Reproductive Health, including HIV/AIDS

#### **Definition and Significance**

The world’s current human population of 7 billion is estimated to exceed 9 billion by 2050, with the highest growth rates occurring in some of the poorest countries. Increasing human populations coupled with poor development planning and unsustainable use of natural resources can put an enormous strain on biodiversity. Population pressures can also lead to further degradation of already fragile ecosystems. This, in turn, can have negative impacts on human health, since natural systems provide critical ecosystem services, including the provision of clean water, food security, protection from natural disasters, and medicinal plants.

Many of the world’s most biodiversity-rich areas face some degree of threat from population pressures. According to Conservation International, an estimated 1.4 billion people, or 20 percent of the global population, live in “biodiversity hotspots,” defined as the most biologically rich areas on the planet, which are under significant threat from human activities. These human

communities are not only growing at a fast rate, 1.3 percent per year, but are also putting pressure on natural resources through such practices as slash-and-burn agriculture and unsustainable harvesting of flora and fauna, leading to loss of biodiversity. In addition, many of these communities are located in very remote areas where basic public health services, including voluntary family planning, are not available. **Studies** have shown that improving access to family planning – respectful of the rights of individuals and couples to freely choose the timing, spacing, and number of children – not only reduces population growth but also saves the lives of women and children.

Human migration, driven by factors as diverse as natural disasters, wars, and environmental degradation, also presents serious risks to biodiversity. When large populations migrate to rural areas that are rich in biodiversity, they can negatively impact ecosystems and species in a number of ways, including through forest clearing for agriculture, unsustainable natural resource extraction, introduction of invasive species, and pollution. In addition, migration impacts the social structure

within communities, which may have negative effects on ecosystems and biodiversity. Similarly, outmigration or emigration may have negative environmental consequences. For example, when indigenous groups leave an area, they may take traditional knowledge of sustainable natural resources management with them, making management more difficult for those remaining (or for new immigrants).

For these reasons, an integrated approach to human population, health, and environment may be warranted in order to achieve biodiversity conservation objectives. Clearly, not every program should be expected to address all of these complex and interrelated issues. Given the primary importance that health, fertility, and population issues play in the lives of humans, particularly the poor, these aspects of biodiversity conservation may provide credible entry points for working with relevant communities and other partners. Addressing issues in an integrated way often increases the potential for broad buy-in for a complementary suite of conservation and human development goals.



**CIRCLE OF LIFE:**  
*An instructor in the Democratic Republic of Congo explains the standard days method for tracking daily fertility using traditional cycle beads. When integrated into biodiversity projects, family planning and other health services help achieve long-term sustainability goals while providing an immediate, tangible benefit to families who are in turn more inclined to participate in conservation actions*  
*Photo: Daren Trudeau/ Institute for Reproductive Health, courtesy of Photoshare*

## BOX 52. DEMOGRAPHICS CONCEPTS

**Demographics:** This term refers to statistical information that defines a population. When studying the impact of demographics on biodiversity, key concepts to consider include global population density and distribution, global biodiversity richness and distribution, global resource use and consumption patterns, and the spatial and temporal intersection of these.

**Global population:** The world's current population is 7 billion people, which translates to a population density of nearly 50 people per square kilometer of land. By 2050, the global population is likely to reach 9 billion, or more than 60 people per square kilometer of land. Of course, human population is not evenly distributed on Earth; China's density is 145 persons per square kilometer, while Canada's is less than 5 persons per square kilometer.

**Biodiversity hotspots:** As with human populations, biodiversity distribution is variable around the globe. The concept of biodiversity hotspots – areas with disproportionately high concentrations of endemic species and disproportionately high levels of threat – is now well recognized among leading biodiversity scientists. More than half of the world's endemic species (and nearly 80 percent of all endemic vertebrate species) live in 34 biodiversity hotspots, covering just 2.3 percent of the Earth's land surface. These areas are among the most threatened by humans.

**Human footprint:** Human impacts on biodiversity can be thought of as a footprint and can be measured by such indicators as population, travel routes, and land use. Using these indicators, humans have influenced more than 80 percent of the Earth's surface. The human footprint is not evenly distributed; some parts of the planet remain relatively intact, such as northern Canada, while others, such as southern and southeastern Asia, face very high levels of transformation and degradation.

**Ecological footprint:** It is useful to understand patterns and trends of both localized and international resource consumption, referred to as the “ecological footprint.” The ecological footprint is a measure of demand (consumption of resources) on the Earth's ecosystems and can be contrasted with the Earth's ecological capacity to regenerate. In 2011, the human population used 135 percent of the resources that the Earth can generate. The consumption of resources is not distributed equally around the globe – less than one-half of one percent of the world's population uses more than one-third of its resources, and about 7 percent of the world's population is responsible for more than one-half of all CO<sub>2</sub> emissions. Population density alone is not necessarily a strong indicator of an ecological footprint (and associated impacts on biodiversity). For example, the population living in the grasslands of Brazil (with a density of only 13 persons per square kilometer) has a greater impact on the grassland ecosystem, due to the expansion of commercial agriculture, than the more dense population of the Ethiopian Highlands has on its ecosystem.

## **Key Questions**

### **How do human population issues have the potential to enhance or constrain the achievement of biodiversity conservation results?**

In many cases, the sustainability of conservation results can either be threatened by or secured through changing population demographics and health concerns. For example, rapid population growth can lead to resource consumption that exceeds sustainable rates. Conversely, a significant decrease in human population near a degraded ecosystem, due to such factors as migration or increased use of family planning services, may facilitate recovery of that ecosystem.

Migration of human populations into biodiversity-rich areas can threaten conservation results when the use of natural resources exceeds sustainable levels. Rural-to-rural migration generally has the highest negative impacts on biodiversity, especially when driven by agricultural expansion. Migration of populations due to insecurity or natural disasters can increase demand for biodiversity products – bushmeat and medicines, for example – when refugees end up settling in an area more or less permanently.

In remote areas with biodiversity-rich ecosystems, addressing the unmet need for basic health services, including family planning, can serve as an effective entry point to build community support for conservation and as a key rationale for projects that integrate health and conservation goals. Because these communities are dependent upon their natural resources for livelihoods and basic needs, maintaining a healthy environment and population is a priority for ensuring sustainable community development.

### **Do synergies exist between biodiversity conservation and human health and/or population programs?**

In many cases, the tools and technologies for meaningful strategic approaches in population, health, and biodiversity conservation already exist. Often, the greater challenge lies in finding ways for programs and stakeholders who do not traditionally work together to form effective partnerships around common

objectives. When done well, this can create synergies and movement toward sustainability.

A recent World Wildlife Fund (WWF) manual (see tools and resources below) defines population, health, and environment (PHE) programs as “projects that integrate health and/or family planning with conservation activities, thereby seeking synergistic successes and greater conservation and human welfare outcomes than if they were implemented in single-sector approaches.” These programs are good models of effective integration of health and conservation goals. An example of a successful PHE program is the USAID-supported **BALANCED** (Building Actors and Leaders for Advancing Community Excellence in Development) project, which focuses on applying an integrated health and conservation approach to high-biodiversity areas that are threatened by population pressures in a number of developing countries. In the Philippines, research conducted by a BALANCED partner found that sites where the integrated PHE approach was used had improved coral reef and mangrove health and increased use of family planning, when compared with sites where conservation or family planning programs were implemented separately.

### **How can effective linkages be made between family planning and/or health programs and biodiversity conservation?**

In many cases, “win-win” opportunities for human health, population, and biodiversity may exist. For example, the restoration of intact upstream forests may also ensure potable water supplies for downstream users. The promotion of alternative sources of fuel to replace wood consumption may also decrease the occurrence of human respiratory problems from indoor air pollution. Family planning programs that address the unmet need for contraception may reduce the long-term demand for natural resources in biodiversity-rich areas due to population pressures by allowing women to control their own fertility and reach their desired family size.

PHE programs can serve as models for how family planning and health objectives can be integrated into conservation projects. These programs are successful in meeting conservation objectives because the parallel



public health and family planning measures help to build trust within communities and meet community needs in a holistic way. This trust then leads to increased community buy-in for the conservation aspects of the project. In addition, the integration of conservation and health goals leads to engagement of different groups within a given community; traditionally, men and youth have been involved in conservation efforts, while women are more engaged in family planning and public health activities. PHE programs have been successful in engaging women on conservation issues and increasing participation of youth and men in family planning and health activities.

One limitation of current PHE programs is that they are often implemented on a small scale in communities located in remote regions near areas of high biodiversity. Cross-sectoral approaches that integrate family planning and public health goals with conservation programs can be successful in a variety of settings, however, and therefore should be expanded beyond remote biodiversity-rich areas to any areas where conservation and health goals intersect. Integrated programs such as PHE not only succeed in meeting health and conservation outcomes but also build capacity for coordination within communities while reducing operating costs and preventing duplication of effort.

#### **4.1.2 Health Benefits of Biodiversity**

##### ***Definition and Significance***

Biodiversity loss and ecosystem degradation pose myriad threats to public health and well-being. Intact ecosystems contribute to human health by providing critical services, including the provision of clean water, food, and medicines. In addition, a growing body of research suggests that biodiversity loss and ecosystem degradation may facilitate the transmission of such infectious diseases as malaria, schistosomiasis, and Lyme disease, which impact tens of millions of people each year. There is also increasing evidence that the degradation of natural systems and biodiversity loss may contribute to the rise in emerging infectious diseases seen in the last several decades.

Until recently, the public health benefits of biodiversity and intact ecosystems have not been well appreciated. International multilateral organizations, such as the World Health Organization (WHO) and the United Nations Environment Programme (UNEP), have started to recognize these connections, however. The WHO has a webpage highlighting the importance of biodiversity for human nutrition, regulation of infectious diseases, and as a source of traditional medicines. A 2010 UNEP/CBD fact sheet for the public on biodiversity and health starts with the statement, "You rely on biodiversity to stay healthy." The Cooperation on Health and Biodiversity (COHAB) Initiative, which works with UN agencies, conservation NGOs, and government agencies such as USAID, was formally established in 2007 to increase understanding of the links between biodiversity and health among relevant parties.

Biodiversity conservation advances global health priorities and provides important ecosystem services that help to prevent human diseases and maintain health. Therefore, integrating efforts to prevent biodiversity loss and ecosystem degradation into the global health agenda may be warranted. Clearly, many global health priorities require such focused prevention and treatment programs as vaccinations, antiretrovirals for HIV, and insecticide-treated bed nets for malaria prevention; however, long-term global health strategies that focus on disease prevention and health optimization should recognize the importance of biodiversity and natural systems in meeting these objectives. In doing so, the conservation and public health communities can work together to advance common goals. For example, an integrated, comprehensive, long-term approach to malaria control and prevention would require the use of such public health tools as indoor spraying with insecticides and insecticide-treated bed nets, which have proven short-term benefits. Long-term prevention strategies should also involve efforts to prevent deforestation, which has been linked to increased malaria incidence and transmission in some parts of the world. Malaria transmission zones are expected to expand in many regions due to climate change; preventing deforestation in these areas may have the added benefit of slowing down this expansion.

## Key Questions

### **How does biodiversity loss have the potential to impact human health and well-being?**

Biodiversity and functioning ecosystems benefit public health in many ways, most essentially by providing clean water, food, and critically important medications. For example, it is estimated that more than two-thirds of residents of developing countries have used natural medicines. Natural products have also provided the templates for many modern drugs; a recent analysis (Bernstein and Ludwig 2008) found that almost half of the 100 most-prescribed medications in the United States are derived from nature. On the other hand, ecosystem degradation and biodiversity loss can decrease food production and water availability, pollute water sources, increase transmission of certain infectious diseases, and result in the loss of species that could produce the next blockbuster drug to treat a common medical ailment.

A number of studies from different regions have drawn a direct correlation between deforestation and increased prevalence of the vector that transmits malaria, a disease that kills 1.2 million people per year. In the Peruvian Amazon, researchers found that *Anopheles darlingi*, the primary vector for malaria in the region, had a biting rate that was 278 times higher in deforested areas than in forested areas. In the Kenyan highlands, the vectorial capacity (a measure of transmission efficiency) of *Anopheles gambiae* increased by a range of 29 to 106 percent in deforested areas, depending on whether measurements were done in the dry or rainy season. When researchers looked at the association between long-term loss of forest cover and malaria incidence in the Amazon, they found that a 4.2 percent change in deforestation over a four-year period resulted in a 48 percent increase in malaria incidence.

Intact ecosystems, particularly forests, help to maintain the watersheds that provide adequate supplies of clean water for downstream communities and may thus decrease the risk of diarrheal disease in these communities. In Indonesia, research on the relationship between watershed protection and diarrheal disease found an inverse relationship between water availability and diarrhea risk. In Malawi, a recent analysis found that

children living in areas with higher percentages of forest cover were less likely to experience diarrhea.

### **What are the synergies between biodiversity conservation and global health priorities?**

USAID's Global Health programs focus on a number of priority areas, including HIV/AIDS, maternal/child health, family planning, nutrition, malaria, diarrheal disease, emerging infectious diseases, and neglected tropical diseases. Ecosystem degradation and loss of biodiversity can exacerbate many of these priority issues and impede the long-term success and sustainability of the global health programs that address them.

The following are examples of common goals that advance both global health and conservation priorities:

- prevent biodiversity loss among thousands of species that serve critical roles in agriculture, such as pollinators and natural pest control agents, to optimize and diversify crop production and decrease malnutrition/undernutrition
- prevent deforestation in regions of the world where research has indicated that loss of forest cover can increase malaria transmission
- prevent loss of biodiversity to maintain potential natural sources of critically important, life-saving medications
- prevent deforestation in regions of the world where schistosomiasis is common, since research has indicated that loss of forest cover can preferentially increase numbers of snail species that carry the parasitic worm that causes the disease
- prevent deforestation and ecosystem degradation as a means of decreasing rates of emerging infectious diseases, especially in areas where humans and wildlife live in close proximity
- value the health benefits of ecosystem services – such as clean water, wild foods, clean air, and healthy soils – that healthy, biodiversity-rich environments provide

### **How can integration benefit both global health and conservation efforts?**

Given the inextricable links between human health and biodiversity, the global health and conservation sectors have an opportunity to integrate many of their



efforts and programs in ways that benefit both sectors. Integration of efforts to prevent ecosystem degradation into global health programs can strengthen health programs and contribute to their long-term sustainability. Similarly, biodiversity conservation programs should consider community issues, including health impacts, when designing strategies. For example, establishment of a protected area that restricts access to medicinal plants or wild-harvested foods can have profound impacts on the health of a community. The community may then perceive that their interests and well-being take a back seat to conservation efforts, which may result in resentment and encroachment into the protected area.

Cooperation between the global health and conservation communities can lead to joint efforts that take advantage of the strengths of each sector. For example, global health programs have developed communication strategies that are effective in targeting communities to bring about changes in behavior. These strategies can be adapted to educate communities about the importance of biodiversity to health and to help members to be better stewards of their local ecosystems.

In addition, engaging the health sector in conservation efforts brings in potential new stakeholders at all levels,

### BOX 53. THE IMPACTS OF HIV/AIDS ON BIODIVERSITY

HIV/AIDS is a serious public health issue in many developing countries that are also rich in biodiversity. In southern Africa, which has some of the world's highest incidence of HIV/AIDS, prevalence rates are estimated to be as high as 25 percent in some countries. The prolonged illness and early mortality associated with HIV/AIDS can devastate family structures and lead to widespread social and economic instability.

The HIV/AIDS crisis has impacted biodiversity conservation in two primary ways. First, organizations that work on conservation issues in some developing countries have lost a substantial portion of their workforce to the disease, resulting in setbacks in all types of environmental programs and projects. Capacity within the conservation community in many countries has been severely depleted due to the disease. Second, the HIV/AIDS crisis has profound social impacts on the patterns of natural resource use in many communities. Households that experience the loss of healthy adults to the disease may also lose significant income; as a result, they may turn to natural resources to fill this gap in livelihoods, leading to increased hunting of wildlife and collection of plant species for food and medicine (see Oglethorpe and Gelman, 2009, for more information on the links between HIV/AIDS and the bushmeat trade). Unsustainable harvesting of trees to make coffins has also increased deforestation in some areas.

In areas where HIV/AIDS has been found to impact conservation programs, the environmental sector should make an effort to collaborate with the health sector to optimize treatment and prevention efforts. PHE programs have been successful because they engage different sectors, drawing from the strengths of each to advance both conservation and health goals. Similarly, integrated approaches that address both biodiversity loss and HIV/AIDS can have positive impacts that go beyond what can be achieved if the sectors work separately.

including traditional healers, public health advocates, physicians, and ministries of health. These new stakeholders can serve as effective champions for conservation programs and contribute significantly to their success and long-term sustainability.

Integration is often difficult to accomplish, given current constraints on the use of foreign assistance funds. USAID's Global Health funds are often allocated for very specific, targeted strategic approaches, which makes it difficult to design integrated programs. Policymakers and legislators need to be informed about the advantages of integrated programs.

## BOX 54. THE INTERSECTION OF WILDLIFE, LIVESTOCK, AND HUMAN HEALTH

- Infectious diseases that can be transmitted from animals to humans, and vice versa, are known as zoonotic diseases. Well-known examples include anthrax, rabies, and avian influenza. Zoonotic diseases can be transmitted to humans from both wildlife and domesticated animals.
- According to WHO, an emerging zoonotic disease is “a zoonosis that is newly recognized or newly evolved, or that has occurred previously but shows an increased incidence or expansion in geographical, host, or vector range.” Emerging zoonoses present a serious threat to public health; such diseases as HIV/AIDS, influenza A (H1N1), Ebola, and SARS have contributed to the deaths of millions of people and cost the global economy billions of dollars.
- Major drivers of emerging zoonotic diseases include environmental change, increased human population density, and land use changes, especially those related to expansion of agriculture. According to the recent World Bank report *People, Pathogens, and Our Planet*, specific environmental factors that contribute to zoonotic disease emergence include deforestation, loss of biodiversity, bushmeat trade and consumption, unregulated tourism, human encroachment into previously unexplored areas, illegal wildlife trade, and habitat fragmentation (see [Chapter 2, pg. 8](#)).
- Conversely, zoonotic diseases can also be transmitted from humans or livestock to wildlife, presenting a serious risk to many endangered species. For example, the endangered mountain gorillas that reside in the Bwindi Impenetrable National Park in Uganda are vulnerable to contracting scabies and tuberculosis from people in nearby communities. The Ugandan nonprofit [Conservation through Public Health](#) seeks to address this issue by providing basic health services, including tuberculosis surveillance and treatment, for community members. As community health improves, there is less opportunity for zoonoses to be transmitted from humans to the gorilla populations in the adjoining national park.
- Certain wildlife diseases also pose a risk to livestock, and countries take great effort to regulate meat processing and trade, often to the detriment of wildlife. In southern Africa, thousands of miles of fences have transformed the landscape in order to prevent foot and mouth disease (FMD) transmission from African buffalo (the endemic carrier) to cattle, a requirement to access to export markets for beef. Fences negatively impact pastoralists and prevent wildlife migration, crisscrossing new transfrontier conservation areas established to promote free movement of large animals. There is increased interest now in applying no-fence approaches to FMD management that are compatible with the needs of wildlife and local people.

### 4.1.3 Ecosystem Health and Disaster Risk Reduction and Response

#### **Definition and Significance**

Healthy ecosystems can provide protection from climate change and a variety of natural disasters, including floods, tsunamis, and landslides. Forests, mangroves, sand dunes, and wetlands can serve as physical buffers to these natural events. For example, a 2006 study (Chang et al. 2006) on the role of ecosystems in providing protection from the 2004 Indian Ocean tsunami found that “a preliminary comparison of villages that otherwise faced similar tsunami exposure suggests that the presence of healthy mangroves did afford substantial protection.” As environmental degradation increases worldwide, however, natural systems are losing their capacity to protect nearby human communities from disasters.

Similarly, forests can act to stabilize hillsides that would otherwise be prone to dangerous landslides. Highly denuded regions, such as in the Philippines, chronically suffer from deadly, damaging landslides, like the event that killed more than 8,000 people in 1991 on Leyte Island. In addition, healthy ecosystems, especially forests, can serve as effective carbon “sinks,” thereby contributing to climate change mitigation. Forests also hold water in their soils and can regulate water flows to mitigate the effect of drought.

Environmental degradation can also lead to the loss of other critical ecosystem services that may increase vulnerability to disasters. Food security, access to clean water, and livelihoods can all be negatively impacted by ecosystem degradation, leaving communities more vulnerable to disaster impacts.

Once a disaster occurs, the humanitarian response can have serious negative impacts on the health of ecosystems and on the provision of ecosystem services to local communities. Because humanitarian assistance and reconstruction activities are needed to save lives and relieve human suffering as quickly as possible, planners and responders often disregard environmental considerations. Experience has shown, however, that not addressing actual or potential threats to ecosystems only leads to an increase in these threats that must be mitigated later on, almost always at a much higher

human, monetary, and environmental cost. For example, without careful consideration for their siting, camps for displaced people can harm ecosystems through activities surrounding infrastructure, water and sanitation, food distribution, fuel collection, and agricultural practices. These camps can cause ecosystem degradation, with negative impacts on food security, availability of clean drinking water and fuel, and livelihoods of already vulnerable populations.

These types of impacts can be significantly reduced if the relief and development sectors integrate environmental considerations during all stages of disaster management, including prevention. Collaborative planning with governments, local stakeholders, relief organizations, and environmentalists can identify mutually agreed-upon responses that are both culturally and environmentally appropriate. Environmental damage from humanitarian or reconstruction operations is far less costly to prevent or mitigate than to repair. Moreover, all parties involved in humanitarian relief, reconstruction, and development have a powerful incentive to collaborate on biodiversity conservation activities, because the livelihoods and ultimate survival of local communities and refugees alike depend on natural resources and healthy ecosystems.

#### **Key Questions**

##### ***How can USAID activities help protect against disasters and reduce the negative environmental impacts of disaster response?***

USAID programs that focus on improving ecosystem health may also serve to strengthen many of the natural systems that help protect communities from disasters. As an example, USAID’s biodiversity and forestry programs provide assistance to improve the condition of forests, mangroves, and wetlands in many countries – all of which serve as important physical barriers to such natural disasters as hurricanes, floods, and landslides.

Conflicts and natural disasters often cause impacted populations to migrate from their homes to escape harm or seek assistance. Migration can be a major driver of environmental change, resulting in ecosystem degradation and unsustainable use of natural resources. In addition, competition and conflict can erupt between the displaced and local communities over control and



access to such life-sustaining resources as water, crops, fodder for animals, and fuel wood. Early consideration of these problems can help determine effective ways to better share assets and reduce the impacts on local ecosystems.

The rapid environmental assessment is a methodology initially developed with the assistance of USAID implementing partners that helps to determine environmental issues and risks in a disaster context and provides a foundation for addressing them effectively. After the 2010 earthquake in Haiti, a USAID team was deployed to the country to complete a rapid environmental assessment, which was circulated among contractors, NGOs, and other aid organizations involved in the disaster response and rebuilding effort. UNEP has also published [guidelines](#) on how to conduct a post-disaster environmental needs assessment.

### ***What are the potential effects of disaster aid or reconstruction activities on local ecosystems and natural resources?***

The influx of personnel, vehicles, and the other inputs associated with humanitarian assistance, or the materials needed for reconstruction operations, can cause damage to and exact a significant toll on local ecosystems. Environmentally sensitive planning after a disaster can help to ensure that ecosystems and natural resources are used in a sustainable manner, and this in turn can increase resilience to future disasters. “Green procurement,” the acquisition and use of ecosystem-friendly materials and goods, should also be a part of all humanitarian assistance or reconstruction activities. The post-disaster period should be regarded as an opportunity to rebuild communities that are more environmentally sustainable over the long term. WWF and the American Red Cross have produced a toolkit that provides guidance on how to integrate environmental concerns into the disaster recovery and rebuilding effort. This [Green Recovery and Reconstruction Training Toolkit](#) provides guidelines on different aspects of post-disaster recovery, from how to optimally site new construction to the best way to incorporate sustainable, local materials into rebuilding efforts.

## 4.2 FOOD SECURITY

### ***Definition and Significance***

Despite tremendous gains in food production over the past 40 years, currently 795m people do not have enough food to lead a healthy active life. That’s about one in nine people on earth, according to the [World Food Programme](#). USAID combats food insecurity through the U.S. Government’s flagship [Feed the Future initiative](#), among other efforts.

Food security involves many sectors and strategic approaches. Beyond agricultural production, fisheries, forest products, wild meat, and other non-agricultural products are critical to food security, contributing critical nutrients as well as income to buy food.

These natural assets are under threat, however. [According to the World Resources Institute](#), “Forty-five years of increasing fishing pressure has left many major fish stocks depleted or in decline.” Overfishing has been recognized as a problem across the globe since the 1950s, but better management practices have not kept pace. [Based on projections from the UN Food and Agriculture Organization \(FAO\)](#), 60 percent of important fish stocks are in need of rehabilitation as they are already showing declining yields.

Sustainable agriculture that is compatible with or enhances biodiversity conservation can make a major contribution to food security, as discussed in the next section. USAID has invested in sustainable agriculture for decades in the form of support to agroforestry, integrated pest management, conservation agriculture, and components of traditional agricultural production projects. Currently, USAID promotes climate-smart agriculture, implementing the U.S. Government’s flagship food security initiative known as Feed the Future. Climate-smart agriculture seeks to achieve food security while enhancing ecosystem services derived from biodiversity in landscapes or seascapes.

## BOX 55. BUSHMEAT: A CRITICAL FOOD SECURITY AND BIODIVERSITY INTERSECTION

The hunting of wild animals for meat is perhaps the least documented, but one of the most far-reaching, uses of wildlife. It is believed to involve more people and to have a greater effect on terrestrial wild animal populations, including those in protected areas, than any other wildlife use. Growing human populations and a lack of livelihood options in many areas of the globe mean that demand for wild meat is likely to continue to rise. Poverty and a lack of alternative resources mean that traditional taboos restricting the consumption of certain species are increasingly being ignored, and traditional resource management systems are breaking down. In addition, rising prices and facilitated access to remote areas are stimulating trade for a dwindling resource. As a consequence, wild meat harvest is now the primary illegal activity in many protected areas. Efforts to improve hunting efficiency have also led to the increased use of more effective and, in most cases, unsustainable hunting techniques such as “night torching,” long-line wire snaring, and hunting with semi-automatic weapons. More information on the links between biodiversity, livelihoods, and food security can be found [here](#).

Research within the former Collaborative Research Support Programs (CRSPs), now known as [Feed the Future innovation labs](#), and the International Agricultural Research Centers (IARCs), funded entirely or in part by USAID, contributed to our knowledge base about the links between biodiversity and food security. For

instance, the Sustainable Agriculture and Natural Resource Management (SANREM) CRSP supported the Community Markets for Conservation (COMACO) program in Zambia, which applies a market-driven approach to conservation to address two root causes of biodiversity loss: poverty and food insecurity.

### Key Questions

#### **What food security activities may be compatible with the Biodiversity Code?**

Note that all biodiversity earmarked funding must meet all criteria of the Biodiversity Code, as described in Chapter 2.

Food security activities should be designed to minimize threats to, and promote benefits of, biodiversity; however, these practices alone are not sufficient for such activities to comply with the code. Food security activities that may be considered biodiversity conservation activities include

- capture fisheries management, including marine management areas that increase natural productivity and fish populations for human consumption while conserving habitat, breeding grounds, and fish populations
- community-based natural resource management, such as natural forest management or wildlife management areas that includes increasing the rights and capacity of local communities to access, utilize, and market wild food products
- sustainable hunting practices promotion that contributes to revenue as well as food stocks while increasing wildlife populations through regulations, zoning, enforcement, and other measures
- landscape management that sustains or enhances ecosystem services that support both priority conservation areas and food production zones
- In addition, if a vulnerable population depends on natural forests and wild biodiversity for food security and the project is protecting or sustaining these resources, activities may qualify under the Biodiversity Code. These activities should be integrated into a comprehensive conservation program.

**What are the opportunities for integrating biodiversity conservation and food security in the USAID context?**

Food security is not just about agriculture. Planners need to consider the role of a wide variety of natural resources in food security at the landscape or seascape scale. There are multiple connections between natural resources and food security, including pollination and other ecosystem services and famine resources like wild tubers or fruits, which provide calories, micronutrients, and protein sources.

Water resources for agricultural production and clean water for health impact both food security and biodiversity, as described in **Section 4.6** on water resources management.

Revenue is another entry point: Having resources to buy or barter food is as critical as producing enough food for one family, community, or locality. High-value assets such as fisheries or community forests not only assure food security but also provide a social safety net in times of resource scarcity and instability.



*OVERLOOKED: A fisherman peers over his drying racks in the village of Nkolongue, Mozambique. Recognizing the benefits of conservation for fish stocks and ecotourism, communities to the south of a planned Lake Niassa Reserve successfully petitioned to add their fishing grounds to the protected area. Photo: Caroline Simmons, WWF*

**BOX 56. FEED THE FUTURE LINKAGES**

Feed the Future strategies for food security are designed not only to accelerate agriculture-led growth and reduce undernutrition but also to encourage sustainable and equitable management of land, water, fisheries, and other resources. Poor land use and agricultural practices are common factors that increase the vulnerability of developing countries to such global threats as water scarcity and pandemic disease. Feed the Future integrates environmental considerations into USAID's investments and builds the capacity of partner countries to take advantage of opportunities in effective resource management and proactive adaptation to environmental challenges. Feed the Future does emphasize nutrition but has not made a specific link between diversity of foodstuffs and diversity in agricultural systems and nutrition.

Additional integration entry points and resources include

- FAA 118-119 and Reg 216 (see **Section 2.1.2** for more information)
- [Feed the Future's research agenda](#)
- Interagency Climate Smart Agriculture Working Group [<http://rmportal.net/groups/csa>]



## 4.3 AGRICULTURE AND LIVESTOCK

Agriculture has a tremendous impact on biodiversity, both directly through land conversion and indirectly through ecosystem effects. During the last four decades, almost 500 million hectares of land were converted to agriculture from other uses. Increasing demand for food production drove this trend, which primarily occurred in developing nations.<sup>1</sup> All told, agriculture has displaced one-third of temperate and tropical forests and one-quarter of natural grasslands. In 2005, cultivated systems covered one-quarter of the Earth's land surface.<sup>2</sup> Every year, about 13 million hectares of tropical forests are degraded or disappear, mainly because of agricultural encroachment.<sup>3</sup> In addition, most water use (70 percent worldwide) is for agriculture, and the amount of water impounded behind dams has quadrupled since 1960. Three to six times as much water is held in reservoirs as in natural rivers. Water withdrawals from rivers and lakes have doubled since 1960. Since 1970, livestock consumption has tripled across the globe, mainly due to population growth, rising incomes, and urbanization. Agriculture also includes the use of wild foods, such as fisheries. Wild fisheries are covered in [Section 4.4.4](#).

Agricultural intensification also has had an impact on the biodiversity within agroecological systems as farmers have reduced the number of crop and livestock species produced to the point of monoculture; however, diversified agricultural systems can provide important habitats for many birds and insects that are typically found in undisturbed ecosystems. Farm crop diversity influences the diversity of wildlife on-farm, in transition, and located in neighboring habitats (see [Section 4.4.3](#)). Monoculture also alters proportions and diversity in pest complexes and soil invertebrates and microorganisms. In some cases, these changes may increase pest populations and result in greater crop losses, increased costs, greater amounts of pesticides used, and eventually pest resistance to pesticides. Ultimately, crop diversity is critical not only in terms of productivity but also as an important determinant of total biodiversity.

<sup>1</sup> FAOSTAT, 2006

<sup>2</sup> Millennium Ecosystem Assessment, *Ecosystems and Human Wellbeing: Biodiversity Synthesis* (Washington, DC: WRI, 2005).

<sup>3</sup> World Bank Development Report *Agriculture*, 2008.

USAID supports research and programs that enhance production from the livestock sector as well as promoting sustainable landscapes and seascapes. For example, the Feed the Future Innovation Lab for Collaborative Research on Adapting Livestock Systems to Climate Change supports integrated research that helps small-scale livestock holders adapt to environmental and health impacts of climate change in Sub-Saharan Africa and South Asia.

To contribute to overall ecosystem health, especially in the face of global climate change, agricultural and food security activities should integrate principles of resilience, diversity, and sustainability, including

- preserving *agrobiodiversity* at species and landscape levels
- optimizing water use and protecting water sources
- applying integrated pest management
- sequestering carbon in soils and woody biomass on farms

### 4.3.1 Ecoagriculture

#### **Definition and Significance**

Ecoagriculture, sustainable agriculture, Evergreen Agriculture, and Landcare are all approaches that aim to minimize the enormous impacts of agricultural production on biodiversity and ecosystems. Ecoagriculture is one of a family of holistic approaches to integrated natural resource management that include both production and conservation. The term was coined in 2003<sup>4</sup> to designate management of agricultural landscapes to enhance rural livelihoods and sustainable agricultural production of crops, livestock, fish, and forest, while conserving or restoring ecosystem services and biodiversity. Sustainable agriculture is a compatible approach “for renewable natural resources that provides food, income, and livelihood for present and future generations and...maintains or improves the economic productivity and ecosystem services of these resources.” **Landcare** is a community-based approach that focuses on perennial crops, among other technologies, partly in response to cases where failure to apply sustainable techniques has led to loss of land, with application in the Philippines East and southern Africa supported by

<sup>4</sup> McNeely, J.A. and Scherr, S.J. 2003. *Ecoagriculture: Strategies to Feed the World and Save Wild Biodiversity*. Washington, DC: Island Press.

## BOX 57. AGRICULTURE AND THE BIODIVERSITY CODE

Agricultural activities that typically **comply** with the code include

- working in target areas that are biologically significant in their own right (e.g., some highly diverse rubber or cacao agroforests that conserve native flora and fauna) and are adjacent to natural forests under threat. There is a need to meet all criteria of the code.
- working in target areas that are not biologically significant in their own right, but where the activities are clearly and directly linked to the conservation of biologically significant areas, and all Biodiversity Code criteria are met (e.g., agricultural production strategic approaches are explicitly designed to draw users and unsustainable practices away from protected areas on a permanent basis)
- working where the activities are explicitly designed to conserve, in situ or ex situ, the germplasm of wild endangered species
- working on improved management of wild fish populations in biologically significant areas

Activities that typically **do not comply** with the code include

- conservation of soil biodiversity in solely agricultural landscapes
- conservation of domesticated species or non-native species, such as livestock and non-native crops or trees, including feral populations of non-native species and local “endemic” cultivars
- promotion of sustainable agriculture with no clear link to conservation of natural areas (no proximity or landscape-scale connectivity, no strategy for conservation of natural areas)

Case-by-case situations:

- Increasing **agrobiodiversity** in itself does not comply with the code but, as part of a landscape conservation strategy that also seeks to conserve natural wild biodiversity, some or all of the project might align with the code. Conserving germplasm of wild indigenous plant species does typically align if all code criteria are met.
- Agricultural **intensification** can have positive or negative impacts on biodiversity. Thus, the links between project activities and intended conservation results should be clearly delineated and appropriate monitoring mechanisms included. Intensification does not stand alone as a conservation strategy but may be part of one.
- Increasing **on-farm and landscape-level diversity** can be critically important in terms of limiting risk to farmers, sound resource management, and the delivery of ecosystem services. It may not meet criteria for biological significance, however, if activities are located in areas not considered to have high conservation value.
- **Land use and land policy** activities that include landscape-level planning – agriculture, forestry, protected areas – may or may not be appropriate under the code, depending on whether the project meets all the other criteria.

Australian and other donors. These approaches are compatible with ecoagriculture, putting more emphasis on biodiversity in managed landscapes, sustainable agriculture on the farm, and Landcare on institutional elements. They all propose a mix of technologies, farming systems, and actions that can favor biodiversity without harming agricultural productivity.

All USAID-supported activities that may impact biodiversity or fragile environments are subject to assessment and mitigation under 22 CFR 216, but some go beyond “do no harm” to promote a positive relationship between conservation and meeting the needs of developing populations. Ecoagriculture is one such approach that has gathered significant support among research centers and donors.<sup>5</sup> According to one USAID-financed review of the concept, managing productive landscapes to benefit biodiversity conservation, agricultural productivity, and communities is necessary because most wild biodiversity resides outside of protected areas and over a billion poor derive their livelihoods in and around protected areas.

## **Key Questions**

### **What are some common elements among different approaches to ecoagriculture?**

All three of these approaches look for biodiversity conservation in landscapes that include productive activities and foster community development and conservation. They see biodiversity in the form of soil microorganisms, for example, as benefitting agriculture, and farmland as potential habitat for many species, seeking to increase the habitat value of farms and the prospects for co-management of livestock and wildlife. They draw on such academic and technical specialties as conservation agriculture, agroforestry, sustainable rangeland and forest management, wildlife biology and ecology, and agricultural landscape design – an emerging science for configuring perennials, spatially and temporally, to provide desired services.

These approaches also aim to increase the diversity of crops, trees, and livestock by promoting diverse production systems, including perennials, tree crops,

forest plots, livestock, backyard gardening, and herbal medicines. They promote agricultural systems that mimic natural ones, such as use of integrated pest management and natural compounds and efficient application when pesticides are used. They also seek better management of soil (including conservation tillage, natural vegetation strips along contours, minimum or ridge tilling, and maintenance of sub-soil flora and fauna) and water (efficient applications and year-round soil cover to enhance rainfall infiltration, for example). Managing nutrient cycles (composting, green manures) is a focus. The somewhat controversial (questions about complexity, replicability) **system of rice intensification** is compatible, as are organic practices.

To some degree, these approaches all include socioeconomic actions to complement agricultural technology in ways that increase production without harming biodiversity. They support whole-farm planning and on-farm waste management. They aim to improve spatial organization of land use, achieve economies of scale through collective action, exchange labor for conservation activities, and address community problems. Though proponents may or may not refer to value chain concepts, practitioners know that results at the landscape level require that recommended practices are profitable to producers, so most projects will aim to work on marketing as well as production.

### **How do ecoagriculture, sustainable agriculture, and Landcare affect biodiversity?**

At the landscape level, elements of these approaches

- maintain large areas of minimally disturbed native vegetation;
- maintain or reestablish connectivity between native habitats within the agricultural landscape;
- conserve areas of native habitat within the agricultural landscape, giving priority to large, intact, and ecologically important patches;
- implement conservation plans for species and ecological communities of high value;
- convert marginally productive lands to natural vegetation;
- protect watersheds with spatial configuration of perennial natural and planted vegetation;

<sup>5</sup> This site has a number of tool kits useful for planning projects: [Ecoagriculture](#).



- create biodiversity reserves that benefit local farming communities; and
- develop habitat networks in non-farmed areas, such as areas around waterways, abandoned fields, forest sites, “sacred groves,” parks, roadways, industry, hospitals, or agro-ecotourism.

**How can these approaches most usefully be incorporated into the design of biodiversity projects?**

Ecoagriculture approaches can easily be incorporated into projects throughout each stage of the project cycle.

**Planning and design phase:** In the project planning phase, projects using ecoagriculture should work at the landscape level to achieve landscape-scale biodiversity objectives. Taking an ecoagricultural approach means managing agricultural landscapes for their full range of production, ecosystem, and social benefits.

**Capacity needs-assessment phase:** Achieving landscape goals often requires the complementary use and management of farm and non-farm lands and will likely require new skills, capacities, tools, and policies, all of which should be clearly assessed during the planning phase of the project.

**Implementation phase:** In implementing ecoagriculture approaches, planners will need to take a multidisciplinary team approach to fully cover the ecological, agricultural, and social aspects of landscape objectives. Planners will also likely use the value chain planning approach, where potential strategies are identified at each stage of production.

**Monitoring and adaptation:** Because farming is inherently experimental, ecoagriculture approaches will require robust monitoring. When practicing adaptive management, planners should keep project approaches flexible enough so that they can be modified to work with people and farms and allow an appropriate mix of technologies. Some requirements may be set in procurement documents, but the nature of the technologies – adjusted to local natural, agronomic, and social conditions – requires both flexibility and accountability for the best results.

**What are some of the benefits of an ecoagriculture approach?**

There are multiple benefits to be gained from an ecoagriculture, sustainable agriculture, and Landcare approach to biodiversity conservation. Benefits to farmers include increased profits and yields, better access to specialty green markets and market premiums, assurance of compliance with environmental regulations, potential for payments for ecosystem services (PES), increased crop diversity, and reduced conflicts with other groups. Environmental benefits include reduced impact from agricultural outputs, including runoff and siltation; improved connectivity at the landscape scale; greater carbon sequestration; improved habitat for certain species, including pollinators; and improved water quality.

**What is an alternative approach to ecoagriculture?**

One alternative to ecoagriculture is agricultural intensification, or the clear demarcation between protected areas and intensive, improved farming systems, often involving high-input, high-return agriculture. Conservation programs may seek to use agricultural intensification as a tool for protecting natural areas by a) decreasing pressure from extensive, shifting cultivation or slash-and-burn practices through improvements in productivity (i.e., increasing yields without expanding the area under production) or b) as an incentive to producers living in and around biologically significant areas, in which case there are often associated management covenants or bylaws that restrict use of the biologically significant area. If these biologically significant areas can be effectively protected within a larger agricultural landscape, then biodiversity will often be concentrated in a given area where those species and ecological communities that require undisturbed areas can thrive. The species that can adapt to living in a disturbed, predominantly agricultural landscape are a relatively small subset of more adaptable species, and an ecoagriculture landscape will harbor less biodiversity overall.

Proponents of ecoagriculture point out that the conditions for maintaining natural areas based on an intensification approach are unlikely to be put in place and that these areas have a high risk of being converted anyway. Moreover, large-scale industrial “agriculture”

focused on such crops as palm oil or soy may account for more forest loss than smallholder agriculture in some areas. Certain enabling conditions for intensification are critical for a positive contribution to conservation: secure property rights to assure that investments can be reaped over the long term, market demand and price incentives to offset the costs of more labor or capital, and good technical information that people can use and adapt to their own circumstances. Of these, secure property rights is perhaps the most important; without these rights, intensification can lead to displacement and migration into undisturbed, biologically significant areas. USAID and the CGIAR centers have been highlighting the benefits of **sustainable intensification** as a new paradigm for agriculture that is climate smart. Sustainable intensification is a practical pathway toward the goal of producing more food with less impact on the environment, intensifying food production while ensuring that the natural resource base on which agriculture depends is sustained, and indeed improved, for future generations.

### 4.3.2 Rangeland Management and Pastoralism

#### **Definition and Significance**

Rangeland ecosystems are dominated by herbaceous and shrub vegetation and maintained by fire, grazing, drought, or freezing temperatures. This broad category includes savannas, mixed woodland savannas, shrublands, tundra, and grasslands. Pastoralists are herders in areas where rain-fed agriculture is not particularly viable or possible; they have livestock-based livelihoods with mobility to pasture and water as a key characteristic. Pastoralists manage herds of domestic livestock, including cattle, sheep, goats, camels, yaks, llamas, alpaca, and horses. In the drier ecosystems, pastoralists may be truly nomadic, following sporadic and often unpredictable rains. In other areas, they may be very mobile but follow predictable seasonal rainfall with long-standing wet and dry season grazing areas. Agro-pastoralists are herders in areas that can either regularly or occasionally support crops. These groups tend to be sedentary, with a subset of the community often moving with herds to distant grazing lands. There are tens of millions of pastoralists in Central Asia, the Sahel, and East Africa, with fewer numbers in the temperate zones of South America,

Europe, and Siberia. Among the ethnicities and cultures associated with pastoralist adaptations are the Maasai, Tuareg, Somali, Fulbe/Fulani, Mongol, Tibetan, Bedouin, Baktiari, Sami, Siberian, and Turkic peoples.

Under varying definitions, 25 to 40 percent of the Earth's terrestrial area is rangeland, including the world's grasslands. Many dryland species are uniquely adapted to their environment or represent remnants of species that were elsewhere driven to extinction, making grassland biodiversity irreplaceable. The population of pastoralists – the human custodians of the grasslands – also varies by definition, from tens of millions to 200 million. Because of the often delicate relationship between rangeland health and productivity on the one hand and grazing and management practices on the other – and because the vast majority of pastoralists are wholly dependent upon grazing animals for their subsistence and/or livelihoods – rangeland management is critically important for one of the world's most economically disadvantaged and vulnerable groups.

Grasslands are also among the world's most threatened, but least protected, ecosystems. **An International Union for Conservation of Nature (IUCN) report** found that the most immediate threats to dryland biodiversity are the degradation of ecosystems and habitats caused by urbanization and other forms of human settlements, commercial ranching and monocultures, industrialization, mining operations, wide-scale irrigation of agricultural land, poverty-induced overexploitation of natural resources, and – underlying all of the threats – disincentives and distortions in the enabling environment.

#### **Key Questions**

##### **How can pastoralists contribute to biodiversity conservation strategies?**

Pastoralists can be a primary actor in contributing to biodiversity conservation by maintaining habitat and ecological processes. Rather than being a threat to biodiversity, pastoralists' grazing practices often maintain processes that promote healthy grasslands and support biodiversity. However, a major threat to grassland biodiversity is a massive loss of habitat and unsustainable use by pastoralists. Planners should consider how to develop strategies that build on existing

pastoral practices that are compatible with biodiversity conservation objectives.

Pastoralists can also contribute to biodiversity conservation by maintaining traditional knowledge about grasslands. There is a rich body of literature describing the many pastoralist and agro-pastoralist cultures and adaptive strategies, including their response to variation of rainfall in space and time, changing relations with their neighbors, and even political events that affect them and their herds. Activities of adapting pastoralists include moving flexibly among pastures, choosing among herd animals (for example, between goats and camels), selling or using their animals, allocating milk between calves and people, investing in wells, adopting mechanized transport, diversifying occupations (tourism, agriculture, wage labor), bartering or buying food for money, migrating, sending remittances, competing for pasture with other clans or tribes, establishing symbiotic relations with agriculturalists or agro-pastoralists (some codified in cultural norms, as along the margins of the African Sahel), and entering or leaving the pastoralist life as opportunity allows. Pastoralists can contribute expert knowledge of grassland biodiversity and the factors affecting ecosystem functioning and health, as holders of “indigenous ecological knowledge,”<sup>6</sup> as survey respondents, or in interchanges with pastoralists from other regions.<sup>7</sup> This knowledge can be particularly useful to researchers and biologists who are establishing biodiversity baselines, identifying potential strategies and priority sites, and monitoring ecosystem health.

### **What are some key issues in rangeland management and pastoralism?**

There are a number of issues that conservation planners should consider when working with rangelands and pastoralists, including

**complex adaptations and relationships** – Any project with pastoralists should recognize the complexity

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6 Arnold L. Mapinduzi, Gufu Oba, Robert B. Weladji, and Jonathan E. Colman, “Use of indigenous ecological knowledge of the Maasai pastoralists for assessing rangeland biodiversity in Tanzania,” *African Journal of Ecology* 41: 329–336. Article first published online: January, 2004. doi:10.1111/j.1365-2028.2003.00479.x

7 C. Curtin and D. Western, “Over-the-Horizon Learning Exchanges between African and American Pastoralists,” *Conservation Biology*, August, 2008, 22:4: 870–877. doi: 10.1111/j.1523-1739.2008.00945.x

of their adaptations; failure to do so can result in missed opportunities. For example, in Sierra Leone and Guinea, pastoralists interact with forest dwellers and should be included in forest management plans. If they are not, the groups may compete with each other for water and forest resources. Pastoralists may also burn forests to create pasture and start land tenure struggles with the forest dwellers. Thus, in much of West Africa, herder-agriculturalist interactions are both symbiotic and a source of conflict.

**distribution of benefits** – There is a growing body of literature on the costs and benefits of ecotourism for herders. While participation in tourism strengthens land tenure claims, low or inequitably distributed benefits can result in social conflicts and exacerbate land tenure issues for pastoralists.

**need for mitigation measures** – Conservation strategies that seek to protect grasslands need to address impacts on the human populations. Expropriation of rangeland for strict conservation is likely to raise a resettlement issue that requires serious attention and mitigation of potential harm.<sup>8</sup> Many studies show that herding livestock within protected areas can be compatible with biodiversity.<sup>9</sup> Therefore, rather than excluding herders from these areas, programs should address the factors that overwhelm the capacity of pastoralist systems to maintain habitat: increasing populations, in-migration of other ethnicities, sedentarization of nomads, changing land tenure (for example, privatization of land holdings), reduction of territories, erosion of traditional social organizations, and availability of powerful firearms. While some of these changes may bring diet, health, or income benefits, they may also lead to overstocking and environmental degradation. Maintaining the capacity of pastoralists to survive, even while incorporating new adaptive options, is an important and complex consideration for any development effort.

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8 K.M. Homewood, and W.A. Rodgers, *Maasailand Ecology: Pastoralist Development and Wildlife Conservation in Nogorongoro Conservation Area, Tanzania*. (Cambridge: Cambridge University Press, 2004.)

9 Vasant K. Saberwal, “Pastoral politics: Gaddi grazing, degradation and biodiversity conservation in Himachal Pradesh India.” *Conservation Biology*, June, 1996. 10:3: 741–749.



### **What experience does USAID have with grasslands and pastoralists?**

Using the model that improved grazing systems can lead to increased wildlife populations, USAID has supported the management of pastoral grazing lands, focusing on sustainable stocking rates, reliable access to markets, improved grassland health, improved livestock production, and effective conservation of wildlife habitat.

In Ethiopia, Kenya, and Somalia, the USAID Africa Regional Enhanced Livelihoods in Pastoralist Areas project is aimed at increasing the resiliency of pastoralists and agro-pastoralists in drought-prone areas by stabilizing and improving their livelihoods. Activities include 1) emergency assistance to affected populations; 2) conflict prevention and mitigation; 3) livestock-based and alternative livelihood development; 4) increased involvement and representation of pastoralists, including in regional policy affecting pastoralists and cross-border trade in live animals; and 5) improving regional early warning information and dissemination. USAID supported the Small Ruminant CRSP, the Global Livestock CRSP, and nine other CRSP programs developed under Title XII of the International Development and Food Assistance Act of 1975. Research from this investment has shed much light over the last couple of decades on the rethinking of rangeland management from a traditionally preferred ranching model of livestock production toward sustainable pastoral livelihoods with mobility and environmental stewardship as fundamental considerations.

Local and international NGOs such as the African Wildlife Foundation have worked extensively with pastoralists. One such organization in the international research systems is the International Livestock Research Institute, which studies pastoralism and other work related to livestock. The institute and associated scientists have developed actor-based models for rangeland management, depicting the different and convergent uses, needs, and goals of various stakeholders in grassland ecosystems.<sup>10</sup>

### **4.3.3 Agroforestry and Tree Crops**

#### **Definition and Significance**

Agroforestry is commonly defined as the deliberate association of trees and shrubs with agricultural crops and/or livestock. There are several forms of agroforestry, including

**agrisilvicultural** – the association of agriculture with trees. These can be “natural systems,” such as shifting cultivation (see below), or “improved systems,” where high-value and/or nitrogen-fixing trees are introduced into a farming system to enhance value and improve soil fertility.

**agrosilvopastoral** – the association of agriculture, trees, and livestock. One example is Sahelian Agroforestry Parklands, where valuable trees, such as the shea tree, are combined with livestock browsing and different crops grown intensively and extensively.

**silvopastoral** – the association of trees and livestock. Examples include USAID/Panama’s efforts to support sustainable ranching with reforestation in the Panama Canal watershed.

**evergreen agriculture** – the combination of trees in farming systems with the principles of conservation (no-till or low-till) farming. This is emerging as an affordable and accessible science-based agroforestry solution, which results in better care of the land and increased smallholder food production.

Agroforestry plays a role in ecoagriculture and sustainable intensification approaches that reduce pressure on natural system. Ecoagriculture (see [Section 4.3.1](#)) approaches incorporate agroforestry and agricultural intensification into multi-stakeholder land use planning for target, biodiversity-rich landscapes. Agroforestry also may be considered as a low-input, perennial technology for agricultural intensification that may be more appropriate for poor farmers (e.g., “green manure” from agroforestry shrubs, versus purchasing inorganic fertilizer). A naturally intensified farming system that increases soil carbon can improve productivity, thus mitigating the need for agricultural expansion.

<sup>10</sup> USAID East Africa Regional [webpage](#).

## Key Questions

### What are important biodiversity values of agroforestry systems?

It makes intuitive sense that agroforestry is a more appropriate use of land around natural forests than land with few or no trees. More trees in the landscape promote connectivity of habitat and improve ecosystem function. For example, using native trees and shrubs in agroforestry systems next to protected areas is a way to extend/expand the natural habitat. Important biodiversity species, including pollinators, find habitat in these corridors and edges.

In addition, many agroforestry systems have intrinsic biodiversity value. These include diverse tree crop and agroforestry systems, such as

**Multistory agroforestry systems** found in Amazonia

**Jungle rubber** in Indonesia

**Cocoa agroforestry systems** of West Africa

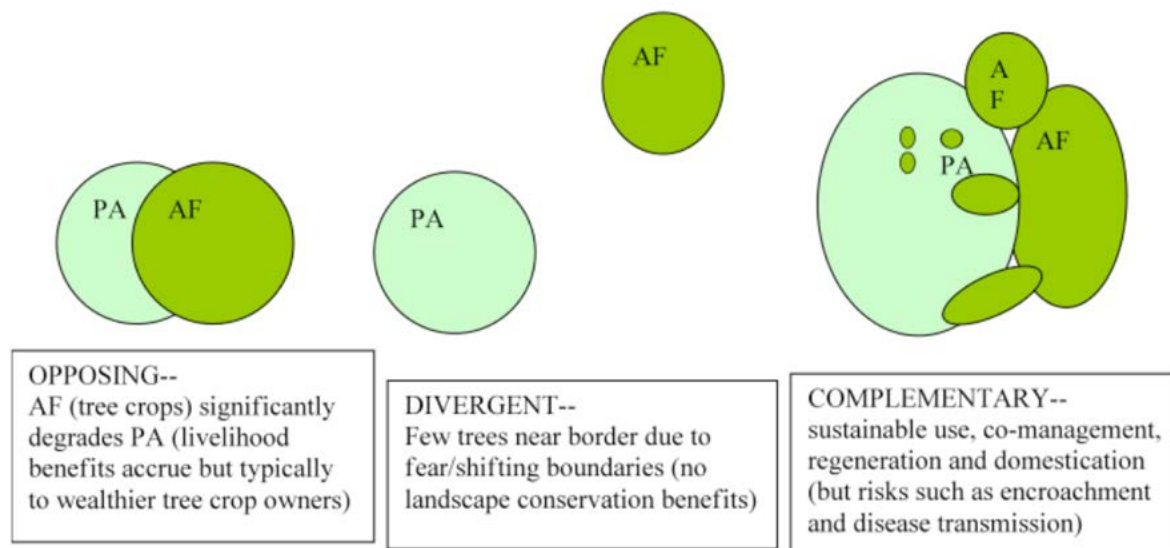
**Swidden or shifting cultivation systems** with long rotations that promote regrowth of trees and incorporation of trees into the farm – as distinguished from “slash and burn” where rotations are short or large areas are cleared with low productivity.

### What are the best ways for agroforestry to support landscape-scale conservation?

Agroforestry tree crops, such as native fruits, nuts, and barks, and intercrops within tree-crop agroforestry systems add value to diverse forest farming systems. Farmers are less likely to cut and burn trees in their fallows and forest areas if they harbor valuable products to grow crops. Natural enterprises from these products can bolster conservation efforts (see [Section 4.5.2](#)). Some non-timber forest products (NTFPs) may be successfully cultivated in agroforestry systems, and this could broaden and localize their production nearer to households, with concomitant savings in labor time and effort; however, it could also undercut the value the products provide in more natural forest systems.

Agroforestry techniques may be used as part of a larger, landscape-scale ecoagriculture or agricultural intensification program in mixed agricultural and natural habitat and protected area landscapes. These techniques may be effective in reducing pressure from more extensive, shifting agriculture practices; for example, providing the positive benefits of fallow in a smaller area through hedgerow intercropping. These more intensive, sedentary practices, combined with native tree crops, can also enhance connectivity between natural habitats. Figure 17 shows how this approach can provide landscape benefits even as there are risks to consider.

Figure 17. Three Models of the Relationship between Agroforestry (AF) and Protected Areas (PAs)



Source: Reprinted by permission. Russell, Diane, Rebecca A. Asare, and J. Peter Brosius. “People, Trees, and Parks: Is Agroforestry In or Out?” *Journal of Sustainable Forestry*. 2010.

To employ agroforestry effectively for conservation, it is important to ensure that people will benefit from additional trees on their land and/or in their common areas. The trees and associated crops must have economic value and people must be able to control their use. (In some countries indigenous trees are the property of the state forestry agency, even if on private land.) Agroforestry technologies have to make economic sense to farmers. Adding more trees or more biomass has to translate into concrete gains, either through direct sales of products or clearly increased production of marketable crops. The agroforestry approach has to be technically and economically sound. It is important to employ the right expertise for assistance and to use adaptive techniques, such as farmer field schools, to share and disseminate best practices.

The target population should be involved in using or managing the natural area; otherwise, there is little incentive for agroforestry to substitute for use of natural forest.

The scale should be sufficient to make a real difference in the landscape, but increased scale often results in increased costs, at least initially (e.g., more extension resources are needed to facilitate introduction of improved techniques to a large number of farmers).

Agroforestry does not always work in a conservation strategy. Promoting agroforestry approaches has been used extensively in conservation programs, yet there has been little rigorous testing of its efficacy. Studies of agroforestry around protected areas have found that

- access to planting materials – and hence farmers' choice of trees – is often limited to fast-growing exotics that are not likely to extend or improve natural habitat, although they may sequester carbon.
- incorporating the history of agroforestry and tree use by local people into conservation planning can deepen understanding of the landscape, as well as strengthen local natural resource use and management.
- agroforestry extension in conservation projects can be weak technically and not appropriately targeted, particularly with respect to more marginalized land users, such as women, indigenous peoples, and younger households.

- livelihood options around protected areas may be characterized by restrictive economic and conservation policies and few wage options. In addition, the "buffer zone" is an area of "rough policy terrain," where protected area policy on use of forest resources meets national policy and local bylaws governing land and tree use and tenure. Thus, local people may receive conflicting signals about whether they can plant trees or be free to use trees and tree products.

### **Tree Crops and Biodiversity**

Tree crops can be a threat to biodiversity

- when oil palm, rubber, or timber plantations extend into natural forests
- where there is monoculture and intensive tree crop systems, including use of chemicals such as fungicides that can have an impact on soil microorganisms and other vegetation

Tree crops can make a contribution to conservation through extending habitat and improving forest connectivity. For instance,

- as part of complex indigenous tree crop agroforestry systems, such as "jungle rubber" systems (see Agroforestry [Section 4.3.3](#))
- within shade and bird-friendly tree crop systems, where there is a price premium for biodiversity-friendly production
- where they buffer natural forests or parks and may protect against poaching and incursion (such as "tea buffers" in Kenya)
- in new initiatives, such as [TFA2020](#), that seek to reduce the impact of larger-scale tree crop production on tropical forests and as such may have a positive impact on biodiversity at the landscape level

### 4.3.4 Fisheries and Aquaculture

#### **Definition and Significance**

Fisheries involve the harvesting of fish from wild, natural populations. Wild fisheries are the largest use of biodiversity in the world. Fish are among the most nutritious foods, providing an array of minerals, vitamins, and fatty acids that are vital for normal brain development. Globally, fish provide an estimated 30 percent of daily protein requirements for over one-third of the world's population and provide livelihoods for more than 600 million people. Despite their importance to the health and economic well-being of billions of people globally, fisheries are one of the most poorly managed natural resources on earth. **The World Bank estimates** that more than \$50 billion in revenue is lost each year because of poor or weak management of these valuable resources, including at least \$1 billion in Sub-Saharan Africa. As a result, fisheries are collapsing, largely due to open and often unregulated access, lack of proper management, and destructive fishing practices that are reducing the natural productivity of aquatic habitats around the world.

**Sustainable fisheries** can be defined as the management of resource extraction and ecosystem health to ensure conservation and long-term use of these valuable natural assets. Thus, sustainable fisheries depend upon a focus on the open-access nature of these “common resources” and the restoration and maintenance of the natural productivity of aquatic ecosystems. Sustainable fisheries often require the implementation of sustainable fishing policies and practices, as well as effective local, national, and international governance, to ensure the long-term health and productivity of aquatic species that are important to human health, livelihoods, and economic well-being. Unlike traditional fisheries management, modern approaches consider the entire ecological, policy, social, and political context and focus on fostering intact and productive ecosystems, rather than simply on the harvest levels of a narrow range of target species.



**COLLECTING COCKLES:** In Bweleo Village, Zanzibar, women spend hours bent at the waist collecting cockles for food. USAID support for “no-take” zones has allowed regeneration of cockles while securing a good supply of oysters for half-pearl farming and jewelry making. Photo: Klaus Hartung



## Key Questions

### **What are key threats to sustainable fisheries and aquatic biodiversity?**

Major threats to sustainable fisheries and aquatic biodiversity may include open access to resources; destructive fishing practices that destroy the natural productivity of ecosystems; overfishing; removal of under-aged individuals before they reproduce; loss of critical fish habitats, especially spawning and nursery habitats such as mangrove forests and wetlands; unsound aquaculture; diversion of water flows and water pollution; unsustainable coastal development; sedimentation and pollution from poor watershed management; the introduction of marine and freshwater invasive alien species through aquaculture, transportation, and the wildlife trade; and climate change threats, such as acidification and increased temperatures.

Unsound fishing practices threaten not only the health and biodiversity of aquatic ecosystems, but also the fishing industry itself. Destructive fishing practices – such as the use of poisons (i.e., cyanide), explosives (dynamite), bottom trawls, and beach seines – destroy the habitats and disrupt the food chains upon which healthy fisheries depend. Non-selective removal of target fish can also lead to the unintended mortality and waste of non-target species (referred to as by-catch), further disrupting the ecosystem and food chains. The use of small net sizes catches juveniles before they can reproduce, and overfishing reduces the ability of the population to replace itself and grow, reducing the resource “capital.”

Aquaculture also presents considerable threats to marine fisheries. More than 40 percent of all fish caught in the world are ground up to produce “fish meal,” which is used as feed, primarily for farmed fish, but also for livestock. Small fish lower down on the food chain are particularly targeted for fishmeal; these small fish are also important components of the natural food chains, and their collection can have ramifications for the rest of the ecosystem.

### **How can the productivity of fisheries, both small-scale and industrial, be maintained or enhanced through investments in biodiversity conservation?**

There are a range of biodiversity conservation strategies that can help to reverse the trend in fisheries and ensure healthy and sustainable fish populations. Modern fisheries management practices can restore, maintain, and increase the biodiversity resource base upon which the productivity of fisheries and livelihoods depends. New practices manage access to the fishery, adopt an ecosystem-based approach to management, utilize appropriate fishing gear, establish fishery reserves, and promote active participation by fishers in the management process. These practices include

**managing access to fisheries** – A key step in reforming fisheries is to manage access to fishing areas. Co-management approaches, in which both the fishers and government share management responsibility, can increase resource stewardship, improve compliance, and promote transparent decision-making.

**promoting sound economic and trade policies** – Policy reforms are needed to eliminate perverse subsidies driving overfishing, destructive fishing, and illegal fishing, and to capture the economic rents from these valuable resources.

**reducing and eliminating destructive fishing practices** – This step includes eliminating bottom trawling; dynamite fishing; and the use of destructive fishing gear, such as long-line fishing.

**creating fisheries or ecological reserves, protected, or managed areas** – Fisheries reserves ensure the health of critical feeding, nursery, and spawning sites; allow the growth of juveniles; and foster larger, healthier fish that can help populate fishing areas. Creating no-take zones in vital fish spawning areas increases fish stocks and ultimately benefits fishermen and communities. This step may also include the promotion of locally managed and community-conserved areas.

**ensuring connectivity of marine and freshwater habitats** – Best practices in maintaining connectivity, particularly for anadromous fish such as salmon, include the construction of fish ladders; the design of fish-friendly culverts and passages; the regular release of dams in order to mimic natural flow regimes; and the

maintenance of large sections of undammed rivers and streams, especially main river stems.

**protecting and restoring key aquatic habitats** – Ensuring the health of key habitats, such as mangrove forests, coral reefs, and wetlands, may require proper economic incentives for the sustainable use of these areas. In some areas, active restoration efforts may be needed.

**changing land and watershed management practices** – Direct sources of pollution and sedimentation, such as unsound coastal development, hotel effluent, logging, and excessive pesticide and fertilizer use, can often be addressed through improved land use practices and sectoral policies, including requiring wastewater treatment and reforming logging practices to minimize sedimentation.

**increasing efficiency** – Utilizing value chain analyses to identify areas for improving efficiency can promote more efficient and sustainable fishing and processing practices, thus providing more benefits to fishing communities and incentives for improved management.

**utilizing market-based mechanisms and rights-based approaches** – Appropriate economic incentives can promote sustainable use and environmental stewardship. Rights-based management allocates a given percent of the catch to each individual or license, increasing owner buy-in and commitment to sustainability. Certification schemes can also promote improved and sustainable management through third-party verification. Major seafood buyers around the world are recognizing the need for more sustainable seafood sourcing and are investing in and promoting improved management.

### **What are some basic principles of an ecosystem-based approach to sustainable fisheries?**

A group of scientists recently identified [ten principles of ecosystem-based approaches](#) for promoting sustainable fisheries. These include

**Keep a perspective that is holistic, risk-adverse, and adaptive.** This requires the incorporation of clear monitoring mechanisms, the development of management thresholds and warning signs, and the use of adaptive management practices.

### **Maintain a diverse structure in fish populations.**

Large, healthy, and older female fish are extremely productive but also susceptible to overfishing.

**Maintain the natural spatial structure of fish stocks.** This requires ensuring that management boundaries match natural boundaries in the sea.

**Monitor, protect, maintain, and restore key habitats.** This ensures that fish have adequate feeding, spawning, and nursery habitat.

**Maintain resilient ecosystems.** This ensures that the healthiest examples of diverse ecosystems are maintained and are able to withstand occasional shocks.

**Identify and maintain critical food-web connections.** This includes both predators and forage species.

**Think in longer time cycles.** This requires thinking in decadal and even longer cycles to accommodate impacts from climate change.

**Assess the impacts of fishing and account for evolutionary changes.** This entails determining the long-term impacts of harvesting larger, older fish on the overall trophic structures.

### **How can effective governance help foster the sustainable management of fisheries?**

Governance includes the range of actors, policies, laws, structures, and practices by which decisions are made regarding the management, harvest, protection, and conservation of fisheries. Governance exists at multiple scales, including community, national, and international. Each of these levels is important to ensuring sustainable fisheries.

**Governance of community fisheries:** Small-scale fishers comprise approximately 94 percent of the world's fishers and produce nearly half of the global fish supply for human consumption. Therefore, effective community governance is vitally important. A first step in community governance is delineating and managing access to the community fishing area, which will increase local stewardship and compliance with management practices. Governance approaches can include community-based management, co-management, or territorial use rights, where access is managed at the community level. More attention is also being

placed on securing individual access “rights” through “individual transferable quotas” or “catch shares,” which guarantee an individual a certain percentage of the total quota. Catch shares have been shown to both increase stewardship and maintain more stable fish populations.

**Governance of national fisheries:** National governance affects fishing policies within a country’s exclusive economic zone – a 200 nautical mile boundary from the coastline. An example of a national fisheries governance framework can be found in the Philippines, where the country has adopted a comprehensive coastal resource management approach as the foundation of fisheries management. Examples of actions that indicate effective national fisheries governance include

- development of a comprehensive, integrated coastal-zone management framework or integrated river basin framework
- development of a comprehensive fisheries management plan, including the development of a list of species allowed to be collected and traded, a list of registered collectors and exporters, a science-based approach to setting quotas, financing mechanisms to capture the economic rents from fisheries and reinvest revenue back into management, an assessment of fishing capacity, and enforcement of sustainable fish harvest levels
- creation of a comprehensive system of marine protected areas and fisheries reserves – the current guidelines for the 2011-2020 Strategic Plan of the Convention on Biological Diversity call for 10 percent protection of marine and coastal areas
- effective surveillance, control, and prevention programs governing illegal fishing within the economic exclusive zone

**Governance of international fisheries:**

International governance is particularly important for regulating straddling fish stocks (fish populations that span political boundaries and exist in more than one national jurisdiction) and high seas fisheries (those that exist outside of all national jurisdictions). Global responses include the UN Convention on the Law of the Sea, the UN Fish Stocks Agreement, and the FAO Code of Conduct for Responsible Fisheries. Regulating

fisheries in the high seas is one of the greatest challenges in establishing sustainable fisheries beyond national boundaries.

**What are some examples of sustainable fisheries?**

**Fisheries Improved for Sustainable Harvest (FISH) Project**

– a USAID-funded program in the Philippines. Along the Danahon Bank, FISH has demonstrated that well-managed fisheries can increase productivity three-fold, and that fish catch decline can be arrested and reversed over a period of time if destructive and illegal fishing practices are reduced, fishing capacity is managed, and local fisheries governance is strengthened. Management initiatives included gear restrictions; species-specific management, establishment of marine protected areas (MPAs) and MPA networks; coordinated and consistent law enforcement; stakeholder education and engagement; and registration, licensing, and zoning of fishing and water-use activities. From 2004 to 2008, there was a 76 percent increase in the total harvest, with a corresponding 73 percent increase in the value of fish. Likewise, catch per fisher showed an increase from 2.6 kg per day in 2004 to 6.06 in 2008. Such changes in exploitation patterns in these municipalities redound to increased food on the table and increased income for many coastal families dependent on the Danajon Bank for food and livelihood (see also Box 58).

**Management of Aquatic Ecosystems through Community Husbandry (MACH)**

– a USAID-funded program in Bangladesh. By adopting conservation measures and sustainable fishing practices, villages in Bangladesh restored and improved fisheries productivity in three degraded wetlands, leading to improved food security and well-being of 184,000 of the country’s poorest citizens. Between 1999 and 2006, fish catches in project villages rose by 140 percent, consumption went up 52 percent, and average daily household incomes increased 33 percent. With increased consumption of fish – a vital source of much-needed protein, essential oils for brain development, and micronutrients like vitamin A – malnourishment and hunger decreased. Restoration of the wetlands also led to a large increase in bird, as well as fish, diversity.

### **How can aquaculture help to conserve biodiversity?**

Aquaculture is one of the fastest-growing food production sectors globally. It also accounts for as much as one-half of the global consumption of fish and shellfish. This trend comes at the expense of terrestrial and marine biodiversity and is driven by ever-increasing global demand for inexpensive freshwater and marine fish products. While aquaculture presents opportunities for providing high-quality protein sources to meet the demand of a growing global population, there are some basic best practices that can help to minimize environmental risks. These include

- promoting landscape-scale governance that ensures proper siting and management of aquaculture facilities
- promoting native, low trophic-level species, especially filter-feeding animals (such as oysters, clams and mussels) that do not require any feeds and can help cleanse the water
- moving toward plant-based feeds originating from sustainable agriculture
- reducing and eliminating the use of fishmeal or fish-oil-based feeds from unsustainable fisheries
- ensuring that there is no net loss in fish protein yield in the life cycle of the fisheries
- avoiding the use of wild-caught juveniles for grow-out
- preventing negative environmental impacts from discharges and effluents to the surrounding areas
- preventing negative effects to local wildlife (plants as well as animals), including avoiding risks to local wild populations
- avoiding the use of exotic species and genetically engineered fish or feed
- minimizing the risk of disease outbreaks and transmission (e.g., by controlling stock densities)
- avoiding the depletion and diversion of local water resources to safeguard the health of wild fish populations
- promoting land-based Recirculating Aquaculture Systems (RAS)

*NOTE: Restocking has been shown to reduce the resilience of fish populations.*

### **BOX 58. SECURING SUSTAINABLE SMALL-SCALE FISHERIES FOR FOOD SECURITY, POVERTY ERADICATION, AND BIODIVERSITY CONSERVATION**

Small-scale fisheries have been largely invisible within the global fisheries sector even though they play a pivotal role in meeting food needs, building local economies, and managing marine and coastal ecosystems. They represent about 90 percent of the world's nearly 51 million capture fishers, produce half of all global fish catch, and supply two-thirds of the fish consumed by people. Small-scale fisheries employ more than 90 percent of the world's capture fishers and fish workers, about half of whom are women. World marine capture fisheries production, however, peaked in the 1990s and continues to decline, with about 61 percent of the global marine wild fish stocks fully exploited or overexploited. These trends have keen implications for biodiversity conservation and the viability of small-scale fisheries that provide food and livelihoods in developing countries. *The Voluntary Guidelines on Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication* were adopted in 2014 to draw attention to the considerable contribution of small-scale fisheries to a broad array of development objectives.

For more information, see *USAID 2015. Small-scale Fisheries and Marine Tenure: A Sourcebook on Good Practices and Emerging Themes* and *USAID 2015. Looking to the Sea to Support Development Objectives: A Primer for USAID Staff and Partners*.



## 4.4 GLOBAL CLIMATE CHANGE

### 4.4.1 Overview

#### **Definition and Significance**

Climate change is defined as a change in global climatic patterns, primarily caused by increased levels of atmospheric greenhouse gases (GHGs) and produced by such human activities as burning of fossil fuels, clearing and burning of forests, and grazing of livestock. Climate change impacts are highly variable and unevenly distributed around the world. Greenhouse gases refers to a number of different gases, including carbon dioxide, methane, and nitrous oxide, that collectively increase the amount of solar radiation trapped in the Earth's atmosphere.

Climate change has implications for biodiversity and natural ecosystems around the world. Loss of biological diversity is one of many impacts associated with changing climatic conditions, and planning for effective biodiversity conservation will mean helping species and the ecosystems on which they depend adapt to the expected changes. In the terrestrial realm, changes in rainfall quantity and seasonality mean that conditions will no longer allow certain plant or animal species to exist in portions of their current ranges, changing the functionality of entire ecosystems, such as forests or grasslands. When these changes make wilderness or pastoralism a better use of land than cultivation, wildlife and native plant species can benefit. In marine systems, changes in ocean temperature and acidity can lead to mass die-off events, such as coral bleaching.

#### **Key Questions**

##### **What is the global response to climate change?**

The global community has begun to address climate change in a number of ways; the most notable is the United Nations Framework Convention on Climate Change (UNFCCC), which was adopted in 1992 and which more than 190 nations have now signed. According to Article 2, the purpose of the Convention is the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.”

##### **What are some of the impacts of climate change on natural and human communities?**

The impacts of climate change on biodiversity and ecosystems are highly variable globally and depend, in part, on the geographical context. Examples include low-lying coastal areas that are susceptible to rising sea levels, areas at each of the poles that are most susceptible to rapid warming, areas closest to the equator and dry areas that are most susceptible to drought and heat extremes, areas at high elevation that are susceptible to species loss, degraded areas that are susceptible to invasive species and disease, and fragmented areas that are susceptible to disruptions in migratory patterns. Even where short-term climate conditions are compatible with the persistence of species, the current speed of climate change is expected to outpace many species' ability to migrate or adapt, especially in the case of species with highly restricted ranges or those whose habitat has been severely fragmented. Climate change is expected to be one of the main causes of biodiversity loss this century.

The effects of climate change on ecosystems and biodiversity will also have profound impacts on human communities. These impacts, which are also variable and context-dependent, include decreased productivity in fisheries, grazing lands, forests, and agriculture; increased incidences of human disease; increased numbers of forest fires in proximity to human habitations; increased frequency and intensity of catastrophic storms; increased numbers of floods and droughts; and impacts to coastal cities through sea-level rise.

##### **What are some strategies for incorporating climate change considerations into biodiversity conservation strategies?**

Although the impact of climate change on natural and human communities will likely be profound, conservation planners can take steps to help strengthen resilience to climate change and promote adaptation:

- Identify long-term biodiversity conservation and development goals for an area, focusing on the ecosystem goods and services that will require conservation, restoration, protection, and/or management. Planners should keep in mind that climate change will continue for decades, even if

the emissions of greenhouse gases are dramatically decreased in the near future.

- Reduce the impact of other stressors, such as pollution, overexploitation, land use change, and invasive species. A comprehensive approach to biodiversity conservation will increase the capacity of species to adapt to climate change, and a more diverse, functional ecosystem will be more resilient to its impacts.
- Assess how climate change may impact an area's biodiversity, ecosystems, and ecosystem services. Biodiversity responses to current or recent climate-related events offer some guidance. It is valuable to consider future scenarios of key environmental variables, such as temperature and precipitation, and how they may be expected to impact biodiversity and ecosystems. Planners also should account for predicted changes in demand for ecosystem services that may magnify or moderate climate impacts and likely human adaptation actions that may affect ecosystems.
- Focus on connectivity and spatial distribution. Species and ecosystems will tend to shift their habitats and ranges toward areas that will remain cooler, including poles, higher elevations, and sheltered areas. This may also entail identifying areas of refugia – places that have survived or are likely to survive extreme weather conditions. Planners can consider how to facilitate ongoing and future range shifts in their spatial planning efforts. This process makes conservation outside formally protected areas more important; current and future habitats can be connected by creating corridors between protected areas and increasing the size of areas being managed for biodiversity.
- Maintain and expand large, intact landscapes and blocks of habitat. By focusing on landscape-scale conservation, planners can provide the best safety net for species and ecosystems and encourage a more resilient, robust landscape. This can be accomplished through transfrontier conservation areas.

### **What is the relationship between ecosystem management and climate change?**

Although climate change is largely caused by the consumption of such non-renewable fossil fuel resources as oil and coal, the management of various ecosystems

also plays a key role in affecting the amount and types of GHGs in the atmosphere and, therefore, the severity of climate change. The most obvious example can be found in tropical forests, which store large volumes of carbon and have experienced high rates of deforestation during the last century. Other ecosystems, such as tundra, peatlands, and wetlands, may store a very large amount of carbon-rich biomass below ground, so the conversion of these areas has the potential to release large amounts of GHGs as they dry out, are exposed to air, and/or are burned. Terrestrial ecosystems have the potential to both store large amounts of carbon, which could otherwise end up in the atmosphere, and release carbon, if poorly managed.

The dual role of ecosystems as both potential carbon sources and sinks means that their proper management represents an accessible, low-technology mechanism by which atmospheric carbon content can be regulated. This is especially the case with tropical forests. Tropical deforestation, forest degradation, and agriculture together account for as much as 30 percent of all GHG emissions globally. Considering that the clearing of tropical forests is often a result of increased demand for agricultural production, their management has become an important focus of climate change mitigation. In many tropical developing countries, forestry and land use are by far the most important sources of GHG emissions.

### **4.4.2 Biodiversity and REDD+/Sustainable Landscapes**

#### **What is REDD+ and what is its impact on biodiversity conservation and development outcomes?**

In recognition of the importance of preventing forest degradation and loss, climate change scientists and policy experts developed a mechanism known as Reduced Emissions from Deforestation and Forest Degradation (REDD+). REDD+ describes a mechanism by which forest conservation and/or restoration, as well as the sustainable management of forests and enhancement of forest carbon stocks, can play a key role in reducing atmospheric GHGs. Site-level projects or policy-level interventions to reduce deforestation are an increasingly common part of national and international climate mitigation strategies. Early projects sold carbon credits,

representing tons of CO<sub>2</sub> sequestered as a result of avoided deforestation, on the international voluntary market as a way to finance forest conservation or reforestation activities in specific sites of interest. Carbon credits are purchased by companies or individuals in order to meet voluntary or required reductions in the amount of GHGs they emit from their operations.

A well-designed REDD+ program has the potential to deliver benefits for local communities, including indigenous peoples and forest-dependent populations, by providing direct PES. Sources of subsistence and livelihoods, such as small-scale agriculture, agroforestry, and non-timber forest products, depend on the reliable provision of forest ecosystem services. Successful REDD+ programs may also assist communities with adaptation to climate impacts.

### **What are some key issues for USAID to consider when supporting the development of REDD and REDD+ mechanisms?**

There are several key areas where USAID programming, in synergy with efforts from other donors and national programs, could advance the development of REDD+, including

- supporting the development of national REDD+ strategies while helping to build capacity at the provincial/state or local government level to engage in the program
- supporting the effective engagement of forest-dependent communities, private enterprise, and other civil society actors in the development of REDD+
- providing technical support to the development of national GHG inventories, national forest inventories, and national or subnational reference scenarios (“baselines”), as appropriate
- providing technical assistance on the legal, financial, and regulatory structures necessary for participation in the REDD+ mechanism
- developing demonstration projects at the site level to test methodologies, strategic approaches, and safeguards to inform the development of the national REDD+ strategy

### **What are some examples of conservation projects that address climate change?**

In the Congo Basin of Central Africa, maintaining the region’s carbon sink potential is a key objective of USAID’s Central African Regional Program on the Environment (CARPE), a long-term initiative to promote improved forest management and biodiversity conservation. With its vast forest reserves, Central Africa is the most important African sub-region for storing carbon and mitigating carbon dioxide emissions. The **CARPE Program** creates and executes on-the-ground land use management improvement, coupled with a satellite imagery monitoring system supported by stakeholder participation and good governance tools. At the same time, national governments in the CARPE region are moving forward with the design and implementation of their national REDD+ plans, providing opportunities for USAID to support key elements while informing emerging priorities with years of successful conservation work at the subnational landscape scale. A United Nations Development Programme/Global Environment Facility (UNDP/GEF) project in Namibia focuses on increasing the capacity of protected area managers to improve climate resilience and adaptation by promoting activities that reduce bush encroachment and maintain water supplies for forests, even under climate threats, thereby reducing water demand. The project also aims to increase the size and representativeness of the protected area system to extend protection of climate refugia, such as mountainous areas with south-facing slopes, and increase connectivity through the north-south corridors.<sup>11</sup>

### **4.4.3 Biodiversity and Clean Energy/LEDS**

#### **What is LEDS?**

LEDS refers to low emission development strategies. USAID’s climate change mitigation work seeks to help countries accelerate the transition to low emission, sustainable economic development through investments in clean energy and sustainable land use. A country pursuing a low emission development path will grow its economy and improve the lives of its people in a way that achieves economy-wide reduction in net greenhouse gas emissions, compared to a business-

<sup>11</sup> GEF, [Strengthening the Protected Area Network \(SPAN\)](#) in Namibia.

as-usual trajectory. Changes will be achieved through sector-specific improvements in key areas, such as energy, forests, agriculture, and transportation. Countries that pursue low emission development will be the best positioned to benefit from a new global low carbon future. USAID accomplishes LEADS work through two mitigation pillars: clean energy and sustainable landscapes.

### **What is the relationship between LEADS and biodiversity?**

Climate change poses direct and indirect threats to species and ecosystems across the globe. Climate change mitigation seeks to lower the rate of accumulation of GHGs in the atmosphere by reducing emissions and increasing sequestration of GHGs. Mitigation lowers the probability that the Earth's temperature will rise to dangerous levels, and that humans and other species will experience the worst consequences of warming. Two main sources of GHG emissions are burning fossil fuels for energy and land practices that release GHGs into the atmosphere. By adopting a low emissions development pathway, countries can reduce their emissions with benefits for biodiversity, as well as human communities. The clean energy and sustainable landscapes pillars both interact with biodiversity. See [Section 4.4.2](#) for more on sustainable landscapes.

### **What are the impacts and benefits of clean energy on Biodiversity?**

USAID works to strengthen countries' abilities to use indigenous or regional clean energy resources, including wind, solar, biomass, and hydropower, at both small and large scales, and supports improvements in efficiency of buildings, appliances, and industrial applications – all of which can reduce greenhouse gas emissions. Alternative energy sources can have impacts on biodiversity. For example, in addition to land that may be flooded and other land conversion caused by infrastructure development, dams for hydropower can disrupt river and stream ecosystems and impede fish migrations. In addition, wind turbines and some types of solar arrays are a threat to birds, bats, and insects that are killed in collisions. Some of these threats can be ameliorated through informed siting based on thorough analysis of species migration and movement corridors and by designing infrastructure that mitigates negative impacts

on biodiversity (e.g. fish ladders on dams or bird-safe wind turbines). Improvements in efficiency of appliances, buildings, etc., reduce the amount of fuel or other energy sources needed, potentially relieving pressure on resources. For example, improved cook stove efficiency could lead to less wood or charcoal collection, reducing forest and habitat degradation.

### **Where do LEADS and biodiversity work together?**

The U.S. Government's flagship interagency program Enhancing Capacity for Low Emissions Development (EC-LEADS) has established partnerships with more than 20 developing countries, including Albania, Bangladesh, Colombia, Costa Rica, Gabon, Indonesia, Kenya, Macedonia, Mexico, Moldova, the Philippines, Serbia, and Vietnam. Where these countries overlap with biodiversity priorities, there are opportunities for integration. Many USAID clean energy and biodiversity projects have been successful in reducing carbon emissions, conserving biodiversity, improving human health, and raising household income (see Nepal case study in Box 59).



**HEALTH IS WEALTH:** A member of the Samjhana Community Forest User Group in the Terai Arc of Nepal examines her “crop” of medicinal plants. In addition to producing a valuable harvest, they are easier to maintain than food crops because wildlife don’t eat them. Photo: Helena Telkanranta, WWF-Canon



## BOX 59. TERAJ ARC LANDSCAPE, NEPAL – BIOGAS TECHNOLOGY

One example of a clean energy project that conserves biodiversity is in the Terai Arc Landscape of Nepal. In 2003, WWF-Nepal and the Khata Community Forestry Coordination Committee, an entity comprising 32 forest user groups in the Khata area, began incorporating health services into conservation work in the southern region of the Terai Arc Landscape (TAL), Nepal. The Khata corridor is a critical area connecting Bardia National Park in Nepal and Katarniaghat Wildlife Sanctuary across the border in India, and a suite of activities was planned to restore degraded forest land in the corridor by relieving the main threats to the forest and promoting community forest management. Subsequently, WWF-Nepal expanded this program and began introducing the use of biogas technology more widely in the region to produce an efficient, environmentally friendly, locally constructable, and healthy energy source for local communities.

Biogas would be used to combat biodiversity loss in the landscape due to increased agricultural grazing and deforestation for firewood. WWF-Nepal signed an agreement with the Alternative Energy Promotion Centre and Biogas Sector Partnership-Nepal to develop its own WWF-Nepal Gold Standard Biogas VER project in 2006. Starting in January 2007, the program's goal was to build 7,500 biogas plants in buffer zones throughout the TAL. With preliminary funding from WWF-Germany, WWF-US, WWF-Finland, Johnson & Johnson, and the USAID Nepal Mission, and seeking matching funds from carbon financing, WWF-Nepal introduced micro-financing loans so that villagers could afford to install biogas plants.

From January 2007 to August 2009, more than 3,628 biogas plants were constructed and operational in buffer zones and corridors across the Terai. To finance the installations, micro-financing institutions now work in 13 different sites across the TAL. The village of Badreni in Chitwan has earned the title of First Biogas Village in the TAL, as 80 of the 82 houses in the village now have biogas plants. Due to the nature of the project, hundreds of jobs for local Nepalese residents have been created for planning, construction, and maintenance of the biogas plants. The hope is for the project to prevent as much as 148,000 tons of carbon dioxide from being emitted into the atmosphere.

*More information on clean energy biodiversity projects can be found at*  
[http://www.panda.org/what\\_we\\_do/footprint/climate\\_carbon\\_energy/energy\\_solutions22/renewable\\_energy/bioenergy\\_access/](http://www.panda.org/what_we_do/footprint/climate_carbon_energy/energy_solutions22/renewable_energy/bioenergy_access/)

#### 4.4.4 Biodiversity and Climate Change Adaptation

##### **How can integrating biodiversity conservation and climate change adaptation improve programs?**

Among many possible connections, a vulnerability analysis (VA) can spur stakeholders to protect coasts or make sure water recharge occurs in the face of a changing climate, which can motivate them to apply coastal and watershed conservation approaches. Additionally, conservation of landscapes – corridors – helps to climate-proof areas while encouraging greater engagement with people living around and between high biodiversity areas.

##### **What are some key resources and issues for USAID to consider when planning integrated conservation and adaptation programs?**

Required assessments can help scope opportunities for integration. Congress mandates that operating unit strategies be informed by an analysis of threats to biodiversity ([FAA Section 119](#)) and the extent to which planned programs will address those threats. This assessment is usually associated with a tropical forests assessment ([FAA Section 118](#)) in tropical countries, and sometimes is part of a broader environmental threats and opportunities assessment (ETOA). The 118/119 or ETOA is a good first resource, often recommending opportunities to integrate funds or approaches, including those associated with biodiversity and adaptation.

**Conduct a vulnerability analysis.** A vulnerability analysis (VA) can often be done as a desktop exercise, and need not be done by USAID; if a VA that is relevant to the targeted sector or geographic area already exists, it may be sufficient. The E3/GCC Office is available to help assess existing VAs or design new ones.

Including cross-sectoral considerations into a 118/119 assessment and a VA will help to identify appropriate points for integration. A high-quality 118/119 assessment would include information on how climate stressors acting directly on biodiversity and climate stressors acting on human communities could exacerbate existing threats or introduce new threats to biodiversity. Likewise, a VA that considers the vulnerability of key ecosystems to climate change and includes some consideration of

ecosystem-based adaptation approaches (see Mekong ARCC case study below) can facilitate an integrated design. It is advisable for the VA to address more subtle climate change issues, such as expected gradual shifts in temperature or precipitation, and not just extreme events like floods and droughts, as they may be important for ecosystems.

**Consider the whole system.** A systems approach can identify linkages and common pressure points for adaptation and biodiversity conservation. Intersections where vulnerable ecosystem services have a large impact on human well-being and where biodiversity and people rely on a shared vulnerable resource may serve as good areas for integration. A systems analysis may also reveal other threats and development opportunities that can inform the decision of whether integration makes sense.

**Ensure that requirements associated with biodiversity and/or GCC-Adaptation funds are met.** Beware of incorrect attribution! While conserving biodiversity or improving the management of natural resources often positively impacts nearby communities, one cannot assume that any biodiversity or NRM activity automatically contributes to GCC-AD outcomes. To attribute GCC-AD results to activity strategic approaches, actions must explicitly seek to measurably reduce vulnerability and increase resilience to specific climate threats identified in a VA. Conversely, one cannot assume that adaptation strategic approaches automatically contribute to biodiversity results. There must be intent to positively impact biologically significant areas, and activities must address threats identified in an analysis of threats to biodiversity.

The following conceptual models may be helpful in developing an integrated activity, regardless of funding streams:

**adaptation for people through ecosystem goods and services** – Often called ecosystem-based adaptation, this involves the conservation, management, or restoration of biodiversity and ecosystem services to increase the resilience of people, places, or livelihoods to climate change. With biodiversity funds, reducing threats to biodiversity should be the main objective, but increased resilience due to more sustainable ecosystems

and their services could be a co-benefit of, or synergistic with, adaptation-funded strategic approaches.

**adaptation for people and biodiversity** – People and biodiversity use shared natural resources, such as land and water, which can be vulnerable to climate change stressors. Activities designed to reduce the vulnerability of these shared resources to climate stressors can benefit both people and biodiversity.

**climate-smart conservation** – To be sustainable, conservation activities should take account of a changing climate. It may be possible to support the adaptation of species and ecosystems to climate change through, for instance, managing or protecting suitable refugia or adaptively altering approaches to fire management.

**climate change and water availability/scarcity** – A key link for development is how climate change will impact water available for human use, which in turn can be associated with watershed protection. A link to biodiversity is how changing water availability will shape ecosystems and impact wildlife. An example is the Mau Forest, one of Kenya’s major “water towers.” This watershed not only meets the needs of humans for drinking and irrigation but also those of domestic animals and the globally important biodiversity found in the Serengeti and the Maasai Mara downstream. Reports like [this](#) from the BBC on the drying up of the rivers emanating from the Mau Forest created a stir in Kenya and led to [considerable investment](#) from donors including USAID to better understand climate links and improved management.

### ***What areas of intervention offer high potential for integrating conservation and adaptation?***

The following examples are representative of actions being undertaken in current USAID field activities focused on biodiversity conservation and adaptation:

**ecosystem valuation for decision-making** – As ecosystems have become a more recognized concept, there has been a growing interest in how to demonstrate their value to policymakers and planners. Quantifying the ecosystem values at risk due to increased weather variability and projected climate change can serve as a sound integrated adaptation and biodiversity strategic approach. A related undertaking is building understanding among decision makers of the role that healthy ecosystems can play in human

adaptation efforts and promoting consideration of ecosystem-based adaptation options alongside more typical responses, such as the construction of hard infrastructure.

**integrated planning and management** – A number of ongoing activities are using capacity building and technical assistance to promote the adoption of systems approaches in local planning, management, and decision-making processes – similar to the holistic approach to program and activity design that has been discussed earlier in this document. In this way, biodiversity and adaptation considerations are incorporated into initial prioritization processes and can be “mainstreamed” into any future actions. An example of such an approach is integrated water resources management (see the RESILIM case study below).

**governance** – Supporting the capacity of governments and communities to manage biodiversity and natural resources may have direct benefits in terms of their ability to address climate threats. Better coordination between resource management institutions, for instance, can lead to more effective long-term planning and flexible approaches for future droughts or floods. Addressing disputes over rights to natural resources can improve conservation outcomes and may reduce the vulnerability of local communities who depend on those resources.

**biodiversity and climate monitoring** – Adaptation requires understanding how changes in climate variables, for example shifts in seasonality or water temperature, impact natural and human systems. Climate change data collection and monitoring may dovetail nicely with species monitoring to assess conservation impacts. The effects of climate change are often more tangible for local communities when they become involved in monitoring potential climate stressors and their impact on key species – like red crab stocks in coastal Ecuador (see [Forests and Coasts](#) case below) – and can begin identifying adaptation responses themselves. Furthermore, climate data collected by local communities can contribute to larger climate datasets.

**integrated farming methods** – Helping farmers to adopt methods that lower their impact on natural systems can offer a number of co-benefit opportunities, especially when agricultural encroachment is a threat to neighboring biodiversity areas. (Note, this linkage is not

always sufficient to justify the use of biodiversity funding.) Reducing land conversion contributes to improved watershed management around critical habitats while also potentially providing a buffer against storms and floods. This and other practices, captured under the rubric of climate-smart agriculture, can provide an opportunity for adaptation, sustainable landscapes, biodiversity, and/or food security benefits.

#### **ecosystem management and restoration –**

Activities in this area might include strategic approaches such as restoration of corridor connectivity, removal of invasive species, reforestation on degraded lands, or fire line maintenance. While reducing threats to biodiversity, these activities can also improve livelihoods and increase ecosystem resilience so that ecosystems can serve as a buffer against climate-related impacts for nearby communities. Since many of these activities deal primarily with non-climate stresses, any direct GCC-AD funding would need to be paired with biodiversity funds and clearly reduce specific vulnerabilities of human and natural systems.

#### **mangrove forest conservation and restoration –**

Mangroves are often cited as a high-potential ecosystem for programmatic integration. They can serve as a buffer against extreme storms, which may increase in frequency and intensity with climate change. In addition, mangrove habitats are often high in biodiversity value, support food security, and provide other services that underpin local livelihoods. Assuming that storm surge, flooding, sea level rise, and/or food insecurity due to shifting fish stocks are identified as significant climate change stressors, and mangroves are identified as priority areas for biodiversity, activities in mangrove areas could provide a good intersection of biodiversity, livelihoods, sustainable landscapes, and adaptation opportunities. However, not all mangrove areas are biodiverse or viable in the face of sea level rise and other climate change impacts, so activity designers should not assume that any mangrove-related activity is inherently biodiverse or “climate smart.”

#### **What are some examples of projects that integrate climate change adaptation and biodiversity conservation?**

In 2012, USAID Missions launched 11 new environment activities receiving both biodiversity and GCC-AD funding, up from only two co-funded activities initiated

in 2009. In addition, activities using only one source of funds are increasingly looking for co-benefits. In response to this growing trend, the Forestry and Biodiversity (FAB) and Global Climate Change (GCC) offices within the E3 Bureau set out to identify early lessons learned from these activities and begin to develop a set of best practices for integrating adaptation and biodiversity in USAID programming.

#### **Ba Nafaa (“Benefits from the Sea” – Gambia-Senegal) – The Challenge of Integrating in**

**Mid-Stream:** The Gambia-Senegal Ba Nafaa activity (2009-2014), which focuses on artisanal fishing and coastal and marine conservation, was designed as a classic biodiversity activity based around USAID’s nature-wealth-power framework. When GCC-AD funds were added in year three, the team found it difficult to integrate new adaptation activities with the existing biodiversity activities. The team initiated a VA with the funds, which was quite comprehensive in nature and assessed the sensitivities of some of the critical ecosystems to potential climate shifts. However, the implementation challenge came in identifying local climate vulnerabilities that aligned with ongoing biodiversity conservation and fisheries management activities, limiting their ability to successfully integrate.

#### **The Mekong Adaptation and Resilience to Climate Change (ARCC) – Quantifying the Link Between Shifting Ecosystems and Livelihoods:**

The Mekong ARCC activity (2011-2016) undertook a comprehensive climate downscaling study in the Mekong River Basin, to identify projected shifts in ecosystems and eco-agricultural zones that impact local livelihoods. In the face of rising average temperatures, these ecosystem boundaries are generally projected to shift upland. The study analyzes how this will likely impact species migration, invasive species, reproductive rates in fisheries, availability of non-timber forest products, and productivity of lowland rainfed rice, among other livelihood assets in the region. Understanding how a shifting climate regime might impact ecosystem services, and thereby livelihoods, will lead toward an analysis of the value of those services for the region, which will help governments to identify smart adaptation and conservation options.



### **Resilience in the Limpopo River Basin**

**(RESILIM) – Use of the IWRM Approach:** The RESILIM activity (2012-2017) was designed using an integrated water resources management (IWRM) framework overlaid with conservation and adaptation objectives. IWRM supports programmatic integration by addressing a critical shared resource, water, when it is vulnerable to climate stressors and essential to biodiversity. Issues, such as water allocation and environmental flow requirements for ecosystem and human needs within a particular catchment, could be addressed within an integrated activity. RESILIM suggests that balancing socioeconomic and ecological needs to optimize land use practices and integrating climate information increases the ability of river basin landscapes to support water flows critical to the integrity of biologically diverse habitat and the corresponding well-being of the population benefiting from its ecosystem services.

### **Costas y Bosques (“Forests and Coasts” – Ecuador) – Monitoring Red Crabs**

**Activity:** The Forests and Coasts activity in Ecuador (2009-2014) works with local crabbing cooperatives whose primary source of income is generated from their respective mangrove concessions. As part of the mangrove concession agreement, crabbing cooperatives are required to capture data on their catch and report it to the National Institute of Fisheries as a means of species monitoring. While the impetus for the activity is tied to biodiversity conservation, the team plans to use the data alongside an analysis of weather trends and water temperatures to monitor potential climate change-driven seasonal shifts and their corresponding impact on crab populations. Indirect GCC-AD results could be attributed to this activity because it uses biodiversity funds to improve the science available to track climate change-related impacts on a natural resource of importance to local livelihoods.

### **Hariyo Ban (“Healthy Forests”-Nepal) – Ecosystem Restoration as a Co-Benefit**

**Activity:** The Hariyo Ban activity in Nepal (2011-2016) identified an invasive species (water hyacinth) as a threat to biodiversity in wetlands and waterways. At the same time, the implementing team realized that local communities are vulnerable to increased flood events, in part due to degraded wetlands and waterways, which exacerbates impacts from large rainstorms.

To address these issues, the team designed a wetland restoration activity to remove invasive species and improve management of rivers and streams.

## **4.5 FORESTRY**

### **4.5.1 Conservation of Natural Forests**

#### **Definition and Significance**

Forestry is the science and practice of managing trees and forests to provide a diverse range of benefits. As an example of the sustainable use of biodiversity, the type of forestry that will be discussed here is the sustainable management, use, and conservation of natural forest ecosystems in order to maintain their health, flows of timber and non-timber forest products, and nonmaterial values and benefits, as well as the ecological services they provide.

Many people, especially those in rural parts of the developing world, depend on forests for their livelihoods, deriving from them food, medicine, fuel, construction materials, and monetary income. Forests are also important for their spiritual and aesthetic values and are central to the cultural identities of many indigenous peoples. Local forest communities often serve as stewards, preserving and protecting areas rich in biological diversity. In other cases, economic conditions, settlement patterns, cultural changes, or population dynamics can change what may have been traditionally sustainable use patterns into overexploitation of key species or habitats. Many local economies depend on the sale of forest commodities, especially timber and wild game (or bushmeat), for revenue.

Healthy forests also provide critical ecological services that are of local, regional, and global significance. These include climate regulation, carbon sequestration, watershed protection, soil conservation, and recycling of organic matter and mineral nutrients. These services are the result of ecological processes that depend on the overall health and resilience of the forest ecosystem. The long-term health of that ecosystem, in turn, relies on the maintenance of the biological diversity it contains; there are clear linkages between the maintenance or loss of a forest's biological diversity and the environmental services it provides.



**CAUGHT IN THE ACT:** Remote camera traps assist with jaguar censuses in places such as the Amazon rainforest. For proper setup, a staff member must act like a jaguar to ensure the right height and settings for capturing images.  
Photo: Wildlife Conservation Society

The greatest threat to biological diversity, especially in tropical regions, is the loss of forest cover as forest lands are converted to other land uses, especially due to agricultural expansion. Poor governance; weak legal, judicial and institutional capacity; and short-sighted national policies that fail to promote sustainable use or that subsidize or promote agricultural expansion along the forest frontier all contribute to the conversion of forest land to other uses. Tropical forests and the biodiversity they contain are also being destroyed by conventional forestry practices and the extraction of unsustainable volumes of timber. Illegal logging activities and corruption further accelerate the destruction of many of the world's forests; sustainably harvested wood cannot compete in markets flooded with illegal timber whose lower price reflects the lack of investment in forest inventories, management plans, and careful harvesting.

A major impediment to protecting forests, the biological diversity they contain, and the environmental services they provide, is the failure of the market to capture noncommercial values of forests and the opportunity costs of competing land uses. Emerging experiences with payment for such ecosystem services as water provision or carbon sequestration offer opportunities to recalibrate those tradeoffs and provide additional incentives for forest management and protection. Where ecosystem services are undervalued, or not valued at all, and competing land uses (e.g., agricultural or pasture expansion) are subsidized, land holders and settlers are likely to opt for the highest short-term return, which often results in forest conversion to other uses. Tenure regimes that recognize stronger rights over cleared land than over forested land further tip the scales toward activities that result in deforestation. Entry costs can also determine land use choices; the strict regulations and

upfront investments needed for legal forestry activities (forest inventories, forest management plans, maps, environmental impact studies, roads, and machinery) can be daunting and beyond the means of both governmental forestry agencies and rural communities. This often leads to the easier and cheaper path of overharvesting forest resources, both legally and illegally, resulting in eventual forest conversion to low-input agriculture or grazing.

Forest and biodiversity conservation is dependent on conserving forest species and ecosystems within protected areas, as well as on the sustainable use of forests in managed or production forests outside protected areas. In 2006, IUCN estimated that 11.5 percent of the world's forests were in protected areas and 5 percent were in plantations. This means that 84 percent of the world's forests are in areas where they may be either under some form of forest management or no formal management at all. In these forests, logging is perhaps the most important activity that influences their ecological sustainability because of its direct and indirect environmental impacts. Depending on the intensity, logging can change the mosaic of habitat types, alter species distribution and forest turnover rates, change soil nutrient and moisture quality, and influence aquatic communities downstream. The greatest harm to biodiversity associated with logging, however, is often from the indirect, follow-on effects of logging – human encroachment, overhunting of wild game, mining, and forest conversion facilitated by easy access on logging roads.

The sustainable management of natural forest resources, whether through the collection and marketing of NTFPs, such as wild game, resins, rattan, or medicinal plants, or through the harvesting of timber products by reduced or low-impact logging techniques, has the potential to support economic development both locally and nationally. This can be done while conserving and maintaining biological diversity outside the boundaries of formal protected areas. As home to 70 percent of all terrestrial plants and animals, forests are critical to conserving biodiversity on a global scale; however, efforts to maintain forest biodiversity outside protected areas – where the vast majority of the biodiversity is located – must be an integral component of a larger,

landscape-level approach to biodiversity conservation and sustainable development.

Growing international interest in REDD+ can increase the value of forests by attaching an economic value – potentially through the sale of carbon credits to national or international markets – to their ability to sequester and store atmospheric carbon. The “plus” in REDD+ refers to increasing forest carbon stocks through forest restoration, natural regeneration, or management techniques that increase the carbon density of forests. Many countries are developing strategic plans to reduce their overall greenhouse gas emissions, including through the more deliberate management of forests for carbon. This is encouraging; however, it also will be important to consider and monitor biodiversity tradeoffs that could occur under particular schemes that favor more carbon-rich species.

If countries are able to capture the economic values of healthy forests and improve coordination in the land use sector by reducing or eliminating subsidies working against sustainable forest management, it is hoped that the economic balance will shift away from favoring the conversion of forested lands toward other uses. The challenge will be to ensure that those making daily land use decisions are able to perceive and fully realize the benefits of healthy, standing forests – i.e., that incentives are structured and delivered to the right stakeholders.

### **Key Questions**

#### ***What current economic development policies encourage forest degradation and deforestation, and what reforms can USAID support to reverse the trend?***

As countries seek to develop and grow economically, the pressure of national budgets to increase short-term revenues often means that they favor growth in agriculture, mining, infrastructure, and other sectors over forestry. Forests are often considered to be “undeveloped” land, and forest agencies are given few resources for management, monitoring, protection, or forest-sector development. The widely shared economic benefits of forests for climate regulation, water catchment, and recreation are not quantified or recognized as tradeoffs that are made between



forests and agricultural or infrastructure expansion. Working with national governments to more fully value and develop the forest sector can lead to improved policies and incentives to maintain forests. The following are a few strategies that USAID has used successfully to highlight the value of forests and improve the management and protection of forest lands:

- promoted policies that created incentives and an enabling environment for local control of forests ; fostered public-private partnerships based on the sustainable production of forest products (including timber and NTFPs), which increased product values and sales
- raised awareness among stakeholders and built local capacity to certify forest management systems and wood products; in some cases, this led to linking existing forest-based enterprises to voluntary market-based mechanisms, such as Forest Stewardship Council (FSC) certification, that improved access to higher-value international markets and created greater incentives for sustainable management and harvesting methods
- encouraged the planting of indigenous species with market value on private or communal land, including timber and fuel wood plots
- supported the valuation of timber, NTFPs, and ecological and cultural services derived from specific forest areas as part of a larger strategy to improve public and policymaker understanding of tradeoffs between alternative development paths
- worked with financial institutions to improve their environmental risk assessment of loans to companies engaged in commercial forestry or forest conversion (i.e., oil palm); this has led to better environmental management and practices by these companies, as they did not want to risk having their financing disappear
- brought national decision makers together with local stakeholders in the field to understand realities of implementation for better policy formulation

Remarkable transformations can occur in a relatively short period of time with changes in the policy-enabling environment. A case in point is the middle hills landscape

in Nepal. Prior to 1978, local communities were alienated from the forest estate: They used trees and tree products but did not have clear, legal rights to do so. This resulted in a denuded and increasingly degraded landscape, as there were no incentives to manage the forest estate sustainably. Starting in 1978 and culminating with the 1993 Forest Act, a series of new laws were passed that devolved forest management, giving clear rights to Forest User Groups (FUGs) to manage and benefit from forest resources. In the space of two decades, FUGs became direct managers of more than one million hectares of forest – approximately 25 percent of Nepal's forest estate – and forest cover in the middle hills significantly increased.

In Southeast Asia, USAID catalyzed a groundbreaking **public-private alliance** under the Responsible Asia Forest and Trade (RAFT) initiative to combat illegal logging, consisting of the U.S. Government, international and local NGOs, research institutions, and more than 17 private companies. These alliance partners worked to

- sustainably manage forests
- track sources of wood
- link legal and sustainable wood producer groups to international buyers (such as Home Depot) and avoid forest destruction by building awareness among international banks and other financial institutions

For example, in Lao PDR, the alliance helped make regulations clearer; forged links between responsible producers, manufacturers, and buyers through the establishment of the country's first voluntary chain-of-custody certification system, which tracks timber from forest to factory; and increased benefits to people who rely on forests for income. Based on this work, the Association of Southeast Asian Nations (ASEAN) produced guidelines on tracing timber that are expected to be adopted by all its members by 2015. These activities have generated increased incomes from sustainable forest products while conserving high-biodiversity forests. This highly successful program partnership continues as a well-known entity in Asia, with follow-on funding from the U.S. Department of State and the Government of Australia.



**What are the roles and responsibilities of national and local government institutions in implementing current forest land management and use policies? And what are the most effective ways that USAID can help strengthen forest governance at the local level and support the devolution of authority for forest management to communities?**

Many governments are devolving or decentralizing control over forest resources to local governments and institutions. By supporting the strengthening of these local institutions and systems to manage forest resources (including indigenous land use systems), USAID can significantly improve local forest governance and promote equitable access to forest resources.

In Ecuador and Colombia, USAID has supported activities to involve indigenous groups in designing management plans for forest reserves, certifying forests and forest products for increased market value, resolving land and resource tenure issues, integrating traditional subsistence activities with sustainable natural resources management practices, learning through exchange visits, and sharing best management practices. The results of these activities have strengthened conservation of biodiversity, enhanced local and indigenous capacity, and improved income levels in the region.

In the Philippines, USAID supported the development of indigenous lands policies that recognized the rights of indigenous people to manage, use, and protect forest tracts they have occupied for hundreds of years. This policy, later codified into law, enabled the government to devolve authority to the indigenous communities, provided they could produce a plan for the protection, management, and sustainable utilization of resources found in these lands. USAID subsequently supported efforts to help several indigenous peoples organizations develop these management plans. More recently, USAID has supported programs that strengthen the capacity of local and provincial governments to manage and control the use of public forest lands other than those under the management of indigenous peoples organizations. These efforts are in line with the overall initiative of the national Government to devolve greater management and regulatory authority to local governments.

**How can USAID strengthen processes for transparent and equitable sharing of benefits from forests that consider gender and marginal groups?**

Nepal also provides an example of how managed forest benefits can be linked to empowering women and vulnerable or marginalized groups. Within the community forestry program, many donors, such as USAID, the UK Department for International Development (DFID), and the Swiss Agency for Development and Cooperation (SDC), have emphasized the importance of targeting these groups as part of an overarching poverty alleviation strategy. After several years of raising awareness on these issues, FUGs have internalized the need to target women, the landless, and lower-caste groups. Many now grant a portion of their revenue directly to marginalized groups and households. Representation of marginalized groups in FUG executive committees has also shown a noteworthy increase. Moreover, the USAID-funded Strengthened Actions for Government in Utilization of Natural Resources (SAGUN) project promoted an approach known as public hearing and public auditing (PHPA). This proved to be an important tool in improving the governance of FUGs, ensuring that issues were discussed in a transparent fashion and that all stakeholders within the FUGs benefited from forest management activities.

**How can USAID help to develop the full range of values (timber, NTFPs, ecological and cultural services) from a forest as part of a strategy to expose the opportunity costs of forest degradation and conversion?**

In Guatemala, USAID has been supporting community forestry in the Petén for more than 15 years. Initial projects focused on the new community concession system and capacity building in sustainable forest management. Concession requirements stipulated that Forest Stewardship Council (FSC) certification was necessary to demonstrate good forest management. The next generation of projects focused more on community enterprise development and helped communities with improved processing and marketing of certified timber products, especially to international markets looking for FSC-certified wood. The value-added focus helped communities improve product quality while increasing their competitive edge in the international marketplace.

The latest focus of USAID support has been on increasing the full range of values from the forest, which includes sustainable management and certification of NTFPs (especially xate, a forest palm exported to the floral industry) and potential carbon sales to the voluntary market from the FSC-certified concessions. Proceeds will be deposited into an endowment fund that will support government monitoring of the concessions, as well as community economic activities. Communities will be able to realize multiple and diverse streams of funding from timber, xate, and carbon, all of which are dependent on the maintenance of forest cover and health.

**Are national and local governments and local communities able and willing to use innovations such as payments for ecosystem services to generate greater economic resources and support for sustainable forest management?**

The UN's 2004 Millennium Ecosystem Assessment grouped ecosystem services into four categories: 1) provisioning, including the production of food and water; 2) regulating, including the control of climate and disease; 3) supporting, including nutrient cycles and crop pollination; and 4) cultural, including spiritual and recreational benefits. One of the most tangible and easily recognized ecosystem services is the provision of clean water. Most cities depend upon nearby or distant watersheds for their water supplies; however, to date there exist few examples of successful payments for environmental services outside of developed countries. Few cities or water companies in developing countries actively contribute to the management and protection of these watersheds. For example, Tegucigalpa, Honduras receives almost half of its water supplies from the nearby La Tigra National Park, yet neither the water company nor the city contributes to the park's maintenance or protection. Some cities or water companies charge water users an environmental fee – either fixed or assessed, based on cubic meters of water consumed – that provides a dedicated source of funding for watershed rehabilitation, protection, and management. This represents an opportunity but will depend upon enlightened leadership and government commitment, combined with effective public-information campaigns, to convince water users to pay for a service they had previously received at no cost.

**What is the current legislation on USAID working with the commercial forestry sector and where do we get guidance to comply with this legislation?**

Since 2010, Annual Foreign Appropriations legislation has specified prohibitions and restrictions to USAID programming in the forestry sector. Proposed FY15 language is identical to FY14 language, which reads

*“... funds appropriated under Title III (Bilateral Economic Assistance)...shall not be used to support or promote the expansion of industrial scale logging or any other industrial scale extractive activity into areas that were primary intact forests as of December 30, 2013...”*

Title III covers all bilateral economic assistance, including the Development Credit Authority, humanitarian response, the MCC, global climate change programs (GCC) , and not only biodiversity earmarked funds. For further guidance on programming, please contact your RLA or GC representative or E3/FAB office.

It is important to remember that USAID strategies, investments, or impacts on forests are also governed by the Foreign Assistant Act Section 118, Tropical Forests, as well as FAA Sections 117 and 119 as relevant, and this legislation changes less frequently. Under Section 118, part (c) (13) and (14) describe restrictions on commercial forestry activities, such as the purchase of logging equipment and the need for conducting environmental impact assessments (EIAs) related to forest work.

## **4.5.2 Non-Timber Forest Products**

### **Definition and Significance**

The term “non-timber forest products” refers to all biological materials other than wood that are extracted from forests for human use. As used here, it is the equivalent of “non-wood forest products.” NTFPs include plant products, such as fruits, tubers, roots, seeds, leaves, resins; fungi; grasses, such as bamboo; and animal products, such as meat and skins, insects, and fish and aquatic invertebrates (see [Section 4.10.4](#)). NTFPs may be used for subsistence or as a source of income. They provide a wide range of direct material uses, including food, fiber, medicine, building materials, fuel, and cultural and religious objects.

It is estimated that 80 percent of the population of developing countries relies on NTFPs for their primary health and nutritional needs (FAO, 1995). Many rural communities trade NTFPs in local, regional, and international markets. In some forest communities, many poorer households get a substantial part of their incomes from NTFPs. This income may be crucial during the “hungry time,” when crops have not yet been harvested and available household financial resources are few. The NTFPs often provide hunger foods and a safety net to prevent starvation. NTFP enterprises have the potential in some cases to diversify and improve local economies.

At least 150 NTFPs – including honey, gum arabic, rattan, bamboo, cork, nuts, mushrooms, resins, essential oils, and plant and animal parts for pharmaceutical products – are important export commodities that are significant in international trade. Trade of NTFPs, particularly for pharmaceutical uses, may form a significant portion of regional and national economies, comparable in some countries to annual timber sales. Yet, despite their widespread use and importance, NTFPs have generally been considered to be minor or specialty products, and their management has been not included in regional or national forest planning.

Interest in NTFPs, as with other sustainable uses of biodiversity, has grown due to the increasing awareness of the potential role of these materials in biodiversity conservation and sustainable forest management. Managing forests for NTFPs can increase their long-term value and may provide a diversified stream of income from the forest for local communities and national economies.

## **Key Questions**

### **Are NTFP harvest practices sustainable?**

Ensuring that harvest of NTFPs is sustainable for subsistence and commercial uses may be the greatest challenge. Sometimes little is known about the basic biology of an NTFP, such as its ecology; response to harvesting; or potential for domestication, semi-domestication, or silviculture. Ecological sustainability has to be factored into value chain analysis, and if data are not available, monitoring will have to be included to

enable USAID and its partners to determine the viability of these enterprises from an environmental/ecological perspective. Practical, participatory, and cost-effective methods of estimating the potential harvest level should be developed, along with methods of monitoring the response to harvesting. Guidelines exist for monitoring sustainable use based on the plant parts to be harvested (such as bark, leaves, stems, seeds, and roots) (see Shanley et al. 2002).

Sustainable management and harvesting depends on the user group’s rights and ability to exclude other stakeholders from these activities. Forest concessions often extend rights to timber but not to other products. While a community might be managing a forest for wood harvest, the government could still have the right to give permits to outsiders for hunting, grazing, and/or NTFP collection. Inability to control the actions of outsiders removes the incentive for sustainable resource management and creates a situation where each user tries to maximize their extraction (if markets exist). Where rights are clear and outsiders can be excluded, communities or user groups may still need enforcement and legal back-up to exert their rights.

Note that activities that support the sustainable use of NTFPs are not necessarily considered biodiversity conservation under USAID’s Biodiversity Code. In order to be attributed to the biodiversity funding earmark, all conservation activities must adhere to the Biodiversity Code criteria. For example, tight linkages between identified threats to biodiversity and the proposed NTFP project must be present.

### **Are NTFP enterprises appropriate and desired by local communities?**

Investments in NTFP-based enterprises can improve community capacity, access to natural resources, and income levels. These investments will be most appropriate when communities are already engaged in the extraction of NTFPs to some extent. It is important, however, to understand the following: how these enterprises link into the broader value chain for the specific NTFP product (discussed in greater detail below); what investments and capacity are needed for the communities to meet market volume

and quality requirements to extract good value and benefits in terms of jobs, incomes, and greater technical capacity for both men and women; and whether the communities have the wherewithal to undertake these investments without significant outside support. With this information, government agencies and/or outside advisors can have discussions with community leaders and members to determine whether they are interested and would want the types of investments and changes that these enterprises would bring to their community. Equally important are opportunities to create niche markets based on sustainable practices and greater economic equity.

### ***Are NTFP-based enterprises developed using value chain analyses?***

It is important to understand how the NTFP value chain operates in the areas of production, collection, processing, storage, transport, marketing, and sales in order to identify weak links in the commercial process. A value chain analysis of the particular NTFP can provide useful information to local enterprises and guide their business and investment planning. The value chain analysis can also help clarify potential issues related to the rights, responsibilities, and economic returns for each actor in the chain that could be addressed through project activities. It should not be assumed that eliminating middlemen will benefit producers. Middlemen can play important roles in aggregating supplies for the market, extending credit and technical assistance to producers, and providing quality control.

### ***Have the appropriate investments been made to ensure the success of an enterprise project?***

Investments can be made along the value chain, depending on the analysis. While development activities often focus on the community enterprise, support for storage facilities, credit, and other critical inputs might be needed at different points along the value chain, not just at the community level.

### ***What are the social implications of NTFP production?***

The potential social impacts of an NTFP-based enterprise depend on who in the community gathers and processes the NTFP, how the resource is managed,

and how the income is distributed. Strengthening the rights or abilities of one group within a community may lead to a weakening of rights for another group. Women from poor households generally rely more on NTFPs for both subsistence use and income; an enterprise development project may encourage additional members of the community to collect the NTFP, decreasing their availability to poorer households. Enterprise activities may also add to women's time burdens, since they are often the ones who harvest NTFPs; and NTFP-based enterprises may actually decrease women's incomes if men take over the enterprise. Combining NTFP products (which tend to be gathered by women) with traditional timber products (which tend to be harvested by men) broadens the participation of families in forest-based incomes. In general, the more value-added processing involved, the more income opportunities generated for women.

### ***Has certification of the NTFP been considered?***

Various forms of certification are available for some NTFPs that can increase their market value in certain circumstances. Many accepted certification schemes include criteria focused on the environmental, and to some extent, the social aspects of forest-product harvest. Others involve "chain-of-custody" tracking that follows a forest product through the value chain, from harvest, through processing or manufacturing steps, to marketing and point of sale. Organic certification focuses on production and processing stages for agricultural and agroforestry products and sometimes NTFPs, as well as tracing products to ultimate point of sale. Fair trade certification focuses on fair compensation to the producers. Rainforest Alliance certification contains both environmental and social standards. Certification can increase producer costs, so a careful analysis of different markets is needed to ensure that the price buyers are willing to pay merits the increased costs for product certification.

### ***Have NTFP enterprises been integrated with other economic activities?***

To be successful, NTFP enterprises must be integrated with other economic activities. If a community depends too much on one enterprise, they may lack resilience when a harvest fails or market demand decreases. NTFP



management might require separate zoning in forest areas or close coordination with other forest uses (such as timber, pole, and firewood extraction and grazing) to ensure compatibility in resource management. These possibilities should be taken into account when designing the project. One way to address this is to diversify enterprise activities to avoid excessive dependence on a single NTFP.

Another strategy is to domesticate high-value NTFPs. Wild grown and harvested plants are subject to natural conditions, such as weather variability or animal and insect predation, which affect their production. Also, certain plants that have pharmaceutical or cosmetic value are site-specific in terms of active compounds found in their tissues. This will have to be factored into any consideration of the plants' economic value and will require bioassays before true market value can be determined. Learning to commercially produce these products can reduce threats to the forest, increase quality and reliability of supply, and provide a more constant stream of income for farmers. Care is needed, however, in the decision to support NTFP domestication, as those who might gain could be farmers with land and those who might lose could be the landless poor with few other options for income generation. Several organizations are currently working on genetic improvement and domestication programs for tree crops and NTFP-producing species. In some cases, partnerships are developed with private sector

## BOX 60. NTFPS AND THE BIODIVERSITY CODE

### **Non-timber forest products (NTFP)**

enterprise development or promotion is not automatically compatible with biodiversity conservation. To contribute positively to biodiversity conservation objectives, explicit links must exist between the enterprise and conservation of a biologically significant *area*, not just the species used. Compliance with the code may also depend on the relationship between the NTFP enterprise group and the biological resources. For example, the NTFP enterprise group may be natural resource users, but activities should focus on the group's role in either protecting or threatening biodiversity.

interests who hope to gain economically from improved varieties. A promising example is the Novella Africa initiative, involving Unilever, SNV, IUCN, and the World Agroforestry Centre species of the *Allanblackia* genus. *Allanblackia* trees produce a fruit with an edible oil that is remarkably similar to butter. This oil could replace palm oil in a wide variety of products.



*Pa Somphorn and Ngorn Tvey take stock of non-timber forest products – NTFPs – collected from their community forest in Cambodia. NTFPs provide food, fuel, fiber, and medicine to local communities and sometimes have export value, all of which encourage conservation of natural forests and sustainable harvests governed by careful resource monitoring and access rights.*

*Photo: Jeremy Holden*

## 4.6 WATER RESOURCES

### 4.6.1 Freshwater and Biodiversity

#### **Definition and Significance**

Freshwater ecosystems cover a wide range of systems, including lakes, ponds, rivers, streams, springs, headwaters, wetlands, deltas, and floodplains, among others. Freshwater diversity includes the species that depend upon freshwater ecosystems for one or more components of their life cycles, including plants, insects, amphibians, reptiles, fishes, crustaceans, mammals, and birds.

There are some important concepts related to the anatomy of aquatic systems. The headwaters area is the area at which a river begins. This area might include a wetland, a natural spring, a lake or pond, or a series of small tributaries in a mountain forest. Riparian areas are the areas along a river or stream; these are especially important for maintaining water quality, reducing sedimentation, and regulating water temperature. Flow is the amount of water that runs in a river or stream; it includes two aspects: the volume and seasonal timing of water and the pattern of movement, which can be altered by dams and channels. Wetlands are lands that are inundated by water for at least a portion of the year. They range from ephemeral wetlands that last a few weeks to permanent wetlands that are permanently covered by water. Floodplains are low-lying, flat areas adjacent to rivers, lakes, and coastal areas that frequently experience, and are particularly adapted to, periodic flooding. Estuaries are semi-enclosed bodies of water that have a free connection with the ocean but are considerably less saline. The mouth of a river, or delta, is where a river runs into an ocean, lake, or wetland; these areas are typically rich in nutrients and thus very high in biodiversity.

Water is the basis of all life on Earth. Although fresh water makes up only 3 percent of the world's available water, only 1 percent of this 3 percent of total water is available and suitable for drinking water. Moreover, freshwater bodies cover only about .8 percent of the Earth's surface, but freshwater ecosystems support nearly 6 percent of all species ever described, and extinction rates are four to six times higher for freshwater species than for terrestrial species.

Fresh water plays a key role in every aspect of human life, including those that are most essential: drinking water, food, and sanitation. Poor people, in particular, depend upon the goods and services provided by freshwater ecosystems, including for their subsistence and livelihoods. **An estimated 2.8 billion people are expected to face serious water shortages by the year 2025.**

Freshwater ecosystems and the biodiversity they contain are declining faster than almost all other ecosystems globally. More than half of the world's wetlands have been lost in the past century alone, and a large percentage of threatened and endangered species are aquatic.

#### **Key Questions**

##### **What are key types of threats to freshwater biodiversity?**

Just as with threats to terrestrial biodiversity, there are a wide variety of stresses on and threats to freshwater biodiversity. The most important threats include

**pollution** – Water pollution includes chemical and nutrient run-off and effluent from households, farms, and businesses. One of the most difficult threats to tackle is non-point source pollution, which includes pollution, such as run-off from farms, which emanates from numerous sources that are difficult to pinpoint, detect, and regulate. In areas with high levels of air pollution, water bodies are also vulnerable from acidification.

**fragmentation** – Fragmentation occurs when dams, dikes, and levees are constructed, whether for water supply, flood control, or hydro-electricity. The vast majority of the world's major river systems have been dammed. Fragmentation poses an especially significant threat to migratory fish species, such as salmon.

**alteration of hydrological regimes** – Fragmentation is not the only threat resulting from the construction of dams; the regulation of water flow results in altered hydrological regimes, such as timing of seasonal floods. The channelization of rivers and streams, and dredging of stream and river bottoms, can also result in altered hydrological regimes, which can be just as important as fragmentation for many aquatic species, affecting their ability to reproduce at key points in their life cycles.

**sedimentation** – Changes to riparian ecosystems, such as through intensive logging, can result in sedimentation and siltation downstream, with huge impacts on aquatic biodiversity.

**conversion of wetlands** – Because wetlands can easily be converted to other land uses by dredging and filling, and because they are traditionally undervalued, they are especially susceptible to conversion to other land uses, including transportation and industrial and residential infrastructure.

**invasive alien species** – Freshwater systems are vulnerable to a variety of invasive alien species, such as mussels, snails, parasites, fish, snakes, and aquatic plants. These species can easily spread from one water body to the next, and one country to the next, through multiple pathways, including transportation.

### ***What are some emerging social and political dimensions in freshwater management?***

Some key emerging issues in water management include political conflicts, gender issues, and water security. Although these issues do not directly involve biodiversity, they can be either exacerbated by mismanagement of biodiversity and aquatic ecosystems or mitigated by sustainable natural resource management practices.

**conflict** – Water is a source of conflict in many regions of the world. More than a billion people do not have adequate supplies of drinking water. This number will continue to grow; as stated above, some studies predict that by 2025, two-thirds of the world's population will face water shortages. Water conflicts may take several forms, including control of water resources and use of water as a political tool, military target, or instrument of terrorism. Although there are few direct wars over water, and water conflicts have been relatively mild in the past, water-related issues have often aggravated existing conflicts. With increasing pressure on freshwater resources, and with many countries sharing the same water sources, an increase in water-related conflicts is likely to occur in the future. Areas of particularly acute water conflicts include the Jordan River Basin and the Tigris-Euphrates Basin in the Middle East; the Nile, Volta Niger, and Zambezi Basins in Africa; and the Indus River Basin in Asia.

**water security** – National water security is defined as the ability of a country to reliably secure an adequate quantity of sufficiently high-quality water to meet the needs of its population. Water security is threatened around the world primarily by three factors: diversion of rivers toward competing uses (either within or across national boundaries); unsustainable water management practices, such as the depletion and/or salinization of aquifers and unsustainable consumption; and inappropriate land management practices that do not adequately protect headwaters, riparian buffers, and water-recharge areas.

**gender** – In many cultures, women are largely responsible for agricultural work, home sanitation, food preparation, and childcare. All of these are water-intensive activities. In many regions of the world, women spend more than a quarter of their time and daily calories collecting water. In India alone, this adds up to 150 million work-days per year that are lost to water collection. In addition, access to clean drinking water is essential to maintaining the health of children, particularly in developing countries, and this role also primarily falls to women. Therefore, access to sufficient water is widely recognized as a key gender issue.

### ***How will climate change affect freshwater resources and what can managers do about it?***

Climate change impacts are most noticeable through changes in precipitation, including increased frequency and intensity of storms, floods, and drought. Studies suggest that weather-related disasters involving water (e.g., floods, drought, and storm surges) have increased three-fold over the past three decades and will continue to increase in the future. These threats are felt most severely in developing countries and can be mitigated to some extent by effective ecosystem management that focuses on principles of climate resilience and adaptation. Examples of managing freshwater ecosystems for climate resilience, adaptation, and mitigation include

**riparian and headwater forests** – Forests, particularly riparian and headwater forests, help regulate water flows and maintain water quality. Nearly half of the world's largest cities obtain a significant portion, if not all, of their water from protected or managed forests. Maintaining high-quality forests is the first step toward

maintaining water supplies during times of drought, which are likely to be exacerbated by climate change.

**wetlands and floodplains** – Wetlands are a natural water-treatment system and ensure regular flows of clean water in times of both drought and flood. Floodplains enable human communities to adapt to more frequent and intense rainfall events by absorbing large volumes of water. Managers can help strengthen resilience of both areas by reducing threats to wetlands, maintaining key structures and ecological processes, and designing and managing wetland areas to withstand weather events that are more frequent and intense than historical norms.

**rivers** – Managers can strengthen river resilience by maintaining natural hydrological flow regimes; increasing connectivity; and reducing key threats that lower resilience, such as removing invasive alien species, restoring degraded riparian areas, and reducing pollution and siltation.

**peatlands** – Peatlands cover less than 4 percent of the world’s terrestrial area, yet they contain up to a third of the Earth’s terrestrial carbon and store more than double the amount of carbon stored in the world’s forests. Peatlands found in Indonesia, the Amazon, and the Congo Basin harbor major forest biodiversity. Managers can ensure that peatlands continue to be a carbon sink rather than a carbon source by avoiding peatland dredging, draining, and drying out.

### **Why is economic valuation important to freshwater biodiversity?**

Economic valuation is the assigning of economic values (usually measured in monetary figures) to the ecological services provided by an ecosystem. Numerous studies on the economic valuation of ecosystems have been conducted over the past decade, many of which have focused on the vital services that freshwater ecosystems provide, including the provision of clean water and flood control. The total value of services provided by wetlands has been estimated to be as high as \$15 trillion annually (MEA, 2005).

Yet these benefits are often hidden, and not well incorporated into full cost accounting and decision-making processes. Economic valuation studies reveal the hidden costs and benefits of ecosystem services and can

help decision makers recognize and capture the value of these services, often through a payment for ecosystem services (PES) scheme. Proliferating watershed markets allow downstream users to pay for the costs of conserving water sources upstream. Nearly 300 such markets have been identified, and the number continues to grow (Stanton et al., 2010).

### **BOX 61. AN EXAMPLE OF A PAYMENT FOR WATERSHED SERVICE IN ECUADOR**

An example of a payment for watershed service is the Quito Water Fund (FONAG) in Ecuador, a trust fund established with USAID technical assistance over several years for the protection of the watershed providing Quito’s drinking water supply. The quasi-public municipal drinking water and electrical utility, a private brewery, and a water bottling company committed resources through an 80-year trust fund mechanism created through local financial regulations. To date, FONAG has generated an endowment of \$6 million and provides \$800,000 a year for conservation efforts that involve strengthening upstream watershed parks and protected areas providing water quality protection to the city’s municipal water supply. Payments support rural families in restoring degraded lands and adopting sustainable farming practices, reforestation, and educating children about sustainable water management. From 2000 to 2008, USAID invested US \$2.3 million and leveraged an additional US \$7 million of fund revenue to support key conservation and watershed protection activities through FONAG. The Quito model is now being replicated for many Andean cities (Stanton et al. 2010).

Increasingly, economists not only focus on the value of ecosystem services but also calculate the infrastructure costs that are avoided by maintaining freshwater ecosystems. According to the [Environmental Protection Agency](#), maintaining the Congaree Bottomland



Hardwood Swamp in South Carolina helped to avoid a \$5 million wastewater treatment plant; protected forests in the Catskills of upstate New York helped avoid \$6 billion in construction costs and \$300 million in operating costs annually for a water-filtration system; and restoring the 100-year flood zone of the five-state Upper Mississippi River Basin could store 39 million acre-feet of floodwaters – the same volume that caused the Great Flood of 1993 – and save over \$16 billion in flood-damage costs.

In the future, economists will likely place even more importance on the economic value of freshwater ecosystems, particularly as the full brunt of climate change impacts begins to be felt. From 2000 to 2006, more than 2,100 water-related disasters were reported globally, killing more than 290,000 people, affecting more than 1.5 billion, and inflicting damages worth more than \$422 billion (Adikari and Yoshitani, 2009). Given that the World Bank estimates the total costs of adaptation to be between \$71 and \$82 billion, there is little doubt that governments will soon want to begin to assess the economic value of freshwater ecosystems, particularly their role in enabling societal adaptation to climate change.

## 4.6.2 Freshwater Systems and Conservation Planning

### **Definition and Significance**

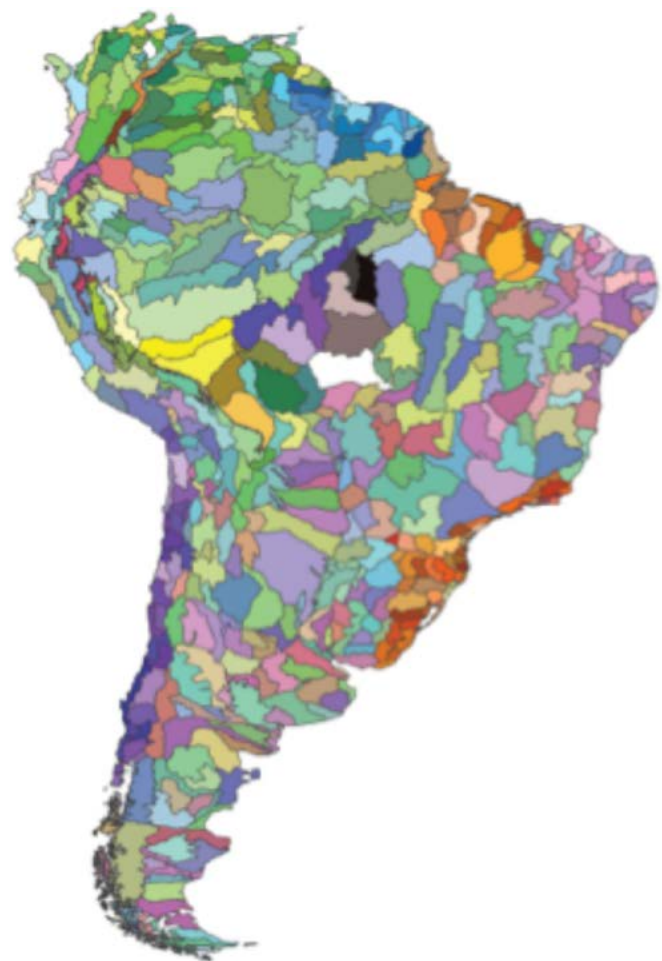
As described earlier in this handbook, conservation planning is defined as the deliberate process of identifying priorities for taking conservation action. Freshwater conservation planning entails planning for the conservation and protection of freshwater species; natural communities; and ecosystems at a variety of scales, including site, ecoregion, watershed, and national levels.

The vast majority of conservation planning processes that have taken place around the world have focused on either terrestrial or marine biodiversity. There have been very few systematic efforts to incorporate freshwater biodiversity into ecoregional- and watershed-scale planning processes. Yet freshwater processes and dynamics are often very different from terrestrial ones. Terrestrial ecoregions are dramatically different

from freshwater ecoregions,<sup>12</sup> and the primary unit for freshwater planning is often the drainage unit.

Figure 18 shows South American ecological drainage units based on geomorphic and climatic attributes (TNC, 2007). This section outlines a process by which planners can incorporate freshwater aspects into conservation planning at ecoregional and watershed scales.

**Figure 18. South American Ecological Drainage Units Based on Geomorphic and Climatic Attributes (TNC, 2007)**



*Reprinted by permission. Petry, Paolo and Leonardo Sotomayor. Mapping Freshwater Ecological Systems with Nested Watersheds in South America. The Nature Conservancy: 2009.*

<sup>12</sup> See, for example, the freshwater ecoregions defined by WWF and compare with their terrestrial ecoregions.

## **Key Questions**

### **How can planners incorporate freshwater biodiversity into broad-scale conservation planning?**

Just as terrestrial biodiversity is divided into realms, biomes, ecoregions, landscapes, and ecosystems, freshwater biodiversity can be divided into classification units that help planners better capture it in their planning efforts. [Higgins, et al.](#) propose a four-tier classification system that includes a) an aquatic zoogeographic unit, or basin; b) an ecological drainage unit; c) an aquatic ecological system within an ecological drainage unit; and d) microhabitats within aquatic ecological systems.

Key variables in defining an aquatic ecological system include stream size and gradient, stream and lake elevation, stream and lake geology, hydrological regime, lake size, lake drainage, lake drainage network position relative to species connectivity requirements, and lakeshore complexity. These factors allow planners to develop conservation plans that better capture the nuances and complexities of freshwater biodiversity. Once these factors are defined, planners can incorporate them into the same kinds of systematic conservation planning processes and models as used in terrestrial planning, including [Marxan](#) and other software programs.

### **What is an example of incorporating freshwater biodiversity into broad-scale conservation planning?**

In South Africa, planners used generic conservation planning software and applied it to the freshwater ecosystems and planning units that were particular to freshwater ecology ([Rivers-Moore et al., 2011](#)). They began by identifying priority primary catchments, and then selected priority sub-catchments for finer-scale planning. The team identified significant biodiversity for the freshwater systems by focusing on key estuaries, free-flowing rivers, highly intact areas, and important catchment areas. They added additional features by focusing on upstream-downstream connectivity and identifying migratory aquatic species, such as eels and fish. As with terrestrial conservation planning, they incorporated existing protected areas into their analysis.

### **What are some key challenges in planning for freshwater biodiversity conservation?**

Planners face numerous challenges when planning for freshwater biodiversity conservation. Much of freshwater biodiversity has yet to be classified. As a result, planners often rely upon biodiversity surrogates, rather than actual biodiversity data. The reliability of these surrogates has yet to be tested. The selection of focal species in freshwater conservation planning has not yet reached the same level of maturity as in terrestrial planning. Integrating the results of freshwater, marine, and terrestrial planning can be difficult, and there are multiple conservation tradeoffs that must be made. In addition, the process of planning for freshwater connectivity is still largely uncertain; connectivity requirements are clear for some anadromous fish species but are far less so for other freshwater species. Finally, the process for and key principles of planning freshwater ecosystems for climate resilience are still in their infancy.

## **4.6.3 Integrated Planning for Watersheds, Estuaries, and Coasts**

### **Definition and Significance**

Several interrelated concepts are involved in managing freshwater biodiversity in a coordinated fashion across broad scales.

The issue of integrated water resources management is an increasingly important focus of USAID's work. Defined as "the coordinated development and management of water, land, and related resources in order to maximize economic and social welfare without compromising the sustainability of ecosystems and the environment" (Global Water Partnership), integrated water resource management is a critical process. It helps to avoid unsustainable rates of water use; address problems between competing water uses (including for drinking water, livestock, agriculture, industry, and energy); and promote better cooperation and coordination across multiple sectors.

The concept of integrated coastal management is also important. Defined as a dynamic planning process that encompasses the sustainable use, development, and protection of coastal, nearshore, and marine areas, integrated coastal management is a well-

established process in many countries. But integrated coastal management planning processes often do not address inland issues within watersheds. A “ridge-to-reef” approach tries to create a planning framework for uniting inland waters with integrated coastal management. See Chapter 3, [Section 3.2.3](#), for more details on ridge-to-reef approaches.

### **What are some basic principles of integrated water resource management?**

Integrated water resource management is a widely recognized planning approach. Broad consensus exists on some of its basic principles, including

- a focus on coordination among multiple stakeholders
- a simultaneous focus on economic and social welfare, equity, and biodiversity protection
- an understanding of the interconnectedness of catchments, coastlines, estuaries, and land use practices at multiple scales
- an understanding of the potential for conflicts and tradeoffs between various stakeholder groups
- the use of scientific data as the basis for decision-making
- an emphasis on good governance and democratic participatory processes

### **What are some practical steps toward integrated water resource management?**

A recent [USAID guide](#) highlights a series of practical, concrete steps that planners can take to put integrated water resource management principles into practice. These include

**identifying key issues and building constituencies** – understanding the historic and predicted water flows, threats, and uses; identifying stakeholders and their concerns; evaluating potential future impacts of uses on the freshwater ecosystems; assessing the existing management system

**formulating integrated water resource management policies and strategies** – setting goals with stakeholders, conducting targeted data collection and research, developing potential scenarios, and experimenting with potential plans to determine potential outcomes

**negotiating and formalizing goals, policies, and institutional structures** – getting formal endorsement of policies by major stakeholder groups, selecting an institutional structure for implementing integrated water resource management policies, and securing the required funding

**adaptively implementing the integrated water resource management program** – assessing the degree to which the preconditions of effective implementation have been met, encouraging voluntary compliance with agreements, and monitoring results

**evaluating the program and learning from the results** – assessing the quality of the program execution and evaluating social and environmental impacts

### **What are some examples of integrated water resource management actions?**

**improving institutions and policies for water resource management** – USAID has helped develop new mechanisms for better coordination and stakeholder participation and assisted in the development of new policies on key water issues.

**developing best practices in water resource management** – USAID can help identify best practices, then encourage the diffusion and adoption of these technologies and practices throughout the country.

**increased NGO participation in water resource management** – USAID has helped NGOs and community-based organizations increase their capacity to participate in water resources management. The Agency has also supported public-awareness and outreach campaigns.

## 4.6.4 Wetlands and Biodiversity

### Definition and Significance

The Ramsar Convention on Wetlands defines wetlands as “areas of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters.” Wetlands may include lakes, rivers and marshes, nearshore marine areas, and human-made wetlands, such as reservoirs.

Wetlands harbor extraordinary levels of biodiversity. Because wetlands are remarkably productive ecosystems, they provide an unusually large number of benefits and services. The Millennium Ecosystem Assessment for Wetlands listed dozens of services, including

**food production:** fish, wild game, grains

**fresh water:** for domestic, industrial, and agricultural uses

**fuel:** production of peat

**climate regulation:** carbon sink

**water regulation:** groundwater recharge and discharge

**water purification:** removal of excess nutrients

**natural hazard regulation:** flood control and storm protection

**habitat:** highly diverse ecosystems

As a result of these services, wetlands have enormous value to society. **One study** found that for the Mthurajawela Wetland in Sri Lanka, the economic value exceeded \$7.5 million; for the Lake Chilwa Wetland in Malawi, it exceeded \$21 million; for the Wadden Sea in the Netherlands, it exceeded \$2.3 billion; and for the Pantanal Wetland in Brazil, it exceeded \$15.6 billion. Despite the extraordinary economic, social, and ecological value of wetlands, they are among the most-threatened ecosystems in the world, and poor consideration of these values is the leading cause of their loss and degradation. Integrated wetland assessments can help identify the economic, social, and ecological values of wetlands and foster better societal decisions about wetland management.

### Key Questions

#### **What is an integrated wetland assessment and why is it important?**

Because the economic, social, and ecological values of wetlands are so inextricably intertwined, a broader, integrated assessment is often required. A recent guide by IUCN (Darwall et al., 2007) describes the process of integrated wetland assessment, with examples of key elements to be included:

**physical wetland** – the geology and topography and hydrological regime

**biodiversity and ecosystems** – the wetland ecosystem-specific species and their ecological context, and ecological processes

**ecosystem services** – the full range of values, benefits, and services, including water provisioning and regulation, food, and flood control

**local livelihoods** – agriculture, fisheries, and products that flow from the wetland

**policies, governance, institutions, and markets** – markets, fisheries policies, and protected area management and land use patterns

Together, these elements can be combined into a conceptual synthesis, which in turn can lead to an integrated management plan that addresses each of the issues above.

#### **What is an example of integrated wetland assessments?**

One example of an integrated wetland assessment is from Mtanza-Msona, Tanzania (Campese, 2008). In this assessment, planners held a series of national and local dialogue meetings, followed by a national roundtable discussion. Key findings included the following:

- All households used a variety of wetland resources for their subsistence and livelihoods.
- Wetlands provided substantial economic value to the village as a whole (about \$100 per capita).
- The poorer households had a heavier dependency on the wetland in order to spread household risk.
- The vast majority of village economic activities depended on the wetland.



- Some wetland species had a disproportionate importance for local livelihoods, while others were more important ecologically.

The existing management framework was inadequate to incorporate these issues and needed to be upgraded to accommodate the multiple benefits, challenges, threats, and opportunities revealed by the integrated wetland assessment.

### **What is mainstreaming of wetland biodiversity and why is it important?**

Conducting an integrated assessment of wetlands is an important first step. In order to ensure that the values of wetlands are fully recognized by society, however, planners will need to take the next step – integrating and mainstreaming these values into broader sectoral plans and policies. Mainstreaming can be defined as the full internalization of biodiversity conservation and sustainable use goals and objectives into the daily management practices and policies of production sectors. Examples of sectors that influence and/or depend upon wetlands include agriculture, land use planning, water management, tourism, forestry, energy, and climate change planning.

### **What are some examples of mainstreaming of wetland biodiversity?**

There are several examples of effective mainstreaming of wetland biodiversity into sectoral plans, policies, and practices, including

**Mexico:** One of Mexico's main development challenges is the availability of water – 32 percent of the country's natural water is located in central and northern Mexico, where 77 percent of the population lives and 88 percent of the gross domestic product is generated. The number of depleted aquifers has jumped from fewer than 20 in the 1970s to more than 100 in 2006. The focus of mainstreaming efforts, supported by WWF and the Government of Mexico, has included

**improving sectoral awareness** – promoting awareness of the functions and services of freshwater and wetland ecosystems, especially in the land use and water management sectors

**strengthening governance** – supporting the consolidation of water governance across many sectors within each basin

**assessing and incorporating the economic values of wetlands** – determining the economic values of environmental services and products, incorporating these values through demonstrative projects, and promoting the results of these projects widely

**promoting sustainable resource use** – strengthening the capacity of rural and indigenous communities to improve sustainable use of ecosystems, particularly sustainable forestry and agriculture

**securing water rights** – ensuring that indigenous and rural communities with populations under 2,500 had secure water rights for domestic and productive activities

**Cameroon:** In Cameroon, African coastal mangrove forests cover 3.9 million hectares and are of enormous economic and ecological significance to the country. For decades, these mangrove forests have been facing threats from harvesting of timber, fuel wood, non-timber forest products, and artisanal fishing. Efforts to address these threats have focused on the dual aims of biodiversity conservation and poverty alleviation. Specifically, wetlands and poverty mainstreaming efforts have included

**mangrove and wetland restoration** – restoring key mangroves and wetlands, while building efforts for poverty alleviation through sustainable harvest of non-timber forest products

**value-added processing of wetlands products** – improving methods of drying fish by building 50 community fish smoking buildings

**land use planning and gazetting** – improving participation in the land use planning process and creating community-use zones adjacent to core conservation areas

**ecotourism development** – promoting ecotourism, specifically to the international bird-watcher community

**forestry and tenure policies** – revising forest-clearing policies that allowed for the clear-cutting of mangroves, and helping to resolve ambiguous land tenure policies that promoted unsustainable practices



*Community members restore coastal mangrove forests near Davao City in the Philippines. Mangroves are biodiversity hotspots, acting as nurseries for a variety of marine fish and invertebrates with local and/or commercial value. They also help mitigate and adapt to climate change by sequestering carbon above and below ground and shielding coastal communities from more frequent or intense storms, especially as sea levels rise.*

*Photo: DAI*

#### **4.6.5 Water Supply, Sanitation, and Hygiene (WASH)**

##### **Definition and Significance**

“Water supply,” “sanitation,” and “hygiene” (WASH) (see Box 62 for definitions) constitute a suite of basic services that are fundamental to human well-being and development. Providing more of the world’s population with WASH services is a declared Millennium Development Goal, and access to water supply and sanitation was recently acknowledged by the United Nations as a basic human right. Despite this high-level attention, it is estimated that 2.5 billion people around the world still lack access to improved sanitation, and over 780 million people, primarily in sub-Saharan Africa and South Asia, do not have access to improved drinking water sources.

Sustainable and equitable access to water supply and sanitation services and adoption of critical hygiene behaviors are important enablers of a broad range of development benefits. WASH investments improve health and save lives, especially those of children under 5, about 760,000 of whom die from diarrheal-associated causes every year. When safe household water supply is reliably accessible, food security and nutrition are also improved. Girls have better opportunities for education, and women are less burdened in the home. Secure and sustained access to domestic water expands options for livelihood strategies for both men and women and facilitates broad-based economic development. WASH is a good investment, as well; the **World Health Organization has estimated that economic benefits associated with WASH total \$3-34 for every dollar invested.**

Underpinning these benefits are numerous important linkages between WASH and the natural environment, including the conservation of biodiversity. The integrity of ecosystem processes is, in fact, a key supporting element for the provision of sustainable WASH services. At the same time, carrying out WASH activities in an environmentally responsible way is essential for protecting ecosystems and biodiversity. These intersections occur both “upstream” and “downstream” of the WASH services. Domestic water supply and water-based sanitation depend on the availability of steady, reliable, and clean quantities of water from natural sources. “Ecosystem services” associated with the natural hydrologic cycle – including the regulation of water runoff, infiltration, recharge, natural water storage, sediment control, filtering, and purification –

ensure the continuous natural supply of this resource for all human uses, including WASH. The economic value of the environmental services provided by such healthy, intact natural systems as high-biodiversity forests, riparian areas, and wetland systems is not trivial. In the well-known case of New York City, a long-term watershed protection scheme has saved billions of dollars by avoiding drinking water filtration and treatment costs over the two decades it has been in place. In addition to drinking-water quality protection, intact and biodiversity-rich ecosystems can provide other services, such as the mitigation of climate change impacts that threaten WASH infrastructure and services (e.g., coastal ecosystems buffering extreme storm events or mitigating sea level rise saltwater intrusion into groundwater supplies).

## BOX 62. WASH DEFINITIONS

“Water supply,” “sanitation,” and “hygiene” can embrace a wide variety of meanings in day-to-day conversation. Not all of these meanings align with the technical definitions most accepted in the international WASH community, however. International WASH initiatives, such as are included in the Millennium Development Goals (MDGs), use more precise definitions that should be kept in mind:

- **Water Supply** refers to water services provided primarily for domestic uses, including drinking, cooking, cleaning, laundry, and basic personal and household hygiene. Some productive uses of water may be included, but dedicated water supply development for agriculture, power generation, or ecosystem use is not included in this definition. “Improved” domestic water supply under the WASH MDG definition implies some degree of “safety,” but does not include explicit water quality standards or required treatment.
- **Sanitation** is defined as hygienic management of human feces to reduce the risk of fecal-oral transmission of disease. As a primarily public health-oriented definition in the developing country context, “improved sanitation” has not traditionally required management of human waste collected before discharge into the environment (i.e., wastewater treatment or fecal matter processing). In more recent international dialogues, however, the definition of sanitation has broadened to address the issue of environmental sustainability and appropriate waste management associated with sanitation collection systems. Note that issues such as industrial wastewater management are still not included in these discussions.
- **Hygiene**, for most WASH practitioners, refers to specific evidence-based behaviors that are linked to the reduction of diarrheal disease, including hand washing with soap; sanitary feces management; and proper transport, storage, or treatment of household water quality. Increasingly, attention to food preparation and storage is also included as a key hygiene behavior. In addition, some WASH practitioners include other forms of personal hygiene, such as face washing to control trachoma and other water-related diseases, or non-diarrheal disease-related practices, such as menstrual hygiene.



At the opposite end of the WASH services value chain, poorly managed waste from human sanitation systems can pose significant threats to biodiversity downstream, especially near dense population centers. In developing countries, less than 10 percent of wastewater is treated or managed in an environmentally sustainable fashion. Given expected rates of global urbanization, and a shift to more water-based sanitation and sewerage typically accompanying the growth of cities, these volumes are likely to increase dramatically in the future. Discharge of this untreated human waste from urban areas is already having a significant environmental impact. More than 50 percent of global rivers, lakes, and coastal waters are estimated to be seriously contaminated, with bacteriological and nutrient pollution from domestic wastewater a key contributor in some areas. “Dead zones” currently affect more than 245,000 km<sup>2</sup> of marine ecosystems as a result of such contamination. By 2030, more than one-fifth of the global population will be discharging its waste in coastal areas, placing fragile coastal/estuarine ecosystems and biodiversity at even greater risk.

Systems thinking and integrated approaches are essential to addressing both “upstream” and “downstream” WASH and biodiversity linkages. The prevailing management paradigm in the water sector is integrated water resources management (IWRM), which includes WASH and all interconnected users and stakeholders in the governance and management of water resources. Intersections between WASH and biodiversity can be explicitly addressed within the framework of IWRM, including issues of water quantity and quality for human use, as well as the maintenance of healthy ecosystem services.

### **Key Questions**

#### **What are the essential ingredients for strategic integration of WASH and biodiversity programs?**

While there has been increasing interest in the integration of biodiversity conservation and WASH programs, not all such efforts are strategic or result in sustainable benefits. Successful integrated WASH and biodiversity programming occurs when the approaches proposed are deemed a priority from the perspective of both the WASH and biodiversity sectors, and when

the implementation of such approaches demonstrates equal or better development results than stand-alone programming in each area. Guiding principles include the following:

**“Do no harm” to either sector** – e.g., by ensuring that human waste from WASH systems is managed properly before discharge into the environment, or that investment in ecotourism or other natural resource-based livelihoods to conserve biodiversity does not result in domestic water shortages for communities.

**Adhere to state-of-the art technical approaches in both sectors.** The provision of one-off, individual community WASH systems, employed as an entry point for rural community NRM governance, is not generally considered to be either sustainable or transformative by WASH practitioners. Conversely, focusing biodiversity programs specifically on WASH-related ecosystem services (either upstream or downstream) may not be seen by biodiversity specialists as the most critical way to reduce threats to a country’s high-value biodiversity areas. However, with some modest compromises and strategic pooling of resources on each side, synergies can often be found that are strategic from both points of view.

**Engage appropriate technical expertise in both sectors.** Much of the justifiable criticism of integrated programs has occurred when WASH or biodiversity specialist organizations attempt to design and/or implement programs in the other sector. Environment NGOs often construct water points or train community WASH committees without a core expertise in this area, while WASH NGOs may add on environment-sector activities without the necessary technical capacity in this area. Demonstrated multi-sectoral expertise should be present starting in the design stage of the program and continue throughout implementation and follow-up; this may require engaging more than one implementing organization.

#### **What are some of the most common examples of strategic integrated WASH and biodiversity activities?**

Successful integrated WASH and biodiversity programs support a variety of policy tools, technical approaches, and market mechanisms to simultaneously keep



ecosystems healthy and ensure the sustainable delivery of WASH services. The Africa Biodiversity Consultative Group (ABCG) provides a **valuable resource** based on an expert workshop for integrating WASH with freshwater conservation and biodiversity. See Box 63 for tips on applying biodiversity funding earmarks to WASH activities.

Common strategic approaches seen in successful integrated WASH and biodiversity programs include

**water resources and watershed management to protect source water supplies for WASH services and healthy ecosystems**

– There is increasing recognition among WASH practitioners that protecting the quantity and quality of source water in nature is a fundamental component of sustainable and resilient domestic water and sanitation service delivery. Biodiversity advocates also recognize the value of conserving high-value ecosystem services provided by important river basin systems, most of which also provide a supply of drinking water and assimilate sanitation waste. Integrated strategic approaches may include reduction of threats to ecosystem services in upper catchments that specifically protect drinking water quality (such as WHO’s “Water Safety Plan” approach) or multi-stakeholder, participatory governance of water resources and services at the scale of the watershed, catchment, river basin, or aquifer. Managing domestic water supply extractions to ensure that there is no adverse impact to natural flow regimes or the ability of hydrologic systems to produce food, cycle nutrients and sediments, and maintain critical wetland and estuarine habitats is also important. These integrated activities are most appropriate in defined water catchments with documented high-value ecosystem services that also provide surface water supply to a population center. (See Box 64 on water safety planning in the Philippines.)

**economic valuation of environmental services**

– Economic valuation of ecosystem services that benefit people can be an effective tool to advocate for the importance of investing in biodiversity conservation. It also provides an incentive for promoting policy and legal reforms for both environmental and human health. A significant portion of the monetary value assigned to ecosystems worldwide is associated with water and

watershed-related benefits. “Beneficiaries” of these services can be downstream consumers of drinking water supply, as mentioned above. At the other end of the spectrum, businesses and industries in valuable coastal and marine habitats, including tourism and fisheries, can also be recipients of ecosystem benefits derived from upstream urban areas that treat domestic wastewater. In selected contexts, there are opportunities to convert this value into financial support in the form of payments for environmental services (PES)/payments for watershed services (PWS) that transfer funds from the recipients to the providers of ecosystem services. More than 100 of these schemes are currently operating around the world in association with municipal drinking water supply, primarily in Latin America (e.g., in Quito, Ecuador and Bogotá, Colombia). While promising in some settings, operationalizing such schemes is difficult in practice, and many barriers remain, including lack of technical and market information, limited institutional experience, inadequate legal framework, limited successful business models, and equity concerns.

**improved management of excreta and domestic wastewater to reduce threats to sensitive freshwater and marine aquatic habitats**

– The design and implementation of WASH programs must follow USAID environmental compliance regulations to mitigate environmental externalities associated with these activities. This starts with the immediate impacts of construction of water and sanitation infrastructure that might affect ecosystem functions (e.g., vegetation clearing, damage to riparian or wetland habitats, alteration of river flows, and soil erosion at construction sites). The long-term environmental impacts of waste management are also priority areas of intervention. Numerous wastewater treatment options are available, including decentralized constructed wetlands and other lower-technology/lower-cost approaches. For household or institutional latrines, there are several “ecological sanitation” options available that compost waste on-site. Increasingly, technologies are being developed that view excreta as a useful resource, rather than simply as a waste disposal problem. These technologies are creating closed-loop systems that transform human waste into a valuable community asset such as fertilizer or energy. (See Box 65 on wastewater management and marine conservation in the Caribbean.)

**provision of basic WASH services as an entry point to other development issues** – Poverty, environmental degradation, poor human health, and the lack of basic WASH services often coexist, especially in remote rural areas, and there has been some positive experience in co-programming these sectors to achieve development outcomes at a more efficient cost. From a community buy-in perspective, access to WASH services is often a much higher local development priority than the conservation of biodiversity or environmental protection. Biodiversity programs can productively collaborate with WASH partners as a way to engage and organize local residents in a

broader range of governance and development issues. Likewise, biodiversity programs that include livelihood components and WASH programs can find productive and mutually beneficial ways to partner through the development of multiple use water services that provide community water supply for both domestic and small-scale productive uses. As mentioned earlier, care must be taken to ensure that any such co-programming is done as part of a systemic and strategic investment in sustainable WASH services at scale, not merely as a “wrap-around” activity for NRM, or water and sanitation services are unlikely to remain operational over time.

### BOX 63. WASH AND BIODIVERSITY: TIPS FOR APPLYING USAID FUNDING EARMARKS

When considering options for integrated programs that include both WASH and biodiversity components, careful attention must be paid to the requirements associated with both the USAID biodiversity earmark and the USAID water earmark (as well as any other potential sources of funding used for either). Some things to keep in mind:

- Biodiversity earmark funds can only be used for the direct provision of WASH services in rare instances, e.g., the construction of WASH facilities for visitors in national parks. (Use of water earmark funds for this purpose would be technically eligible but not considered particularly strategic from a WASH systems point of view.)
- The water earmark generally only permits a partial attribution to water resources management activities, so would need to be pooled with other funding sources (potentially including the biodiversity earmark) to support an integrated water resources/watershed management activity.
- To partially attribute biodiversity earmark funds for water resources/watershed activities supporting WASH, there must be a clear, documented, and evidence-based cause/effect relationship between reduction of biodiversity threats and the high-value watershed ecosystem services being protected.
- Geographic location is critical to even considering the possibility of successfully integrating biodiversity earmark money with the water earmark or other funds. Strategic approaches supported by the biodiversity earmark must reduce threats in areas of high-value biodiversity. To effectively integrate with WASH activities, these zones of high-value biodiversity must occur on the “upstream” or “downstream” side of the targeted WASH activities.
- Water earmark resources may be used for small-scale treatment of community wastewater or management of fecal matter associated with household sanitation. USAID environmental compliance regulations can provide an important incentive to allocate water earmark funds to mitigate potential pollution or other impacts associated with WASH programs.
- Both water and biodiversity earmark programs must have an explicit primary or secondary objective and must monitor indicators associated with outcomes in each sector.

## BOX 64. WATER SAFETY PLANNING IN THE PHILIPPINES

Most “watershed management” activities prioritize conservation, natural resources management, or poverty alleviation goals, with benefits for downstream drinking water supply sometimes claimed but rarely documented. The World Health Organization (WHO) has developed a methodology that provides opportunities to achieve both conservation and WASH outcomes in selected high-biodiversity watershed settings – water safety planning (WSP). Similar to the threats-based approach used in conservation programming, WSP focuses on identifying and targeting “risks” to drinking water quality along the entire service cycle, from source to consumer. The methodology begins with a thorough assessment of vulnerabilities throughout the service chain. It follows through with development of specific action plans and implementation of multiple preventive “barriers” to contamination. Finally, it institutes a rigorous monitoring and evaluation program to ensure that drinking water quality is maintained to WHO or locally mandated standards.

While much of the WSP methodology is focused on identifying and addressing risks in the physical infrastructure of the water supply or treatment system, one part of the approach requires assessing the condition and state of protection of the natural water source. In the case of surface water-fed systems, there is a specific focus on the important water quality protection services provided by watershed landscapes, one of the most commonly cited ecosystem services and conservation values provided by healthy watersheds.

In recent years, there has been considerable dissemination and testing of the WSP methodology in developing countries around the world. In 2007, the methodology was applied by the Maynilad Water Company 50 km northeast of Manila, Philippines, which is home to a forest surrounding the Ipo Reservoir, one source of the municipal water supply for Manila. The ecosystem is under threat from illegal loggers and charcoal makers, with the resulting deforestation contributing to mudslides and flash floods that put people and settlements at risk and contaminate drinking water supplies. The Maynilad Water Company’s WSP has highlighted deforestation as one of the biggest threats to drinking water quality in their system, with the resulting turbidity levels requiring a significant increase in the cost of treatment, as well as maintenance needed to prevent sedimentation blockages.

The village of Sitio Anginan on the shore of the Ipo Reservoir is home to 43 indigenous Dumagat families whose traditional livelihood is derived from farming, fishing, and making charcoal. Following the participatory WSP process, the water company and community worked together to reduce such water-contaminating practices as land clearing around the reservoir, where a vegetated buffer is now in place to reduce sedimentation into the reservoir. Charcoal making has also stopped, with firewood now collected from fallen trees. To compensate for the loss of income, the water company has employed community members to cultivate and plant tree saplings for reforestation and provide protection of the forest from damaging activities. The discipline and rigor of the WSP process has also had broader benefits, including capacity building to improve water company operations and improved governance of both water resources and services through the methodology’s highly participatory stakeholder planning process. Following the WSP protocol, strict monitoring is also in place by the water company to track the impact on risks to drinking water quality resulting from this and other strategic approaches. (For more information, see [www.wsportal.org](http://www.wsportal.org).)

## BOX 65. WASTEWATER MANAGEMENT AND MARINE CONSERVATION IN THE CARIBBEAN

The Caribbean Sea Ecosystem Assessment (CARSEA) and other studies have found that one of the greatest drivers of degradation of the Caribbean coastal and marine environment is the discharge of untreated wastewater into coastal waters. This threat to the biodiversity of these highly valued ecosystems undermines livelihoods that depend heavily on natural marine resources. Currently, 85 percent of the wastewater entering the Caribbean Sea is untreated, and less than 2 percent of urban sewage in Small Island Developing States (SIDS) is treated before disposal. While wastewater is considered a serious threat by environmental managers and biodiversity conservationists, from a WASH services perspective there has been less commitment, with the global priority focused on access to basic sanitation and sewage collection (not treatment). This has been changing in recent years, as reflected in the current post-MDG Development Agenda consultations, where WASH practitioners have begun to consider management of fecal waste as part of the commitment to sustainable sanitation coverage. Constraints are huge, however, with limited funding for infrastructure remaining a challenge for many governments in developing countries. The political priority of wastewater treatment infrastructure financing is also low. In the Caribbean region in the 1990s, the water and sewage sectors as a whole consistently received the least investment, compared with the energy, telecom, and transport sectors, with very little directed to wastewater treatment.

The Caribbean Regional Fund for Wastewater Management (CReW) was established with support from the Global Environmental Facility (GEF) program in 2011. The program, co-implemented by the Inter-American Development Bank (IDB) and the UN Environment Program (UNEP), is testing two different innovative wastewater financing mechanisms in four pilot countries: Jamaica, Belize, Guyana, and Tobago. Projects are selected to address both biodiversity and WASH considerations. Investments must result in a significant improvement in (or reduced further deterioration of) coastal water quality. At the same time, projects must address a high service priority for the wastewater utilities and work to keep project financing costs within ratepayers' ability to pay. Financing mechanisms reflect local financial conditions, regulatory frameworks, and utility capacity and include both revolving fund and credit enhancement models. The program provides capacity building and technical assistance for wastewater system design to ensure that projects satisfy all local government and CReW requirements.

Policy and legislative reform efforts are also being pursued, including improving compliance with obligations of the Cartagena Convention and its Protocol on Land-Based Sources of Pollution. Learning, as well as knowledge exchange and dissemination, are also core components of the program, including sharing of pilot-project results and lessons learned through the GEF International Waters Learning Exchange and Resource Network (GEF IW-LEARN) and development of a clearinghouse mechanism to provide information about wastewater management to technical experts, as well as national leaders, policymakers, the private sector, the media, and the general public. While it is too early to assess results, the program has the potential for a catalytic impact in both reducing biodiversity threats and improving the quality and sustainability of WASH services at a regional scale. (For more information, see: [www.gefcrew.org](http://www.gefcrew.org).)



## 4.7 SOCIETY, CULTURE, AND INSTITUTIONS

This section focuses on the intersection of conservation and human society as expressed in social institutions, including cultural norms and legal and regulatory systems. Humans are social animals; cooperation is essential to human survival. Yet humans are also intensely competitive. Society is the ultimate driver of the current epoch's catastrophic biodiversity loss, as well as the foundation for conservation. What knowledge about human social organization and behavior is necessary for biodiversity conservation programming? What are the best ways to tame conflict and leverage cooperation in the service of conservation?

The section reflects the ways that social science and conservation science have worked together to understand, model, and improve natural resource management. Insights have emerged from multiple disciplines, notably anthropology, rural sociology, psychology, political science, legal studies, human rights, and human geography, as well as cross-disciplinary work on common property (or common pool) natural resource management and environmental governance. Intersections with USAID programs that have significant social and institutional dimensions are included in the following sections: Land Tenure and Property Rights, Democracy, Rights and Governance, and Conflict Management and Mitigation.



*People living in the foothills of the world's third-highest mountain gather to assess red panda populations and habitat. Communities like this in the Sacred Himalaya Landscape of eastern Nepal and neighboring India manage their natural resources through forest-user groups and anti-poaching patrols. Photo: WWF*

## BOX 66. DEFINITIONS

**Society.** Society is human interaction that produces enduring structures. All humans are part of societies, which in turn comprise many levels, groups, and institutions. A person's role (functions served in the social group) and status (relative power and influence) strongly determine involvement in groups and institutions. People have multiple roles within social layers, from the household to the nation-state and, increasingly, within global societies.

**Institutions.** Institutions are structures that govern the way societies act, as well as the expression of how people organize themselves to act. A legal, market, or governance system is thus an institution or an organization created to work within these systems, such as a legal advocacy group, Chamber of Commerce, or political party.

**Culture.** Material culture refers to the physical tools, artifacts, and structures that people create. But culture also comprises symbolic structures, such as music, art, different forms of written and spoken language, concepts, and ideas – indeed, the whole architecture of knowledge. The essence of culture is pattern and structure that is passed on via learning rather than genetic inheritance. A “culture” is thus a constellation of learned behavior patterns. Non-human primates, such as chimpanzees, have been found to employ cultural transmission of such knowledge as hunting and gathering techniques; however, “culture” in its full complexity is a unique human characteristic. A worldview is a knowledge system that comprises the ways that people perceive and understand causality, family, strangers, space, time, nature, and other concepts. For instance, in some cultures, nature is integrated into human society.

**Behavior.** Behavior is what people do and how they react to situations. It is shaped by humanity's primate heritage, as well as by social status, gender, locality, power relations, and other social variables. There is a difference between normative behavior – people saying or doing what they think they should do to conform to culture and society – and actual behavior. This difference is crucial to an understanding of behavior change.

**Community.** This term is vague and often not useful in understanding and interacting with individuals, groups, and institutions. Social scientists prefer to use more specific terms that refer to a locality, for instance “village,” “hamlet,” and “district,” or to a social function, such as “forest user group” or “marine management institution.”

Conservation requires **social capital** and **collective action** in the management of common property natural resources, such as forests, fisheries, coasts, rivers, and grasslands. Social capital is the intangible quality of being able to work together productively on common tasks. The glue is trust that comes from common values and adherence to rules. Collective action is needed because natural resources and biodiversity are not the province of one individual, family, group, or actor; they cross boundaries. People must work together to manage them.

## 4.7.1 Social Safeguards and Soundness

### Definition and Significance

A USAID-supported conservation program in the South Pacific got off to a rocky start in developing relationships with landowning clans in the conservation area. Project staff interviewed project implementers, who described what happened:

*We organized a landowner forum. It was supposed to be a big meeting where we were going to develop an agreement between the project and the landowners. But the meeting was very poorly planned and facilitated. Our facilitator, who was from the outside, brought policemen to the meeting and kept pushing for conservation in a very open way. This ended up getting the people angry at us. They were saying, “This is our land – who are you to tell us how to run it?” This kind of forum needs much better planning so that you can work out a deal that benefits both sides, including provisions for what happens if the deal is not upheld by either side.<sup>13</sup>*

This story illustrates two key elements of social safeguards and soundness: due diligence and building trust. The bottom line of due diligence is assuring that programs do not cause harm or generate conflict – or that when they do, managers put in place a sound mitigation plan agreed upon by all stakeholders. To avoid negative outcomes, managers need comprehensive and reliable data about target populations, their institutions, and their history on the land, as well as knowledge about appropriate and effective modes of engagement, communication, and even proper manners and dress.

Communicating in culturally appropriate ways not only prevents misunderstanding and conflict, it builds trust. And relationships of trust are essential for conservation success. A study in three protected areas by Marc Stern of the University of Vermont found trust and legitimacy to be key factors related to voluntary compliance in situations where general agreement with conservation regulations does not necessarily exist.

In developing countries, the stakes are higher now, as local communities and other actors become better

<sup>13</sup> BSP, *If Only I Knew Then What I Know Now: An Honest Conversation About a Difficult Conservation and Development Project*. Lessons from the Field, Biodiversity Conservation Network, c. 1998.

informed, more organized, and empowered to challenge and/or collaborate with initiatives. There is also more potential for conflict, in the absence of effective, legitimate state-society relations, due to the growing scarcity of land and natural resources and rapidly shifting demographic trends.

**Social safeguards** have the aim of assuring that projects “do no harm” to people and groups, parallel to USAID’s environmental safeguards embodied in 22 CFR 216, which mandates initial analysis and regular monitoring of possible environmental harm that can come from a given activity. Social safeguards require review of projects to assess stakeholder consultation processes and possible impacts on vulnerable groups and indigenous peoples. They flag such key concerns as dislocation and resettlement of populations and potential loss of livelihood.

Safeguards are critical both to protecting affected populations and to mitigating risk to project implementers. They are, in a sense, a minimum standard, often legalistic in nature; for example, they may mandate stakeholder consultation but not necessarily assure the quality of this consultation. Or they may involve compensation for displacement and redress mechanisms in the case of harm or perceived/alleged harm, but not necessarily analysis that would prevent such harm in the first place. As such, an organization can have excellent safeguards but not necessarily incorporate the social soundness approaches that improve prospects for social sustainability.

While safeguards and other project- or institution-level policy mechanisms are used to avoid or mitigate harm and conflict, **socially sound programming** complements safeguards by proactively assessing and addressing key social dimensions and issues in design and implementation. These dimensions include existing and historical relations among stakeholders, institutional capacity, good governance, conflict sensitivity, and approaches to behavior change.

**Behavior change:** Although often a stated goal of conservation efforts, it is not easy to change behavior. An individual’s behavior is shaped by a multitude of personal and social factors. Over-reliance on data gathering



through surveys and focus groups limits understanding of behavior and thus the ability to impact it. Observed behavior is often very different from stated behavior, which reflects social norms, particularly with respect to activities that may be sensitive, illegal, covert, or socially discouraged. Thus, the understanding and trust needed to implement socially sound conservation requires time and effort, as well as the emotional intelligence to listen and learn from others.

**Constituency building:** While knowledge about social institutions, norms, and history is critical, social soundness also involves how that knowledge is used – how one goes about doing the work, as much as what one knows or does. For instance, an assets-based approach builds on, and builds up, the assets of involved stakeholders (see [Section 3.3.5](#)). It uses an understanding of what matters to people and how to best communicate and work together to ground an initiative in stakeholders' knowledge, values, skills, networks, and institutions. These concepts are the basis for building constituencies for conservation that may be outside of the “conservation sphere” but have intersecting interests, concerns, and values.

## Key Questions

### ***Is conservation an essentially benign activity?***

Virtually all conservation actions involve some measure of risk or tradeoff. Indigenous and environmental justice activists, journalists, and social scientists have focused on issues of [resettlement and dislocation](#) in the creation of parks and protected areas, as well as other perceived human rights violations. Protected areas are often located in the territories of indigenous, tribal, and marginalized peoples who have weak political and economic influence at the national and international levels. As with all USAID programming, it is important for the planners and managers of conservation programs to be alert to international and national treaties, laws, and safeguards and – given USAID's mandate to end extreme poverty – to consider actions that may put poor people at risk.

### ***What social safeguards does USAID apply to biodiversity programming?***

Although USAID has no formal social safeguards, such as those found in the multilateral development banks and other agencies (e.g., World Bank, Overseas Private Investment Corporation [OPIC]), efforts to develop guidelines that serve a similar purpose are proceeding on multiple tracks:

The Forest Carbon, Markets, and Communities (FCMC) program has analyzed the social dimensions of REDD+ and assisted USAID in evaluating policy and practice options. This analysis includes a review of all donor and large NGO safeguards and standards for REDD+.

The Democracy Conflict and Humanitarian Assistance (DCHA) Bureau has developed a [human rights strategy](#) to guide program managers in considering impacts on such vulnerable populations as indigenous peoples and lesbian, gay, bisexual, and transgender individuals.

The Policy, Planning, and Learning (PPL) Bureau has mandated project-level “sustainability analysis” that addresses some elements of social and benefit sustainability.

The mandated gender analysis is increasingly stressed Agency-wide. Understanding the differential impacts on men and women of a given activity is a critical component of social soundness (See [Section 3.1.6](#)).

In Chapter 2, many approaches to assessment and evaluation are described that can be used to measure the social impacts of projects and activities. If appropriate indicators and learning systems are put into place, these impacts can become apparent early on to avoid possible harm and increase engagement of more marginalized stakeholders.

In terms of USAID-funded research, [USAID's new research policy](#) calls for oversight of an Institutional Review Board (IRB) for human subjects research – this typically applies more to laboratory research. [The American Anthropological Association](#) has a detailed code of ethics with respect to field research informant and data confidentiality.



## **How are social soundness principles incorporated into USAID programming?**

In the past, USAID required a social soundness analysis ([here is as an example from an agroforestry project in Haiti](#)) as part of project design. The current [guidance](#) is better suited to the type of integrated development project that was implemented in the 1980s than to the range of today's projects and this analysis is now optional. At present, consideration of social soundness may depend on the type of program, the experience of managers and implementers, the country, and site-level concerns. The following are suggested approaches to integrating social soundness in programming:

Pertinent resources to consider in design of socially sound programs include institutional assessments, conflict assessments, and political economy analysis in addition to the required gender and sustainability analyses (See [Section 2.3.4](#)). Review social and economic indicators, which indicate vulnerability of different populations in a country, and project reports that discuss implementation lessons in terms of adoption, spread, and sustainability of specific approaches.

In line with [USAID Forward](#), project planners should consider ways to support local organizations that have high social capital and the ability to mobilize collective action in socially and culturally appropriate ways to meet USAID funding requirements. These institutions may or may not be in the conservation or environment sphere.

It is important to start at a broad social scale rather than piloting and scaling up. The SCALE methodology (see [Section 3.1.1](#)) can be used to identify active umbrella institutions and networks. These institutions and groups may be formally or informally organized. For instance, a market or value chain for a product may have no formal organization but have a structure that links actors. Note that some formal umbrella institutions may be weak because they lack a mandate or were created to fill donor or government needs for consultation or harmonization, rather than the needs of local constituencies. **Working with journalists and media on campaigns that promote social soundness is one vital avenue.**

Social science research should be consulted and supported during the course of the program.

As noted in other chapters and sections of this handbook, social soundness is part of USAID's legacy in the biodiversity and NRM sector – a sector that has learned through the decades to take a holistic, participatory, long-term approach that builds on and bolsters local institutions. There is no substitute for relationships built on trust and partnership.

### **4.7.2 Effective NRM Institutions**

Social soundness does not mean sustaining specific institutions, but sustaining and improving institutional *capacity* to meet social needs. Steps include assessing the capacity, evolution, and context of partner institutions and seeking appropriate roles for local institutions while taking care not to overload them or put them at risk.

Key questions in sustaining and improving institutional capacity include the following: What services do local environmental NGOs provide to their constituencies? Have they become more service providers to donors and lost touch with local needs and constituencies? What can be done to help them build skills that will aid local constituencies? What about government institutions and their capacity and performance with respect to people's needs for security and livelihood (and beliefs, values, and sense of dignity)? Perceptions about ineffective or illegitimate performance by institutions can drive grievances around natural resource management and fuel conflict. (See [Sections 3.3.7](#) and [Section 4.8.2](#).)

Nobel Laureate Elinor Ostrom devoted her life's work to the study of effective institutions for "common-pool" natural resource management. Her quest was motivated by the desire to disprove "tragedy of the commons" theories that posited that when resources were managed in common they would inevitably be depleted because individuals would look out for themselves, rather than the common good. Ostrom and her students and colleagues developed a master database on common property NRM and identified conditions for successful common property institutions and their outcomes:

- clearly defined boundaries

- adapted to local conditions
- inclusive decision-making
- effective/accountable monitors
- conflict management institutions
- graduated sanctions for enforcement
- nested in larger systems
- recognition/acceptance of resource ownership by external authorities (the state)

USAID has invested intensively in NRM institutions and learned a great deal as well. Much of this learning was distilled in the [January 2013 workshop](#) on CBNRM. Box 67 describes some of this experience related to support to NRM institutions.

USAID's [Human and Institutional Capacity Development Handbook](#) is a great resource for gauging the competencies and needs of local institutions.

Some Missions implementing [USAID Forward](#) are also developing guidance and tools for local partners to strengthen their capacity.

Many scholars continue Orstrom's work. [The International Forest Resources and Institutions \(IFRI\) database](#) is a major resource for understanding institutional dimensions of forestry and human-ecological systems linkages such as [this one](#):

*By using original data on 80 forest commons in 10 countries across Asia, Africa, and Latin America, we show that larger forest size and greater rule-making autonomy at the local level are associated with high carbon storage and livelihood benefits; differences in ownership of forest commons are associated with tradeoffs between livelihood benefits and carbon storage. We argue that local communities restrict their consumption of forest products when they own forest commons, thereby increasing carbon storage.*

## BOX 67. NATURAL RESOURCE INSTITUTIONS: LESSONS LEARNED

Rural institutions are presented with a number of challenges.

- There can be a proliferation of organizations.
- Organizations can be tools of empowerment, representation, and self-determination, but they may also be coopted as an extension of command and control.
- They face prescriptive and onerous processes.
- Documentation requirements (e.g. to obtain a community forest) often reflect a double standard and top-down thinking.
- Groups face low economic margins and high transaction costs: meetings, monitoring, trainings, meetings, paperwork, planning, meetings.

Local government and community-based organizations' needs must be harmonized.

- LG needs resources to have credibility, legitimacy, and discretionary powers.
- In some cases, resource-based CBOs and technical committees undermine the authority and resource base of LG by locking up the tax base and creating parallel structures.

Apex organizations (networks of CBOs) and externally-created groups may not be the most beneficial to local actors.

- CBOs may need to represent themselves rather than through apex organizations or NGOs.
- CBOs need legal advice pertinent to their situations and capacities.
- Resource-specific organizations (e.g., forest or water user groups) often duplicate existing organizational legislation.
- Multipurpose and flexible organizational types are often more appropriate.
- Resource rights may be obtained through other avenues, such as land legislation.

Structural change is needed for local NRM institutions to thrive.

- Public interest law firms can assist groups.
- Regulating agencies can adopt a minimum standards approach.

### 4.7.3 Cultural and Spiritual Values in Conservation

#### Definition and Significance

Project designers should not assume that economic rewards are the only conservation incentives. Improved security, reduction in conflict or corruption, pride in stewardship and in culturally or spiritually important landscape features, and opportunities to learn new skills and competencies can be compelling reasons to sustain conservation.

People are motivated to conserve that which they value, treasure, and even worship. The last decade has seen a proliferation of initiatives linking conservation with religion and spirituality. In addition, research on conservation and beliefs, values, and norms has uncovered many important conservation approaches that are grounded in the spiritual and transcendental. “A sense of place” – a term coined by Wendell Berry – describes how the value of rootedness translates into emotions about home landscapes and terrains, which in turn can spark a conservation ethic.

#### Key Questions

##### How do people perceive their landscapes?

The concept of **biophilia** asserts that people are evolutionarily adapted to experience strong ties with nature, as well as preferences for certain landscapes. But biophilia may fade as societies become removed from nature. In his book *The Spell of the Sensuous*, author David Abram argues that “our Western worldview has evolved to be based on literacy, abstract thought, and separation from the body. By ‘the body’ I mean not just our individual, animal bodies, but the body of the earth and the material cosmos. By removing ourselves from this sensuous realm, we have lost the connection to the living dream that we share with the soaring hawk, the spider, and the stone silently sprouting lichens on its coarse surface.”<sup>14</sup>

**Do people prefer natural areas to be “wildernesses,” or are they attuned to more domesticated landscapes?** Local cultures may not understand or be attuned to the concept of wilderness

<sup>14</sup> David Abrams, *The Spell of the Sensuous: Perception and Language in a More-Than-Human World* (New York: Vintage Books, 1997).

or may perceive what we see as wilderness as cultural space. Research into land histories has encouraged critical reflection regarding long-held assumptions, such as the myth of the pristine Americas (Denevan, 1992). Landscapes once viewed as “wild” are now increasingly being recognized as shaped by human societies. The presence of human-mediated disturbances such as fire, pathogens, and viruses provides evidence for past human settlement in such landscapes.

##### How is the sacred embodied in conservation?

Examples of the way the sacred can be represented in conservation include

**sacred landscapes** – Included in the subcategory of “organically evolved locales” are sacred landscapes and sites, such as the groves of Ghana, Uluru in Australia, and Tongariro in New Zealand, that link natural features to cultural identity. UNESCO recognizes that this connection, a blend of human and natural forces, “enriches and humanizes life the world over.” USAID’s SCAPES support to the **Sacred Himalaya Landscape** provides an example.

**customary taboos and restrictions in NRM systems** – Similarly, societies used taboo or off-limits zones or time periods, such as restricting hunting during animal reproductive season, to manage exploitation. Fiji’s successful locally managed marine areas were built around these principles, and scientific monitoring was added to confirm and reinforce the effectiveness of the off-limits/taboo approach. Recently, Muslim authorities **issued a fatwa** against wildlife crime in Indonesia, a huge step in engaging the largest Muslim nation on earth.

**species as totems and icons** – The conservation organization **RARE** uses species as cultural icons to foster conservation action through social marketing. This practice is based on ancient traditions that closely linked specific species to human groups. Within a society, different clans or sub-groups adopted different totems or iconic species to represent them; often, they were prohibited from hunting or eating these species. Or certain groups would be tasked with hunting a species such as lions or sharks but would be subject to specific rituals and behaviors to protect them in their role. Such practices serve to limit the number of people involved in hunting.

**How can implementers capitalize on cultural and social values in conservation?**

- Build on existing efforts, such as those mobilized for the social and economic benefit of certain communities or groups, including faith-based groups.
- Define stewardship in a cultural context and enhance pride in stewardship; reward stewardship by groups rather than individuals, building the capacity of key groups.
- Encourage collective action for conservation that also achieves development objectives.
- Use social media to build and reinforce group solidarity.
- Find common purpose with culturally valued institutions and symbols.



*In the Maya Biosphere Reserve of Guatemala, a common understory palm generates hundreds of thousands of dollars each year for local people while providing a strong incentive to keep the natural forest standing. The palm, xate ('sha-tay'), is certified sustainable and sold to U.S. buyers at a premium for floral arrangements and Palm Sunday celebrations. USAID partners have trained local people to collect only high-quality fronds, without hurting the plant or damaging the product, then sort and pack them to maximize value and profit.*

*Photo: Dani Newcomb, USAID*



## 4.8 DEMOCRACY, RIGHTS, AND GOVERNANCE (DRG)

### 4.8.1 Governance

#### **Definition and Significance**

Governance describes the process by which decisions are made and carried out; it can refer to corporate, international, national, or local bodies, or interactions between sectors of society. Governance comprises such critical development elements as the rule of law, public-sector accountability, communication with citizens, anti-corruption measures, and the ability to deliver goods and services. A definition of good governance needs to include two-way communication and active citizen voice and engagement.

There is a clear relationship between meeting individual, personal needs and creating a better society. Better governance, conservation, and NRM all focus on improving the collective good. People know that to fulfill individual needs, common property and common institutions have to be safeguarded and strengthened; however, this often is not their highest priority, and individuals alone cannot do the job. Collective action is needed to improve governance and biodiversity conservation. Linking collective action for natural resource management with overall governance objectives provides incentives to individuals and groups: They get more value out of their natural assets and can plan over longer time horizons to safeguard those assets. Good governance is thus a linchpin of biodiversity conservation. Where governance institutions are seen as legitimate, transparent, and effective, people are much more likely to follow the rules that such institutions create or disseminate.

Governance has to be considered at all levels, from the transnational to the local. This section breaks governance into two main categories: formal legal and regulatory systems, and informal/ indirect elements of governance. The latter category encompasses structures, rules, or processes that may not have legal or statutory recognition but do have the power to shape outcomes. An example is the leadership structure within religious, cultural, kinship, or ethnic organizations or groups.

Conservation planning and implementation requires knowledge of treaties, policies, laws, and regulations governing ownership, use, rights, access, and other elements of the formal systems that impact the conservation targets and the stakeholders who interact with them (see [Annex 5.1](#)). Key laws to consider are not just those that are directly related to natural resources but also those economic and sectoral policies, laws, and regulations that may relate to incentives (such as subsidies or export bans), institutions (such as decentralization policies and devolution of authority to local entities), or access to markets. For example, promoting the sale of non-timber forest products requires knowledge of laws and policies governing their harvest, transformation, and sale. To market goods, producer groups may need to register and have formal charters.

Although a country may have a multitude of excellent official policies and laws governing natural resources and conservation, these may not be implemented for a variety of reasons, ranging from a lack of political will to a dearth of human and financial resources. In Kenya, for instance, dozens of well-written policies govern conservation and NRM, yet forest destruction and poaching continue to be severe problems in several areas. Often, informal governance of an area or resource is stronger or seen as more legitimate than the formal system because the reach of authorities is weak, corruption is a factor, or informal institutions are strong and heeded by local actors.

Learning about informal governance systems requires knowing what people actually do and what they consider in taking action. Do they follow, neglect, ignore, or possibly not even know about formal conservation and NRM regulations? What regulations are followed and why?

Asking these questions can help conservation initiatives craft workable governance systems. For example, much effort has been put into studying and improving local conservation bylaws so that they will be adopted and used, or even integrated into formal systems. These bylaws pertain to how people can access, use, harvest, or own a piece of land, fishery, forest, or other natural resource. Often, bylaws are derived from customary

governance systems that not only generate rules but also identify authority and decision-making powers. These systems can be highly effective but inequitable, often marginalizing women, youth, or minorities. Also, they often must be complemented by formal governance systems that step in to deal with crimes or transgressions and other larger-scale governance concerns that are beyond the authority of a local group. For instance, villagers in northern Sierra Leone turned over poaching problems within a national park to national authorities when an elephant was killed and guns were involved. This represented a serious threat to security in a formerly war-torn part of the country.

Natural resource management is a tool for better governance and vice versa. Many USAID Missions have discovered that NRM and conservation are good entry points for strengthening governance and civil society because they focus on issues and concerns central to livelihoods and well-being. NRM also offers the opportunity to bring together multiple stakeholders to foster a priority USAID value of participation and helps avoid potential violent conflict. Clearer policies and bylaws governing natural resources can diminish overexploitation by clarifying management, ownership, use, and benefits.

Clear policy frameworks are necessary but not sufficient for improved outcomes. An additional impediment to the implementation of laws and policies is lack of access to information. While the laws may be on the books, if the citizenry does not have access to the laws or other pertinent information, implementation is nearly impossible. Access may be related to freedom of information acts, information on budget allocation, availability of information in all languages, and capacity/willingness of civil servants to respond to information requests.

### **Power Relations**

Power has numerous dimensions and operates at all levels, from the household to the global scale. There are overt dimensions of power and more hidden ones. Power inequalities are real, as well as perceived. Social sustainability and improved governance do not involve doing away with power inequalities, as this is functionally impossible. They do involve understanding these inequalities and crafting explicit strategies to enable stakeholders with different levels of power to

communicate and work together in a way that does not harm the less powerful.

Power inequalities may be shaped by the history of a country, people, or region. Colonialism and the expansion of the global economy radically transformed local cultures. The impacts resonate in modern struggles over land and natural resources and, directly or indirectly, in models of conservation. Colonialist powers appropriated land and natural resources for the benefit of their homeland and for settlers. For instance, many national parks in Africa were originally game parks for white settlers and administrators and were militarized to keep the former African landowners and resource users out.

In the history of many developing countries, local populations were coerced or minimally compensated for collective conservation actions, such as reforestation or soil erosion control. This approach led to resistance that resonates even today. To complicate matters, traditional and customary forms of collective action with high levels of social capital are eroding in many parts of the world, due to increased mobility and globalization, among other factors.

Conservation policies dating from the colonial era may continue to impact local livelihoods. Policies often change more rapidly than practice. For instance, in some African countries it is no longer illegal to cut a tree on one's own farm, but farmers may not be aware of this policy change, and the colonial-era policy is still enforced by forestry authorities.

Added to these historical patterns are new trends that contribute to power inequalities at the national scale: land grabbing for plantations or agriculture and non-transparent allocation of concessions, dams, and other infrastructure. Transparency, advocacy, and communication are central to attacking these abuses of power.

At the local scale, power inequalities among stakeholders contribute to elite capture, conflict, and lack of collective action. These power differences cannot be swept under the rug. If one group is perceived, and perceives itself, as being less powerful, it will need help to work and negotiate with other groups perceived as more powerful. Cultural differences are often involved, such as

## BOX 68. POLITICAL ECONOMY ANALYSIS: A KEY TOOL FOR CONSERVATION

A political economy analysis (PEA) is a field-research methodology used by donors to explore not simply how things happen in an aid-recipient country, but why. It is particularly concerned with how power is used to manage resources and, as such, is especially valuable for exploring a “lack of political will,” which is often blamed for undermining reform and hindering progress.

A PEA asks questions about a set of factors that impact a nation’s development and governance – factors that include politics, rules and norms, social and cultural practices, beliefs and values, and historical and geographical determinants. It can be applied at various levels: a countrywide analysis investigates the factors driving outcomes nationwide, while a sector-level PEA explores influences acting on particular technical areas like health or education. A problem- or issue-focused PEA examines the forces that create a particular developmental or governance challenge. A PEA can also identify opportunities and actors that can drive change locally. See [Section 4.8.1](#)

those that exist between indigenous peoples and other groups. Assistance can take the form of capacity building, targeted facilitation, and legal-literacy training.

Power inequalities are also found within communities and households: between the genders, between youth and elders, and between remote residents and town dwellers. Two considerations are critical in a conservation context: 1) mitigating harm to vulnerable groups, and 2) assessing how under-represented groups can contribute to conservation. For instance, remote dwellers may have more incentive to conserve a natural area than those on a main road, but if they are not contacted and engaged, they cannot participate.

## Environmental Governance

The field of environmental governance introduces a range of tools and concepts for critical analysis of the intersection of governance and conservation. A few of the key terms and concepts are described below. See also [Annex 5.1](#) for information on international policies and treaties affecting global environmental governance.

**perverse policy incentive** – Systems of property rights, government regulations, and market dynamics can provide both benefits and risks to those who steward natural resources. While some policies encourage sustainable management of the environment, others have unintended negative consequences. An example of perverse policy incentives can be found in tree tenure systems in Ghana, where all rights to “economic trees” are vested in the president, in trust for the local customary leaders. Farmers who have the trees on their land have no opportunities to profit from them, and hence usually eliminate seedlings before they can mature. A system that gave farmers some percentage of the proceeds from the sale of mature trees would encourage more silviculture, with positive environmental impacts.<sup>15</sup>

**open-access situation** – Common property resources are resources that are owned and managed by communities, societies, nations, or – in the case of international waters and the upper atmosphere – by the world community. The challenges of managing such resources are great, and the need to understand and factor them into broader NRM policies and structures is vitally important.<sup>16</sup> If the harvesting of resources is not adequately monitored, or if restrictions on extraction are not enforced, then the system may break down and an open-access situation may result, in which users have no incentive to sustainably manage the resource. In a governance vacuum, rational economic actors will simply exploit the resource as rapidly as possible, before other actors can exhaust it. Careful research and analysis is necessary to determine whether local management institutions exist before alternatives are put in place.

<sup>15</sup> Rebecca Ashley Asare, [Implications of the Legal and Policy Framework for Tree and Forest Carbon in Ghana: REDD Opportunities Scoping Exercise](#) (Washington, DC: Katoomba Group/Forest Trends, 2010).

<sup>16</sup> This was recognized by the choice of Elinor Ostrom, a leading theorist of the management of common pool resources, as winner of the [2009 Nobel Prize in Economics](#).

Conservation and NRM initiatives benefit greatly from partnership with **democracy and governance** programs and partners to reinforce the importance of good governance, transparency, and the rule of law to society as a whole and to conservation and NRM specifically.

## **Key Democracy and Governance Concepts in a Biodiversity Context**

### **Rule of Law**

The rule of law is the cornerstone for all other elements of good governance. Unless the rule of law is respected, environmental policies and regulations may simply be ignored, particularly by the most wealthy and powerful. Effective environmental governance is likely to thrive in situations characterized by a free and fair political system, respect for human rights, a vibrant civil society, and public confidence in the police and the courts. In many developing countries, the rule of law is constantly undermined by corruption, systemic inequalities in access to justice, or economic barriers to enforcement of laws and regulations.

During episodes of widespread conflict, the rule of law may completely break down. Conflicts often give rise to rampant, uninhibited resource exploitation, both by vulnerable households with few alternative means of survival and by organized criminal gangs or armed groups.

Programs designed to better conserve biodiversity are unlikely to succeed in the absence of the basic elements of the rule of law, and biodiversity programming in countries where the rule of law is weak should include elements to improve accountability, ensure universal enforcement of regulations, and reduce losses to the financial infrastructure for conservation through corruption.

### **Civil Society Strengthening**

Civil society organizations (CSOs) are important to ensuring the accountability and transparency of environmental governance. They are particularly important in situations where the political system is compromised by violence or corruption, as lack of real political competition means that lawmakers have

few incentives to consider environmental dimensions in their decision-making. CSOs can play a role in disseminating and critiquing laws and regulations, monitoring implementation of laws, assisting those negatively impacted by environmental injustice to seek legal or administrative recourse, pressuring powerful institutions and individuals (particularly through the media) to change laws or practices, and transferring knowledge and skills to local actors to help them better manage biodiversity. USAID projects can strengthen CSOs through financial and technical support, as well as through implicit or explicit diplomatic support, which can protect these organizations from co-optation or coercion. Co-optation by government or the private sector essentially involves offering benefits (such as a well-paid position on a board or commission) in return for influence, while coercion may involve false accusations of sedition or, in extreme cases, outright violence against CSO staff.

### **Judicial Strengthening**

For biodiversity conservation to succeed, laws must be interpreted and enforced effectively. In many cases, the state itself poses one of the most significant threats to biodiversity, and keeping the state within the bounds of its own laws requires a judiciary that is willing and able to entertain litigation against it – a stand that may be politically unpopular. In some countries, transnational or local private corporations also enjoy great political and economic influence. Public interest litigation, an important instrument for environmental accountability in the United States, is largely unknown in many developing countries. Biodiversity programming, therefore, may involve strengthening the judicial sector by supporting changes in the law that make magistrates more independent, providing judges with training on the legal interpretation of international and domestic environmental legislation, and supporting bar associations that train lawyers in conducting public interest litigation around environmental issues.

### **Accountability**

The notion of accountability refers to systems, procedures, and mechanisms that impose restraints on power and authority and create incentives for appropriate behaviors and actions. It is a core value of



democratic governance. Key aspects of accountability include transparency (the publication or diffusion of laws, records, and accounts of potential interest to the public); answerability (the responsibility of powerful institutions to answer queries and accusations by the public); and sanctions for illegal or inappropriate actions (which might be legal in nature but can also include disciplinary measures associated with professional codes of conduct). An institution's accountability system may be internal or external but part of the institution's broader architecture, such as an ombudsman that is part of the government but nevertheless has an oversight role over other state institutions. Or an accountability system may be completely external, such as a civil society organization that plays a "watchdog" role. In the latter case, external efforts to ensure accountability usually have some means to influence internal oversight mechanisms. For example, media attention to the environmental misdeeds of a particular local administrator will have little effect unless it can convince the ministry of the local administration to take disciplinary action against the person in question. In more democratic systems, external accountability tends to be more powerful, as civil society can influence citizens who have the power to elect officials of their choice.

Most rule-of-law strategic approaches that reduce levels of corruption and coercion will also have a positive impact on accountability by creating an environment that encourages it. Strategic approaches explicitly aimed at improving accountability can include creating, formalizing, or reinforcing systems of "answerability," such as public accounts committees, which are often chaired by members of the opposition parties and monitor government spending. Through support for improved answerability, USAID projects can ensure that public funds (and bilateral aid) are disbursed as planned, rather than being spent on tangential activities or simply stolen. Civil society organization can also contribute to answerability: CSOs may publish critiques of the government budget, drawing attention to any differences between publically stated spending priorities and actual allocations of funding.

## **Transparency**

Transparency is a key part of "answerability," as discussed above. In the environmental sector, aspects of transparency include the regular publication of state inventories of land allocation and use, which can reveal the extent of habitat loss, and the declaration of politicians' sources of income, which can expose links between decision makers and industry, and hence potential conflicts of interest over environmental regulation. While political will is a key determinant of levels of transparency, financial and technical capacity is also an issue. Institutions might not have the technical means or budgets available to make information adequately available to the population through official websites or the dissemination of printed reports. USAID strategic approaches intended to improve transparency might therefore include support for legislative reforms that require the publication of statistics, narrative reports of government activities, and other relevant information. Such strategic approaches might also include technical support to government agencies to help them better fulfill their new responsibilities. In some countries, linguistic diversity, poverty, and widespread illiteracy mean that written documents, televised announcements, and even radio programming may not be an effective means of ensuring transparency. In such cases, community radio stations that broadcast in local languages, along with other civil society organizations, play an important role.

## **Human Rights**

Understanding and being attentive to human rights is fundamental to socially sound conservation and development. The conservation human rights agenda has achieved high visibility in such international fora as the Convention on Biodiversity. Indigenous people are active and vocal. As indigenous and local people are a key constituency for conservation, it is essential not only to consider but also to secure their rights to assets and negotiation. This concern does not mean neglecting or rejecting the rights of the government or other stakeholders. Indeed, USAID often plays a positive role in facilitating negotiation among these groups to achieve clarity, mitigate conflict, and establish appropriate local ownership (See [Section 3.1.7](#)).

## Media Strengthening

Media can play many important roles: informing citizens about the importance of natural resources management, performing watchdog functions to assure compliance with laws, and serving as public forums for discussing issues related to natural resources and biodiversity. Multimedia approaches can help reach and inform diverse segments of a population; for example, community radio in more rural or remote areas; television in more urban areas; and wireless phones and other devices using the internet and social media to facilitate interactive citizen reporting. Media should serve as public forums. For example, broadcasters can host interactive talk shows that connect environmental experts, government officials, business representatives, civil society activists, and other citizens in ongoing public discussions about how to approach environmental and natural resource challenges and opportunities. Also, investigative journalists and citizen reporters can play important watchdog and transparency functions, probing the effectiveness of NRM program management and revealing violations of environmental protection laws, thereby holding public officials, businesses, and society more accountable.

## Key Questions

### **How does corruption impact biodiversity conservation?**

**Impunity**, where elites feel that they can do as they wish without reprisals, inhibits both good governance and conservation. This effect can be felt at the local and national levels. For example, deforestation of protected areas for the production of drugs, charcoal, or other valuable commodities may be carried out under the protection of powerful interests who see themselves as untouchable.

**Encroachment.** In the 1990s, relatively well-off cocoa farmers encroached into Lore Lindu National Park (Sulawesi, Indonesia) with impunity, crowding out other uses, such as honey hunting and ecotourism. In Maharashtra, India, forestland was allocated by the government to NGOs that promised to carry out development activities on the parcels but often sold them off to private developers for a profit.

**Wildlife trafficking** has important links to organized crime and corruption of protected area managers, border guards, and other officials due to the very high value of the products (see [Section 4.10.4](#)).

**Degazettement** is becoming common in many parts of the world. Sometimes it is used to place land and resources into elite hands. This was the case in the Mau Forest in Kenya, where political elites degazetted state forests and moved in populations from their ethnic groups to shift election balances. Later, the government wanted to return much of the territory to conservation, but people had already settled and in some cases had legitimate titles. [PADDD Tracker](#) tracks degradation, downgrading, and degazettement of protected areas.

### **How do patron-client relations impact governance of biodiversity and natural resources?**

Patron-client relationships or “clientalism” is one way that corruption creeps into initiatives and communities. These relationships are inherently unequal: An individual or group is linked to wealthier and more powerful individuals through kinship, ethnicity, locality, or other social identities. The powerful provide resources and services in return for loyalty, votes, and other support. There is nothing wrong with getting support from better-off or better-connected people – indeed, the poor need these ties to move up in the world – however, relationships can be manipulated by the powerful to influence and undermine initiatives to improve governance or NRM so that rules are bent or changed to facilitate their interests. In the film [Weex Dunx](#), Jesse Ribot shows how, after many years of work to reform the charcoal sector in Senegal with an aim of better forest management – USAID funding played a key role – powerful charcoal merchants continued to undermine the community forestry system by offering bribes to local leaders with whom they had close kinship or trade relationships.

In the case involving elephant poaching in Sierra Leone, the smuggler cultivated clients within the communities by providing small employment opportunities and access to guns. These ties are often appealing to rural youth, who have no other employment opportunities and are not inclined to be poor farmers.

Undertaking careful stakeholder analysis is critical in identifying both threats and opportunities from patron-client ties. Activities need to help stakeholders most at risk of becoming clients to smugglers, poachers, and other exploiters of biodiversity. Anthropologist Janet MacGaffey was able to uncover highly valuable data on these “underground” relationships in the Congo (then Zaire) through innovative field research approaches that tracked the pathways of such commodities as ivory and minerals from the village level to final destinations as far away as Europe, including information on financing and patronage involved in these transactions. Commissioning [this type of innovative study](#) can show how investments are flowing from the powerful to local communities.

### **What can be done in situations of overall poor governance?**

Situations of poor governance, where democratic institutions and practices are not in place, may be conceptualized as forming a continuum between two extremes. At one extreme are authoritarian, non-democratic states that have functional, organized institutions but are not accountable to the population and use coercive, command-and-control mechanisms to ensure compliance with environmental and other laws, policies, and regulations. At the other extreme are states that may have some characteristics of multi-party democracies, and hence some element of popular representation and accountability, but where governance is routinely undermined by corruption and violence, and where government institutions are fairly ineffective. In the latter case, there is a real risk that piecemeal strategic approaches in the environmental sector will be undermined by the dysfunctional political economy and thus have little impact.

To make a difference, strategic approaches should be well coordinated with broader programs designed to combat corruption and build an institutional culture of accountability. Sequencing of strategic approaches is key. In addition, identifying specific pockets of accountability – such as administrative regions or institutions associated with better governance – may allow a “building block” approach, where programs are established in these “better” areas and then replicated elsewhere.

The first extreme – highly organized authoritarianism – presents different challenges. Because such governments are often willing and able to use coercive means to implement policies, biodiversity programming can rapidly demonstrate “effectiveness,” but the longer-term impacts may be counterproductive. For example, where a donor and an authoritarian government agree that forest encroachment is a problem, the government may use donor funding to forcibly evict and resettle those living in the forest. This may be done more quickly and comprehensively by an authoritarian state than by one that has to be concerned about the voting preferences of the evicted communities. In the long-term, however, such coercive measures tend to turn the affected populations completely against the idea of forest conservation, and the livelihood options of those resettled may be so limited that few legitimate sources of income remain. The result is likely to be an ongoing pattern of poaching, tree-felling, and other unsustainable practices, as well as violence between forest guards and local people. In authoritarian situations, therefore, biodiversity programming should avoid legitimization of undemocratic practices and include extra safeguards to ensure that the rights of citizens will be respected.

### **What conservation efforts contribute to good governance?**

One positive aspect of biodiversity programming in authoritarian contexts is that it may provide an entry-point for improving governance. For example, it may be politically feasible to decentralize governance of low-value forest resources (such as degraded areas) to local communities, whereas this would be impossible in the case of higher-value resources, such as intact rainforest. Providing these communities with the experience of autonomous decision-making and building skills for negotiation may have positive effects at the level of political governance.

### **Role of protected area authorities/enforcement.**

The institutions that manage protected areas and enforce conservation regulations in and around them can make important contributions to good governance or, conversely, be tools for corruption and oppression of local people. Key to governance of conservation areas is the collection, management, and redistribution of income derived from tourism, the sale of non-timber forest

goods, and other sources of revenue. Because protected areas may have relatively few, and easily monitored, means of generating income, USAID programs may find that supporting improved financial accountability within the conservation sector yields more success than broader reforms relating to highly dispersed forms of revenue collection, such as taxation.

For example, improving systems of receipting for tourist entry to conservation areas, as has been done in Kenya, may be relatively inexpensive and effective. These efforts may then be replicated more broadly across other sectors. In some countries, agencies that enforce regulations in and around protected areas – such as forest guards or the national wildlife service – have institutional links with the police or military. By facilitating a culture of accountability within the institutions of the forest guards, biodiversity programs may have an influence over other branches of the security services; for example, as training curricula or institutional reforms are replicated, or as individual personnel are transferred from one agency to another.

**Rule of law.** Significant opportunities exist regarding the role of conservation organizations in upholding the rule of law, including international treaties and free, prior, informed consent/consultation (FPIC). Organizations concerned with biodiversity conservation have played important roles in the development of frameworks for international environmental governance.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was one of the earliest modern international environmental legal instruments (dating from 1973) and has developed extensive regulations for the participation of NGO conservation organizations. Such organizations have played an important role in the development and monitoring of CITES by funding specific CITES activities, such as species-specific status surveys, trade projects, and species management plans. Approximately half of the participants to the Conferences of Parties of CITES are NGO representatives.<sup>17</sup>

<sup>17</sup> Sebastian Oberthür, et al., *Participation of Non-Governmental Organisations in International Environmental Governance: Legal Basis and Practical Experience* (Berlin: Ecologic – Institute for International and European Environmental Policy, 2002).

Most international environmental treaties allow for the accreditation and participation of NGOs in many of the meetings associated with treaty implementation monitoring. Typically, however, as many treaties do not categorize NGOs by country of origin (e.g., impose a “quota system” by country or region of origin), and as the financial and technical capacity of NGOs varies greatly, Western-based NGOs have been more active in international environmental governance than those based in the developing world. Few treaty organizations, with the exception of the UN Convention to Combat Desertification and the GEF, have provided funds for NGOs to participate in meetings. Improving the technical and financial capacity for non-Western conservation organizations to influence international environmental regimes may be useful, especially in effecting regional-level change.

Outside of specific treaty frameworks, organizations working on biodiversity have been part of efforts to develop principles, international standards, and best practices. In some cases, these have been recognized as international customary law and incorporated into the internal regulations of multilateral organizations or have become part of international law. For example, organizations like the Forest Peoples Programme, working on issues of biodiversity and the rights of indigenous peoples in biodiverse areas, have contributed to the development of the FPIC principle, which is now considered a standard international best practice in situations where such activities as mining or infrastructure development may disrupt local ecosystems and livelihoods, and a legal responsibility in areas inhabited by indigenous peoples. NGOs based in the Philippines, where progressive laws on indigenous rights have been promulgated (and long supported by USAID), were called upon by the UN Commission on Human Rights to help in standard-setting for FPIC,<sup>18</sup> and the Forest Peoples Programme and other organizations have made formal submissions to United Nations agencies regarding its implementation. See **Chapter 3** for more discussion of FPIC and how the U.S. Government interprets it.

<sup>18</sup> United Nations Commission on Human Rights, *Sub-commission on the Promotion and Protection of Human Rights Working Group on Indigenous Populations*. 2003-6 Resolution 2003/29.



### **What about governance of transboundary conservation and peace parks?**

Poor governance of even one part of a landscape can impact the whole landscape through conflict, migration, and overall mismanagement. For instance, sound watershed management requires adherence of all stakeholders to management agreements. In cases of transboundary management, the policies and practices of one country will impact the other countries. As an example, Tanzania allows limited sport hunting while Kenya does not, and this has profound implications for wildlife management. Good governance and peace building can spread across boundaries in the service of conservation as well. The [International Gorilla Conservation Program](#) (IGCP) unites efforts in the once-warring countries of DR Congo, Rwanda, and Uganda.

### **4.8.2 Conflict and Peace Building**

#### **Definition and Significance**

Conservation is a long-term effort that can generate conflict but also holds the potential to encourage cooperation where mutual interest can be identified. Conservation efforts have to tackle immediate threats while chipping away at the drivers of biodiversity loss, which often emanate from outside a landscape, no matter how large it is. A strategy often needs to balance actions “from the inside out” and “from the outside in” in terms of attacking specific threats. For instance, certain threats tied to powerful interests might be challenging for those working inside a country or region to address directly; in these cases, conservation strategies need to consider partnerships with watchdog or advocacy groups.

The high economic value of such biodiversity as tropical timber and rare species of wildlife, and the importance of biodiverse ecosystems to local livelihoods, often place biodiversity at the center of conflict, making the sustainable and equitable management and conservation of ecosystems an important aspect of international security. The relationship between biodiversity and conflict is multidimensional, encompassing scarcity of valuable biodiversity elements and disputes over their access or ownership that serve as a catalyst for conflict; exploitation of biodiversity elements to finance

conflict; degradation of biodiversity as an impact of conflict; and acceleration of unsustainable harvesting of biodiversity elements during the post-conflict economic boom (associated with refugee return, the presence of international organizations, and renegotiation of pre-conflict contracts and resource rights). Although its most visible symptom is war or violent clashes, conflict can also be nonviolent, simmering at the local level, breaking down productive relationships, and retarding economic and social development.

A systematic conflict assessment and rolling conflict analysis should help stakeholders understand the conflict dynamics, which include patterns of grievance and resilience, how key actors are able to mobilize groups for peace or conflict, and which likely events could trigger violence or create openings to build peace. At a minimum, conflict analysis for conflict sensitivity requires basic knowledge about dividing and connecting issues in society, as well as important actors pursuing conflict or peace. Where possible, analysis should be done in conjunction with local partners and updated during project implementation. USAID’s Office of Conflict Management and Mitigation (CMM) within the Bureau for Democracy, Conflict, and Humanitarian Assistance (DCHA) provides technical assistance to field Missions to plan and implement conflict assessments and understand conflict dynamics as they relate to programming.

Degradation and high levels of exploitation of ecosystem goods and services, combined with a changing climate, decrease the dependable supply of valuable resources, increasing the insecurity of human populations that depend on them. Further, in many parts of the world where USAID works, weak governance, uneven law enforcement, and lack of security of tenure and property rights are the norm. The combination of these dynamics is a recipe for increased competition and conflict over access and rights to biological resources. For example, local communities may have resource and biodiversity management traditions but insecure tenure. External pressure on local resources – exerted by elites, loggers, migrants, and other resource users – may force communities into violence in defense of their resource rights. These conflicts have the potential to arise within, as well as between, communities. The growing scarcity

of vital natural resources and biodiversity, as well as the increasingly global nature of trade (for example, poaching of endangered species in Africa to supply markets in China), enhances competition for access to resources, exacerbating conflict. Empowering communities to manage and uphold access rights, develop better institutions and systems of resource governance, and minimize corruption can both contain conflict and conserve biodiversity.

### **Human-Wildlife Conflict**

High profile human-wildlife conflicts most often occur around the boundaries of protected areas that are home to populations of large mammal species; however, with the ongoing loss of natural habitat and the spread of human settlements into unprotected biodiverse areas, as well as fluctuations in species numbers (e.g., changes in the equilibrium between “prey” and “predator” animals), interactions between people and wild animals are increasingly common. Wild animals may graze on agricultural crops; hunt domesticated livestock; spread diseases to livestock or people; damage fences and buildings; or in rare cases, directly attack humans. In some places, particularly around protected areas, compensation schemes have been established to reimburse local people for economic losses caused by wildlife; however, some schemes have been criticized for being slow to respond or for providing insufficient compensation. In cases where compensation is not provided or is inadequate, local people may resort to killing wildlife, including protected species, to reduce their economic losses.

If human-wildlife conflict escalates, it can turn into a clash between local communities and conservation personnel, and eventually into a wider community-state conflict. More generally, increased interactions with humans can disrupt the migration, feeding, and mating patterns of wildlife. Management of human-wildlife conflict may involve the establishment of physical or biological barriers (ranging from fencing-in livestock to the use of flags to limit wolf predation), private insurance schemes (which are often more effective than state-managed compensation programs), or managed harvesting of wildlife (e.g., through licensed hunting) to control

populations while providing some resources to local communities.<sup>19</sup>

### **The Use of Biodiversity (Timber, Fish, Wildlife Trade) to Fuel and Fund Armed Conflict**

It is no coincidence that many conflict-affected countries rely heavily on the export of raw (unprocessed) natural resources, such as rubber or timber, as well as agricultural produce. In past years in the Democratic Republic of Congo, for example, the value of the annual sale of non-timber forest products, including bushmeat and medicinal plants, is approximately \$2 billion. Timber and minerals are also major elements of the national economy.<sup>20</sup> Some countries are resource dependent but have managed to avoid internal struggles. The nature of local and national governance of the extraction and trade in resources will determine whether these processes lead to conflict. After all, while resources are “natural,” their extraction, transport, and processing are social and political in nature. In poor governance situations, export of high-value natural resources provides opportunities for taxation and corruption by elites, which – in combination with unemployment, associated with lack of investment in the industrial and manufacturing sectors – can eventually lead to civil unrest and violence. In turn, civil unrest discourages domestic and foreign investment, thereby reinforcing the dependence upon primary exports in a vicious cycle.

As countries move toward armed conflict, such economic elements as trade in natural resources become increasingly intertwined with the illegal or informal economy, aspects of which are often linked with organized crime. Globally, the “shadow economy” of untaxed business – without the inclusion of such inherently illegal activities as drug dealing – represents some \$10 trillion annually.<sup>21</sup> While the “criminalization of the economy” may be of great concern to international institutions, the bottom line for local people – and for vulnerability to conflict – is not the extent of criminality

19 Distefano, E. 2004. *Human-Wildlife Conflict Worldwide: A collection of case studies, analysis of management strategies and good practices*. Rome: FAO.

20 Wolvekamp, P., Schmitz, T., and Anouk, F. 2008. *Sustainable forestry in the Democratic Republic of Congo: The way out of poverty and conflict*. Both ENDS Policy Note.

21 Neuwirth, R. 2004. *Shadow Cities: A Billion Squatters, A New Urban World*. Routledge.

but the levels of economic exclusion and structural and physical violence involved in resource extraction and trade. In some cases, systems of resource extraction may be legal and formal in nature, but nonetheless exploitative and conflictual.<sup>22</sup>

In states affected by political instability and violence, the trade in natural resources may be used to fund the purchase of guns and the maintenance of private militia. Illegal trade in natural resources, in particular, becomes enmeshed in broader networks of criminal activity, including drug smuggling and human trafficking. Rebel groups that control border areas or such transit points as ports and airstrips may allow the export of endangered and other valuable species in return for illegal “taxes,” putting these flows outside of international monitoring and enforcement mechanisms. The global illicit trade in wildlife may be worth as much as \$10 billion annually; key producing areas include sub-Saharan Africa and Southeast Asia, while key “consumers” include China, the United States, and the European Union.<sup>23</sup> The skills and equipment demanded for poaching – weapons; combat training; and the ability to operate unseen in remote, wild locations – overlap with those required for guerilla warfare. It is not surprising, therefore, that non-state armed groups have often been involved in poaching, using the proceeds to fund their armed activities. Examples include ethnic Somali separatists in Kenya, who were involved in poaching elephant and rhinoceros in the 1980s, and more recently the so-called Janjaweed militia in Sudan’s Darfur region, who have been poaching elephant from the Zakouma National Park in neighboring Chad since 2003. This latter conflict has also spilled into northern Cameroon, where Sudanese militias have slaughtered elephants in Bouba Ndjida National Park. For recent analysis, see this report on [Tusks for Terrorists](#).

22 Le Billon, P. 2001. [The political ecology of war: natural resources and armed conflicts](#). *Political Geography* 20: 561–584.

23 Haken, J. 2008. [Transnational Crime in the Developing World](#). *Global Financial Integrity*.

## **Key Questions**

### ***How can conflict sensitivity be built into biodiversity programming?***

Biodiversity conservation and natural resource management activities, particularly those that address the allocation of access to resources, have the potential to prevent, mitigate, incite, or fuel conflict. The prevention of further harm and, ultimately, the success of the effort require an awareness and consideration of where the location of the project (region, country, or community) falls on the conflict continuum. CMM describes three stages of conflict: the “pre-conflict” stage, the “during conflict” stage, and the “post-conflict” stage (see Box 69). These stages have differing impacts and implications for ecosystems and biodiversity conservation efforts. The design, implementation, and management of biodiversity conservation programs must continuously integrate and be responsive to conflict dynamics.

### ***In areas of violent conflict, are its negative impacts on biodiversity being taken into account in planning development or emergency aid activities?***

Conflict can break down or overwhelm established institutions of ecosystem protection and management, including civil society, law enforcement, military support, protected area management, and government ministries, resulting in neglect of ecosystem management and the human communities that depend on these systems (Box 70). In general in conflict settings, there may be an increase in illegal natural resource extraction, because “no one is home” in the official sphere to stem the flow of criminal activities, and the conflict itself is often financed at least in part by the money that can be made by trafficking in illegally and unsustainably extracted natural resources.

In addition, violent conflict can cause the movement of populations into remote areas and ecosystems, thereby increasing the exploitation of biodiversity in these sensitive regions. On a regional level, the use of environmental information, such as locations of protected areas and zones of high biodiversity, can inform the siting of refugee camps in areas that will have limited negative impacts on local ecosystems.

## BOX 69. THREE STAGES OF CONFLICT

At the **pre-conflict stage**, there may be opportunities to help mitigate or lessen the likelihood that tensions will erupt into outright violence by strengthening natural resource governance; clarifying property rights; and improving communication among stakeholders, such as communities, the government, and the private sector. If not designed and implemented well, biodiversity conservation actions (such as the top-down establishment of protected areas) can quickly precipitate conflict. Conflict assessments are an important tool to help identify potential sources of dispute. The concept of “do no harm” should be embraced throughout development programming and is discussed further below. When conflict becomes imminent, projects may build capacity for key conservation stakeholders to adapt to the difficulties they will face. This is also the time to secure funding, as it may become increasingly difficult to access program funding as conflict worsens.

**During violent conflict**, appropriate actions may be aimed at securing and protecting the highest-value biological resources, to safeguard them from total destruction. Conservation staff – such as those working in protected areas – will only be able to continue their work if they are seen as neutral in the conflict and demonstrate a capacity to strategize or negotiate their way out of risky situations. Indirect and behind-the-scenes support may be more effective than higher-profile support so that staff can be seen as neutral. Strategic approaches to control illegal resource extraction and trade may also be appropriate. Biodiversity and natural resource-based governance efforts can provide a semblance of stability and a framework for sustainable management during conflict that will benefit human and ecological communities over time. The design and location of camps for internally displaced people (IDPs), refugees, and peacekeeping operations should also take biodiversity concerns into consideration. For example, provision of firewood or sustainably harvested timber (or alternatives to wood) may reduce the extent of tree-cutting in forest areas that serve such camps.

In a **post-conflict** period, there is generally a transition phase to a more stable environment. As governments and institutions are put back in place, displaced populations return home, and combatants seek livelihoods and integration back into society, there are opportunities to promote sustainable approaches to economic development and democratic governance through biodiversity conservation. The post-conflict period also represents risks: Resource exploitation may accelerate in areas that were once off-limits due to active conflict, or victorious armed groups or returning refugees may grab land that is important for biodiversity. In Colombia, for example, as guerilla activity has begun to decrease, the agricultural and mining frontier is pushing into intact Amazon forest with little management or control. In post-genocide Rwanda, large parts of the Akagera National Park were degazetted in order to provide land for returning refugees. In addition, to the extent that resource-related disputes were a factor in the original conflict itself, it is important to focus programming on resolving those issues; e.g., through collaborative governance and management, clarifying tenure, or other approaches.



## BOX 70. ILLEGAL FISHING: THE CASE OF JAMAICA'S PEDRO BANKS

Globally, the trade in illegally harvested fish is worth between \$4.2 and \$9.5 billion. Fisheries located near international borders are often the site of violent encounters between navy or coast guard vessels and foreign fishing boats accused of illegally fishing in sovereign waters. For example, within Jamaica's national waters, Honduran fishing boats on the biodiversity-rich Pedro Banks have been fired upon by the Jamaican Defense Forces, who are tasked with enforcing the international fishery regulations in areas of concentration of valuable conch and lobster. In 2011, several Honduran fishermen were shot and many vessels seized. The prevalence of drug-smuggling operations in the area contributes to the violent nature of the conflict, as many fishermen are equipped with semi-automatic weapons associated with the drug trade.

### **What conservation actions contribute to peace building?**

A UN [report](#) highlights some of the main theories of change that pay peace dividends. The report focuses primarily on WASH programs, but the theory is applicable across a wide range of activities in the NRM sectors: To the extent that conservation efforts strengthen governance and build responsive, inclusive, and accountable institutions at national and subnational levels, they can improve state-society relations and lay foundations for a self-sustaining peace. Practitioners can look for opportunities within conservation programs to address grievances that underlie or can trigger violent conflict, or offer a means for the state to reach out to society to (re)build its legitimacy.

There is no blueprint to biodiversity programming in conflict-affected countries, as the situation will vary greatly from place to place and during different phases of

conflict. In some cases, significant areas of a country may remain stable, even during the conflict phase, allowing the state and other institutions to maintain a presence. In others, central government may temporarily collapse or be overthrown but NRM institutions may persist, as was the case in Nepal (Box 71).

USAID staff may be able to remain a significant in-country presence in some cases, or they may be completely evacuated, particularly in situations where foreign nationals and employees of international organizations are being targeted. Programming strategies, therefore, may range from maintaining a careful physical presence and running adapted, stripped-down versions of regular programs to completely withdrawing from the country and using policy instruments to influence the trade in particular natural resources, for example. International border areas between hostile states are often off-limits to civilians and, in some cases, may form an area of relatively undisturbed natural regeneration with biodiversity potential.

What about **Peace Parks**? The potential for transboundary programming and the symbolic aspects of border areas have prompted the establishment of "peace parks" in some parts of the world. In Southern Africa, which has been the site of civil and international conflicts, particularly during the apartheid era in South Africa, a number of countries, including Botswana, Namibia, and South Africa, have established transfrontier conservation areas that straddle international borders and represent areas of significant biodiversity. In the Korean Peninsula, the DMZ Forum and other actors have advocated that the demilitarized zone (DMZ) between North and South Korea, a narrow strip of empty land (2.4 miles wide by 155 miles long), should be transformed into a UNESCO World Heritage Site.<sup>24</sup> The goals are to provide a sanctuary for wildlife and plant species, while generating tourist revenue and also representing a monument to the soldiers and civilians who died during hostilities between the neighbouring countries. This combination of goals and the large physical scale of the areas involved has made the **Peace Parks** concept widely popular. In some cases, however, the links between conservation and peace building are insufficiently clear. The peace parks concept tends to

<sup>24</sup> DMZ Forum. 2011. [The DMZ: Description and History](#).

be driven by international organizations and central governments, and the material and political benefits accruing to local communities may be limited.<sup>25</sup> While international war is often, by definition, driven by governments, the roots of conflict can often be found in local-level political economies characterised by poverty, inequality, and marginalization from governance structures. Therefore, the peace parks concept arguably contributes to peace building to the degree that it can positively transform local political economies, rather than making larger symbolic statements.

### More Information

CMM's relevant toolkits – Forests and Conflict, Water and Conflict, and Land and Conflict and the Conflict Assessment Framework (CAF 1.0) are available at <http://www.usaid.gov/what-we-do/working-crises-and-conflict/technical-publications>

Another good resource on conflict sensitivity is the Conflict Sensitivity Consortium ([www.conflictsensitivity.org](http://www.conflictsensitivity.org)) that has a How-to Guide on Conflict Sensitivity.

On conflict sensitive M&E, Saferworld has a short module on the subject: [http://www.saferworld.org.uk/downloads/pubdocs/chapter\\_3\\_module\\_3\\_conflict\\_sensitive\\_monitoring\\_414.pdf](http://www.saferworld.org.uk/downloads/pubdocs/chapter_3_module_3_conflict_sensitive_monitoring_414.pdf)

Human-Wildlife Conflict Collaboration: <http://www.humanwildlifeconflict.org/>



**ELECTION DAY:** A community in Guinea uses a show of hands to elect forest co-management committee members. Cooperative management among farmers, community groups, and government forestry officials protects biodiversity, maintains the forest, and results in equitable sharing of responsibility and benefit among partners. Photo: USAID/Guinea

<sup>25</sup> Duffy, R. 2005. *Global Politics and Peace Parks*. Woodrow Wilson International Center for Scholars, Washington DC.

## BOX 71. NEPAL CFUGS IN MAOIST ZONES

Nepal has a network of more than 13,000 Community Forest User Groups (CFUGs). During the 10-year conflict (1996-2006) between the government and Maoist rebels, the international agencies that provided the CFUGs with technical and financial support were largely unable to visit rural locations. The CFUGs came under intense pressure from both government and Maoist institutions, but were generally able to function. In many cases, Maoists saw the CFUGs as legitimate community institutions with ideological similarities to the populist, peasant-based Maoist political program. Nonetheless, Maoists demanded free supplies of firewood and imposed taxes on the sale of forest products by the CFUGs, meaning that the CFUGs were taxed by both the Maoists and the government. In addition, Maoists used forest areas as training camps and sometimes placed booby traps in forests to prevent government patrols. In retaliation, the Nepalese government declared some forests off-limits to civilians and established military camps in them.

The CFUGs employed various strategies to reduce their vulnerability to criticism or control by the parties to the conflict. To more closely follow the Maoist political program, some CFUGs emphasized pro-poor activities (such as income-generating activities, credit schemes, and construction of small infrastructure projects), rather than their forest conservation objectives. This may have reduced their capacity to manage the forests sustainably in the short term, but it ensured their longer-term survival. Other elements that contributed to the survival of CFUGs included donor support to local NGOs that provided technical support to the groups, and the formal legal status enjoyed by CFUGs, which allowed them to continue to operate even in the absence of a functioning forest department.

## 4.9 LAND AND MARINE TENURE AND PROPERTY RIGHTS

### **Definition and Significance**

Land or marine tenure is defined as the institutional (political, economic, social, and legal) structure that determines how individuals and groups secure access to land/ocean and resources. Property rights are defined as the use, control, and transfer of assets, including land and natural resources, such as trees, biodiversity, and carbon. Land tenure rules define the ways in which property rights to land and natural resources are allocated, transferred, used, or managed in a society. Depending on the local context, property rights may be held by individuals, families, communities, firms, other groups, and governments. Rights held by individuals and non-state groups, such as communities or firms, are referred to as “private property,” whereas rights held by government entities - such as reserves, national parks and coastal and ocean areas - are considered “public property.”

Property rights may be permanent, as in the case of permanently protected nature reserves, or temporary. Temporary rights may include leaseholds or concessions for logging, sport hunting, fishing, tourist lodges, or river rafting. In many countries, property rights are associated with certain obligations or conditions. For example, a firm that holds a forest concession right may be required to log sustainably, while governments may be obligated to protect biodiversity in parks.

In addition to defining who can hold and use resources, for what length of time, and under what conditions, land/marine tenure and property rights (LTPR) systems include mechanisms to resolve disputes; defend rights; administer or manage land and natural resources; and transfer rights, including by passing rights from one generation to another (inheritance). LTPR systems may be recognized by either formal or informal (sometimes customary) authorities, or both. These systems overlap in many countries where USAID works, and informal property rights often go unrecognized by formal laws and institutions, such as protected areas and land registries.

The overlapping and sometimes conflicting nature of formal and informal LTPR systems can undermine confidence that property rights will be protected, or “tenure security.” A lack of tenure security reduces incentives for rights holders to invest in long-term sustainability because there is no guarantee that investments made today, such as planting trees or building corrals to protect livestock from predation at night, will benefit the right holder in the future. This is a common challenge in many biodiverse areas globally, so it is critical for USAID biodiversity programming to consider both formal and informal LTPR systems.

Who owns the land and its resources? Who is allowed to fish or hunt which species, in which areas, at what times of year? Who makes decisions, enforces them, and arbitrates disputes about ownership and access to natural resources? Does the government recognize the rights of local individuals or communities, or is there a disconnect (and potential conflict) between de jure formal rights and de facto informal rights on the ground? Questions such as these are fundamental to identifying stakeholders at the intersection of LTPR and biodiversity conservation, or those who may be affected by actions in support of conservation. The declaration of protected areas, extractive reserves, or indigenous lands; identification of destructive uses; creation of conservation easements; managed access to fisheries; and many other core conservation actions all depend on, and may potentially affect, the LTPR of various groups and individuals.

Furthermore, world trends are increasingly reinforcing the relationship between secure property rights and conservation as population increases, primary production rises, globalized trade or finance brings new stakeholders to centers of biodiversity, and indigenous peoples come into closer contact with national authorities. It is reasonable to expect increasing conflict over competing rights to land, water, natural resources (especially valuable minerals and other raw materials for agribusiness and industry), and carbon (and allocation of REDD+ benefits), particularly as climate change impacts the distribution of these resources.

Existing conflicts often center on the overlapping rights to a single resource, such as access to marine resources for artisanal and commercial fisheries, recreation, tourism, aquaculture, or mariculture – especially where one or more land use rights negatively impact the ability of other users to access the resource and enforce their rights. For example, the combination of fishing licenses allocated to commercial firms and changing fish distribution may potentially lead less-wealthy artisanal fishers to resort to unsustainable techniques to maintain their livelihoods. This is just one example of the ways that climate change, population growth, and other global trends are likely to bring competing land and resource users into conflict, making attention to LTPR issues increasingly relevant.

There are five important reasons why actions to clarify, establish, or change property and access rights must constitute a core component of biodiversity activities:

1. The current lack of secure tenure in many countries leaves many resources claimed by no one or everyone (“open access”), which may lead to a “tragedy of the commons,” where users are incentivized to exploit open-access resources before others do, thereby degrading areas once beneficial to people and biodiversity.
2. Some conservation actions are not feasible without attention to LTPR issues, as occurs when parks or land use regulations are declared formally without attention to conflicting (formal or informal) rights, which may undermine conservation incentives.
3. To be successful, conservation activities that change formal or informal resource rights may require mitigation measures to address potentially negative impacts, especially on vulnerable populations, such as through compensation or alternative livelihood support for those who access or use resources inside protected areas.
4. Clear rules and institutions governing the use, transfer, and ownership of resources provide the foundation for sustainable management, particularly when they place control of resources in the hands of stakeholders likely to conserve them, such as through extractive or indigenous reserves that formally recognize the rights of local people to benefit from sustainable use and conservation.

5. Clarifying and strengthening LTPR can also contribute to local development through sustainable use and conservation, as occurs when rights are formally or informally recognized through co-management, public-private partnerships, and eco-certified production.

Now that the conceptual relationship between biodiversity activities and secure land tenure and property rights is clear, the remainder of this section will use real-world examples to illustrate these concepts, highlight lessons learned, and provide additional resources on LTPR issues.

### **Key Questions**

#### ***What are some dimensions in land/marine tenure and property rights that are of importance to conservation?***

LTPR systems vary considerably around the world, and there are many inherently complex dimensions in any LTPR system. Some of these dimensions include the following:

#### **Different tenure systems for land, marine areas, and the natural resources that occur on or under them**

– In many countries, property rights to subsoil or natural resources are separate from land ownership rights. In several African countries, for example, land may be owned by private individuals or communities, but wild animals are “owned” by a state wildlife agency; or grazing rights in semi-arid zones may be vested in one ethnic group, while rights to agricultural uses may belong to a different ethnic group. The constitutions of several Latin American countries give the state rights over subsoil resources, water, and some natural resources, even while others own the land.

#### **Existence of both statutory (formal) and informal (sometimes customary) LTPR systems**

– Informal LTPR systems, which are sometimes but not always customary or traditional, are the social rules and institutions that local people develop to manage their land and natural resources. In many countries, these informal systems exist entirely outside the statutory (formal) LTPR system, but governments are increasingly recognizing existing informal systems. For example, the state may define an indigenous people’s territory formally, leaving local custom to govern



LTPR within that territory. However, ambiguity can result in conflict or an inability to control the exploitation of resources where informal rights are not formally recognized, or where formal or informal rights overlap or are not enforced in practice.

**Communal property rights as an effective means to manage critical resources** – Informal LTPR systems, including some recognized by government statute, frequently include communally held property, or “common pool resources,” such as forest or grazing areas that are owned and managed by the community as a whole. Where these common pool resources are governed by rules to control use and access, they can avoid the “tragedy of the commons” and represent an effective management strategy for resources that cannot easily be subdivided. For example, several governments in East and West Africa recognize rights in arid rangelands where mobility of people and animals is critical to sustainability.

**Protected areas, land use planning, and other conservation actions that can have profound impacts on local LTPR** – Protected area management plans, which include zoning or limits on use or access, are de facto LTPR documents with potentially extraordinary impact on vulnerable populations who access or use resources within the boundaries of a protected area. In addition to undermining local livelihoods, these rules can inadvertently compromise conservation objectives by increasing the potential for conflict with other users and/or insufficiently addressing ongoing land uses that may pose threats to wildlife. Such often-contentious aspects of parks management should be treated with appropriate care and seriousness. Although less well-known, the same goes for other conservation actions, such as land use planning and conservation easements, that can also impact use, access, ownership, and/or transfer rights.

### **What types of USAID conservation work rely on LTPR?**

Work on LTPR is integral to any USAID program that helps governments adjust rights to resources in a manner that achieves conservation or requires mitigation measures to protect vulnerable stakeholders. Such projects include those that establish or manage protected areas; promote landscape- and watershed-

level planning; strengthen forest governance at the local or national levels; support the devolution of resource management to subnational governments or communities, for example through community-based natural resource management (including rights-based and assets-based approaches, discussed separately in this handbook); support the recognition of indigenous peoples' territories; and help to make REDD+ a force to change the way that individuals and communities access and use resources as well as allocate rights to benefit from forests and carbon sequestration. Many other USAID initiatives affect LTPR and the relationship between rights and resource management, such as those in support of food security and adaptation to climate change. Consequently, LTPR concerns are linked to a wide range of USAID programs.

### **What are some examples of the intersection between biodiversity conservation and LTPR systems?**

USAID experience with LTPR systems within a biodiversity conservation program is very diverse, as illustrated by the following examples:

**East Africa:** In East Africa, USAID supports the African Wildlife Foundation with Maasai<sup>26</sup> communities in the Maasai Steppe Heartland, focusing on synergies between traditional pastoral systems and biodiversity conservation. These pastoralists live in areas surrounding such famous wildlife parks as Amboseli and Masai Mara in Kenya and Lake Manyara and Serengeti National Parks in Tanzania. Many of these parks were established on lands previously owned by the Maasai, thereby blocking these pastoralists from accessing key water and pasture resources for their animals, which are the cornerstone of their economy. Conflicts over access to grazing resources within and around the parks have become increasingly frequent as farms and other land uses, such as infrastructure and commercial game reserves, encroach on the remaining rangelands outside of protected areas in the region. At the same time, the legal frameworks in both Kenya and Tanzania have historically vested ownership of wildlife in the state.

<sup>26</sup> “Maasai” and “Masai” are both acceptable spellings, but the former is used more often when referring to people, and the latter when referring to the Masai Mara Reserve.

To address these issues and increase incentives for conservation, USAID has supported various efforts in the region that aim to provide tangible livelihood benefits to the Maasai in exchange for promoting conservation-friendly land uses. These include community conservancies, where local communities partner with private companies to establish for-profit game reserves that provide local employment and other benefits. Another incentive-based approach involves conservation easements, where individuals or communities are paid a fee, usually on an annual basis, for restricting certain land uses, such as grazing and cultivation, on their land. Although these models have the potential to achieve both conservation and development objectives, their sustainability depends on the benefits of conservation outweighing the costs to local rights and livelihoods.

**Ecuador and Colombia:** Key issues that USAID identified in Ecuador and Colombia included supporting indigenous groups in designing management plans for forest reserves that take into consideration their traditional access and use rights; certifying forests and forest products for increased market value; resolving land and resource tenure issues; integrating traditional subsistence activities with sustainable natural resource management practices; learning through exchange visits; and sharing best management practices, including those related to land and resource tenure, to achieve both biodiversity conservation and improved incomes.

**El Salvador:** A USAID project in El Salvador that focused on improving management and conservation of critical watersheds addressed multiple LTPR issues. The project followed a major cadastral mapping effort of the country's parks and partially focused on protected area boundary delineation. No procedures were in place for recording protected areas and mangrove forests in the national land registry, however, and the procedures for defining marine protected areas had not yet been developed. As a result, resource users, who were often not consulted when the parks were initially established and thus were typically unaware of the unrecorded boundaries, continued to collect resources illegally. Moreover, limited budgets for monitoring and enforcement meant that illegal resource collection often went undetected or unprosecuted, which undermined the integrity of the conservation areas. The key point is that clarifying and communicating resource rights is

essential to the management of protected and adjacent areas, but this has to be complemented with monitoring and enforcement. After lengthy consultations with local communities, the project resulted in legally secured and registered protected areas and a government declaration of the country's first marine protected area.

**Peru:** USAID has supported improved management and control of forest concessions in eastern Peru, particularly where CITES-listed species are still found. The constitution establishes forests as state property, and forestry concessions based on satellite images were granted. Although this process was designed to ensure the sustainable production of timber products by limiting logging in high-value conservation areas, it appears that the concessions granted did not adequately address all of the drivers of deforestation. Observers suggest that half or more of the wood harvested in Peru is illegal, with much of it harvested from within parks and indigenous territories, making attempts to track sources unreliable. A common problem faced by many landholders, including official protected areas, is that property borders are not clearly demarcated on the ground or in official registries, which allows for intentional or unintentional encroachment. Often, the lack of clearly defined boundaries is compounded by inadequate monitoring and enforcement mechanisms, which undermine the rights of landholders to effectively protect their land and resources from illegal encroachment. As a result of these LTPR issues, violent conflicts over resources had occurred and concession papers were not clearly verifiable.

**Democratic Republic of Congo:** In the Democratic Republic of Congo, the state leases large logging concessions to private companies. Unfortunately, the government does not currently recognize the rights of communities living in the forests, including Ba'aka pygmies, although a land tenure reform process is underway. In the late 1990s, the logging companies also encouraged wildlife hunting for bushmeat, even though their concession rights did not include bushmeat harvesting. The commercial bushmeat trade was ultimately unsustainable and additionally undermined a critical resource for the Ba'aka pygmies. To address these overlapping rights around one protected area, a USAID-supported NGO worked with a timber company to control the transport of hunters and bushmeat into the

protected area and logging concession and to provide domestic meat to workers as an alternative. Recognizing the traditional rights of the pygmies to harvest bushmeat and its importance to their diet and livelihood, this strategic approach provided an alternative source of meat that reduced bushmeat demand without negatively impacting local food security and livelihoods. The activity was so successful that it was used to set a new standard for forestry regulations that is now national law.

**The Philippines:** In the Philippines, through a project on governance and local democracy, USAID helped devolve land tenure and forest-resource extraction rights from the central government to local communities, thereby improving the livelihood of local families and the protection and management of 2.9 million hectares of forest – 50 percent of the Philippines' remaining forests. In one municipality, USAID support helped community members develop a forest land use plan. As community members became stakeholders, were engaged in the democratic decision process, and had increased control over local resources, they began to report illegal logging incidences and to fully use incentives for the protection and sustainable use of forest resources.

### **What are some best practices in LTPR in conservation?**

USAID's experience with incorporating LTPR into conservation projects, and examples throughout LTPR literature, highlight many complex and potentially contentious issues, but also many best practices in addressing those issues. Some of these best practices include

#### **addressing the impact on indigenous peoples and local communities**

– Where the state claims land or resources for national benefit – a protected area or mining concession, for example – the loss of local access to previously available resources can result in conflict: illegal taking or encroachment from the state's view, dispossession or involuntary resettlement from the local perspective. Good project design requires attention to local LTPR systems, as well as national and international policies. Conservation planners should focus on developing feasible alternatives that do not displace local indigenous peoples, vigorously assessing the benefits and costs of altering the use patterns of indigenous people and other legitimate rights holders,

and adhering to principles of FPIC for actions involving indigenous people (see discussion of [U.S. Government interpretation](#) of FPIC in [Chapter 3](#)).

**including a wide diversity of stakeholders** – The literature cites or describes diverse stakeholders in LTPR/conservation activities who can, by support or resistance, help projects succeed or fail. The ultimate sustainability of any conservation activity depends crucially on the inclusion of all those with formal or informal rights to land and resources who may be affected by the activity. Incorporating these rights-holders into the project design process early on can help to identify potential resource conflicts and solutions to avoid or mitigate the loss of land or resource rights. Stakeholder consultations should therefore include a full diversity of local and indigenous community members, as well as government institutions (local, subnational, and national); private sector representatives (e.g. producers); and nonprofit representatives. On the professional side, national and international experts in land tenure and property rights, in addition to biological and social scientists, can offer varied and valuable perspectives.

**ensuring vigorous monitoring** – Use of remote sensing and overlays using LTPR data, where they exist, with other data layers is increasing and can be accomplished at modest cost. The landscape approach practically requires use of mapping to visualize options and results. However, there may be a need to first demarcate existing rights, in particular informal rights, as many property rights are not formally recorded or mapped. Good project design should identify and mitigate potential negative outcomes, such as overuse of resources, resource conflict, and overharvesting of wild resources. However, the high incidence of informal and/or unrecorded rights in many biodiverse areas complicates the accurate identification of all resource claims. Good project design requires clear and adequately supported monitoring systems at the local, landscape, and national levels, tied to adaptive management practices that make sense and respond to local issues. Monitoring systems need to be practical, sustainable, effective, transparent, supported by stakeholders, and easily understood. In practice, LTPR/conservation links can only be observed through a combination of monitoring techniques, including on-the-ground monitoring; landscape monitoring using relatively

low-cost applications of geographic information systems (GIS) and remote sensing, combined with ground truthing; and ongoing consultations, for example using surveys or appraisal methods.

**adapting to broad developments and USAID priorities** – Crucially, LTPR will affect and be affected by climate change. Potential LTPR impacts could result from shifts in agroecological zones (a situation that is already bringing farmers and herders into increasing conflict across Africa); increased risk of conflict over property and resource access in low-lying, flood-prone areas, which can complicate efforts to rebuild after natural disasters, as seen in many countries after recent hurricanes and typhoons; the displacement or migration of communities due to changing climate patterns, which may result in further marginalization of those without formally recognized property rights; additional stress on the institutions related to ownership and allocation of land and natural resources; and conflict over the allocation of mitigation and adaptation funding. Climate change is also resulting in new funding sources, such as REDD and REDD+ (discussed further in [Section 4.4](#)), that are intended to change land and resource use rights and will create new rights to benefit from forests and carbon. These impacts may require new ways of thinking about LTPR issues, as well as new forms of governance and property rights systems to allocate the benefits of carbon financing efficiently and equitably and mitigate risks.

**drawing awareness to the broader international enabling environment** – The international community has recently codified best practices for the governance of land, fishery, and forest tenure. The [Voluntary Guidelines for the Responsible Governance of Tenure of Land, Fisheries, and Forests in the Context of National Food Security](#) were adopted in 2012 by the Committee on World Food Security (CFS) under the Food and Agriculture Organization of the UN (FAO). The Voluntary Guidelines provide a non-binding framework for countries to use in the establishment of laws and policies, strategies, and programs that clarify and secure tenure rights. It is also important to recognize that LTPR issues are related to a broader international framework that promotes the conservation and sustainable use of biodiversity. In addition,

conservation planners may need to focus national attention on existing international frameworks, such as the Convention on Biological Diversity (CBD), CITES, and the Protocol on Access and Benefits Sharing. All but a few nations have committed themselves to these international conventions, and they provide a useful framework for national LTPR laws and policies.



## BOX 72. RESPONSIBLE GOVERNANCE OF TENURE IN SMALL-SCALE FISHERIES

The [Voluntary Guidelines on Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication \(SSF-Guidelines\)](#) seek to ensure that the appropriate conditions are created to enable small-scale fishers to have access to key resources, promote food security and nutrition, participate in decision-making, enjoy their human rights, and assume responsibilities for sustainable use of fishery resources. This is a precautionary and human rights-oriented agenda that recognizes the importance of bolstering the capabilities of small-scale fishing communities for oncoming unpredictable transformations, large and small. Building resilience and ending poverty among small-scale fishing communities will enable them to secure sustainable and robust futures. One of the central components of this agenda is to ensure that small-scale fishers have secure marine tenure rights and responsibilities so that communities can gain clear and secure access to fishing areas in order to manage them for building viable livelihoods and future prosperity. Not only has there been a breakdown in traditional tenure institutions due to population growth, technology, and economic transformations, but growing competitive pressures between large-scale and small-scale fisheries have undermined the tenure rights of small-scale fishers who are typically poorer and more vulnerable.

For more information, see *USAID 2015. Small-scale Fisheries and Marine Tenure: A Sourcebook on Good Practices and Emerging Themes* and *USAID 2015. Looking to the Sea to Support Development Objectives: A Primer for USAID Staff and Partners*.

## 4.10 ECONOMIC GROWTH

Economic growth is essential to development. While some have argued that “no-growth” models are best to support biodiversity conservation, this philosophy is untenable and unfair: Growth with technological innovation, equity, planning, and efficiency can improve the prospects for humanity, as well as nature. This section presents some promising models and tools for economic growth that are compatible with and support conservation, while also pointing to sectors and actions that have the potential to further damage biodiversity if they are not well managed.

Using the nature, wealth, and power (NWP) framework, it is important to note that economic decisions are closely linked to governance, so economic actions and models that otherwise may be sound can be diverted or damaged by poor governance. Conversely, better governance can lead not only to better conservation outcomes but also improved benefit sharing and equity for stakeholders whose economic growth depends on biodiversity.

### 4.10.1 Economic Growth and Biodiversity

Currently, humanity is experiencing the greatest increase in global economic growth and the most significant reduction in extreme poverty ever recorded. This is also a time when “humans have changed ecosystems more rapidly and extensively than in any comparable period in human history.”<sup>27</sup> There is a correlation.

Natural assets provide ongoing ecosystem services (ES) that supply inputs for key productive sectors. These services include water availability, soil fertility, pollination, pest control, and growth and reproduction of food species, as well as storm mitigation, climate regulation, waste assimilation, and many other services that are used in economic processes, provide conditions essential for the functioning of these processes, or inform mitigation techniques to protect these processes should shocks arise. While this dependence is well recognized, the costs of ES degradation are difficult to measure in economic terms; therefore, a gap remains between the emerging body of economic data on the role of ecosystem

<sup>27</sup> Millennium Ecosystem Assessment, 2005. *Ecosystems and Human Wellbeing: Biodiversity Synthesis* (Washington, DC: WRI, 2005).

services on the one hand, and the narrowly focused economic information often used by policymakers and development efforts on the other. USAID is making strides to narrow this gap.

### USAID and Economic Growth

USAID’s E3 Bureau has several offices with objectives that are explicitly oriented toward economic growth. The Trade and Regulatory Reform (TRR) Office handles commercial legal reform issues and generally helps countries build the institutions and knowledge needed to make international trade an engine for economic growth (e.g. policy; customs; management of international financial flows; and the ability to establish, monitor, and comply with global trades and standards). USAID’s Development Credit Authority (DCA) Office seeks to prove the commercial viability of underserved markets by working with investors, local financial institutions, and development organizations to design and deliver investment alternatives that unlock financing for priority sectors. The Economic Policy (EP) Office focuses on economic enabling environment and tools that help gauge project and business profitability. The Bureau’s newly created Private Capital and Microenterprise (PCM) Office seeks to attract private capital investment in support of Agency and host-country priorities.

Many factors contribute to economic growth, including economic and political stability, investments in human capital (e.g. health and education), effective governance and strong institutions, favorable environments for private enterprise and investment, and increases in technology. USAID has directly invested in virtually all of these contributing factors across several sectors. Notably, these same factors are often outcomes or “co-benefits” from projects that are not explicitly those targeting economic growth, as is frequently the case in the natural resources sector. For example, community forest management projects frequently entail the strengthening of local governance and institutions, which supports economic growth more broadly.

More often than not, explicit economic growth projects incorporate natural resources considerations to the extent that they represent production inputs or negative externalities to production. Agency screening tools for

addressing these environmental considerations include the regulatory compliance of the environmental review (22 CFR 216) and the sustainability assessment. The desire is to shift these considerations from a compliance check box to actually informing USAID project design in a manner that recognizes the risks and opportunities of undertaking productive activities that impact on and are influenced by biodiversity and ES.

While there are few examples of economic growth projects with biodiversity earmarked funds (compliant with the Biodiversity Code), there have been some efforts at integration. For instance, there are now environmental chapters of free trade agreements, and there are loan guarantees serving the natural resource sector (e.g. water). In addition, there are some high-level cross-sector U.S. Government initiatives, such as the **Tropical Forest Alliance 2020** (TFA 2020), a public-private partnership with the goal of reducing the tropical deforestation associated with key global commodities (soy, beef, palm oil, and pulp and paper). The alliance includes government, civil society, and private-sector partners, including the Consumer Goods Forum (CGF) – a network of more than 400 retailers, manufacturers, and service providers across 70 countries with combined sales of approximately \$3.4 trillion and directly employing over 10 million people, with a further 90 million related jobs estimated along the value chain. In other words, highly significant market influences are being brought to bear on reducing commodity-driven deforestation on both the supply and the demand side.

### **What are the opportunities for integrating biodiversity conservation and economic growth in the USAID context?**

#### **Tools and Concepts**

An important analytic tool used by USAID/EP, which is not mandatory but would arguably be a substantial component of the sustainability analysis, is a **cost-benefit analysis** (CBA). USAID is most frequently applying CBA to the agriculture, power, and infrastructure sectors, all targeting economic growth and development.

A CBA, as performed by USAID, includes four different analyses: the financial analysis (key to understanding

incentives), stakeholder analysis (winners/losers), economic analysis (economy- wide perspective) and a sensitivity analysis (risk assessment). Not surprisingly, there are elements of these analyses that are coincident with those of the analytic tools used within the natural resource sector. For instance, the nature, wealth, and power (NWP) analytic construct also includes strong stakeholder analysis and an examination of incentives and impacts on the economy and society at large. In the CBA, it is the economic analysis that allows for the inclusion of the negative and positive environmental externalities of the projects and, therefore, possible compensation or mitigation opportunities.

Unfortunately, because environmental values (e.g. biological diversity) are often not quantified in monetary terms, they are frequently excluded from the CBA. A cost effectiveness analysis (CEA) is generally the methodology applied in such instances, but it is seldom actually used within USAID.

Over the past several years, advances have been made in the quantification of ecosystem service (ES) values and even their inclusion in CBAs. Two means of categorizing ecosystem services have contributed to their valuation. The first originates from the 2005 Millennium Ecosystem Assessment (MEA), which divides ES into the following services: 1) provisioning (e.g. food, water, fuel); 2) regulating (e.g. climate, flood, disease, water); 3) cultural (e.g. aesthetic, recreational), and a cross-cutting service; 4) supporting (e.g. nutrient cycling, primary productivity, soil formation).

To this typology, one can then apply the second lens for categorizing ecosystem services, listing their contribution to total economic value (TEV) [*Pascual et. al. 2010 TEEB*]. The components of TEV include use values (direct use, indirect use) and non-use values (e.g. bequest value, existence value, option value). Cross-referencing these two taxonomies can then suggest the appropriate valuation methodologies, such as direct/ market methods (e.g. market price, replacement costs), revealed preferences (e.g. hedonic pricing, travel cost), stated preferences (e.g. contingent valuation), or benefits transfer. Due to associated costs and the level of effort required, USAID will generally default to the use of benefits transfers, which simply access and apply ES

values calculated from similar earlier projects researched by others.

Because natural resources are universal and undervalued input to most economic growth projects, the need for **natural capital accounting** is on the rise. Natural capital accounting is the process of calculating the total stocks and flows of natural resources and services in a given ecosystem or region. This process can subsequently inform government, corporate, and consumer decision-making as it relates to the use or consumption of natural resources and land and sustainable behavior. ES valuation is required for natural capital accounting, and several global initiatives provide good sources of information (e.g., [The Economics of Ecosystems and Biodiversity – TEEB](#)).

Increasingly, progressive private-sector firms are recognizing the value of natural resource goods and services to their profits and applying natural capital values to their financial calculations. Indeed, PES schemes – applied most frequently perhaps in the water sector by private, semi-private, and even public utilities – are predicated upon being able to value the ES provision. See [Annex 5](#) for more information on PES. Both firms and nations can apply natural capital accounting. To date, USAID has explored application of natural capital accounting through a handful of its NRM projects (e.g., [Translinks](#), [SCAPES](#), [BUILD](#)) but has not yet engaged extensively in this area at either the scale of the firm or the nation. It continues to be a promising field with application for existing initiatives, such as TFA 2020.

In assessing a country's capacity for broad-based economic growth, it is not uncommon for economists to apply constraints analysis (CA) to identify the most binding constraints to private investment and entrepreneurship that hold back growth. USAID's **inclusive growth diagnostic** is a significant expansion upon the MCC's CA model, which itself builds on the [Ricardo Hausmann, Dani Rodrik, and Andrés Velasco \(HRV\) growth diagnostic model](#). All such CA models attempt to identify binding constraints (low supply matched with strong demand) to investment and growth. In as much as the CA approach incorporates a contextual cause-effect framework, it is not dissimilar to results chains and concept models used by the FAB

Office for development of theories of change in project design.

A similar economic growth constraints analysis used by the World Bank stems from its **Doing Business** project. Doing Business measures business regulations for local small and medium-size companies operating in a country. Based on standardized case studies, it presents quantitative indicators on the regulations that apply to firms at different stages of their life cycle. The results for each economy can be benchmarked over 189 economies and ranked in 10 areas of business regulation, such as starting a business, resolving insolvency, and trading across borders. Doing Business encourages countries to compete toward more efficient regulation and offers measurable benchmarks for reform in the business climate of each country. USAID makes use of this analytic tool.

## Sectors and Activities

It has already been demonstrated that good project assessment tools and processes (e.g. EIAs, CBAs, and natural capital accounting) can address environmental impacts and values of any project in a manner supportive of sustainable growth. Still, there are those economic growth projects with very direct links to natural assets and biological diversity that are worthy of special consideration, as depicted in Table 4.

### 4.10.2 Extractive Industry Definition and Significance

Extractive industries are those that are engaged in the discovery and/or extraction of non-renewable natural resources, including minerals, petroleum, natural gas, coal, sand, and gravel. By their very nature, extractive industries are considered unsustainable, and the activities associated with extractive industries typically result in negative impacts on biodiversity. Congress places limitations on how USAID can work with extractive industry (forest industries to be specific), as described in [Section 4.5](#).

Extractive industries exert enormous pressure on biodiversity. These industries, by their very nature, convert natural habitat into permanent human uses, making it very difficult, if not impossible, to restore or



Table 4. Examples of Economic Growth Activities' Links to Biodiversity

TYPES OF ACTIVITY	STRENGTHENING THE LINK WITH BIODIVERSITY	WARNING SIGNS*
ecotourism/cultural tourism	incentives and benefits go to those who represent threats to biodiversity or are land managers	increases pressure on land and resources
natural products such as ornamentals, herbs, and spices	link back to land and wild species management	no native species used promotes cultivation of non-natives
sustainable agriculture	create covenant or conservation agreement with farmer groups, enforced by peer pressure and backed by economic incentives	farmers do not have secure title and cannot exert pressure to change practices of peers benefits unclear or not enough to change behavior promotes increased use of pesticides
tree crop rehabilitation and improvement	incorporate native tree crop diversity and connectivity into the planning	weak market or private sector buy-in; market board disincentives insurmountable  no clear link to conservation of biodiverse area

rehabilitate. Extractive industries have both direct and indirect impacts on biodiversity. Direct impacts include the conversion of habitat and the displacement or destruction of species. Indirect impacts include long-term persistent effects on surrounding biodiversity, including those from noise, light, air, and water pollution; from fragmentation; and from associated infrastructure and activities required to explore, extract, process, and distribute industrial products, which can open up previously inaccessible areas to immigration and settlement, as well as conduits for illegal trade. Unfortunately, the environmental regulatory agencies responsible for oversight often do not have sufficient resources and capacity to assess and monitor these impacts and require that they be addressed. For more information, see [Partnering with Extractive Industries for the Conservation of Biodiversity in Africa: A Guide for USAID Engagement](#).

### Key Questions

#### What are trends in growth for extractive industries?

Growth in the demand for natural resources has been exponential over the past decade, particularly given population trends, a booming middle class in Asia, and China's position as a manufacturing giant. Commodity prices have skyrocketed, with a steep jump in the value of non-renewable resources. Ever-increasing demand and higher prices for natural resources have pushed extractive industries to search for non-renewable resources in places where it was once too expensive or too dangerous to do so. Globally, many areas once considered dangerous or unreachable for mining and oil companies to operate in are now safer and accessible. Nowhere does the tension between the demands of better livelihoods and environmental protection manifest itself so immediately as in the debate over resource extraction. Although extractive industries create significant opportunities for the near term, they

entail substantial risks for future generations, and the costs and benefits of resource extraction are seldom borne equitably. In many geographic areas, extractive operations overlap with indigenous and/or traditional peoples' territories, presenting additional complexities and challenges.

### **What role do NGOs and aid agencies have regarding extractive industries?**

Addressing social equity is a major challenge for extractive industries, and it generally falls to governments to referee tradeoffs and protect the most vulnerable, as well as future generations. Transparency, public access to information on extraction, and stakeholder participation in decision-making are all elements of effective governance of extractive industries. Governments, however, are often ill-equipped to arbitrate tradeoffs and, in some cases, may not consider the interests of all segments of the population when investors promise high returns, development projects, or even bribes in exchange for access to resources. Given this reality, international and local organizations, including USAID and its partners, need to fill critical niches in community development, public health, and the environment. They can do this by encouraging governments to exercise due diligence and implement social and environmental safeguards; by helping to negotiate tradeoffs with extractive industries; by ensuring that good governance is practiced by extractive industries; and by empowering affected communities to participate in decisions that have an impact on their lives. Often, empowering communities requires their ability to access independent legal, technical, and social advisors to allow for a more balanced decision-making and negotiation process. More specifically, donor agencies such as USAID can provide support for extractive industries policy analysis, support capacity building in SEA/EIA (environmental impact assessment), introduce biodiversity guidelines for EIA and other policy tools, collaborate with extractive industries at sites of high biodiversity importance, and support improved monitoring.

One example of due diligence in the extractive industries sector is the Model Mining Development Agreement (MMDA), a product of the International Bar Association, which can be used in negotiations by mining

companies and host governments for mining projects. The MMDA project asks what a mining contract might look like if the process started from the precept of a project aiming to contribute to sustainable development. The MMDA recognizes that the natural, social, and economic environments around mining projects are also essential considerations. The final product is web-based and publicly accessible at [www.mmdaproject.org](http://www.mmdaproject.org). It is not "prescriptive" in the sense of setting out one standard form; rather, it seeks to provide an agenda for negotiations based on a sustainable development objective that is common to all parties. The MMDA's public nature will also allow local communities and civil society groups to contribute in a sound manner to negotiation processes. By setting out a comprehensive and common template, it is hoped that this tool will enable and assist better structured negotiations, resulting in better lasting results in mining projects.

### **What kind of assessment and management tools can be used to improve extractive industries?**

There are three primary tools that can be used to improve extractive industries and minimize their impacts on biodiversity:

#### **Environmental impact assessment (EIA) –**

This tool formulates short- and long-term goals for environmental responsibility and performance by determining a project's current or potential impact on the environment. Before beginning a commercial project, a company should perform an EIA, which may be a requirement of a government or lending organization. The EIA reviews likely production of pollution, wastewater, and solid waste, as well as the proposed project's use of energy, water, and other natural resources. The assessment identifies the nature and scope of potential impacts, presents options for mitigation, and recommends a course of action.

**Environmental management plan/system** – An environmental management plan can be developed from the EIA's recommendations; it may include procedures for monitoring impact on species (e.g., changes in turtle nesting), changes in water/soil quality, and other indices of environmental health. An environmental management system can be based on the environmental management plan to improve a company's environmental

performance by helping to organize the management structure's focus on environmental impact.

**Strategic environmental (and social) assessment (SEA/SESA)** – SEAs move the environmental assessment process “upstream” to look for potential environmental and social impacts and opportunities at the level of policies, programs, plans, or regions. In this way, negative effects or positive opportunities can be identified early and over a broader range, so that individual projects can be “weeded out” before they begin if they will have negative impacts, or be reformulated to have positive impacts. SEA is a cost-effective approach that is being applied more and more in the developing world. Moreover, SEAs increasingly include social aspects (SESAs).

### **What is a framework for integrating biodiversity into extractive industries?**

The questions below can help partners in extractive industry/biodiversity conservation projects identify biodiversity priorities and previously unrecognized biodiversity issues and values for areas of extractive interest.

- Has the project area been identified as having high biodiversity value? Does it contain endangered species, and is it considered critical habitat or unique and irreplaceable?
- Does the project or other biologically significant area contain, or exist within, a state-designated or community-managed protected area?
- Has the methodology used in the collection of baseline data for the determination of the area's biodiversity importance been rigorous enough?
- Can operating within the protected or other biologically significant area be avoided using technical options?
- Can the government approve extractive industry development activities within a protected area or other biologically significant area through a valid process?
- Can the biodiversity values of the conservation priority area not currently under protection be confirmed?
- Are there any significant biodiversity issues?

- Can negative environmental impacts on biodiversity be mitigated to an acceptable level?

### **What is the mitigation hierarchy approach in conservation?**

The mitigation hierarchy is a concept that addresses the need to look holistically at activities that may significantly impact biodiversity and identify strategies at various stages of the activity development. The mitigation hierarchy includes four levels: avoidance, minimization, rehabilitation, and offset/compensation. It is referred to as a hierarchy because of a preferential application of the stages. The sequencing of adopting the hierarchy is to (a) anticipate and avoid risks and impacts; (b) where avoidance is not possible, minimize risks and impacts; (c) once risks and impacts have been minimized, mitigate; and (d) where residual risks or impacts remain, compensate for or offset, as appropriate. Because the concept of biodiversity offsets is controversial, the mitigation hierarchy views the role of biodiversity offsets as a last resort, after all reasonable measures have been taken to avoid and minimize the negative impact of a project and then to restore biodiversity on site ([http://bbop.forest-trends.org/pages/mitigation\\_hierarchy](http://bbop.forest-trends.org/pages/mitigation_hierarchy), 2014).

### **What are the opportunities for avoiding or mitigating/minimizing biodiversity impacts from extractive industries?**

Depending on the extractive activity, there are industry, government, and financial institution safeguards, best practices, and protocols that not only reduce negative impacts to people and biodiversity but also enhance profitability and increase operational and resource-use efficiency. Recognition of the availability of such planning and operational resources, willingness to consider and invest in these, and capacity to approach them at the right time and scale are essential for minimizing impacts to biodiversity.

Some initiatives that work toward improving the environmental and social performance of industrial and small-scale mining include the [Alliance for Responsible Mining](#), the [Initiative for Responsible Mining Assurance](#), the [Framework for Responsible Mining](#), and the [International Council on Mining and Metals](#).

One interesting example of minimizing damage to a very biodiverse ecosystem and its vulnerable communities occurred in the Pastaza alluvial wetlands of the Peruvian Amazon. For years, as a consequence of petroleum exploitation activities, the Achuar indigenous people suffered serious health impacts (from respiratory and skin diseases to birth defects), and extensive thermal and chemical contamination of significant biological resources occurred. In 2011 an agreement was reached between the indigenous communities, the Peruvian government, and the oil company responsible for the damage. The agreement, brokered by local (Racimos de Ungurahui) and international (WWF) NGOs, included a commitment by the oil company to re-inject the contaminating process waters back into the oil wells being exploited, the implementation of a monitoring plan that employed local residents, and the establishment of a health fund to address the community's medical conditions.

### **What are some examples of rehabilitation in extractive industries?**

Without proper operational controls and closure protocols, extractive operations can leave behind dangerous conditions that may continue to cause negative impacts to biodiversity and people years after the activity has ended. For example, abandoned mining tailing, deposition pools, and large extensions of floodplains where the top soil and vegetation have been removed can continue to be costly sources of sedimentation, pollution, landslides, and ecosystem fragmentation. Mine reclamation is the process of restoring land that has been mined to a natural or economically usable purpose. It is a common practice among responsible mining companies and should be a requirement in all mining projects. One key principle in the rehabilitation of biologically significant areas impacted by extractive industries is that the agreements for such efforts are made as early as possible in the planning process, with institutional responsibilities and financial resources clearly assigned.

### **What are some examples of biodiversity offsets?**

According to the [Business and Biodiversity Offsets Programme](#), biodiversity offsets are “measurable conservation outcomes resulting from actions

designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken.” The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat and ecosystem function, and people's use and cultural values associated with biodiversity. Although biodiversity offsets are a relatively new conservation instrument, generating a wide range of opinions within the conservation and development world, they have the potential to transform biodiversity and land use planning and become a major new force in land conservation. One study found, for example, that there are more than 60 programs globally for biodiversity offsets, with an annual global market of as much as \$3 billion.

One example of a voluntary, market-based biodiversity offset project is the Ambatovy nickel mining project in Madagascar.<sup>28</sup> The project, slated to run for 27 years, is located in the central portion of the country's moist forest ecoregion. Several offset activities are planned to compensate for the loss of approximately 1,100 hectares (ha) of natural forest associated with the mine. These activities go beyond regulatory requirements and include the off-site protection of 11,600 ha of similar, endangered forest, as well as set-asides of azonal forest and 4,900 ha of conserved forest around the mine footprint area. The project planned these offsets in consultation with local and international conservation stakeholders and employed quantitative calculation methods to estimate no net loss of biodiversity.

An example of a mandatory biodiversity offset program can be found in Brazil, which has two different biodiversity offset arrangements: a forest set-aside offset and a project development offset.<sup>29</sup> Both schemes operate under the “polluter-pays” principle. The forest set-aside program requires rural landowners to maintain a minimum percentage of natural vegetation on their land and allows them to conserve similar habitat types within their watershed. The project development offset,

<sup>28</sup> [The Ambatovy Project Business and Biodiversity Offset Programme Pilot Case Study](#). 2009. Antananarivo, Madagascar.

<sup>29</sup> Madsen, B., Carroll, N., Moore Brands, K. 2010. [State of Biodiversity Markets Report: Offset and Compensation Programs Worldwide](#).



which is linked to an environmental impact assessment, requires developers to create and maintain conservation land equivalent to their environmental impact.<sup>30</sup>

One must remember that offsets are the last option in the mitigation hierarchy, coming after efforts to avoid, minimize, and mitigate negative environmental impacts. Offsets are considered to address residual risks and impacts as necessary.

### **What are some challenges in implementing biodiversity offsets in an extractive industries context?**

Some of the challenges in implementing biodiversity offsets include the need for credible and measurable standards for biodiversity loss and offset, and the perception that industries could use biodiversity offsets to circumvent environmental standards. Organizations such as the Business and Biodiversity Offsets Program, run by Forest Trends, are working to develop international standards and best practices to address these challenges.

Even where extractive industry impacts on the environment are minimized and mitigated to the maximum extent possible, net loss of biodiversity still occurs. Biodiversity offsets have been put forth as a means for achieving no net loss of biodiversity by creating a framework that allows biodiversity to be reliably measured and businesses to compensate for biodiversity losses in one area through conservation actions in another. Biodiversity offsets include establishing new protected areas, financing management of existing protected areas, and restoring degraded areas. The idea is similar to that in the United States of creating a new wetland to replace one lost to a highway or housing development. As mentioned above, the concept of biodiversity offsets has been advanced largely by the Business and Biodiversity Offsets Program (BBOP), a partnership among companies, governments, and conservation organizations that explores the potential for such offsets. Through a number of pilots in a range of industry sectors, this community hopes to demonstrate the conditions under which biodiversity offsets can help

achieve cost-effective conservation outcomes alongside infrastructure and economic development. Proponents of offsets hope that by undertaking a “no net loss” of biodiversity approach, companies can better secure their operational license, as well as better manage costs and liabilities.

Nonetheless, the questions and doubts surrounding biodiversity offsets should be known and properly discussed through transparent processes by stakeholders considering this option. Establishing credible and effective biodiversity offsets is very complex, given the multiple values and services that biodiversity provides, the way threats and drivers to biodiversity interact beyond the boundaries of specific extractive enterprises, and the goal that offsets should be permanent. Many in the scientific and development community believe that some areas, like critical habitats, can't be offset due to their uniqueness. In countries where governance, science, data, and capacity for monitoring and implementation are weak, biodiversity offset options can carry significant sustainability risks.

### **4.10.3 Infrastructure**

#### **Definition and Significance**

**Infrastructure** is defined as buildings (houses, warehouses, office building); structures (towers, fences); transportation corridors (roads, railroads, airports); and areas of permanent land conversion (parking lots, strip mines). Infrastructure includes the basic physical and organizational structures and facilities needed for a society to develop and function. Built, or physical, infrastructure can have wide-ranging impacts on ecosystem services and functions (sometimes known as “natural infrastructure”).

The development of physical infrastructure – roads, bridges, dams, ports – is a critical element of a country's economic growth and development trajectory. Infrastructure development is supported by a variety of entities globally, including the private sector, governments, and bilateral and multi-lateral institutions, on a variety of scales, from local farm-to-market roads to mega hydropower projects. Infrastructure projects that are poorly planned or implemented and/or do not take into account the full costs of development – including

<sup>30</sup> Escorcio Bezerra, LG. 2007. [Biodiversity Offsets in National \(Brazil\) and Regional \(EU\) Mandatory Arrangements: Towards an International Regime?](#) Dissertation. UCL Department of Laws.

the totality of environmental and social impacts – have been and continue to be a key threat to biodiversity and ecosystem integrity worldwide.

**Natural Infrastructure** is the interconnected network of natural areas needed to maintain and support ecosystems and their functions. Natural infrastructure, and the biodiversity that underpins it, plays an important role in the provision of ecosystem goods and services that are critical to economic growth and development. Wetlands, estuaries, riparian areas, intact forests, and free-flowing rivers are all examples of natural infrastructure.

The principle challenge at the nexus of biodiversity and infrastructure is to improve the interface between built and natural infrastructure to maximize sustainable development benefits. Over the next 20 years, more than \$35 trillion in public funds will be spent on infrastructure; in Asia alone there will be more than \$4.7 trillion in infrastructure investment over the next decade. Although there will be clear benefits accrued from this investment, infrastructure development that has negative impacts on biodiversity has the potential to have negative direct, indirect, and cumulative impacts on people, economic interests, and development investments as well, given that **4 to 8 percent of GDP is lost annually in developing countries due to the environmental impacts of poorly planned infrastructure.**

The impacts of infrastructure development on biodiversity and ecosystems depend on a variety of factors, including the planning process (or lack thereof); the scale, location, and management regime of the infrastructure itself; and the ecosystem and social context of the construction site and region. For example, roads bisect critical habitats, and national parks and dams eliminate migration of important fish populations and alter hydrological systems. These direct impacts are often accompanied by indirect and cumulative impacts, like opening up previously isolated areas to resource exploitation and settlement or changing flooding, sediment, and nutrient dynamics downstream. The negative implications of poorly planned, executed, and managed infrastructure for human populations can include threats to food security, displacement, increased

health and safety risks, and loss of livelihoods and cultures. Often, these social impacts can have further knock-on environmental effects, including relocation of displaced populations into ecologically vulnerable areas and resorting to marginal and unsustainable economic activities.

From an economic growth standpoint, it is important to maintain and support ecosystem functions because healthy ecosystems provide goods and services that are key inputs for economic growth and sustainable development, particularly among the poorest and most vulnerable communities. Built infrastructure has the potential to negatively impact or enhance the function of natural infrastructure and biodiversity. For example, when planning for coastal development, governments should consider the important role that natural infrastructure, such as mangrove forests, plays in buffering coastlines and proximate human populations from storm surges and sea level rise and plan built infrastructure accordingly, in a way that avoids the degradation or fragmentation of critical natural infrastructure. Effective approaches and tools exist to better integrate and maximize economic benefits from built and natural infrastructure.

### **Key Questions**

#### ***How can more socially and environmentally responsible infrastructure decisions be made?***

Infrastructure development is a response to a variety of needs that improve human well-being and opportunities for progress, including the needs for energy, communication, safety, transportation, food security, and reduced vulnerability to disaster. Particularly for mega-infrastructure (large projects like dams, ports, and roads that require large financial investments), a comprehensive needs assessment (or feasibility assessment) that compares several alternatives and/or scenarios can assist decision makers in selecting the options that provide the best balance of social, economic, and environmental costs and benefits. Location, design, scale, technology used, operational practices, sustainability, and monitoring parameters of all infrastructure developments can be enhanced through well informed and participatory needs-assessments processes.

### **What other kind of assessment and management tools can be used to improve infrastructure development?**

Environmental impact assessments, environmental management plans/systems, and particularly strategic environmental (and social) assessments, as described in [Section 2.3.4](#), are also useful tools to assist in the planning of infrastructure development. As with any assessment, access to the best data available, transparency, public participation, and proper timing within the planning process are keys for success.

### **What is a mitigation hierarchy approach to infrastructure and conservation?**

The mitigation hierarchy, introduced in [Section 4.10.2](#), should be applied in the planning of infrastructure projects. It includes four levels: avoidance, minimization, rehabilitation, and offset/compensation. Because it is a controversial option with a wide range of opinions in the conservation and development world, the option of biodiversity offsets should only be considered as a last resort, and approached with the involvement of appropriate, preferably local, experts.

### **What are the opportunities for avoiding or mitigating biodiversity impacts from infrastructure?**

Although many immediately think about EIAs as the primary tool for preventing negative environmental impacts of infrastructure development, there are a variety of entry points and opportunities for avoiding or reducing impacts of infrastructure on biodiversity and ecosystems. EIAs are project based. They generally only capture project-level impacts and mitigation measures; they often do not consider ecologically or socially relevant geographic scales or intergenerational impacts, and they leave out cumulative effects and broad social implications. These issues lead to problems that are very difficult to manage, either because the projects do not include effective safeguards, or because they have safeguards that cannot effectively assess and mitigate cumulative and broader indirect environmental and social impacts. EIAs without broader planning are only a partial solution. By the time an infrastructure project is at the EIA phase, it may be too late to have sufficient influence on the planning and siting of the investment; there is considerable benefit to taking a broader view of

planning that considers more than a project-by-project view of development.

A holistic, spatial, and stakeholder-based approach to development planning that takes into account early in the process the full environmental, social, and economic costs and benefits of various patterns or options of investment and development (including infrastructure) at an ecologically relevant scale has the potential to produce greater benefits and minimize negative impacts over time. The SEA, which includes a range of “analytical and participatory approaches that aim to integrate environmental considerations into policies, plans, and programs and evaluate the inter linkages with economic and social considerations,”<sup>31</sup> responds to this need. It allows the integration of environmental considerations – alongside social and economic aspects – into strategic decision-making at all stages and tiers of development cooperation. Strategic environmental assessment is not a substitute for traditional project impact assessment tools, but a complement to them.<sup>32</sup> Improving the interface between built and natural infrastructure in a way that conserves biodiversity and keeps ecosystems intact will involve “soft” strategic approaches to address the policy, planning, and regulatory environment and should improve the capacity for integrated decision-making in countries where USAID works.

Avoidance strategies include measures, such as careful spatial or temporal placement of infrastructure elements, taken to prevent from the outset impacts on certain biodiversity components or biologically significant areas. This results in a change to a “business as usual” approach. Minimization strategies include measures to reduce the duration, intensity, and/or extent of impacts that cannot be completely avoided, as far as is practically feasible. Rehabilitation and restoration strategies include measures to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/or minimized. Offset and compensation strategies include measures to compensate for any residual significant, adverse impacts

31 [Applying Strategic Environmental Assessment: Good Practice Guidance for Development Cooperation](#). 2006. OECD Development Assistance Committee (DAC). <http://www.oecd.org/dac/environment-development/37353858.pdf>

32 [Applying Strategic Environmental Assessment: Good Practice Guidance for Development Co-operation](#). OECD. 2006) 24-25

that cannot be avoided, minimized, and/or rehabilitated or restored.

Many conservation approaches have been developed to address biodiversity loss due to infrastructure development lower down the mitigation hierarchy, including biodiversity offsets; technological fixes (e.g., wildlife underpasses and bridges, fish ladders, and regulation of water flows from dams); and site restoration after damage has been done. Such strategies should be considered primarily after holistic planning and avoidance measures have been exhausted. Also, it should be recognized that there are no “one size fits all” options in biodiversity conservation – for example, fish ladders in hydropower projects must be designed for specific fish species and river conditions, tested beforehand, and approached knowing that they may prove not to be an effective alternative. One example of a compensation effort is PES arrangements with hydropower management. Stewardship payments can incentivize conservation through, for example, compensation for the true economic value of the services intact ecosystems provide, including protection of water quality, prevention of soil runoff that increases siltation of hydroelectric reservoirs, harvest of natural forest products, and the aesthetic appeal of natural landscapes important to tourism. Downstream users, such as hydroelectric power plants and water companies, gain benefits from water regulation and soil conservation, and so arguably should pay upstream providers of these environmental services. Valuation studies can be instrumental in raising the confidence level of policymakers regarding setting payment levels.

## BOX 73. ASIA REGIONAL BIODIVERSITY CONSERVATION PROGRAM

USAID’s Asia Regional Biodiversity Conservation Program (ARBCP) worked with the Vietnamese government to establish a policy framework for payments for environmental services and implement a pilot PES arrangement with a hydropower dam operation in the Da Nhim watershed area of Lam Dong Province. In this pilot, payments were made by the hydropower operation to communities for the stewardship of the watershed and biodiversity upstream. Without proper watershed and forest management upstream, the levels of silt flowing downstream and the resulting siltation behind a dam would pose a significant problem for dam operation and management, requiring expensive strategic approaches. In the Lam Dong PES case, by December 2010, payments totaling 87,067,200,000 Vietnam Dong (VND; US \$4.46 million) were made to 22 forest management boards and forestry businesses and 9,870 households, 6,858 of which were ethnic minorities. PES activities have resulted in enhanced protection of 209,705 hectares of threatened forest land, and in 2010, the average annual payment per household was 10.5-12 million VND (US \$540-615), representing an almost 400 percent increase over previous forest protection payments by the Government of Vietnam. Based on information in logbooks maintained by patrol teams, forest protection patrols supported by PES payments have resulted in a 50 percent decrease in the number of reported cases of illegal logging and wildlife poaching in the Da Nhim watershed area. Benefits are accrued for both biodiversity and infrastructure in this case.



### **What is USAID’s environmental and social oversight responsibility for multilateral development bank investments?**

Title XIII of the International Financial Institutions (IFI) Act, as enacted in Section 537 of Public Law 100-202, instructs USAID to report to Congress on proposed and current multilateral development bank (MDB) projects (many of which include built infrastructure components) and other assistance proposals likely to have adverse impacts on the environment, natural resources, public health, or indigenous peoples. The law directs USAID to collaborate with other U.S. Government agencies to review MDB assistance proposals to determine whether they will contribute to the sustainable development of the borrowing/project country. USAID produces a biannual report to Congress that provides information regarding the Agency’s performance of its tasks, as assigned by the Act. USAID and its partner reviewing agencies have the responsibility for making recommendations, including proposing alternative measures that could eliminate or mitigate adverse impacts. After evaluating MDB proposals, USAID undertakes an affirmative investigation of selected projects that may have substantial adverse impacts and ensures that the resulting information is made available to the public. USAID provides its findings from this process to the U.S. Department of Treasury. USAID/Washington works with its regional Bureaus and field Missions and other U.S. Government agencies, including the Department of State, the Environmental Protection Agency, and the U.S. Executive Directors’ Offices at the bank to carry out the following tasks: providing adequate attention to priority MDB projects; engaging with project sponsors, bank staff, civil society, and communities affected by bank projects; and engaging early in the proposal process with project countries, sponsors, and bank staff.

When final project EIAs are released by MDBs 120 days before their boards vote, there may be inadequate opportunities and unsatisfactory results in identifying, averting, or mitigating negative environmental and social impacts. To increase its effectiveness in the oversight process, USAID continues to explore new approaches to earlier engagement in the MDB project-proposal process. However, earlier engagement in this process

does not obviate the need to engage with relevant stakeholders during the later stages of the process, when all of the environmental and social documentation is available.

As of this writing, USAID is engaged in a lengthy process of **review of safeguards** used by multilateral institutions supported by the U.S. Government, especially but not exclusively the World Bank. U.S. Government agencies, NGOs, and other stakeholders are actively weighing in.

### **4.10.4 Illegal and Unsustainable Trade**

#### **Definition and Significance**

**Illegal trade** is defined as the trade of any product that is bought, sold, exported, imported, or processed in breach of a country’s national laws and/or international treaties, such as CITES or fisheries agreements. Illegal trade largely involves species of high value or high demand on international markets. For example, growing wealth in China and Southeast Asia has spurred a demand for exotic animal parts, precious woods, and seafood products. Illegal trade can also be masked by, or “co-mingled” within, legitimate trade, such as for ornamental fish or the commercial timber and fish trades. The presence of illegal wood and fish products on commercial markets has become so pervasive that the private sector has joined in the cause to halt illegitimate trade that is undermining their good practices and cutting into profits. Illegal trade drives over-exploitation and the use of destructive methods and may do further damage by introducing invasive alien species that can create havoc in native environments lacking natural defenses. Illegal fishing and trade in fish products are often broken down into “illegal, unreported, or unregulated (IUU)” categories.

**Unsustainable trade** is defined as the extraction, trade, and consumption of any renewable resource (e.g., timber, fish) beyond what the regenerative capacity will allow, or any such activity that causes unacceptable levels of degradation of biodiversity and ecosystems. An example of unsustainable trade is the charcoal trade, where trees are cut in large numbers with no or weak enforcement of sustainable harvesting, regeneration, or replanting. Another example is the unsustainable trade of wild fish from many developing countries

that lack adequate management regimes and enforcement capabilities.

The extraction and trade of wild animal and plant resources is a driver of biodiversity loss, but the demand also presents a potential incentive for conservation and sustainable management of ecosystems. Biological resources are extracted and traded legally and illegally within and across national borders to meet market demands for a variety of products and purposes, including

**food** – Fish are the world's most widely traded food products, and the vast majority of wild fish originate from developing countries. Fruits, mushrooms, nuts, leaves, and tubers are particularly important for nutrition and livelihoods in many rural areas. Wild animals, including fish, contribute at least a fifth of the animal protein in rural diets in more than 60 countries. An increasingly commercial bushmeat trade in Central and West Africa and the consumption of wildlife in populous Southeast Asia have significantly reduced wildlife populations and ranges. A recent study demonstrated that reliance on wild meat is growing in East and Southern Africa in response to increased human populations and poverty.<sup>33</sup>

**prestige** – Certain wildlife products are traded because their combination of traditional value, beauty, and rarity (and even illegality) makes them desirable to give or receive. Examples include carved ivory from elephants, hippos, and walrus; carved or whole rhino horn; wolf pelts; precious woods such as mahogany, ebony, and rosewood; and exotic butterflies and coral reef species.

**fuel and fodder** – Trees and plants are an important source of fuel for cooking and heating and provide fodder for livestock, especially in rural areas.

**building materials** – Trees and plants provide timber and thatch for furniture and housing.

**gums and resins** – Sap from trees and plants produce resins used both in manufacturing processes and locally for a variety of purposes.

**clothing and jewelry** – Wildlife is used by many groups for clothing, and ornaments are made from leather, furs, and feathers. Coral, seashells, pearls, wood, and nuts are used in both traditional and commercial jewelry.

**sport** – Trophy hunting can generate tens of thousands of dollars for private-sector concessionaires, government resource managers, and local communities. Wildlife is also valued for its ability to hunt, specifically falcons used for sport hunting in the Middle East and Central Asia. Overhunting or unlicensed hunting is reported as a common threat in several countries.

**physical and spiritual health** – An estimated 80 percent of the world's population is said to rely on traditional medicines for primary healthcare needs. These include herbal remedies, such as those in the Ayurvedic tradition of India; traditional Chinese medicine, which includes ground seahorse, tiger bone, and rhinoceros horn to alleviate various ailments; and muti of Southern Africa, which involves ingested plant and animal ingredients for health as well as providing talisman properties. Essential oils are a burgeoning natural product that may be wild harvested and promoted for both health and well-being.

**collections, pets, and research** – According to **TRAFFIC**, any wildlife specimens and curios are collected by museums and private individuals; researchers import nearly 15,000 primates annually for research; and the illegal exotic pet trade is estimated at \$20 billion a year. The primary incentive for wildlife traders is economic, ranging from small-scale local income generation, to major industry, to international crime syndicates.

The problem of unsustainable and illegal trade in plant and animal species is significant and pervasive and poses a considerable and immediate threat to ecosystem health, biodiversity, global security, and human development prospects. For example, if current illegal and unsustainable trade trends continue, scientists predict that 13 to 42 percent of Southeast Asia's animal and plant species could become extinct during this century (Brooks et al., 2003), and at least half of those losses would represent global extinctions.

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<sup>33</sup> **Traffic**.

## Illegal Timber Trade

The World Bank estimates that 90 percent of the \$10-15 billion timber trade is illegal. The global economic cost of illegal logging has been estimated at approximately US \$46 billion per year.<sup>34</sup> In the host countries where USAID works, illegal trade in wood products robs governments of revenue that could be invested in public service. This pervasive problem, typically run by organized crime syndicates, has also resulted in the deaths of community activists in Cambodia, the Philippines, and Brazil. Illegal logging and associated trade, which enters and becomes lost within legitimate global commerce, is causing persistent environmental damage, costing governments billions of dollars in lost revenue, promoting corruption, and undermining the rule of law and good governance. A 2012 study by the World Bank describes the nature of the problem:

***Forestry's criminal justice system is broken. Despite compelling data and evidence showing that illegal logging is a worldwide epidemic, most forest crimes go undetected, unreported, or are ignored. All too often, investigations – in the rare event that they do take place – are amateurish and inconclusive.***

The report observes that a four-year study in Brazil, Mexico, Indonesia, and the Philippines – four forest-rich countries – found that the probability of illegal loggers being penalized is less than 0.1 percent. The report goes on to say that estimates of financial losses from illegal logging don't consider “the enormous environmental, economic and societal costs – biodiversity threats, increased carbon emissions, and undermined livelihoods of rural peoples” (World Bank, 2012).

Consumer countries contribute to these problems by importing timber and wood products without ensuring that they are legally sourced. In recent years, however, producer and consumer countries alike have paid increasing attention to illegal logging and its associated trade. The Governments of the United States, the European Union, and Australia have developed legislation that prohibits illegal wood from entering their markets and requests importers to conduct due care on sourcing

(see Box 74 on the U.S. Lacey Act). Furthermore, regional and international processes to address illegal logging through trade and diplomatic channels have emerged. These channels include the Asia Pacific Economic Commission; bilateral MOUs with key trading partners; voluntary partnership agreements with the European Union under their Forest Law Enforcement, Governance, and Trade (FLEGT) Action Plan; and environmental chapters of trade agreements, such as the one between the United States and Peru, which included an annex on forest governance requirements. The need to verify legality through better supply chain management and law enforcement has also given rise to new scientific applications and technologies to identify wood species and their origin – for example, the use of DNA barcoding, fingerprinting, or isotope analysis; enhanced use of wood anatomy; and improved remote sensing and forest monitoring.

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<sup>34</sup> Centre of International Economics. 2010. [A Final Report to Inform a Regulation Impact Statement on a proposed new policy on illegally logged timber.](#)

## BOX 74. LACEY ACT

- The Lacey Act (16 U.S.C. 3371 et seq.), the oldest wildlife protection statute in the United States, combats trafficking in illegally taken wildlife, fish, and plants. It was first enacted in 1900 and was significantly amended in 1981 and 2008. The Food, Conservation, and Energy Act of 2008 – also known as the 2008 Farm Bill – amended the Lacey Act further by expanding its protections to a broader range of plants and plant products, including trees (Section 8204, Prevention of Illegal Logging Practices).

As amended, the Lacey Act now makes it unlawful to

- import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce any plant, with some limited exceptions, taken in violation of any federal, state, tribal, or foreign law that protects plants.
- make or submit any false record, account, or label for, or any false identification of, any plant covered by the Act.
- import certain plants and plant products without an import declaration. The declaration must contain, among other things, the scientific name of the plant (genus, species), value of the importation, quantity of the plant, and name of the country from which the plant was harvested. The import declaration is made by the importer.

The definition of the term “plant” under the Lacey Act now includes “any wild member of the plant kingdom, including roots, seeds, parts, and products thereof, and including trees from either natural or planted forest stands.” There are certain exclusions, including 1) common cultivars (except trees) and common food crops; 2) live plants that are to remain or be planted or replanted; and 3) specimens of plant genetic material to be used for research. Exceptions do not apply to species protected under CITES or the Endangered Species Act.

Violations of the Lacey Act provisions may be prosecuted through either civil or criminal enforcement actions. In addition, the tainted plants or products derived from plants – such as timber, furniture, and paper – may be seized and forfeited on a strict liability basis. The burden of proof is on the U.S. Government. The defendant need not be the one who violated the foreign law: The plants or timber, and the products made from the illegal plants or timber, become “tainted” even if another entity in the supply chain commits the foreign law violation; however, the defendant must know, or in the exercise of due care should know, about the underlying violation.

*More information on the Lacey Act, including definitions of exceptions and the enforcement schedule of the import declaration, can be found at USDA’s Animal and Plant Health Inspection Service (APHIS) [website](#).*



## **Illegal Wildlife Trade**

The scale of the illegal wildlife trade is alarming. Due to the nature of illicit trade, obtaining exact figures is difficult, but some experts estimate the **value of the illegal wildlife trade** at \$10-20 billion annually, rivaling the scale of the international drug and arms trade and involving **more than 350 million plant and animal specimens every year**.

Arrests and interceptions, although increasing, expose only a small fraction of this underground criminal enterprise. The trade is global, with trade flows occurring between source and demand countries within regions and between continents. The United States, the European Union, and China are some of the largest consumer countries of illegal and unsustainably traded wildlife. “Hotspots” where wildlife trade is particularly active include China’s international borders; trade hubs in East/Southern Africa and Southeast Asia; the eastern borders of the European Union; particular markets in Mexico; parts of the Caribbean, Indonesia, New Guinea; and the Solomon Islands.<sup>35</sup> Southeast Asian countries, with the rich biodiversity of Indonesia, Malaysia, and Burma, are particularly targeted as sources for wildlife. Asia also serves as a conduit for such products as ivory and timber from as far away as Africa and Latin America.

This multi-billion-dollar black market trade in threatened and endangered wildlife, marine, and timber species has bred complex global criminal syndicates. A host of factors, including porous borders; the use of communication technology (cell phones, Internet, etc.); improving transportation infrastructure; falsification of paperwork and labels; and widespread corruption have facilitated this rapidly growing illegal trade. According to **TRAFFIC**, between collectors of wildlife and the ultimate users, any number of middlemen may have a role in the wildlife trade, including specialists involved in storage, handling, transport, manufacturing, industrial production, marketing, and the export and retail businesses.

Recognizing the increasing severity and scale of this issue, President Obama issued an **Executive Order to Combat Wildlife Trafficking** (July 2013), leading to a U.S. National Strategy for Combating Wildlife Trafficking (February 2014) and implementation plan (expected February 2015) that are mobilizing resources across the U.S. Government to address this important challenge. According to the National Strategy, poaching and illegal trade of wild animals has far-reaching economic, national security, and ecological consequences that are undermining decades of conservation and development gains. Trafficking in elephant ivory and rhino horn, from Africa to Asia, is particularly concerning due to the involvement of heavily armed poachers and organized crime.

The National Strategy has three strategic priorities: 1) Strengthen enforcement, in the U.S. and overseas; 2) Reduce demand for illegally traded wildlife, in the U.S. and overseas; and 3) Build international cooperation, commitment, and public-private partnerships. USAID is the major funder of overseas programs advancing the strategy and is co-lead for several areas of implementation. The Department of State’s Bureau of International Narcotics Control and Law Enforcement (INL) has a large and growing role in responding to the first priority. USAID projects are managed in coordination with the diplomatic efforts of embassies, policy engagement by State and the U.S. Fish and Wildlife Service, and programs managed by INL. Additional steps are found in Box 75. See also key questions at the end of this section.

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<sup>35</sup> **Traffic**.

## BOX 75. STEPS TO ADVANCE THE NATIONAL STRATEGY TO COMBAT WILDLIFE TRAFFICKING

The Implementation Plan of the U.S. National Strategy for Combating Wildlife Trafficking was released by the U.S. Department of State in February 2015. The plan guides and directs the efforts of Federal agencies in executing the strategy, and specifies the agencies responsible for executing particular tasks. The plan's success relies on agencies working in consultation or collaboration with each other whenever possible. Lead agencies are responsible for ensuring that progress remains on track and will contribute to monitoring or evaluating the effectiveness of strategic approaches.

USAID is taking a co-lead role in several international areas of focus under Strengthening Law Enforcement, including: Capacity Building of Government Authorities; Support for Community-Based Wildlife Conservation; Support for the Development and Use of Effective Technologies and Analytical Tools; Enhancement of Information Sharing with International Partners; and Support for the Development of an Effective Worldwide Network of Wildlife Enforcement Networks (WENs).

USAID is also taking a co-lead role in the Reducing Demand and Building International Cooperation priority areas, including: Raising Public Awareness and Changing Behavior; Promoting Demand Reduction Efforts Globally; facilitating Bilateral and Regional Cooperation among concerned countries; Promoting Partnerships among government, inter-governmental and private sector (including NGO) actors; and Encouraging Development of Innovative Approaches.

USAID will play a contributing role in international efforts to advise or facilitate overseas multinational enforcement operations; address wildlife trafficking in fighting other transnational organized crime; address corruption and illicit financial flows; use diplomacy to catalyze political will; strengthen international agreements and arrangements that protect wildlife; use existing and future trade agreements and initiatives to protect wildlife; and incorporate provisions to protect wildlife in other international agreements. Our programs may also contribute to domestic-focused efforts to "Take the Profit Out of Wildlife Trafficking."

## **Illegal, Unreported, and Unregulated Fishing and Trade**

Fishing is the largest extractive use of biodiversity in the world, and fish products are the world's most widely traded foods. About 90 percent of wild fish products in trade come from the sea. Extraction of marine resources is often categorized as “legal” or “illegal, unreported, and unregulated (IUU)” fishing. IUU fishing includes all fishing that breaks fisheries laws and is thus “illegal” (i.e. is illegal or unreported) or occurs outside the reach of fisheries laws and regulations (i.e. is “unregulated”) in international waters.

Most of the world's fish are caught in the national waters of coastal States, their exclusive economic zones (EEZ), which can extend out 200 nautical miles. **Illegal fishing in national waters can include** fishing without a license; fishing in a closed area; fishing with prohibited gear; using illegal and destructive practices such as cyanide, dynamite, or bottom trawling; fishing over a quota; and the fishing of prohibited species. Illegal fishing also includes “pirate fishing,” where foreign fishing vessels come into national waters with no fishing license at all. **Unreported fishing**, i.e. not reporting or under-reporting the vessel's catch, even if the vessel is legally licensed to catch that species, is also considered to be illegal.

**Unregulated fishing** often occurs on the high seas, the international waters beyond a coastal state's exclusive economic zone. These areas are also referred to as areas beyond national jurisdiction (ABNJ). A network of regional fisheries management organizations (RFMOs) covers some of the high seas. However, the enormous expanse of the oceans, combined with patchy regulation and little enforcement, allows for rampant illegal and unregulated fishing.

IUU fish products and trade refer to those products associated with IUU fishing. Currently, about 50 percent of wild fish in trade originate from developing countries. Fishery resources in many developing countries are under huge pressures due to the increasing demand for seafood from developed countries. Coupled with weak institutions and limited capacity for enforcement, pirate fishing in the national waters of developing countries

poses high threats to marine biodiversity, local food security, livelihoods, national economies, and peace and security. For example, in Senegal, [a recent USAID-commissioned study](#) estimated that 60 percent of the fish collected in national waters were caught illegally, and of the legal catch, only about a third was reported.

IUU often creates conflicts between local fishers and vessels from outside communities or countries fishing illegally, fueling conflicts and loss of fishery resources for local communities. Global losses attributable to the black market from IUU fishing are estimated to be \$10-23 billion annually, representing around 20 percent of the global seafood catch, weakening profitability for legally caught seafood, fueling illegal trafficking operations, and undermining economic opportunity for legitimate fishers. This looting threatens the food security of the 2.6 billion people who rely on fish protein in developing countries. IUU fishing often impacts smaller-scale fishers by stealing fish from near-shore waters or undermining the ecosystem on which the fish depend. Illegal fishing undermines fisheries management efforts, as it skews catch and population estimates. Illegal fishing can also distort marine food webs, damage critical marine habitats, and catch non-target species, resulting in significant losses to marine biodiversity and ecosystem services. Overfishing and destructive fishing reduce the ability of ecosystems to recover from and adapt to global climate change impacts.

Graft and corruption are major contributors to IUU and barriers to its resolution. International reviews have found a strong co-occurrence of IUU fisheries and organized crime, particularly smuggling drugs and migrants, and piracy, largely because fishing vessels are far less regulated than other maritime vessels, which are managed by the International Maritime Organization. IUU fishing and trade is associated with egregious human rights violations, such as the rampant use of forced labor in fishing vessels and seafood processing plants, as highlighted by the [Human Trafficking Report](#), issued by the Department of State on June 20, 2014.

Trade in coral reef species for ornamentals, home decor, and marine aquaria is a key threat in many countries, as it drives overexploitation and the use of destructive practices. Most countries prohibit the use of cyanide in

the collection of live reef fish for the aquarium trade. However, its use is still widespread, making the trade in these fish illegal. The United States is the world's largest importer of coral reef products and **could exert a major**

**influence in redirecting the trade toward legality and sustainability.** Box 76 presents more information on actions proposed to tackle IUU fishing.

## BOX 76. PRESIDENTIAL MEMORANDUM AND TASK FORCE ON ILLEGAL, UNREPORTED, AND UNREGULATED FISHING AND SEAFOOD FRAUD

The United States is a major importer of seafood and potential driver of the illegal fish trade; up to 30 percent of the seafood sold in U.S. markets may be illegal. The United States is also a global leader in sustainable seafood. Over the course of the last six years, the United States has largely ended overfishing in federally managed waters and successfully rebuilt a record number of stocks depleted by the excesses of the past. As a result, the U.S. management scheme is recognized internationally as a model for other countries as they work to end overfishing. Nevertheless, illegal, unreported, and unregulated (IUU) fishing continues to undermine the economic and environmental sustainability of fisheries and fish stocks, both in the United States and around the world. A Presidential Memorandum issued on June 17, 2014 at the U.S.-hosted Our Ocean Conference called for the U.S. Government to develop a Comprehensive Framework to Combat Illegal, Unreported, and Unregulated Fishing and Seafood Fraud. The Presidential Memorandum – similar to an Executive Order – established a task force and two new U.S. Government policies to ensure that seafood sold in the United States is legally and sustainably caught and to combat the negative impacts of seafood fraud:

- a. It shall be the policy of the United States for all executive departments and agencies (agencies) to combat IUU fishing and seafood fraud by strengthening coordination and implementation of relevant existing authorities and, where appropriate, by improving the transparency and traceability of the seafood supply chain.
- b. It shall also be the policy of the United States to promote legally and sustainably caught and accurately labeled seafood and to take appropriate actions within existing authorities and budgets to assist foreign nations in building capacity to combat IUU fishing and seafood fraud. In addition, agencies shall identify opportunities to enhance domestic and international efforts to combat global IUU fishing and seafood fraud.

It is in the national interest of the United States to promote a framework that supports sustainable fishing practices and combats seafood fraud and the sale of IUU fishing products. To achieve these objectives, the United States will need to enhance the tools it has available to combat IUU fishing and seafood fraud, including by implementing the United Nations Food and Agriculture Organization Agreement on Port State Measures to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing; strengthening coordination and implementation of existing authorities to combat IUU fishing and seafood fraud; working with the Congress to strengthen and harmonize the enforcement provisions of U.S. statutes for implementing international fisheries agreements; and working with industry and foreign partners to develop and implement new and existing measures, such as voluntary, or other, traceability programs, that can combat IUU fishing and seafood fraud and ensure accurate labeling for consumers. The task force will submit recommendations to the President through the National Ocean Council and will submit annual progress reports on implementation of the policies and recommendations.



## Key Questions

### **What is the impact of illegal and unsustainable trade?**

The impact of this illegal trade reaches beyond that of a key biodiversity threat. Trafficking in threatened and endangered species is also a regional security concern, as well as a national security interest for the United States, as articulated by the Library of Congress Congressional Research Service: “Numerous sources indicate that organized criminal syndicates, insurgency groups, and military units are among the primary actors involved in large-scale, commercial-sized wildlife trafficking. . . . Some observers claim that the participation of such actors in wildlife trafficking can threaten the stability of countries, foster corruption, and encourage the use of violence to protect the trade.”<sup>36</sup> See also [Section 4.8.2](#). Illegal trade also has economic, livelihood, health, food and nutrition security, and climate resilience impacts. Illegal extraction and the associated trade is undermining markets with cheaply produced goods that have not paid for environmental or social safeguards. It undermines efforts to promote the rule of law, good governance, and sustainable development and reduce poverty. In addition, there are significant and troubling linkages between trade in wildlife and zoonotic diseases, such as HIV, Ebola, and SARS (see [Section 4.1](#)).

### **What is the primary international treaty affecting illegal trade in endangered species?**

The Convention on the International Trade in Endangered Species (CITES) restricts trade in threatened and endangered species that are listed in its annexes for countries that are parties to the treaty. Most countries also have domestic legislation for implementing CITES restrictions, making much of the trade in endangered species illegal or restricted. (This is not true for most species of fish, however.) For some species, the trade is regulated or prohibited in some countries, but not in others. Restrictions may also differ by country. International trade in species not listed under CITES, or domestic trade in listed or unlisted species, is often unregulated, and the trade is poorly understood. The lack of effective governance, including the presence and awareness of laws regulating wildlife extraction and

<sup>36</sup> Liana Sun Wyler and Pervaze A. Sheikh, [International Illegal Trade in Wildlife: Threats and U.S. Policy](#), Washington, DC: Congressional Research Service, 2008.

trade, enforcement of those laws, and effective and just prosecution and sentencing of offenders, further enables illegal and unsustainable trade. For example, despite a complete ban on cross-border trade in pangolins (endangered scaly anteaters native to parts of Asia and Africa and valued for their meat) in Southeast Asia, investigators believe at least one metric ton is trafficked across borders every day. Similarly, although wild populations of tigers and leopards are rapidly dwindling, their skins and body parts are still found in trade across Southeast Asia.

Many species in trade, including most commercial fish and timber species, are not listed in CITES.<sup>37</sup> In these cases, trade is illegal when the products are taken in violation of national laws, such as illegal removal from areas or collection with illegal practices. Regional fisheries management organizations develop and manage regional fisheries treaties and set and allocate quotas for some high-value fish species. The International Tropical Timber Organization (ITTO) is an intergovernmental organization that develops [internationally agreed policy documents](#) to promote sustainable forest management and forest conservation. It also collects, analyzes, and disseminates data on the production and trade of tropical timber and assists member countries to adapt such policies to local circumstances and implement them.

### **What are the primary trends in demand for illegal and unsustainable trade?**

Demand for illegally obtained wildlife, wood, and fishery products is widespread. The United States, China, and the European Union have some of the highest demand for illegally traded wildlife and wild fish and are also major consumers of wood products, with a significant proportion of both wildlife and wood products trafficked through Asia purchased by consumers outside the region. Although observers say demand for illegally traded wildlife is increasing, the underground nature of this black market makes it difficult to determine the magnitude and the trends of demand. Demand for threatened and endangered species is driven by different factors, depending on the product, region, and culture. In Asia, where a significant portion of the global trade takes place, demand is driven by traditional medicine,

<sup>37</sup> Here is a [list of the currently listed tree species](#).

human consumption, and symbols of wealth. The increase of the region's economic growth and affluence has reportedly escalated the demand for these illegal goods in Southeast Asia. In Europe and North America, analysts find that demand for illegal wildlife includes a wide variety of products, such as luxury fashion items, tourist souvenirs purchased abroad, and exotic pets, as well as traditional medicines and wildlife meats for human consumption. The United States is thought to be a significant destination for illegal wildlife, and the magnitude of the illegal trade in the U.S. may be increasing.

Illegal wood products, on the other hand, are often unknown or undetected by the time they reach the market or end consumer. Tree products are found in a multitude of common, everyday goods, including paper, furniture, tools, handicrafts, picture frames, packaging, resins, and industrial products. Products typically traverse several countries, where they are mixed with other products and transformed into value-added items. Supply chains have been poorly documented and are not well understood. Retailers and importers in the United States and Europe are struggling to learn more about their sourcing and finding that it is not simple. Motivated by good intentions and by the amended Lacey Act, buyers are struggling to locate consistent supplies of legal and sustainable timber but finding a short supply in tropical countries. This again points to the critical need for good governance that can support legitimate trade; much work remains to be done within USAID countries on this issue.

Similar to wood products, illegal fish products are often unknown or undetected by the time they reach the market or end user. Illegal fish products end up in many food products, including farmed-raised and aquacultured products; about 20-30 percent of all wild fish caught globally are ground up and used as fishmeal for aquaculture and livestock feed. The demand for wild fish for fishmeal is also driving demand for illegal, and cheap, fish. In an attempt to limit illegal fish from entering its market, the European Union now requires catch documentation for all seafood imports. African and Asian countries are trying to respond to this required information by setting up catch document and traceability systems.

### **What are some factors that enable illegal and unsustainable trade?**

Among the numerous factors that can enable illegal and unsustainable trade are the following:

- lack of a national policy that clearly lists which species can legally be in trade, thus making all other species illegal
- corruption and direct involvement in the trade by government, law enforcement, and judiciary officials
- lack of scientific information and understanding of sustainable resource use levels and sustainable management
- lack of transparency over who has legal licenses for extraction and transport along the supply chain
- absence of laws and regulations against trade in an exploited resource
- failure of enforcement officials to make enforcement of international treaties or national and local laws regarding the trade a priority
- the high profitability of illegal trade for those involved
- failure of enforcement actions to stop the ringleaders who run the trade (often, only the lower-level traffickers are caught)
- weak penalties and sentencing for convictions for illegal trade, which do not serve as a deterrent for future offenses
- lack of capacity in enforcement and judicial systems
- lack of awareness of the problem in supply and demand countries and among enforcement officials
- high demand and lucrative returns combined with low risk of getting caught.
- increasing affluence of demand populations, driving an increase in trade of such "luxury" items as tropical hardwood furniture, shark fin soup, ornamental fish, ivory, wild meats, and sushi
- cultural factors, including the use of traditional Chinese medicine derived from threatened or endangered wildlife, such as tigers and rhinoceros, or traditional seafood preferences
- poor communication and networking between enforcement officials within and between countries
- lack of appropriate, inexpensive technologies for tracking all vessels and products in the supply chain

### **What are early impacts of the U.S. Lacey Act?**

Under the Lacey Act (Box 74), importers of plants and plant products are required to file a declaration for entry, with potential civil or criminal penalties for failure to properly comply. The declaration requirement has had an immediate effect on the behavior of U.S. importers and retailers who have been forced to think about the identification and source of their imported products. Among other things, importers of wood products are required to identify genus, species, and country of harvest for all types of products in a load. Through such a mandate, the declaration requirement is expected to promote greater transparency in the supply chain of wood products and discourage importers from purchasing wood of uncertain or suspect origin and species.

Trade and manufacturing of goods derived from plants can involve global supply chains that touch several countries. The Lacey Act and its impacts on U.S. importers, therefore, may reach back to producers and beneficiaries in USAID-supported countries, regardless of whether they are exporting to the United States or other markets. Along with new, similar import prohibitions in the European Union and Australia, the Lacey Act is instilling substantial change in trade in order to eliminate illegal wood in the market.

**Note:** As new laws trying to regulate an extremely complex trade in forest products, the Lacey Act and the EU Timber Regulation (2013) are generating a necessary debate among a broad array of stakeholders and interests in forest product trade. Like any other law, the act and rules will continue to evolve, as both stakeholders and the government identify challenges and solutions to make them effective and true to their intent. Hence, it will be important to keep updated on the latest version of the statute and its rules.

### **What can USAID do to address the illegal and unsustainable wildlife trade?**

See Box 76 and the text associated with it for specific steps the U.S. Government is taking to operationalize the National Strategy to Combat Wildlife Trafficking.

USAID's approach to the illegal and unsustainable wildlife trade is comprehensive, and the Agency has broad experience working on improving the governance and management of natural resources from a legal and enforcement angle. We invest in both the first line of defense against poachers and traffickers while also bolstering community conservation (see CBNRM [Section 3.2.5](#)), reducing demand for wildlife products, and developing innovative solutions to the crisis.

USAID invests in anti-poaching in approximately 25 countries, and despite proscriptions against support for law enforcement in other development sectors, biodiversity conservation (and recently, all environment) programs are allowed and even encouraged to work with police, park rangers, customs agents, and other authorities who can play a role in protecting wildlife or catching and prosecuting environmental criminals. Many programs include important law enforcement support components, working within policy restrictions on collaborating with certain governments, and sometimes vetting individuals for narcotics or human rights violations. USAID also works with the Department of State and the U.S. Fish and Wildlife Service in related enforcement coordination efforts. As a result, USAID partner countries have undertaken effective coordinated operations across regions and have helped to arrest criminals and close transit routes. Engaging with a variety of partners, such as agencies involved with trade or organized crime, is essential to complement and not duplicate U.S. Government enforcement efforts.

Progress is being made in Southeast Asia through support to the [Association of Southeast Asian Nations \(ASEAN\) Wildlife Enforcement Network \(WEN\)](#) for the ARREST project, which aims to increase public awareness of the problem, stem the demand for illegal wildlife parts, strengthen regional law enforcement coordination, and build the capacity of local authorities to implement CITES regulations. Over the past three years, this has resulted in frequent and high profile arrests and convictions of major criminals. From January 6-26 2014, 28 countries from Asia and Africa participated in "[Operation Cobra II](#)," an intelligence operation that resulted in over 400 arrests and the seizure of 36 rhino horns, over 3 metric tons of elephant ivory, over 10,000 turtles, over 1,000 skins of protected

species, and more than 200 metric tons of rosewood logs, among many other seizures. Though impressive, this demonstration of progress only exposes a small fraction of the total volume and scale of the illegal trade in the region. Enforcement of international treaties and regional and national policies and laws remains the last line of defense and deterrent for this transnational illegal trade.

**Are there other actions that could be taken to combat illegal fish trade?**

In addition to the recommendations on wildlife trade in the section above, specific actions can be taken to combat IUU fishing and trade. USAID could play an instrumental role in developing a comprehensive approach to IUU fishing and seafood fraud by drawing upon our international expertise and experience in multiple sectors, using such strategies as:

- building regional and national capacities to implement ecosystem-based approaches to fisheries management that emphasize habitat conservation, sustainable catch levels and methods, development of co-governance arrangements, and enforcement mechanisms;

- building national government capacities to integrate wild fisheries into national food security strategies, policies, and investment plans;
- building regional and national trade capacities for sustainable and transparent seafood through catch certification and traceability systems and other mechanisms;
- promoting integrated programming by USAID units focused on biodiversity, climate resilience, food security, trade, human health, and human rights in addressing IUU at regional and country levels;
- Strengthening port state measures to combat illegal wildlife trade, including terrestrial wildlife and fish trade; and
- Utilizing science, technology, and innovation – such as mobile technology, DNA bar coding, and electronic commerce – for traceability systems and enforcement.

In addition to supporting “source” countries through the approaches identified above, USAID could engage with priority “consumer” countries to reduce the demand for IUU products and unsustainable seafood.



**FIRE WARRIORS:** Twenty-seven indigenous young people from four ethnic groups received training in fire preparedness techniques and fire safety measures in the Capota-Jarina Kayapo Indigenous Reserve in Mato Grosso, Brazil.

Photo: Eric Stoner



## 4.1.1 SCIENCE, TECHNOLOGY, AND INNOVATION

### **Definition and Significance**

Science, technology, and innovation have had a profound impact on biodiversity conservation over the past 20 years. **Science** is defined as a systematically organized body of knowledge on a particular subject. **Technology** is defined as the application of this scientific knowledge for practical purposes. **Innovation** is defined as the use of technology in new ways to solve problems.

Effective conservation is founded upon sound science, drawing upon social science, biophysical science, and economic fields of practice. Natural resource management and biodiversity conservation are largely about environmental governance – establishing participatory, inclusive, transparent, science-based decision-making processes that determine who has access to resources, how to use resources sustainably, and who benefits. This governance process should create appropriate incentives and disincentives to promote conservation of these public goods, cultural assets, natural heritage assets, and ecosystem services. Thus, at the project level, the application of science and technology should focus on enhancing the effectiveness and transparency of the governance and management processes, such as by increasing compliance, reducing corruption, and enhancing enforcement.

The use of science and technology is also important at the planning and management stages, from local to national and global levels. Scientific analyses and tools can help identify critical ecosystems, habitats, priority targets, and key biodiversity threats; elucidate the needs, habits, and life cycles of endangered species; develop strategic and culturally appropriate strategic approaches; identify opinion leaders and change agents; develop theories of change and experimental designs; promote adaptive management; and measure impacts.

The following scientific principles should be incorporated into planning and implementation activities:

- Encourage critical thinking; question assumptions.
- Use scientifically sound baselines and sample frames for research and monitoring.

- Integrate local knowledge into scientific data collection – for instance, using local categories and terms for species and terrains or integrating local indicators for environmental change into monitoring protocols.
- Ensure that scientific tools are easy for relevant stakeholders to use.
- Connect with existing knowledge and databases.
- Be gender-aware in scientific training and capacity building. Forestry and biodiversity are not the province of one gender!
- Be up to date. Science changes rapidly. Use current standards and methods, as well as research that has undergone peer review.
- Ground monitoring and evaluation in sound science (e.g., use biologically relevant indicators).
- Report results/outcomes in formats that are easy for relevant stakeholders to access.

### **Key Questions**

**What are some examples of the use of science, technology, and innovation for biodiversity conservation?**

**Evidence-based conservation and results-based management** – Science has a strong role to play in helping the conservation community adopt more rigorous theories of change, establishing and testing development hypotheses, and moving toward evidence-based conservation (see [Section 3.1.8](#)). Many initiatives are flourishing to increase the evidence base and encourage rigorous thinking about [conservation effectiveness](#) and the [links between conservation and human well-being](#).

**Geospatial planning, marine spatial planning, and land use planning** – Geospatial technology and tools have enhanced people's ability to plan over large spatial scales and in a more integrated fashion. GIS and tools like [Marxan](#) can assist in the strategic planning of conservation and development programs, integrating human-built and natural infrastructure to ensure that biodiversity and ecosystem services are maintained (see [Sections 2.1](#) and [2.3](#) on conservation priority setting, planning, and design). At the project level, though, the use of these tools must be integrated in a highly

interactive and participatory process to engage local stakeholders and resources users in decision-making and planning.

**Social soundness and political economy analysis** – An important aspect of program design is an understanding of which stakeholders may benefit from planned strategic approaches and establishing appropriate social safeguards. As discussed in **Sections 4.7.1** and **4.8.2**, social soundness, political economy, and social impact analyses are useful tools that can help to ensure more equitable benefit sharing and empower often-marginalized groups, including indigenous populations and women. These analyses are receiving more attention with the growing interest in carbon markets.

**Social change methodologies** – One theory is that sustainable transformations must originate from, be owned by, and be driven from within a particular social system. Social change methodologies, such as social network analyses, can help to identify key opinion leaders within the system and facilitate collaboration and problem-solving by local stakeholders. A key USAID tool for identifying and working with social networks is the **Local Systems framework**.

**Social marketing tools** – Changing individual behaviors – illegal logging, fishing, and poaching – is often at the core of reducing threats to biodiversity. In social marketing campaigns, the theory of change is that increased knowledge, new attitudes, and interpersonal communication, combined with the removal of key barriers to change, will lead to behavior change and thus reduced threats. USAID pioneered this approach in the environmental sector through the **GreenCom** project.

**Economic analyses** – Information on the economic benefits provided by nature – from ecosystem services to non-extractive uses such as tourism – can be useful in creating economic incentives for conservation and for demonstrating alternative development options. These may include payment for environmental services and carbon sequestration and might entail more thorough ecological/environmental analyses, to inform decisions about the value of the biodiversity in given areas and

promote more effective land use planning and zoning so that priority areas can be conserved.

**Electronic government (e-government)** – The use of the Internet for government transactions can promote more open and transparent governance and reduce corruption over resource use. For example, e-government can be used for making public records related to the purchase of/bidding for fishery, forestry, or mining concessions; for posting environmental performance bonds; and for monitoring the status of arrests and prosecutions.

**Enforcement** – Enforcement of resource regulations should be viewed as a continuum from awareness and compliance to arrest and interdiction and successful prosecution. Compliance can be enhanced through the use of social marketing tools and environmental education. Arrests and interdictions can be enhanced through an array of technologies: the use of mobile phones/personal digital assistants (PDAs) with global positioning systems (GPS) and built-in cameras to record and report illegal incidents anonymously; the use of GPS to identify where illegal activities are most likely to occur and where enforcement should be focused; and the use of video systems to monitor the activities of industrial fishing vessels, or the placement of identification chips in artisanal boats to allow for easier identification of boats and monitoring of catch and fishing efforts.

**Bar coding to track legal trade** – The use of bar codes to track individual products and shipments is a standard practice in many businesses and is gaining traction in the tracking of natural products. Bar coding of timber or other products can enhance certification efforts or compliance with requirements for legal sourcing and tracking.

**DNA bar coding** – Unique DNA sequences can be used to identify species, subspecies, and populations, and often the origin of a product, as well. DNA bar coding is being used to determine whether a timber or fish product is labeled according to its species and is being traded legally.

**Mobile technology** – The use of mobile banking and market transactions is rapidly being adopted in many countries. These new technologies often benefit

individuals, such as through the provision of access to more markets, banking services, or information to enhance crop production. An opportunity may exist for the conservation community to tap into this technology for enhanced management of public goods and resources (water, fisheries, and forest products), through transaction fees and other means that could be used for improved resource management or monitoring.

### **Less environmentally destructive fishing gear**

– The natural productivity of aquatic ecosystems is threatened by the use of destructive and non-selective fishing gear. The development of new fishing technologies can help ameliorate these threats, reduce by-catch, and increase productivity.

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*ON THE ROAD TO IWOKRAMA: The enthusiasm and tenaciousness of “birders” make them well-suited to paving the way for ecotourism in Guyana, an ecological gem at the crossroads of the Amazon and the Caribbean. This group of journalists and tour operators made an impromptu stop on route to Iwokrama Forest during a familiarization tour organized by USAID.*

*Photo: Martina Miller*



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