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

IV BIODIVERSITY AND DEVELOPMENT INTERSECTIONS

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 CO2 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.

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