WORLD BANK GROUP

PROFOR

# Biodiversity Offsets: A User Guide

October 2016

# Biodiversity Offsets

## A User Guide

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# Acknowledgements

This User Guide was prepared by George C. Ledec (Lead Ecologist, World Bank) and Sally Johnson (Consultant, World Bank), under the guidance of Magda Lovei (Practice Manager, World Bank). Christopher J. Warner (Senior Technical Specialist, World Bank) and Guy Parker (Wychwood Biodiversity) prepared most of the Case Study material.

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Rapid deforestation and other habitat loss continue in many biodiversity hotspots such as Mindanao in the Philippines.

# Why this User Guide?

## The Biodiversity Loss Crisis

Biodiversity represents the variety of life on Earth, including the full range of ecosystems, species, and genes. Natural ecosystems and wild species sustain human society in numerous and often irreplaceable ways. Nonetheless, much of our planet's biodiversity is today under severe pressure from human activities, with alarmingly high numbers of animal and plant species now at risk of extinction. Worldwide, the single greatest threat today to biodiversity is the rapid loss and degradation of many natural habitats. Other major threats include the human-facilitated spread of non-native invasive species, along with the overharvesting and incidental take of many native species; there are also the newly emerging threats of human-induced climate change and ocean acidification. Biodiversity loss is today widely regarded as a global environmental crisis because of its scale and irreversibility—species extinctions are forever.

Biodiversity conservation efforts to date have achieved a great deal to help secure the continued functioning of many threatened ecosystems and the survival of numerous species. However, these efforts have often not been sufficient; numerous species and ecosystems continue to be at risk. Many natural ecosystems are under severe pressure from agricultural expansion, extractive industries, and large-scale infrastructure projects. The world's human population is still increasing, as are the aspirations of most people for improved well-being, including greater material wealth. Making the transition to a more densely populated and prosperous world, while adequately conserving biodiversity, is an enormous challenge, requiring the effective application of a wide range of tools. One type of conservation tool which—when appropriately used—could help to scale-up needed conservation efforts is biodiversity offsets. Under the right circumstances, biodiversity offsets can (i) improve the conservation outcomes from large-scale development projects and (ii) provide much-needed funding for protected areas and similar conservation efforts.

## Purpose of this User Guide

This User Guide provides introductory guidance on whether, when, and how to prepare and implement biodiversity offsets for large-scale, private and public sector development projects. It also explores some of the opportunities that may exist for developing national biodiversity offset systems. A number of detailed technical

references on biodiversity offsets have recently been produced by organizations such as the Business and Biodiversity Offsets Program (BBOP), International Council on Mining and Metals (ICMM), and World Conservation Union (IUCN); these reports are listed below, in the "Further Resources" sections at the end of Chapter 2 and other, thematically corresponding, User Guide chapters. While generally less detailed than these other documents, this User Guide is intended to serve mainly as an introduction to different types of biodiversity offsets and how to use them effectively.

This User Guide is intended to be a technical document, rather than a policy document for the World Bank Group (WBG). Specific WBG policy requirements related to biodiversity conservation—including the use of offsets among other mitigation measures—are provided in: (i) For the World Bank, the current Natural Habitats Operational Policy (OP) 4.04 and Forests OP 4.36, to be superseded in 2018 by the recently approved Environmental and Social Standard 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources (ESS6) and (ii) for the International Finance Corporation (IFC) and Multilateral Investment Guarantee Agency (MIGA), the existing Performance Standard 6 (PS6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources. A detailed Guidance Note 6 exists to provide further guidance in applying the requirements of PS6 (IFC 2013); a parallel Guidance Note is also under preparation for the new ESS6. Many countries also have environmental assessment and conservation laws that encourage, or even require, the use of biodiversity offsets in particular circumstances (see Chapter 8). This User Guide is not intended to specifically interpret any of the requirements of OP 4.04, OP 4.36, PS6, ESS6, or any other existing or proposed WBG standards or national legal requirements. Rather, it provides generic guidance on whether, when, and how to prepare and implement biodiversity offsets, with the expectation that project planners will always consult the specific requirements applicable to each country and financing source.

The intended audience for this User Guide is a broad range of conservation and development practitioners, including staff and consultants for the World Bank Group and other development organizations, government agencies, extractive industries and other firms, conservation NGOs, environmental impact assessment specialists, and anyone else with an interest in development projects and biodiversity conservation.

## FURTHER RESOURCES ON WHY THIS USER GUIDE?

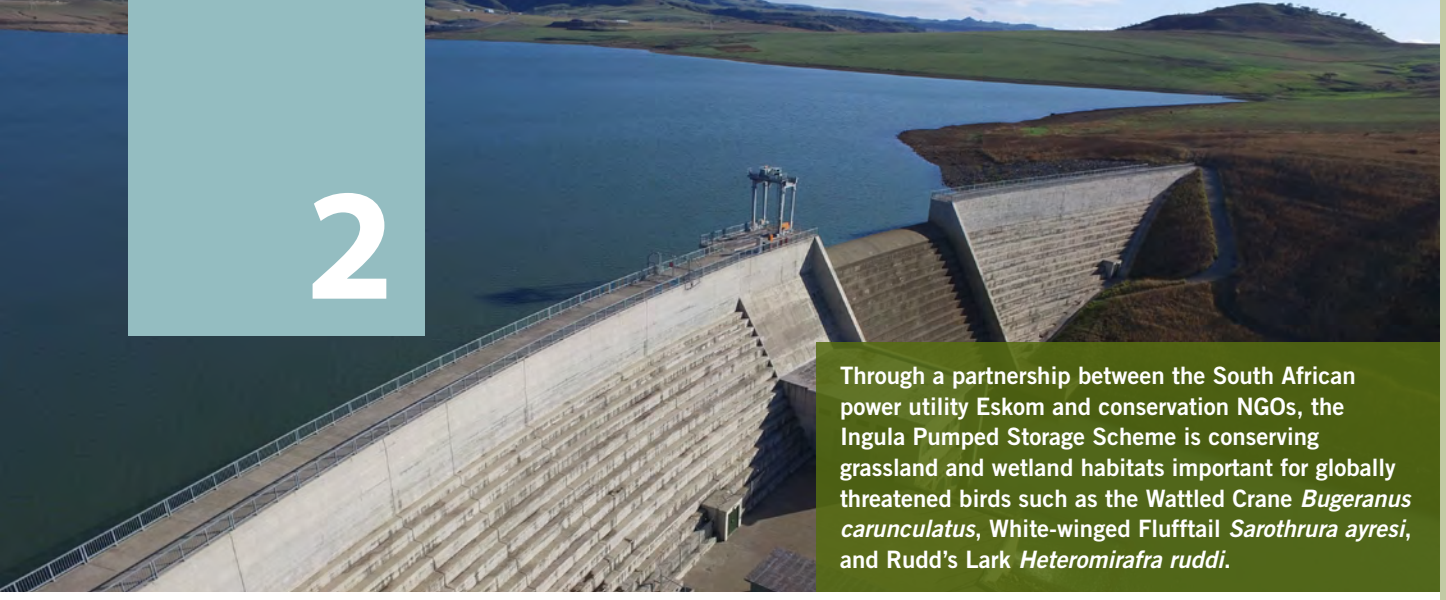

IFC. 2012. *IFC Sustainability Framework: Policy and Performance Standards on Environmental and Social Sustainability* (includes Performance Standard 6, "Biodiversity Conservation and Sustainable Management of Living Natural Resources"). Washington: International Finance Corporation.

IFC. 2013. *Guidance Notes to IFC Performance Standards on Environmental and Social Sustainability* (includes "Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources"). Washington: International Finance Corporation.

World Bank. 2001. *Operational Policy 4.04: Natural Habitats.* Washington: The World Bank.

World Bank. 2002. *Operational Policy 4.36: Forests.* Washington: The World Bank.

World Bank. 2016. *Environmental and Social Framework* (includes Environmental and Social Standard 6, " Biodiversity Conservation and Sustainable Management of Living Natural Resources"). Washington: The World Bank.



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**Through a partnership between the South African power utility Eskom and conservation NGOs, the Ingula Pumped Storage Scheme is conserving grassland and wetland habitats important for globally threatened birds such as the Wattled Crane *Bugeranus carunculatus*, White-winged Flufftail *Sarothrura ayresi*, and Rudd's Lark *Heteromirafra ruddi*.**

*Photo: Ingula Visitors Centre (Eskom Holdings SOC Ltd)*

# What are Biodiversity Offsets?

## Definition

"Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate avoidance, minimization, and restoration measures have been taken." This definition, from the International Finance Corporation (IFC) Performance Standard 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources (PS6), is similar to the definitions used by other conservation and development organizations that focus on offsets, including the Business and Biodiversity Offsets Program (BBOP), International Council on Mining and Metals (ICMM), and World Conservation Union (IUCN)—see Further Resources, below, for details. In simple terms, biodiversity offsets can be regarded as additional conservation activities intended to compensate for the otherwise inevitable damage to species or ecosystems resulting from a development project.

## Intended Conservation Outcomes:

The goal of many biodiversity offsets is to achieve **No Net Loss** and preferably a **Net Gain** of biodiversity on the ground (or in the water), in comparison to the baseline situation before the original project is implemented. No Net Loss or Net Gain are typically assessed in terms of the area conserved and its species composition, habitat types, ecosystem functions, and people's use and cultural values associated with the biodiversity (adapted from BBOP 2009). Some offsets are, in effect, partial, in that they achieve "reduced net loss" rather than No Net Loss—either intentionally (due to less ambitious offset design), or as the *de facto* outcome of some unintended deficiency in offset design or implementation.

Biodiversity offsets can include securing or setting aside land or water areas for conservation, enhanced management of habitats or species, and other defined activities. They can be used to (1) create, expand or buffer existing protected areas; (2) enhance, link or restore habitats and (3) protect or manage species of conservation interest (either within a designated conservation area or more broadly across the landscape

or aquatic habitat where the species occurs). Irrespective of the specific focus of the offset activities, measurable (or at least verifiable)[1] conservation outcomes should be achieved. Biodiversity offsets can be implemented in terrestrial, freshwater, or marine ecosystems, although to date most have been land-based.

**Restoration offsets** involve deliberate actions to restore an ecosystem, habitat, or species population (outside the footprint of the original development project) and thereby improve its biodiversity conservation status or value. An example might be improving the ecological functioning and biodiversity value of a wetland by increasing its available water supply. **Preservation offsets** (aka protection or averted loss offsets) involve intentionally protecting an ecosystem, habitat, or species population (outside the original project's footprint) that is already in good condition or otherwise of high biodiversity value, but that lacks sufficient legal or on-the-ground protection. Preservation offsets are based on the assumption that the designated offset area (or species of concern) would eventually be diminished, degraded, or lost if it were not explicitly protected through the conservation support provided by the biodiversity offset.

## What is Distinctive about Offsets?

Biodiversity offsets differ from other kinds of conservation activities in two main ways:

1. ***Link to Damage from another Project.*** Unlike "free standing" conservation projects, biodiversity offsets are explicitly linked to one or more development projects that are causing some loss of biodiversity, such as the elimination or degradation of a patch of natural habitat or a population reduction in one or more species of conservation interest.
2. ***Focus on No Net Loss or Net Gain.*** Biodiversity offsets are normally expected to fully compensate for specified adverse residual impacts (to the level of No Net Loss or preferably Net Gain) in a way that is measurable or verifiable, long-term, and additional to any other (ongoing or planned) conservation measures. As such, offsets are a more structured and consistent approach to mitigating biodiversity loss than certain other approaches, such as (i) habitat set-asides[2] (where a portion of the project area is intentionally left undeveloped) to reduce the residual adverse impact on biodiversity or (ii) various conservation enhancement activities that might be of great value, but are not set up to compensate for the specific adverse impacts resulting from the original development project.

## Biodiversity Offsets and Ecosystem Services

Conserving biodiversity also typically means conserving ecosystem services, which are the benefits that people derive from ecosystems. Ecosystem services are often of tremendous—and under-appreciated—value in sustaining livelihoods and human well-being. Ecosystem services can be grouped into four types (adapted from PS6): (i) **Provisioning services,** which are the products people obtain from ecosystems such as fish and other wild foods, fresh water, wood and other fibers, and medicinal plants; (ii) **regulating services,** such as water purification, protection from floods and other

[1] In certain cases, it might not be feasible to quantitatively measure a conservation outcome, butit could be verified in yes/no terms. For example, some species of conservation concern might be too uncommon or difficult to detect for a change in their population to be reliably measured, but their continued presence or absence from a site could be verified through monitoring.

[2] As used here, a set-aside refers to habitat within the original project area that is explicitly and intentionally left undeveloped, thereby minimizing the project's adverse biodiversity impacts. By contrast, an offset involves habitat outside the original project area that is incorporated within the project in order to compensate for its adverse biodiversity impacts, ideally enough to achieve No Net Loss or Net Gain. For this reason, offsets are typically "off-site" in terms of the location of the original development project.

natural hazards, erosion control, and climate regulation; (iii) **cultural services,** including sacred sites, recreation, and aesthetic enjoyment; and (iv) **supporting services,** which are the natural processes that maintain the other services and include pollination, soil formation, nutrient cycling, and primary production.

Biodiversity offsets are focused on the conservation of species and ecosystems, in an area that is typically separate and distinct from the original project area. Accordingly, biodiversity offsets might not be an appropriate or effective tool to compensate for the local loss of certain ecosystem services. Based on their location, biodiversity offsets will sometimes serve to maintain the same ecosystem services found in the original project area. However, many site-specific ecosystem services might not be sustained or replaced by an off-site biodiversity offset, due to a variety of factors (such as physical distance from the original project area or more stringent resource use restrictions within the offset area). For this reason, the loss of ecosystem services *per se* will often need to be mitigated through means other than a biodiversity offset. For example, an irrigation, mining, or other development project that cuts off a community's access to a local fresh water source might need to assist the affected community by developing an alternative water supply, rather than through conserving a similar ecosystem through a biodiversity offset.

## FURTHER RESOURCES ON WHAT ARE BIODIVERSITY OFFSETS?


BBOP. 2009. *Biodiversity Offset Cost-Benefit Handbook*. Washington: Forest Trends, Business and Biodiversity Offsets Program. www.forest-trends.org/documents/files/doc_3094.pdf

BBOP. 2012a. *Biodiversity Offset Design Handbook and Appendices.* Washington: Forest Trends, Business and Biodiversity Offsets Program. www.forest-trends.org/documents/files/doc_3101.pdf

BBOP. 2012b. *Standard on Biodiversity Offsets.* Washington: Business and Biodiversity Offsets Program. www.forest-trends.org/documents/files/doc_3078.pdf

Gardner et al. 2013. "Biodiversity Offsets and the Challenge of Achieving No-Net-Loss." *Conservation Biology* 27(6): 1254–1264.

IUCN. 2014. *Biodiversity Offsets Technical Study Paper.* Gland, Switzerland: International Union for Conservation of Nature, 65p. Link: http://cmsdata.iucn.org/downloads/final_biodiversity_offsets_paper__9nov2014_1.pdf

ICMM and IUCN. 2013. *Independent Report on Biodiversity Offsets.* International Council on Mining and Metals. http://www.icmm.com/document/4934

Pilgrim, J.D. and Ekstrom, J.M. 2014. *Technical Conditions for Positive Outcomes from Biodiversity Offsets: An Input Paper for the IUCN Technical Study Group on Biodiversity Offsets.* Gland, Switzerland: International Union for Conservation of Nature, 46p. https://portals.iucn.org/library/sites/library/files/documents/2014-027.pdf

Wind power projects may be suitable for biodiversity offsets when they adversely affect birds, bats, or natural habitats.

# 3 When to Consider Using Biodiversity Offsets

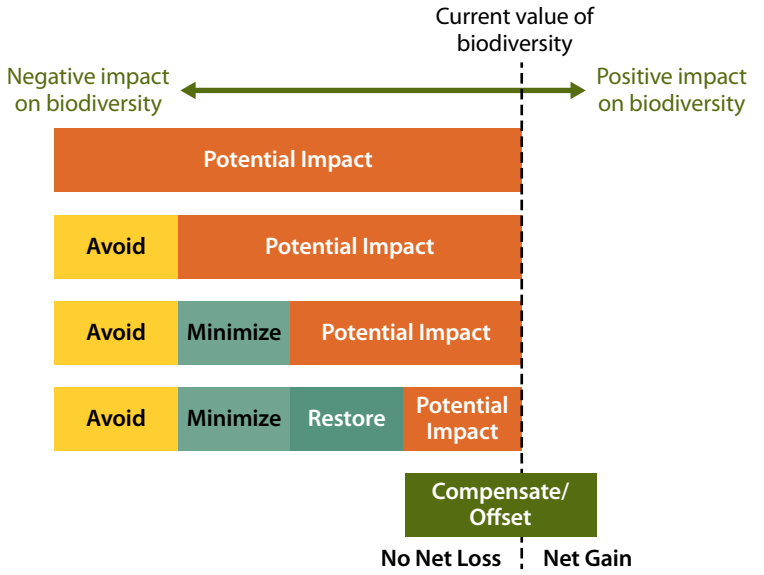
## Importance of the Mitigation Hierarchy

Application of the mitigation hierarchy to the original development project means that biodiversity offsets are viewed as a last resort when considering different mitigation options. The mitigation hierarchy—as typically interpreted by environmental assessment professionals worldwide—states that development project planners should (1) first seek to avoid damaging any biodiversity; (2) then seek to minimize any such damage; (3) then consider how to restore sites or species populations damaged by the project; and (4) then—if adverse biodiversity impacts still remain—compensate through specific actions (not merely cash) comprising a biodiversity offset. The mitigation hierarchy places emphasis on designing out risk to the maximum extent possible (through avoidance and minimization), and only then implementing corrective measures as needed (through restoration and then compensation, including offsets).

**Avoiding Adverse Impacts.** The old adage that "prevention is better than cure" holds true in the case of biodiversity offsets. Avoidance of biodiversity losses is the ideal and most effective mitigation measure. Such avoidance can often be achieved by (1) locating the project area away from sites of high biodiversity conservation value; (2) carefully locating infrastructure within the designated project area; (3) avoiding the use of certain technologies or techniques; or (4) avoiding or curtailing certain types of problematic activities during specific times of year—such as during the migration or breeding periods of species of conservation interest.

**Other Mitigation Measures.** When adverse impacts cannot be completely avoided, they can still be minimized by applying the above-mentioned approaches used for avoidance, or through other adjustments in project construction or operation. Certain sites or species can often be restored within the project area. However, restoration (aka rehabilitation) might not be feasible for certain ecosystems that are inherently difficult to restore; it also might not be cost-effective in comparison with preserving intact ecosystems elsewhere. Thus, for many projects, all feasible efforts to avoid or minimize biodiversity losses, or to restore biodiversity on-site, will not be enough to prevent significant adverse impacts upon biodiversity. In such cases, the remaining significant residual impacts can sometimes be effectively compensated

**FIGURE 3.1 Goal of Biodiversity Offsets: No Net Loss**




*Source:* Adapted from the BBOP—Biodiversity Offsets Handbook

through well-designed and properly implemented biodiversity offsets.

Figure 3.1 illustrates the application of the mitigation hierarchy to a typical case where a biodiversity offset can compensate for the adverse residual biodiversity impact (shown in red), to the point of achieving No Net Loss or (ideally) a positive Net Gain.

## Types of Projects that Could Use Biodiversity Offsets

To date, biodiversity offsets have been used in a variety of large-scale public infrastructure projects, including but not limited to hydroelectric dams. In the private sector, biodiversity offsets are most typically proposed for use by large-scale extractive industries, notably oil, gas, and mining.

As a practical matter, biodiversity offsets could be effectively used to mitigate the adverse residual biodiversity impacts of a wide range of development projects, public and private.

Depending on project location and design, these could include (among others):

1. ***Electric Power:*** All types of utility-scale generation that can affect natural habitats and biodiversity, including fossil-fuel thermal, nuclear, and renewables such as hydropower, wind, solar, and geothermal; also transmission and distribution lines.
2. ***Transport:*** Roads that pass through natural habitats; large ports and airports.
3. ***Water supply*** dams and large transmission canals.
4. ***Extractive Industries:*** Mining; oil and gas development, including pipelines.
5. ***Forestry plantations*** that convert natural habitats.
6. ***Agriculture:*** Large-scale schemes—irrigated and rain-fed—that convert natural habitats (oil palm, soybeans, sugar cane, etc.).
7. ***Urban Expansion:*** Housing developments, shopping malls, sports complexes, golf courses, landfills, and other large facilities that convert natural habitats.

## FURTHER RESOURCES ON WHEN TO CONSIDER USING BIODIVERSITY OFFSETS


CSBI. 2014. *Biodiversity Data Collection Guidance.* Cross-Sector Biodiversity Initiative. www.csbi.org.uk/workstreams/biodiversity-data-collection

CSBI. 2015. *A Cross-sector Guide for Implementing the Mitigation Hierarchy.* Cross-Sector Biodiversity Initiative. http://www.csbi.org.uk/tools-and-guidance/mitigation-hierarchy/

DEFRA. 2012. *Technical Paper: The Metric for the Biodiversity Offsetting Pilot in England.* London, U.K.: Department for Food, Environment, and Rural Affairs. https://www.gov.uk/government/publications/technical-paper-the-metric-for-the-biodiversity-offsetting-pilot-in-england

# 4

Proposed biodiversity offsets in Mozambique may fund the improved on-the-ground protection needed by sensitive beach-nesting species such as the endangered Green Sea Turtle *Chelonia mydas*.

# Core Principles for Biodiversity Offsets

A number of basic, good practice principles apply to virtually all types of conservation and related development projects. These include (i) using a "landscape approach" that takes into account the relevant habitats and species of interest within the broader landscape, beyond the boundaries of any one protected area; (ii) applying sound science as well as traditional knowledge; (iii) diligent project supervision; (iv) effective institutional capacity building; (v) addressing livelihood concerns (see Chapter 6); and (vi) robust stakeholder engagement (Chapter 6), among others. However, the following three core principles are particularly relevant to achieving successful biodiversity offsets.

## Additionality

For any offset to be real, it must be additional. In other words, biodiversity offsets must deliver conservation gains beyond those that would be achieved by ongoing or planned activities that are not part of the offset.

For offsets that intend to strengthen the protection and management of existing protected areas, the question of additionality is particularly relevant. For example, existing protected areas with low threat levels and adequate funding are unlikely to be suitable for biodiversity offsets because it would be hard to demonstrate much additionality. On the other hand, protected areas that exist on paper but are clearly underfunded, lack adequate on-the-ground management, and face significant threats may benefit substantially from the additional support provided by offsets.

Another concern related to additionality is the risk of cost-shifting, in which a government might reduce its budgetary allocation to protected areas, in response to the increased revenues from biodiversity offset payments made by a (private or public sector) project developer. Various strategies are available to prevent or minimize this risk, such as (1) earmarking the biodiversity offset support for separate investments or activities that are not government-funded or (2) providing matching grants that would continue only when the government continues to pay its "baseline" share.

## Equivalence

In general, biodiversity offsets should conserve the same biodiversity values (species, habitats, ecosystems, or ecological functions) as those lost to the original project, following a principle

known as like-for-like. In special cases, the biodiversity offset area might be ecologically quite different from the original project area, but with an ecosystem type or species composition that is widely acknowledged to be of higher conservation priority (perhaps in greater overall need of protection) than the biodiversity to be lost under the original project; this approach to offsetting is known as trading-up. Chapter 6 of this User Guide discusses some of the available measurment techniques (metrics) for estimating whether a proposed biodiversity offset would, if successful, provide a like-for-like or better conservation outcome.

## Permanence

Biodiversity offsets are normally expected to persist for at least as long as the adverse biodiversity impacts from the original project; in practical terms, this often means in perpetuity. Like other conservation projects, biodiversity offsets are ideally designed to last over the very long term. Lasting conservation outcomes will ultimately depend upon the actions of future generations as well as present-day decision-makers. Thus, project proponents often cannot credibly promise that a biodiversity offset will be maintained "forever", but it should be for at least the operating life of the original project and ideally longer. To provide at least a promising foundation for the long-term survival of their target ecosystems and species, biodiversity offset designers should seek to ensure that the following key features of successful long-term conservation are in place:

1. ***Formal legal protection*** of the land, water area, or species involved, as needed for a successful conservation outcome. This legal protection might be by (1) national, sub-national, or local governments, through laws and regulations; (2) organized communities, through their by-laws or similar instruments; or (3) private landholders (individual or corporate), through easements, long-term concession agreements, or other binding legal mechanisms.
2. ***On-the-ground protection and management,*** which may involve using tools such as physical demarcation; management plans; zoning maps of allowed and prohibited uses; co-management agreements; physical presence of conservation staff including trained volunteers; protected area infrastructure (headquarters, outposts, staff housing, access roads, trails, docks, etc.); office and field equipment; adequate law enforcement; and/or conservation incentive payments to landholders (a type of payment for environmental services, PES).
3. ***Financial sustainability*** to the extent feasible, taking into account up-front as well as recurrent costs (see Chapter 7).

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The critically endangered Streseman's Bristlefront *Merulaxis stresemanni* is known from only one small site in Bahia, Brazil with a total of about 15 birds; this is an example of an irreplaceable habitat that could not be "traded away" in a biodiversity offset.

*Photo: Ciro Albano/American Bird Conservancy*

# Limits to What Can Be Offset

Biodiversity offsets themselves are typically conservation projects that are, on their own, usually very positive from an environmental standpoint. Nonetheless, biodiversity offsets are often controversial—typically not because of the conservation activities themselves, but because of the adverse impacts from the original development project.

## Conservation-related Concerns about Biodiversity Offsets

**Inadequate Offsets.** In some cases, the proposed offset might be regarded as too small in size, legally uncertain, financially unsustainable, or otherwise inadequate as compensation for the expected biodiversity damage from the original development project. This type of problem can sometimes be solved by scaling-up the size of the offset investment, or by taking the measures needed to ensure a greater likelihood of success—such as stricter legal protection, strengthening of the organization responsible for offset area management, or better long-term funding of protection and management costs.

**Enabling Destructive Projects?** Biodiversity offsets are sometimes viewed with skepticism because of concerns that they may provide a "license to destroy" by facilitating the approval of environmentally highly damaging projects. However, biodiversity offsets are intended to improve the net biodiversity outcomes from development projects that are considered to be more or less inevitable, and where the mitigation hierarchy (avoid, minimize, restore, and then offset any significant remaining damage) has already been applied. In such cases, the real question might not be whether the project will be built, but how, when, and with which financing. As a conservation tool, biodiversity offsets would not appropriately be used to facilitate habitat losses or harm to species that otherwise would likely not take place at all.

**Damages that Cannot Be Offset.** Another key concern is whether the biodiversity damage from the original project might be so great that it simply cannot be offset. Certain adverse residual impacts cannot feasibly be offset, particularly if the affected area is unique or irreplaceable from a biodiversity standpoint. In such cases, the only effective way to avoid severe biodiversity loss would be not to proceed with the original project (as designed). This is because a biodiversity offset area, even if outstanding in its own right, could not suitably compensate for the loss of a particularly unique and irreplaceable area.

**Project Acceptability.** The question of whether a project is or is not acceptable because of the extent of adverse residual impacts on biodiversity or associated ecosystem services is ultimately one for governments and their citizens to address. International financing organizations have environmental standards that can help to guide this decision making. For example, the IFC's Performance Standard 6 allows projects to affect areas defined as Critical Habitat only to the extent that they do not lead to measurable adverse impacts on those biodiversity values for which the Critical Habitat was designated, nor to a net reduction in the population of any endangered species, among other criteria. Determining exactly when the residual damage to biodiversity from a proposed development project would be too severe to be feasibly offset requires careful interpretation of laws, policies, and treaties; analysis of (often highly incomplete) scientific data; and a dose of good judgment that also takes stakeholder concerns into account. If the residual adverse impacts from a proposed project were found to be unacceptably large and could not adequately be offset or otherwise compensated, then the logical decision would be to substantially redesign or shelve the project.

## Caution Flags for High-Risk Situations

Certain situations pose a high risk that the proposed biodiversity offset will not succeed in achieving No Net Loss, or even more modest conservation targets. In such circumstances, biodiversity offsets need to be assessed very carefully before being planned and implemented. In some cases, the low probability of a successful biodiversity offset, coupled with high adverse residual impacts, would argue for not proceeding with the original project. In other cases, the prospects for a successful offset (in terms of No Net Loss or Net Gain) might be reasonably good, but the overall project (including the offset) might remain highly controversial.

**Flag 1:** Original development project would affect an area that is known or likely (i) to contain highly threatened ecosystems or species; (ii) to be important to the survival of endemic or restricted range species; or (iii) to provide habitat for nationally or globally significant numbers of migratory or congregatory species. High irreplaceability or high vulnerability means high risk for offsetting because (i) finding suitable offset sites of adequate size and quality might prove impossible; (ii) adverse impacts on threatened ecosystems or species could result in further declines or even extinction; and (iii) lack of information, such as on the distribution or population size of certain species, might make it difficult to understand the significance of project impact or to design an adequate offset.

**Flag 2:** Original development project would affect a legally protected area (existing or proposed) or an internationally recognized important site. Protected areas that are designated at a national or sub-national level—along with internationally recognized sites such as Key Biodiversity Areas and Ramsar Wetlands—support important biodiversity features that are often difficult to find elsewhere. Designation of these sites by governments and/or the international community reflects the great significance of these sites for biodiversity conservation. The promise of an offset should not be inappropriately used to justify development projects that would significantly damage these special sites. At the same time, if certain development (such as oil extraction) within a protected area is considered inevitable for political reasons, a well-funded offset (leading to greatly improved on-the-ground protection) might serve to reduce concurrent threats (such as agricultural encroachment) to the same protected area.

**Flag 3:** Proposed offset area has poor prospects for long-term conservation. Even if adequate natural habitats, similar to those that would be lost to the original project, seem to be available as offset areas, closer examination might find that establishing a viable compensatory protected area of suitable size might not be feasible due to land tenure, socio-economic, political, or security constraints (see Chapter 6, Step 2 regarding Implementation Risk Assessment).

## FURTHER RESOURCES ON LIMITS TO WHAT CAN BE OFFSET


African Development Bank. 2013. *Operational Safeguard 3: Biodiversity and Ecosystem Services.* http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/December_2013_-_AfDB%E2%80%99S_Integrated_Safeguards_System__-_Policy_Statement_and_Operational_Safeguards.pdf

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IFC. 2012a. *Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.* Washington: International Finance Corporation. www.ifc.org/wps/wcm/connect/bff0a28049a790d6b835faa8c6a8312a/PS6_English_2012.pdf?MOD=AJPERES

IFC. 2012b. *Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.* Washington: International Finance Corporation, 69p.

World Bank. 2016. *Environmental and Social Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.* Washington: The World Bank.

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Among the many types of conservation actions that biodiversity offsets can support is training in alternative agricultural techniques that reduce deforestation, as shown here near Liberia's East Nimba Nature Reserve.

*Photo: Wing Crawley*

# Preparing and Implementing Biodiversity Offsets

Biodiversity offsets can involve a diverse range of activities for enhancing the conservation of habitats and species, off-site from the original project area. Nonetheless, most of the actions needed to establish a successful offset—whether for a public or private sector development project—fall within the following four main steps to preparing and implementing biodiversity offsets.

## Step 1—Estimate Residual Biodiversity Losses from the Original Project

**ESIA as a Key Tool.** To know what should or could be offset, it is necessary first to estimate the likely biodiversity losses if the original infrastructure, extractive, or other development project were to proceed as planned (taking into account other available measures in the mitigation hierarchy). The main instrument used by most governments as well as international financing institutions for assessing biodiversity impacts is the Environmental and Social Impact Assessment (ESIA), aka Environmental Impact Assessment (EIA) or other names (depending on the country and institution). The quality and integrity of the ESIA process is a critically important factor in decision-making for biodiversity offsets.

**Biodiversity Information Needed.** For projects with potentially significant biodiversity impacts, the ESIA should provide biodiversity information that is important for decision-making. Accordingly, the ESIA terms of reference (TOR) should specify the need for information such as:

1. ***Ecosystem Types Affected.*** The ESIA should estimate the total area—in hectares and percentage terms—of each habitat type that is expected to be converted (lost) or modified (including degraded) as a direct or induced (indirect) impact of the original development project. Each potentially affected habitat type should be described and suitably mapped, including terrestrial and aquatic ecosystems and modified as well as natural habitats. The existing quality of the habitat (in terms of its suitability for species of conservation interest and/or in comparison to its original "pristine" condition) should also be described.
2. ***Species of Conservation Interest.*** The ESIA should indicate which species of global or national conservation interest—including those classified as Critically Endangered, Endangered, Vulnerable, or Near Threatened

under international Red List criteria, and any others with small global ranges—are likely to be adversely affected and to what extent (relative to their existing populations). In addition to species threatened with extinction, the ESIA should indicate the proposed project's impact on other species of special management interest; these include high-value species from a commercial, human consumption, or cultural/spiritual standpoint, along with "keystone" species that help maintain desired ecosystem conditions.

3. ***Special Biodiversity Values.*** Aside from indicating the species of conservation interest, the ESIA should describe the other ways in which project area might be of biodiversity interest. For example, the project area might (i) harbor overall high species or habitat diversity; (ii) support significant concentrations of one or more migratory or congregatory species; (iii) otherwise qualify as an Important Bird Area, Key Biodiversity Area, Critical Habitat (as per IFC Performance Standard 6), or other special conservation designation; (iv) have existing or proposed recognition as a Ramsar Wetland of International Importance, UNESCO Biosphere Reserve, World Heritage Natural Site, or other special international or national status; or (v) sustain or enhance the biodiversity values of nearby or downstream sites of conservation interest, for example as part of a biological corridor or as a water source.

4. ***Protection Status.*** The ESIA should indicate whether the project area has any kind of protected status, whether as (i) any category of formal protected area (National Park, Wildlife Reserve, etc.); (ii) other protection under national or local laws or regulations (such as blanket restrictions on forest clearing or wetland conversion), or (iii) formal or informal protection by local communities or traditional authorities (such as community forests or grazing lands, or sacred natural sites).

5. ***Site Ownership and Control.*** For the entire proposed project area, the ESIA should indicate (i) which individual, corporation, community, government, or other entity legally owns the land and/or water rights and (ii) which such entity has legal or *de facto* management control over the area and its natural resources.

6. ***Baseline Threats.*** The ESIA should seek to quantify ongoing, baseline rates of habitat loss or degradation (if any) within the project area. It should also describe existing and likely future threats (other than the proposed project) to the area's biodiversity.

7. ***Significance of Residual Adverse Impacts.*** The ESIA should assess and explain the significance of the proposed project's expected residual impacts on biodiversity, including both direct and indirect (aka induced) impacts. It should also take into account the likely cumulative impacts from nearby, upstream or downstream, associated, follow-up, or repeater projects. Establishing the significance of the expected adverse biodiversity impacts is a key input to deciding whether a biodiversity offset might be needed: If the adverse impacts are truly insignificant, further mitigation measures (including offsets) might not be required, although they might still be recommended if the project seeks to achieve a Net Gain from a biodiversity standpoint.

8. ***Precautionary Principle.*** Where scientific data may be inadequate (despite the ESIA's best efforts to obtain baseline information), it is advisable to consider the Precautionary Principle: When in doubt, project planners should err on the side of caution with respect to protecting biodiversity from possibly irreversible, harmful changes (including potential species extinctions). In practice, applying a precautionary approach requires careful judgment, since the available biodiversity information on any site is always incomplete

(particularly when insects and other invertebrates are considered). A very strict, legalistic interpretation of the Precautionary Principle might be unworkable, since it could preclude virtually all large-scale development projects affecting natural habitats. On the other hand, sufficient biodiversity information should be obtained to give development planners adequate confidence that the proposed project (with all available mitigation measures, including offsets) would avoid causing significant, irreversible harm. For example, information on the species of conservation concern that are known or likely to occur within the project development and offset areas needs to take into account seasonality and annual variation: Some species are only evident during a particular time of year and, in some ecosystems (notably drylands), certain species are only evident during particular years (for example, unusually wet ones).

**Apply the Mitigation Hierarchy.** As per the Mitigation Hierarchy (Chapter 3), biodiversity offsets are considered a last resort, after the other mitigation approaches (avoid, minimize, and restore) have all been feasibly applied. The need for a biodiversity offset is based on the type and severity of adverse residual impacts that would still remain after using the other mitigation approaches. To help ensure that significant pre-offset residual impacts are indeed minimized, the "Analysis of Alternatives" section of the ESIA needs to explain in detail how and why any alternative project locations or designs (with potentially lower adverse impacts) were identified, considered, and ultimately rejected.

**Assess the Feasibility of Offsetting.** If full application of the pre-offset Mitigation Hierarchy (avoid, minimize, restore) still leaves significant adverse residual impacts, then a biodiversity offset might indeed be the best solution—assuming that the offset itself is feasible. To assess whether a biodiversity offset would be feasible, it is important to answer the following two questions:

1. ***Could the damage from the original project be feasibly offset?*** Certain adverse residual impacts cannot feasibly be offset (i) if the affected area is considered unique or irreplaceable from a biodiversity standpoint (Chapter 5) or (ii) if suitable offset sites with adequate additionality, equivalence, and/or permanence (Chapter 4) simply are not available.
2. ***Could the proposed conservation offset activities feasibly be implemented?*** Notwithstanding a demonstrated need, a suitable biodiversity offset might not be feasible to implement—or might have a low likelihood of success—due to land tenure, political, socio-economic, security, or other constraints.

## Step 2—Select the Offset Activities and Conservation Site(s)

**Biodiversity Offset Activities.** Depending on the local context, expected biodiversity impacts, and desired conservation outcomes (such as No Net Loss or ideally a Net Gain), a variety of suitable offset activities might be chosen, including combinations of the following options:

1. ***New or Expanded Protected Areas.*** Protected areas—broadly defined here to include governmental, community, and private conservation areas under different categories of management and allowed human uses—could be created or expanded to offset the biodiversity losses from the original project.
2. ***Improved Management or Habitat Enhancement.*** The on-the-ground management of existing protected areas could be strengthened, if additionality (Chapter 5) can be demonstrated.

3. ***Habitat Restoration or Enhancement.*** Specific habitats could be established, restored, or enhanced, particularly in areas with some degree of long-term protection.

4. ***Livelihood or Community Support.*** Biodiversity offsets normally should include support for addressing livelihood or community development issues in the vicinity of conservation areas, to help build local support as well as to mitigate any negative socio-economic impacts from newly restricted access to natural resources. The World Bank's existing Involuntary Resettlement Policy (OP 4.12) and newly-approved Environmental and Social Standard 5 "Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement," along with IFC's Land Acquisition and Involuntary Resettlement Performance Standard 5, provide for livelihood restoration measures when needed to mitigate the impacts of new restrictions on access to natural resources within project-supported protected areas.

5. ***Species-specific Interventions.*** To compensate for project-related reductions in the population of some species of conservation interest, biodiversity offsets can support measures to reduce other (non-project) threats to the same species. As an example, to offset the anticipated incidental mortality of Hawaiian Petrels *Pterodroma sandwichensis* through collisions with wind turbines, a wind power project was required to support the removal of predatory, non-native mammals from the petrels' nesting areas (USFWS 2016).

6. ***Financial Support.*** All types of biodiversity offset activities require some level of funding. However, in some cases the sponsor of the original project might simply provide additional support to an aggregate, large-scale conservation offset—or even a conservation trust fund—that was designed to compensate for the cumulative impact of multiple projects, rather than designing a separate, individual offset from scratch (see Chapter 8). A key consideration in such cases is ensuring (through monitoring) that the offset payments made result in verifiable on-the-ground conservation gains.

**Offset Area Site Selection.** The site(s) selected for conservation offset activities should take into account the core principle of equivalence, seeking to achieve like-for-like or trading-up conservation outcomes (Chapter 5). The site(s) selected should also take into account the landscape context—such as the size of remaining patches of natural vegetation, and connectivity to nearby areas of similar habitat—as well as the feasibility of establishing a successful and sustainable conservation offset in that area.

**Implementation Risk Assessment.** It is important to assess a variety of implementation risks, both (i) when considering whether a biodiversity offset is feasible at all and (ii) when planning the offset so as to maximize the prospects of a successful outcome. Implementation risks for biodiversity offsets (as well as other types of conservation projects) might involve, for example (i) **land tenure,** where the individual or community landowners might not be willing to manage the land for conservation, nor to sell the land to a conservation-oriented buyer (government or NGO) at an acceptable price; (ii) **socio-economic realities,** such as where the local human population is engaged in natural resource use practices that are incompatible with biodiversity conservation, and timely change in such practices is not considered likely; (iii) **political will,** where the government is considered unlikely to enact the legislation or regulations needed to establish a protected area or otherwise implement an offset or, conversely, the government might be committed to developing an incompatible form of land or water use—such as a new dam, agricultural plantation, or port facility—within (or too close to) the proposed offset area; (iv) **institutional failure,**

where an NGO or other entity charged with offset implementation might be found unwilling or unable to carry out its commitments; or (v) major **security concerns,** such as the presence of dangerous armed groups (rebels, warlords, terrorists, bandits, or drug cartels) that would inhibit the effective implementation of biodiversity offset activities.

**Stakeholder Engagement.** Effective stakeholder engagement is needed to help ensure the success of all types of development and conservation projects, including biodiversity offsets. Robust stakeholder engagement begins sufficiently early and continues as needed to obtain stakeholder feedback during all key stages of offset planning and implementation, including (i) the assessment of biodiversity and other project impacts (and their significance to stakeholders); (ii) planning of offset location and design, including consideration of alternatives; (iii) participation in project monitoring and (where applicable) benefits sharing; and (iv) if and when major changes are needed or key new findings arise during implementation. It is important to consult with the full range of stakeholders—even those who might not be supportive of the project or offset proposal (at least not initially)—to help ensure that the project details, impacts, and responsibilities are clearly understood and to help build trust between the parties. The World Bank's existing Environmental Assessment Policy (OP 4.01) sets out minimum standards for public consultation on Bank-supported projects. The newly approved World Bank Environmental and Social Standard 10, "Stakeholder Engagement and Information Disclosure", provides more detailed guidance on stakeholder engagement, including the use of a grievance mechanism to address complaints during project implementation.

**Information Sharing.** A key part of successful stakeholder engagement is highly transparent information disclosure. Timely and thorough information sharing can deter harmful speculation about the offset as well as the original project; it can also encourage stakeholders to share what they know and sometimes to collaborate further. Information disclosure is most useful when the information is presented in a readily understandable manner: For example, "raw" project outcome monitoring data should be publicly disclosed, but ideally accompanied by some concise explanation of its significance. The biodiversity offset information that should normally be fully disclosed includes (i) all the expected biodiversity and other impacts; (ii) the offset area location, design, and alternatives considered; (iii) implementation and outcome monitoring arrangements; (iv) budget and funding sources; and (v) the entities responsible for offset implementation, along with any partners. The World Bank Policy on Access to Information specifies that all project-related information is expected to be publicly disclosed except for certain specified categories, including information that is deliberative (such as internal drafts), personal, or security-related. For biodiversity offsets and conservation projects in general, a few special exceptions to the general principle of fully transparent information disclosure might include:

1. ***Private Land Acquisition.*** For biodiversity offsets involving voluntary land acquisition (rather than government expropriation or forced sale), the conservation land might be acquired more economically by involving local NGOs and local people in the price negotiations, since the visible presence of outsiders (especially large companies or foreigners) could drive up the sale price.
2. ***Precise Locations of Vulnerable Resources.*** It is usually inadvisable to publicly disclose the precise geographic location of rare plants, bird nests or animal dens, inadequately protected archaeological sites, or other vulnerable natural or cultural resources that could easily be damaged or removed.

**Metrics for Biodiversity Offsets: How Much Conservation Area is Enough?** If the desired conservation outcome is No Net Loss or Net Gain, it is necessary to calculate the minimum size of the biodiversity offset area that would provide adequate compensation for the damage from the original project. A variety of accounting methods have been proposed for this purpose, ranging from very simple to complex, multi-variable approaches. Each approach has its particular advantages and limitations. Rather than prescribing one specific method, this User Guide briefly describes the simplified versions of several workable approaches. Offset designers generally use one or a combination of these basic approaches or innovate further, as appropriate.

1. ***Surface Area.*** This simplest of metrics compares the surface area (hectares, ha) of habitat lost, without reference to further details such as habitat quality. Because of differences in habitat quality and various uncertainties (noted below), a simple 1-for-1 formula (ha protected under the offset, in exchange for ha lost under the original project) is often not sufficient to achieve a goal of No Net Loss. It may be preferable to have an offset of inadequate size (which achieves some conservation results) than to have no offset at all (if the original project proceeds in any case), but No Net Loss should not be claimed under such circumstances. The Argentina-Paraguay Yacyreta Hydroelectric Project followed a 1-1 biodiversity offset formula for the total land surface area, but with habitat representativeness taken into account (Quintero 2007).

2. ***Habitat Quality.*** This approach uses Habitat Hectares (HH), based on area of habitat lost to the project multiplied by the quality of the lost habitat. The HH score reflects the quality of the habitat relative to the benchmark for that ecosystem type in an undisturbed state. For land-based offsets, the criteria that make up "quality" will depend on the vegetation type and should be developed in consultation with knowledgeable botanists. In a simple application of this approach, 100 ha of a particular forest type in pristine condition would count as 100 Habitat Hectares (100 ha × 100% quality = 100 HH), whereas 100 ha of partially degraded forest estimated to be 50% quality would be expressed as 50 Habitat Hectares.

3. ***Conservation Significance.*** Some ecosystem types within the project area might be regarded as more significant that others from a conservation standpoint, based on factors such as species richness, ecosystem rarity, or degree of threat (at an international, national, or local level). Ecosystems that are assessed as vulnerable, endangered, or critically endangered could score more highly than those that are more common and not under threat.

4. ***Species-level Information.*** There are situations where measures of habitat area and quality are not a good substitute for losses at the species level. It is therefore necessary to carry out species-specific assessments for key species, particularly where these are highly threatened or otherwise valued. This can be done qualitatively, by ensuring that those species that are lost are included at the offset sites; alternatively, a more quantitative assessment can be carried out. For some species, there might be information on population density estimates which allow comparisons to be made between impacted areas and offset sites. The mining company Rio Tinto-QMM approached the question of species conservation significance by developing a Unit of Global Distribution metric for high priority species, which are either highly range-restricted (found in only a small area) or internationally classified as Endangered or Critically Endangered (Temple et al. 2012). In their application, a Unit of Global Distribution is equivalent to 1% of the total

global population of a species (or 1% of its existing global range, if population data are unavailable). The Oyu Tolgoi mining project in Mongolia produced a Net Positive Impact forecast based on its biodiversity offset and other mitigation measures that combined the project's expected impacts (positive and negative) on the species and ecosystem types known to be of high conservation concern (Oyu Tolgoi 2016).

5. ***Multipliers.*** In response to uncertainty, some biodiversity offset schemes use simple multipliers. Multipliers can be used to address various forms of uncertainty including (1) induced impacts that may be hard to measure directly; (2) implementation risk that the offset might fail or only partially succeed; (3) spatial risk that the offset location will turn out to be of lower quality or conservation significance than the site affected by the original project; and (4) temporal lags where habitat restoration at the offset site may take a long time. For example, a biodiversity offset plan might suitably assume a sub-optimal success rate and compensate for this by placing a larger area of habitat under protection. Among the largest obligatory multipliers are in South Africa's Western Cape offset policy, which can require up to 30 ha of land to be offset for every hectare legally cleared in endangered habitats (DEADP, 2007). In this case, the multipliers used in are based on a Regional Conservation Plan and stated objectives for habitat targets. In many other cases, multipliers are based on less precise "guesstimates" or "rules of thumb", with or without scientific underpinning.
6. ***Counterfactuals.*** Counterfactuals (in this context, "what would happen otherwise, even without the project") are sometimes applied to offsets by assessing what the background rate of habitat loss is in an area, and then subtracting anticipated losses from the area to be offset. Although widely used (including by IFC), this approach remains somewhat controversial because longer-term assumptions about the baseline habitat loss are inherently uncertain and could be overly pessimistic. For example, project proponents might find it convenient to argue that the habitat at the project site will soon disappear anyway, even without the project. On the other hand, a high expected rate of habitat loss might well be realistic; it would also strengthen the case that a proposed preservation offset would indeed provide true additionality. If counterfactuals are used, the offset proposal will appear more credible if the project documentation is highly transparent regarding the actual and projected rates of baseline habitat loss, along with the data and assumptions that were used to underpin the projections.

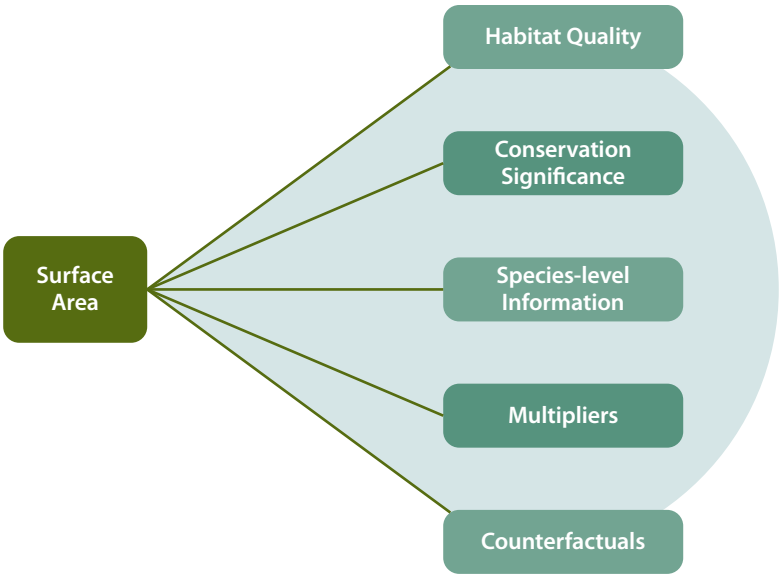
Figure 6.1 illustrates how these variables might be combined to develop offsets metrics, recognizing that other permutations are also possible. The selection of appropriate biodiversity offset metrics should take into account sound conservation science, while ensuring that the approach selected is pragmatic and workable.

## Step 3—Prepare the Biodiversity Offset Project Component

At its core, a biodiversity offset is a conservation project (an integrated set of conservation activities), even though it is linked to one or more original projects that damage biodiversity to some extent. Accordingly, project-specific biodiversity offsets should typically be prepared as a component of the corresponding original project. (For aggregated biodiversity offsets, where one large offset might be used to compensate for multiple original projects, see Chapter 8 on National Frameworks for Biodiversity Offsets.)

**Basic Requirements for Conservation Projects, including Biodiversity Offsets.** If they are to be more than empty promises,

**FIGURE 6.1 Possible Combinations of Variables in Designing Offset Metrics**




biodiversity offsets need to address the same considerations as other conservation or development projects. Certain key "nuts and bolts" provisions are needed to make a biodiversity offset a reality, rather than just a vaguely-stated recommendation in the ESIA for the original development project. These key provisions—which need to be adequately documented in project technical and legal documents—typically include:

1. ***Specific Activities and Inputs.*** If the biodiversity offset is to be measured as one or more conservation outcomes (ideally involving a net gain from a biodiversity standpoint), what are the inputs that the project will provide in an effort to achieve these outcomes? Such inputs could cover, for example, on-the-ground investments in a new or upgraded protected area (such as physical demarcation, park infrastructure, vehicles and equipment, rangers or other personnel, or management plan); habitat restoration or enhancement measures (such as skilled personnel, planting materials, or water control structures); community support (such as training or inputs for alternative livelihoods, new water or electricity supplies, local infrastructure, or small grants); incentive payments to landholders conditioned upon conservation results (aka payments for environmental services, PES); or species-specific management interventions.
2. ***Institutional Responsibilities.*** The offset project documents should clearly define the responsibilities of different organizations, whether government agencies, private firms, organized communities, NGO partners, or other any entities with implementation responsibilities. Since the organization leading the implementation of the biodiversity offset is often different from the sponsor of the original development project (particularly in the public sector), inter-institutional coordination mechanisms need to be clearly defined. This is especially important for defining smooth flow-of-funds procedures between the original project entity (such as a roads agency) and the biodiversity offset entity (such as a protected areas agency).
3. ***Implementation Schedule.*** The time frames for implementing each biodiversity offset investment or action should be clearly defined, including the expected start date and (if not recurrent) the target completion

date for each planned activity. The timing of biodiversity offset activities may need to take into account the implementation schedule for civil works under the original development project.

4. ***Budget.*** Effective implementation of any biodiversity offset requires an adequate budget, both for up-front investment costs and long-term recurrent costs.

5. ***Funding Sources.*** Up-front investment costs normally should be met as a defined part of the original project's investment costs, since the original project provides the basis for doing the biodiversity offset in the first place. Securing the funding for long-term recurrent costs is often a challenge; various options should be considered (see Chapter 7).

**Procedures for Establishing or Upgrading Protected Areas.** Many biodiversity offsets involve protected area establishment, enlargement, or upgrading of legal status or management category (such as from Forest Reserve to National Park). In such cases, the process that needs to be used typically involves some variation of the following steps. Additional steps are needed in particular cases, such as if land acquisition is involved (through purchase, lease, conservation concession, easement, etc.).

1. ***Verify the Conservation Value.*** The biodiversity offset proposal should document that the proposed protected area (or any biodiversity offset area) is indeed of high conservation value—adequate to meet the No Net Loss or other offset criteria—taking into account any possible dependence on upstream water sources or other key off-site features. The conservation value should be verified based on reliable, recent references (reports, databases, or expert opinions), supplemented by additional field work as needed.

2. ***Verify the Land Tenure, Socioeconomic, and Political Feasibility.*** The offset proposal should provide land tenure and socioeconomic information that clearly indicates (i) who owns and/or claims all the land (and associated water area) comprising the potential new or expanded protected area; (ii) who has any concessions, leases, or other legally recognized use rights; and (iii) who is currently occupying or using the land or natural resources in any way (whether or not they have the legal rights to do so). The offset proposal should also describe any official policies and land use plans that might be incompatible with the proposed protected area (such as a new dam, agricultural development pole, or large port facility). Understanding the legal land tenure, *de facto* human uses, and official policies and plans will help to determine the feasibility of establishing or enlarging the proposed protected area.

3. ***Select the Management Category.*** The offset proposal should indicate the planned management category of the proposed protected area, taking into account its size and key conservation objectives as well as the existing and planned human uses. Protected area management categories vary in terms of their emphasis on different conservation and management objectives, along with the extent and types of allowed human uses.[3]

[3] The World Conservation Union (IUCN) protected area categories are a standardized classification system for similar types of protected areas that may have very different names in different countries. (For example, a "Forest Reserve" in one country may mean an area of strict preservation, while in another it might mean a production forest suitable for commercial logging.) The standardized IUCN categories include Category I: Strict Nature Reserve/Wilderness Area (protected area managed for science or wilderness protection); Category II: National Park (protected area managed mainly for ecosystem protection and recreation); Category III: Natural Monument (protected area managed mainly for conservation of specific natural features); Category IV: Habitat/Species Management Area (protected area managed mainly for conservation through management intervention); Category V: Protected Landscape/Seascape (protected area managed mainly for landscape/seascape conservation and recreation); and Category VI: Managed Resource Protected Area (protected area managed mainly for the sustainable use of natural ecosystems).

**TABLE 6.1 Checklist of Issues to Consider for the Planned Biodiversity Offset**

| | |
|---|---|
| **Technical and Ecological Aspects** | • Have the biodiversity and ecosystem values to be offset been listed and described?<br>• Has the full mitigation hierarchy (first avoid, then minimize, then restore, and only then offset) been duly considered, with adequate documentation?<br>• Have potential offset sites and activities been screened against selected criteria (ecological, social, implementation feasibility)?<br>• Are there potential offset sites nearby which meet the desired criteria, or do you need to look into the wider landscape? If the ecological characteristics are not similar, can you trade-up?<br>• How do the proposed offset sites fit in with national and regional conservation priorities?<br>• How do the proposed offset sites provide additionality?<br>• What conservation interventions will be required for the offset to achieve No Net Loss or otherwise succeed?<br>• For proposed restoration offsets, is there demonstrated success for these types of habitats?<br>• Which outcome indicators will be monitored? |
| **Land Tenure, Social, and Political Aspects** | • Who legally owns, who claims ownership or use rights, and who effectively controls all the parcels of land comprising the proposed biodiversity offset area, as well as the corresponding water rights?<br>• Do local residents (individuals or communities) own, occupy, or otherwise use the proposed offset sites?<br>• Are local residents adequately engaged in the biodiversity offset planning process?<br>• What changes in land or natural resource use (if any) will be needed for the biodiversity offset to succeed? How will those changes be implemented?<br>• If access to natural resources will be restricted more than at present, are the livelihood restoration measures (including alternative livelihoods) proposed for or by local residents realistic?<br>• Is there sufficient political support for the planned offset activities? If legislative (congressional or parliamentary) approval is required (such as to create a new protected area), can this realistically be achieved when needed?<br>• Are there other social or political risks (such as security and conflict issues) that could prevent effective implementation? |
| **Long-term Protection and Legal Aspects** | • Are there any legal requirements in place that dictate a particular methodology be followed for designing or implementing the offset?<br>• How long is the proposed offset site expected to be legally protected or otherwise secure?<br>• Will the offset be part of a protected area system or managed independently?<br>• In the case of private (individual or community) ownership of the offset area, what types of conservation instruments will be used to ensure or promote long-term conservation (such as conservation easements, legal covenants, community management agreements, environmental service payments, etc.)? |

| | |
|---|---|
| **Financial Aspects** | • Have the up-front investment costs been adequately budgeted, with an agreed funding source? (These costs may include land acquisition, physical demarcation, protected area infrastructure and other small civil works, vehicles, office and field equipment, staff training, consultancies including Management Plan preparation, etc.)<br>• Will there be adequate funding of recurrent protection, management, and monitoring costs (including salaries, fuel, supplies, and spare parts) over the long term? Through what mechanisms? |
| **Human Resources** | • What human resources are needed to plan and implement the biodiversity offset, including long-term management and monitoring?<br>• How much and what kinds of training will be required? |
| **Partnerships** | • Which organizations have been, or should be, engaged as partners to support offset planning or implementation?<br>• Are people from local communities (adults or students) willing and able to participate in the protection, management, or monitoring of the offset area and its biodiversity? |
| **Stakeholder Engagement** | • Have the interested and potentially affected stakeholders been adequately identified?<br>• Have timely communications and an open and regular dialogue been maintained with local communities or other key stakeholders?<br>• Have interested stakeholders been provided opportunities to engage throughout the biodiversity offsetting process, including site selection, offset design, no-net-loss calculations, implementation, and monitoring?<br>• Has a stakeholder complaint and feedback mechanism been defined (where warranted)?<br>• Do a significant number of local residents or other stakeholders object to key aspects of the proposed offset plans? If so, how will these objections be effectively addressed? |

4. ***Delineate the Boundaries.*** The offset proposal should include a detailed map showing the planned protected area boundaries. The boundaries should be selected in close consultations with key stakeholders, including neighboring landholders (public or private) and local communities.
5. ***Stakeholder Consultation.*** Robust consultations should be carried out with the full range of interested stakeholders—including, but not limited to, local communities and resource users—regarding the proposed new or expanded protected area and its planned boundaries and management category. Some countries have specific legal requirements regarding how this consultation process is to be carried out.
6. ***Prepare the Legal and Supporting Documents.*** Getting the new or expanded protected area legally established (gazetted) typically will require drafting a new (i) law, regulation, or executive or ministerial decree for public (government-owned) protected areas or (ii) by-laws, contracts, trust agreements, easements, or other legally binding documents for private (community, corporate, or family/individually owned) protected areas. In addition to these key legal documents, a variety of supporting technical documents (including maps) will usually need to be prepared.

Depending on national or local political circumstances, obtaining final approval of a new law or decree can take months or even years; these delays need to be considered in the timing or phasing of the original project as well as the biodiversity offset.

**Biodiversity Offset Preparation Checklist.** Table 6.1 provides a checklist of issues to consider when planning a biodiversity offset. This checklist can serve as a reference during the early planning stages of the offset (or other type of conservation project), as well as during the pre-approval (appraisal) stage to help verify that key details have been addressed.

## Monitor Implementation of the Biodiversity Offset Activities and Results

Biodiversity offsets, like other kinds of conservation projects, merit significant investment in the monitoring of implementation as well as outcomes.

**Implementation Monitoring (Supervision).** Diligent monitoring of implementation by the responsible entity is important for achieving the desired outcomes on the ground, as summarized by the saying, "You get what you *inspect,* not what you *expect*." Where civil works (such as protected area facilities) are a part of the biodiversity offset, it is important for the bidding documents and contracts to have sufficiently precise technical specifications.

**Environmental Rules for Contractors** are also needed to help ensure that contractors and construction workers do not cause undue damage while working in sensitive natural areas. Such rules would typically cover, for example, (i) minimizing any clearing of natural vegetation; (ii) adequate clean-up and restoration of construction sites; (iii) proper disposal of solid and liquid wastes; (iv) no washing of machinery or changing of lubricants in waterways; and (v) enforcing good behavior by construction workers, including prohibition of hunting, fishing, wildlife capture, bush-meat purchase, plant collection, unauthorized vegetation burning, speeding, firearms possession (except by security personnel), or inappropriate interactions with local people. Rules such as these—along with transparent penalties for non-compliance—should be part of the relevant bidding documents and contracts for the biodiversity offset. Even more importantly, environmental rules for contractors are needed as part of the mitigation hierarchy, to minimize the biodiversity-related and other adverse impacts of the larger-scale civil works that are part of the original development project.

**Outcome Monitoring.** To verify that a biodiversity offset has indeed achieved its No Net Loss or other conservation objectives, some kind of field-based outcome monitoring is needed. Outcome monitoring is also an essential part of adaptive management: If the biodiversity offset is falling short of achieving its goals, monitoring can provide the information needed to effectively adjust project implementation so as to improve on-the-ground outcomes. The scope, duration, frequency, and budget for outcome monitoring activities (including field work, data analysis, and reporting) should be defined as part of the preparation of a biodiversity offset. Outcome monitoring activities should be designed (i) to be feasible to carry out in the field; (ii) to obtain much-needed information; and (iii) to avoid undue complexity (such as too many indicators). Outcome monitoring reports and data should be routinely shared with interested stakeholders; exceptions should be limited to special cases, such as when disclosing the precise locations of threatened plants or animals could cause them harm. Interested citizens and volunteers often usefully assist with outcome monitoring within a biodiversity offset

conservation area, along with other protection and management functions.

**Management Effectiveness Tracking Tool.** For those biodiversity offsets involving some type of protected area (whether public or private), the Management Effectiveness Tracking Tool (METT) is a useful means to track progress in improving the quality of protected area management across a broad range of indicators. The METT was developed by World Wildlife Fund (WWF) International in collaboration with the World Bank; it is now being used in many protected area projects (including those supported by the World Bank and the Global Environmental Facility, GEF). At its core, the METT is a standardized questionnaire about different aspects of protected area management, with a theoretical "perfect" top score of around 100. Most protected areas worldwide face protection and management challenges of different kinds and thus have scores that are considerably lower than the theoretical maximum. The METT provides a useful instrument for tracking the effectiveness of protected area management and setting future goals, whether or not the protected area in question is part of a biodiversity offset.

## FURTHER RESOURCES ON PREPARING AND IMPLEMENTING BIODIVERSITY OFFSETS

BBOP. Three key resource documents are the *Biodiversity Offset Design Handbook,* the *Biodiversity Offset Cost-Benefit Handbook,* and the *Biodiversity Handbook Implementation Guide.* Washington: Business and Biodiversity Offsets Program. http://www.forest-trends.org/documents/files/doc_3092.pdf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Hydroelectric projects, such as the bi-national Itaipu Dam (Brazil and Paraguay), are often suitable for biodiversity offsets because they generate long-term revenues that can cover the recurrent costs of conservation areas.

# Financial Sustainability of Biodiversity Offsets

Just like any other on-the-ground conservation activities, biodiversity offsets inherently involve recurrent costs for the protection, management, and monitoring of ecosystems and species. These recurrent costs can include salaries, fuel, supplies, spare parts, incentive payments to landholders, and field support to volunteers, among others. Since—like other conservation initiatives—biodiversity offsets will ideally last in perpetuity, they should be designed with a view towards how sufficient funding can be mobilized to cover at least some of their long-term recurrent costs.

**Recurrent Cost Funding Options.** Different biodiversity offsets will face different opportunities and challenges with respect to their recurrent costs. Ideally, the developer of the original project will somehow provide assistance with long-term recurrent costs; however, many developers (public as well as private sector) are only willing to support the up-front investment costs of the offset area (and maybe the first few years of recurrent costs), but not all the recurrent costs in perpetuity. With this reality in mind, the typical menu of possible options for meeting the recurrent cost funding needs of biodiversity offsets and other conservation projects includes:

1. ***Regular Operating Budget.*** Most functioning protected areas, as well as other conservation programs with recurrent costs, receive some type of annual support: Typically this comes from national or local government funding for public protected areas, or from their respective landowners in the case of private (individual- or community-owned) protected areas. For public protected areas, the level of support from governmental budgets is often well below what is needed for adequate management; this problem is particularly acute in—but not limited to—developing countries. In severe cases, such funding neglect leads to "paper parks" with little or no on-the-ground protection or management. The money that governments do spend on protected area recurrent costs largely comes from general revenues; sometimes it also comes from dedicated taxes and fees, such as some tourism-related taxes.
2. ***Donor-funded Projects.*** Conservation projects funded by international donors, including multilateral and bilateral development agencies and conservation NGOs, tend to cover up-front investment costs. They also typically provide some support for recurrent costs, but usually not over the long term. Thus, many protected area systems

(particularly in poor countries) address their recurrent cost needs in part by stringing together irregular amounts of support from donor-funded projects. This type of "boom and bust" funding is far from ideal, resulting in conservation programs that lack the continuity needed for efficient operation.

3. ***Self-generated Revenues.*** Many protected areas generate some revenues within their boundaries through visitor fees, lodges, guiding or other tourism services, or fees for legally-harvested products. In most protected areas worldwide, these self-generated revenues are not sufficient to cover their full recurrent operating costs, although there are some noteworthy exceptions, such as Ecuador's Galapagos National Park (GNP 2013). Compounding the cost recovery challenge is the requirement in many countries for public protected areas to send some or all of their self-generated revenues back to their respective governments.

4. ***Private Philanthropy.*** Some conservation areas (potentially including biodiversity offset areas) have their recurrent costs of protection and management met—fully or in part—by corporate or individual sponsors. Certain protected areas (particularly near urban centers) benefit from the assistance provided by local NGO "friends groups" that focus on one particular park, providing support that is additional and complementary to whatever comes from the national or local government. A few conservation NGOs explicitly provide substantial funding to cover protected area recurrent costs; a case in point is Africa Parks, which has obtained long-term concession agreements to manage and mobilize funding for specific protected areas in a number of African countries.

5. ***Carbon Offset Payments.*** Biodiversity offsets frequently establish or strengthen protected areas; many of these contain forests or other ecosystems with high levels of carbon stored in their biomass and/or soils. Carbon offsets involve site-specific investments intended to compensate for the carbon emissions from fossil fuel combustion elsewhere, often in another country. Carbon offset investments often support low-carbon (typically renewable) energy development or targeted energy efficiency improvements. However, some of the most cost-effective carbon offset options involve either restoring forests through reforestation, or conserving standing forests that would otherwise be at risk of loss or degradation. Therefore, carbon offset payments can be part of a funding package to cover some of the protection and management costs of forests or other high-carbon ecosystems that are being conserved and/or restored (e.g. through reforestation) under a biodiversity offset. Such payments can be made on a project-specific basis, such as when the carbon emissions from one large power plant are offset through support to a specific forest conservation area. At a more aggregated level, the global program for Reduced Emissions from Deforestation and Forest Degradation (REDD+) provides a range of opportunities for channelling climate change mitigation funds to governments or other entities (including organized communities) for the conservation of standing forest areas, some of which might also be biodiversity offset conservation areas. For any conservation area that might receive support through both a biodiversity offset and a carbon offset, it will be important to document the additionality (Chapter 4) provided by each type of offset.

6. ***Project-specific Revenue Transfers.*** Conservation areas, particularly those established or strengthened as biodiversity offsets, can be sustained through dedicated revenue transfers from specific infrastructure projects. For example, a proportion of the operating costs of the Argentina-Paraguay Yacyreta Hydropower Project is to maintain

the compensatory protected areas that were established or strengthened under the project (Quintero, 2007). Hydroelectric and water supply dams, toll roads, pipelines, and other revenue-generating infrastructure projects can be highly suitable for supporting the recurrent costs of associated biodiversity offsets because maintaining the offset can be part of the infrastructure project's regular operating costs—just like water quality monitoring, fisheries management, or other recurrent environmental management costs. In special cases, the infrastructure project can actually benefit from the environmental services provided by its biodiversity offset (such as an upstream conservation area that serves to filter water supplies or reduce sedimentation).

7. ***Conservation Trust Funds.*** Conservation trust funds (CTFs) enable development project sponsors to set money aside up-front to support the recurrent costs of maintaining the biodiversity offset. If enough money is set aside, the CTF can serve as an endowment fund that generates a sustainable (perhaps variable) annual income stream to be used for conservation expenditures. However, if not enough is set aside, the CTF will become (intentionally or not) a sinking fund that supports specified conservation activities for a certain amount of time, but not indefinitely. Sinking funds disburse their entire principal and investment income over a set period of time, until the value of the fund sinks to zero. A CTF can be established for a single biodiversity offset. However, there are large economies of scale in CTF financial management costs. Accordingly, it may make more sense to develop one large (perhaps nation-wide) CTF that can cover the costs of multiple biodiversity offsets (or other conservation projects), rather than a proliferation of smaller CTFs that have most of their limited capitalization tied up as principal and thus unavailable to be used for on-the-ground conservation. There are many good practice principles and lessons learned to take into account when creating a CTF, such as (i) ensuring adequate capitalization; (ii) cost-effective fund management; (iii) sufficiently independent governanace; (iv) transparent procedures and oversight; and (v) obtaining additionality from the conservation money spent (for details, see "Further Resources" section).

## FURTHER RESOURCES ON FINANCIAL SUSTAINABILITY OF BIODIVERSITY OFFSETS


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The project-specific example of support to Liberia's East Nimba Nature Reserve has inspired the preparation of a national-level Biodiversity Offsets Roadmap.

*Photo: ArcellorMittal Ltd.*

# Scaling-up Biodiversity Offsets through Aggregation

## Aggregated Biodiversity Offsets: An Idea Whose Time Has Come?

**Aggregated Biodiversity Offsets.** As used here, "aggregated biodiversity offsets" refers to a system in which biodiversity offsets are planned and implemented in a systematic or wholesale manner, more than just a one-off single offset area to compensate for a single original development project. This can mean, for example, (i) planning one or more relatively large offset sites that would compensate for multiple original projects; (ii) pre-selecting offset areas to facilitate support from development project sponsors; or (iii) otherwise promoting the use of biodiversity offsets through some type of national or sub-national government planning framework.

**Advantages of Aggregation.** Project-specific biodiversity offsets—where an area-specific set of conservation actions is identified, agreed to, and funded to compensate for one original development project—typically require considerable effort to implement successfully. Accordingly, a national or sub-national system to facilitate appropriate kinds of biodiversity offsets could significantly scale up offsets use, with benefits that might include:

1. ***Reduced Transactions Costs.*** Achieving successful biodiversity offsets typically involves high transactions costs, with multiple stakeholders and various legal, political, or social impediments that need to be overcome. Under an aggregated offsets system, the transactions costs could be greatly reduced, since it would not be necessary to design every new biodiversity offset "from scratch".
2. ***Increased Developer Participation.*** In view of the high transactions costs and other practical challenges, biodiversity offsets are often implemented by international companies that might be considered the "environmental leaders" within their sector. Meanwhile, in the absence of clear procedures or strict legal requirements, competing firms within the same sector tend to carry out similar types of high-impact projects, but without the conservation offsets. A consistent governmental framework that promotes or requires offsets under specified circumstances would likely result in participation by a higher proportion of all the companies—or public works agencies—with projects that affect biodiversity. The benefits of such an approach could include (i) increased funding for biodiversity conservation from the private sector or through public sector infrastructure

projects and (ii) improved on-the-ground environmental outcomes for infrastructure, extractive industry, and other large-scale development projects that would have been approved in any case (with or without a biodiversity offset).

3. ***Addressing Cumulative Impacts.*** Increased participation by private or public sector project developers in supporting biodiversity offsets could more fully address the cumulative impacts of multiple development projects. A governmental offsets framework could identify large, ecologically valuable offset areas that could compensate for the cumulative impacts of multiple projects that affect a certain ecosystem type.
4. ***Optimizing Site Selection*.** A governmental framework could enable biodiversity offset sites to be selected according to conservation priorities at a national (or sub-national) level, rather than in an *ad hoc*, project-by-project manner. The pre-identification of suitable conservation areas would also reduce the project-specific costs and delays associated with verifying the feasibility of proposed offset locations.
5. ***Improved Land Use Planning.*** A governmental framework for biodiversity offsets that pre-selects potential biodiversity offset sites will help to ensure that high-value conservation areas (that have not yet been gazetted as protected areas) are not mistakenly allocated to incompatible forms of development.

## Developing National Biodiversity Offsets Systems

**Types of National or Sub-national Offsets Systems.** A number of developed as well as developing countries have some elements of an aggregated biodiversity offsets system. Table 9.1 classifies these systems into four types: (i) **Compensation Funds** (which are not true offsets but nonetheless can help channel funding from large-scale development projects towards biodiversity conservation);

### BOX 8.1 Mozambique Biodiversity Offsets Roadmap

In Mozambique, existing Conservation Areas (CAs) cover about 26% of the country's land area and encompass most types of terrestrial and aquatic ecosystems. However, most are seriously underfunded, with low levels of on-the-ground protection and management. In 2015, Mozambique launched its national conservation trust fund, BioFund, largely to provide sustainable support to its CAs. Like conservation trust funds in many other countries, BioFund needs additional funding in order to function at an optimum level. Mozambique's Biodiversity Offsets Roadmap, *Contrabalanços da Biodiversidade: Um Roteiro para Moçambique* (also in English), proposes using BioFund to transfer biodiversity offsets funding from infrastructure and extractive industry projects to selected CAs that are ecologically similar to the project-affected areas. This approach intends to ensure additionality of the offset investments by (i) supporting CAs that have very limited on-the-ground protection or management (thus enabling "paper parks" to become real ones) and (ii) using matching grant requirements to help ensure that existing governmental support (such as for ranger salaries) will not be reduced. Implementation has begun of the Roadmap's recommendations through the Conservation, Impact Mitigation, and Biodiversity Offsets (COMBO) Project supported by the French Development Agency (AFD) and several partners.

**TABLE 8.1** Different Types of National or Sub-national Biodiversity Offset Frameworks

| | 1. Compensation Funds | 2. Mitigation Banking | 3. Developer Implements under Government Framework | 4. Government Implements with Developer Support |
|---|---|---|---|---|
| **A. Type of Offsets System** | • Compensation funds provide a mechanism whereby project developers are required to pay a fixed fee or a percentage of total project cost, in lieu of conducting project-specific mitigation or buying conservation credits. They are sometimes referred to as in-lieu payment systems.<br>• Funds either directly go towards compensation for project-caused biodiversity losses, or they support more indirect biodiversity-related projects such as funding protected areas management or research. | • Mitigation banking (aka conservation banking) typically involves buying credits from third parties who have already restored or own sites in the same region to offset the impacts from a project.<br>• Conservation area habitat "banks" are typically located on private (individual or community) lands. The value of habitat credits fluctuates based on economic factors, land values, competition, and market demand.<br>• Often there are "brokers" who connect people who want credits with people who are selling credits. | • Project developer (whether private firm or public agency) is responsible for implementing the offset, although the location and approach is decided by a government environmental agency, which also provides guidance on offset design. | • Government implements the offset, typically as part of a protected area strategy, but the costs are paid by the project developer (private or public sector). The amount to be paid by the developer is based on the area and quality of the habitat to be affected by the proposed project. Offset sites are normally expected to be similar to, or (ideally) better than, the areas lost to the project. |
| **B. Conditions where Approach may be Useful** | • Can be used in situations of uncertain land tenure, since the funds are typically applied to protected areas.<br>• Require a reasonable level of capacity within regulatory and enforcement agencies, but less than for conservation or mitigation banking. | • Works well in situations where a lot of land is under private ownership with well-established tenure.<br>• Requires a well-developed market infrastructure and is dependent on a high level of capacity within regulatory and enforcement agencies. | • Requires good data on the location and quality of different habitats, including potential offset sites.<br>• Requires reasonable level of capacity within regulatory and enforcement agencies, especially if project-specific offsets are part of the mix. | • Can be used in situations of uncertain land tenure, since the funds are typically applied to protected areas.<br>• Suited to countries seeking to significantly expand the area and/or increase the funding for their protected areas network. |

| | 1. Compensation Funds | 2. Mitigation Banking | 3. Developer Implements under Government Framework | 4. Government Implements with Developer Support |
|---|---|---|---|---|
| **C. Some Examples** | • The Environmental Compensation Fund in Brazil was established under the National Protected Areas System Law (Federal Law 9985/2000). It has channeled funds from large infrastructure projects to protected areas and other conservation initiatives. For example, the Bolivia-Brazil Gas Pipeline (GASBOL) Project channeled the required 0.5% of project investment costs to on-the-ground strengthening activities in 12 Brazilian protected areas within the general vicinity of the pipeline route (Quintero, 2007). | • In the United States, mitigation banking is used nationwide to promote "no net loss" of wetlands protected under the Clean Water Act. In Australia, the State of Victoria's BushBroker program works by identifying landowners willing to preserve and manage native vegetation. A BushBroker official assesses the potential offset site using a Habitat Hectares methodology and determines the number and type of credits available for sale to developers. | • In Colombia, offsets are required for mining, oil and gas, other energy projects, new ports, infrastructure and new international airports (Resolution 1517 of 2012, Article 2). They are implemented by the private sector but the National Environmental License Authority (ANLA) identifies the site in accordance with the regulation. | • Biodiversity Offsets Roadmap for Liberia proposes that large mining companies be encouraged or required to support offsets within proposed protected areas, enabling them to become part of the formal protected areas network.<br>• Biodiversity Offsets Roadmap for Mozambique proposes a system in which project developers would support offsets that strengthen parts of the spatially extensive yet severely underfunded protected areas network. |
| **D. Advantages** | • Compensation funds are fairly straightforward to implement, compared with either conservation or national no-net-loss frameworks.<br>• Low burden to developers, as simple payments are made proportional to project size. | • Developers (private firms or public works agencies) need not spend time and effort to locate offset sites, since this responsibility is vested in a third party (such as BushBroker).<br>• Offset sites are identified, protected, and sometimes restored before the development project's adverse impacts occur; thus, there is often no time lag between biodiversity losses and gains.<br>• A single large site can provide compensatory mitigation for impacts from two or more projects.<br>• May reduce the time needed for the development project to obtain environmental permits.<br>• Developers with limited capacity (such as smaller firms) can easily participate. | • Approaches can be designed to embody the offset principles of No Net Loss or Net Gain and like-for-like or trading-up.<br>• Offset sites may be identified, protected, or restored before the project's adverse impacts occur, in which case there is no time lag between biodiversity losses and gains.<br>• A single large site can provide compensatory mitigation for impacts from several projects.<br>• May reduce the time needed for the development project to obtain environmental permits.<br>• Facilitates a strategic approach to biodiversity conservation at a landscape level, since offset sites are pre-selected. | • Developers (private firms or public works agencies) need not spend time and effort to locate offset sites, since this responsibility is vested in the government.<br>• Offset sites are identified and protected with developer support, but before the original project's adverse impacts occur; thus there is no time lag between biodiversity losses and gains.<br>• A single large site can provide compensatory mitigation for impacts from several projects.<br>• Facilitates a strategic approach to biodiversity conservation at a landscape level, since offset sites are pre-selected. |

| | 1. Compensation Funds | 2. Mitigation Banking | 3. Developer Implements under Government Framework | 4. Government Implements with Developer Support |
|---|---|---|---|---|
| **E. Disadvantages** | • Strictly speaking, compensation funds are not real biodiversity offsets because the conservation actions supported do not necessarily involve (i) the same ecosystems or species that were harmed under the original project or (ii) "trading up" to an ecosystem of higher conservation priority.<br>• In the absence of adequate safeguards for project permitting, a simple mechanism for making compensation payments could facilitate, rather than deter, projects that convert natural habitats.<br>• In the absence of clear criteria and procedures for how the funds collected are to be spent as intended on biodiversity conservation, the money could accumulate unused in a special account and/or be diverted to unrelated uses.<br>• If the amount to be paid by the (private or public sector) developer is a fixed fee or based on total project costs (rather than specific project impacts), it does not provide an incentive for the developer to reduce biodiversity damage through mitigation hierarchy.<br>• Compensation funds can be perceived as just another tax, making them politically vulnerable to reduction or elimination. | • An effective mitigation banking system normally requires secure land tenure, a well-functioning legal system, and adequate governmental regulatory oversight; it may thus be best suited for more highly developed countries.<br>• Over time, landowners might not adequately manage their designated offset land from a biodiversity standpoint, due to high recurrent costs, insufficient commitment to conservation, etc.<br>• The potential supply of high conservation value offset sites might be limited, particularly if many landowners are reluctant to commit to permanent land or water use restrictions.<br>• Some mitigation banks rely on restoration offsets (as opposed to averted loss offsets), which can be high risk, not cost-effective, or impossible for some habitats. | • Project developer still needs to implement the offset and may lack the requisite capacity or commitment.<br>• Finding suitable offset sites might be difficult, especially to obtain a like-for-like ecosystem match. | • Offsets may be located far away from the original development project; in such cases, stakeholders might perceive that the original project's impact and the corresponding offset are not really connected.<br>• Extractive industry and other private firms might be reluctant to support government-implemented offsets, fearing the potential diversion of their funds to other uses. |

(ii) **Mitigation Banking** (which involves mainly privately owned conservation offset sites, brokered by third parties under government regulation); (iii) **Developer Implements under Government Framework;** and (iv) **Government Implements with Developer Support** (which largely focuses on establishing or strengthening state-owned protected areas). Table 8.1 summarizes the main characteristics of each system, the conditions under which it might be useful, and some advantages and disadvantages of each approach; it also indicates some countries that are using or developing each type of system.

To date, no country—developed or developing—has in place a fully functional aggregated biodiversity offsets system across all ecosystem types within its territory. However, some countries are taking steps in this direction and experimenting with different approaches. Under the World Bank's Program for Forests (PROFOR), preliminary planning documents known as Biodiversity Offsets Roadmaps were prepared for Mozambique (Box 8.1) and Liberia (Box 8.2).

For any country, the feasibility of establishing an aggregated biodiversity offsets system—and the ideal nature of such a system—will differ according to various factors. These include the (i) policy, legal and regulatory framework in support of offsets; (ii) institutional capacity to implement offsets, including on-the-ground conservation enforcement; (iii) existing land use plans or available planning mechanisms; (iv) prevailing land tenure systems and security; (v) quality of available biodiversity data; (vi) extent of remaining natural habitats; (vii) rates of deforestation and other habitat loss; (viii) protected area system coverage and prospects for expansion; (ix) presence and capacity of NGO partners; and (x) non-governmental conservation funding options.

**Four Key Pillars of Aggregated Biodiversity Offsets.** Notwithstanding the different types

### BOX 8.2 Liberia Biodiversity Offsets Roadmap

The Liberia Biodiversity Offsets Roadmap, *National Biodiversity Offset Scheme: A Roadmap for Liberia's Mining Sector,* emphasizes industrial-scale mining because of its prevalence in the country and the successful offset example to date with ArcelorMittal (AML) at Mt. Nimba (see Annex 1). A network of Proposed Protected Areas (PPAs) provides excellent potential offset sites for future mining projects by other firms. Since adequate funding for Liberia's protected areas remains a challenge, biodiversity offsets (scaling-up from the AML-Nimba model) offer potential for improved financial sustainability. The Roadmap outlines a series of steps for scaling-up biodiversity offsets in Liberia: Among the most important is the establishment of a national Conservation Trust Fund (CTF) to enable the reliable and transparent transfer of funds from extractive firms to priority Protected Areas (as one of multiple CTF funding sources). The new Liberia Forest Sector (REDD+) Project, approved April 2016 with support from the World Bank and Government of Norway, provides a vehicle for moving forward some of the Roadmap's key recommendations. The Project's Protected Areas Component 2.2 includes technical assistance for designing a national Conservation Trust Fund, as well as Biodiversity Offsets Facilitation activities such as (i) developing metrics; (ii) convening a Stakeholder Advisory Committee; (iii) promoting additional voluntary pilots (beyond AML-Nimba); (iv) establishing thresholds for possible future mandatory participation by large mining firms; and (v) proposing adjustments to Liberia's Environmental and Social Impact Assessment regulations and other legal requirements regarding offsets.

of aggregated biodiversity offsets systems that exist—including ecological compensation systems that are not quite offsets—experience to date suggests that four key "pillars" or enabling conditions are especially important for establishing a functional system:

1. ***High-level Government Commitment.*** Sufficient political support is needed to establish and sustain a viable program of biodiversity conservation in general (including but not limited to protected areas) and a functioning biodiversity offsets system in particular.

2. ***Legal and Regulatory Framework.*** Scaling-up biodiversity offsets depends upon supportive laws and regulations that facilitate appropriate offset use. For example, environmental assessment laws and regulations can promote offsets by mandating that all large-scale public or private projects with certain characteristics comply with offset requirements. Furthermore, protected area systems legislation can facilitate the legal establishment of new protected areas (under various management categories) in a timely manner, when needed to fulfill the offset requirements for new development projects.

3. ***Offset Site Selection Mechanism.*** Some type of scientifically credible mechanism—whether run by government or capable third parties—is needed to identify ecologically suitable offset sites and the corresponding conservation actions needed to compensate for biodiversity damage from each development project.

4. ***Funds Transfer Mechanism.*** For Compensation Funds, Mitigation Banks, and Government-Implemented Offsets, a secure and transparent mechanism (such as a CTF) is needed to transfer funds from the project developers (private firms or public agencies) to the conservation offset activities.

## FURTHER RESOURCES ON SCALING-UP BIODIVERSITY OFFSETS THROUGH AGGREGATION


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The protected areas assisted financially by the Bolivia-Brazil Gas Pipeline (GASBOL) Project in southeast Brazil support numerous endemic species, such as the Saffron Toucanet *Pteroglossus bailloni*.

*Photo: Catherine C. Ledec*

# Final Considerations

## The Potential and Limitations of Biodiversity Offsets

**Project-specific Offsets.** Biodiversity offsets pose many of the same issues and challenges as other types of conservation projects, from stakeholder engagement to careful site selection to long-term financial sustainability. Beyond this, they involve further complexity and controversy because (by definition) they are linked to development projects that somehow harm biodiversity, such as by removing or degrading natural habitats. Under the widely-adopted mitigation hierarchy, biodiversity offsets are legitimately viewed as a last resort, when other mitigation options are not sufficient to prevent significant biodiversity losses. In such circumstances, properly done offsets can improve the conservation outcomes from large-scale, private or public sector development projects (ideally to the point of Net Gain); in the process, they can provide much-needed additional funding for protected areas and similar conservation efforts. However, achieving positive conservation outcomes is by no means assured; it requires biodiversity offsets (i) to be adequate in their scale, scope, design, implementation, and monitoring; (ii) to avoid facilitating the approval of environmentally damaging projects that otherwise would likely not take place; and (iii) to avoid being used in cases where the loss of unique or irreplaceable sites could not feasibly be offset. The relatively simple, step-by-step guidance in this User Guide on how to plan and implement biodiversity offsets seeks to complement the more detailed technical publications recently produced by NGOs. When considering or planning offsets, it is always important to refer to the specific requirements of each country and financing source, including (where applicable) existing and future World Bank Group environmental standards.

**National Offsets Systems.** As discussed in Chapter 8, national or sub-national biodiversity offset systems potentially offer significant advantages in comparison to *ad hoc* project-by-project approaches. These advantages could include (i) substantially reduced transactions costs; (ii) increased developer participation (such that more projects with significant adverse residual impacts would be implemented with offsets, rather than without them); (iii) addressing the cumulative impacts of multiple projects; (iv) optimized conservation area site selection; and (v) improved land and water use planning at a national (or sub-national) level. Although no country to date has in place a fully functional aggregated biodiversity offsets system across

all ecosystem types within its territory, this User Guide summarizes four different types of approaches with which various (developed and developing) countries are experimenting. Some of these approaches hold promise for wider application across more countries, which—with the appropriate precautions—could help to improve the conservation outcomes associated with future large-scale development projects.

## Overview of the Case Studies

This User Guide describes three selected Case Studies (Annexes 1–3) of recent biodiversity offsets that have already demonstrated significant on-the-ground results, although conservation investments continue to be made. Two of these (Liberia Nimba and Madagascar Ambatovy) are large-scale, private sector mining projects, while the third (Cameroon Lom Pangar) is a large public sector hydroelectric project. These three Case Studies are certainly not representative of the full range of (i) economic sectors or project types for which offsets might at times be needed; (ii) types of offsets (including restoration and species-based offsets); or (iii) countries or regions where offsets could be implemented under particular circumstances. In none of these Case Studies was the design and implementation of biodiversity offsets carried out perfectly. Rather, the Case Studies provide a few examples of real, positive on-the-ground results that can be achieved when biodiversity offsets are seriously planned and carried out.

ANNEX 1

# Case Study: Liberia Nimba Western Range Iron Ore

## Project Overview

ArcelorMittal (AML) is mining iron ore in Nimba County, northern Liberia, close to the Guinea border, where extraction commenced in 2011. Mining operations are focused on three mountains (Tokadeh, Gangra and Yuelliton) in the scattered Western Range of the Nimba Mountains. Ore is transported by rail 243 km to the coast where it is shipped from the port of Buchanan. ArcelorMittal rehabilitated an existing but dilapidated rail line as well as the Buchanan port and material handling facilities with little expansion of the existing footprint. Thus, land clearance for Phase 1 of the project (2011–2015) focused around the mine and resulted in the loss of up to 500 ha of agriculture and forest, including moist evergreen forest. Phase 2 (planned for 2015–2026 but delayed due to a downturn in iron ore prices) is expected to result in the loss of a further 700 ha of forest, including 225 ha of lowland evergreen forest. ArcelorMittal owns 85% and wholly funds its Liberian mining operation.

**Liberia's East Nimba Nature Reserve is receiving support from the mining firm ArcelorMittal as part of a biodiversity offset. The Reserve is a biodiversity hotspot with numerous species of conservation concern, including the spectacular Giant African Swallowtail *Papilio antimachus* (top) and the endemic Nimba Otter Shrew *Micropotamogale lamottei* (bottom)**

*Photos: Wing Crawley (top), Ara Monadjem (bottom)*

## Biodiversity Significance

The Nimba Mountains region is globally recognized as having high biodiversity value and this was confirmed by the company's ESIA studies. The concession area is made up of a mosaic of moist evergreen forest, secondary forest, savanna, swamp forest, and some edaphic savanna on iron pan, together with more degraded habitats and shifting agriculture. The baseline botanical studies determined there were pockets of high value forest (usually tall, closed canopy forest) that contained restricted range species with high conservation value, but these pockets were found both within the mining concession as well as outside.

East of the mining concession is the East Nimba Nature Reserve (ENNR, 13,569 ha), which was gazetted in 2003 and, at this writing, is one of only four legally established protected areas in Liberia. There are also a number of community forests including the Gba Community Forest (approximately 10,823 ha) that was formerly the West Nimba Proposed Protected Area, the Zor Community Forest (1,140 ha), and the Blei Community Forest (629 ha)[4]. All of these forest areas, including the ENNR, are threatened as a result of local communities' activities and dependence on forest resources, including shifting agriculture, hunting and timber extraction. In addition, ArcelorMittal is developing its plans to mine at Mt. Gangra, located within the Gba Community Forest.

## Mitigation Measures

A number of globally threatened species have been recorded from the existing and proposed mining sites and will be affected by the project, which AML decided to offset after appropriate mitigation measures had been applied. The company took a standard approach in addressing the mitigation hierarchy in its environmental and social impact assessment process.

**Avoidance.** Avoidance was achieved by developing constraints maps detailing important habitats that should be avoided or preserved wherever possible, and setting rules for the layout of infrastructure. For example, all mine drainage had to be directed into a single catchment at Mount Tokadeh, and the steep scarp slopes on the southern and western flanks of the mountain were left untouched to preserve the higher quality forest in those areas. A relatively small (20 ha) but unique high-level catchment on the mountain was designated as a biodiversity set-aside, where about 3% of the available iron ore was not developed in order to leave this area intact. This area is considered an important habitat for a very high abundance of dragonflies, crabs, and a wide range of bird species, as well as being the only remaining area of sub-montane forest left on Mount Tokadeh. Further examples of avoidance include stockpiles, waste dumps, and in-pit access roads being designed specifically to avoid important habitats.

**Minimization.** Since an infrastructure footprint could not be avoided altogether, AML addressed minimization in two main ways. One was linked to the "value engineering" exercise as part of the design process, whereby layouts were rationalized to limit footprint, construction costs, and energy uses. The other was through a set of standards that had to be followed, such as sediment controls, buffer zones for riparian zones, strict rules for stream crossings, and minimizing nocturnal light disturbance to animals.

**Restoration.** Areas affected by construction and early mining have been revegetated routinely with the immediate aim of preventing soil erosion, and with the longer-term objective of initiating restoration. Revegetation is done by hand-planting stem-and-root cuttings of local native grasses; this has led to the successful re-establishment of surface cover over large areas. Induced habitat restoration is essentially still unknown in Liberia, but to develop capacity in this area, AML initiated a series of site trials on the abandoned pre-war mines near the current mining site. By collecting the seed of pioneer tree species from the forests and raising them in nurseries, a series of trials with different species and planting treatments is starting to show how restoration might be accomplished.

## Biodiversity Offset

ArcelorMittal Liberia's Biodiversity Conservation Program (BCP) is intended to compensate for

[4] Community forests engage local communities in the management of forest resources, in order to promote sustainable use through locally led governance. Management objectives are decided locally, and community forests are not usually established with the protection of biodiversity as a primary objective.

residual adverse impacts to biodiversity resulting from the company's operations. This is being achieved through enhanced protection of existing protected areas and agricultural intensification to improve food security and reduce people's dependence on forest resources. It should be noted that Community Forests do not necessarily protect the forest since, depending on their management objectives, they may be designated for other uses, such as timber extraction. The specific activities of the BCP are as follows:

- Enhancing the management and protection of the ENNR through a co-management structure and the development and implementation of a Management Plan that defines clear roles and responsibilities (there was no Management Plan previously).
- Entering into Memorandum of Understanding (MOU) agreements with Community Forest management bodies for sustainable management, conservation, patrolling, and other operational activities.
- Introduction of sustainable livelihood projects to reduce dependence on hunting and forest products, including improved agricultural practices that serve to diminish the extent of shifting cultivation.
- Partnership with the NGO Conservation International to negotiate and manage Conservation Agreements that make conservation a viable choice for local resource users by providing benefits to communities in exchange for effective conservation of high priority areas and species.
- Establishing species-specific programs for the endangered Nimba Otter Shrew and Western Chimpanzee *Pan troglodytes verus*, focusing on research to understand better the ecological requirements for these species and thereby inform the design of effective conservation measures.

Detailed baseline surveys were carried out to verify the conservation value of the mining concession, ENNR, and Community Forests that this Project seeks to enhance. However, no specific loss and gain analysis was undertaken and, as such, the offset measures proposed here are not linked by specific metrics to the mining impacts. In this respect, this Project admittedly and consciously does not meet all the offset design principles espoused by BBOP.

Nevertheless, real biodiversity gains are expected through positive management interventions delivered at a landscape scale. The BCP program is designed to achieve a Net Gain, as it extends over a much larger area than the company is affecting through mining. Conservation agreements are being implemented at six initial sites started in 2015, expanding to more sites in 2016 and subsequent years. Ultimately, with Phase 2 the AML offsets program aims to deliver a gazetted multiple-use protected area in northern Nimba County (tentatively referred to as the Northern Nimba Planning Area). This new protected area will be managed through coordinated and objectivized land use planning, incorporating existing communities, agricultural lands, mines, and forest reserves.

## Legal Framework

There is no specific mention of offsets in current Liberian legislation, although a requirement to comply with IFC Performance Standards is increasingly being required in new Mineral Development Agreements in Liberia. There was no requirement for an offset for this project, but ArcelorMittal considered compensation for biodiversity impacts to be a company responsibility.

## Stakeholder Engagement

A regional grouping of stakeholders was established in 2008, and comprised mainly the Government of Liberia's Forestry Development Authority (FDA), Conservation International, Fauna and Flora International, USAID and its successive community forestry programs, and ArcelorMittal. Local-level involvement started through various channels of AML, the NGOs and Government, and was mainstreamed through a Community and Conservation Workshop in November 2011. Since then, regular meetings have been coordinated by the BCP, including several workshops to define the management of the ENNR. The program is guided by and submits quarterly reports to multiple stakeholders, including local community representatives, in what since 2011 has been the Nimba Biodiversity Stakeholders Forum.

Community participation and engagement have been central to developing the BCP. Capacity building is a key activity, made particularly necessary by the gap in education caused by Liberia's long civil wars. Both the BCP and the international NGOs provide strong support to local NGO staff to boost local skills.

## Monitoring

Before the start of the BCP, formal bio-monitoring work proved to be difficult to administer to a consistent scientific standard, due to the remote location, challenging logistics, and limited local capacity. Rather than using a significant part of the program budget in expensive international bio-monitoring (and consequently less on conservation-related works), a conscious decision was made to defer quantifiable bio-monitoring until such time as it could be achieved in a more cost-effective way. However, certain bio-monitoring activities have been conducted as part of the ESIA process with a view towards developing long-term methodologies and building capacity. The Wild Chimpanzee Foundation (WCF) and Actions pour la Conservation de la Biodiversité in Ivory Coast (ACB-CI), in collaboration with Conservation International (CI), have developed a long term bio-monitoring program for mammals, during which 42 persons were trained in field survey techniques. Similarly, BCP activities include (i) the design of a long-term bio-monitoring program for butterflies that has been successfully piloted in the ENNR and (ii) a Nimba Otter Shrew Conservation Project to investigate its ecology, status and distribution.

Both community members and FDA forest guards (the latter engaged for the ENNR) were trained during these studies. The BCP has also worked in partnership with USAID's PROSPER program to train and support Community Forest guards to collect information on biodiversity and human activities in their forests in a simple but meaningful way. In addition, ENNR rangers will conduct regular bio-monitoring, patrols, and enforcement in the Reserve through the AML partnership with the NGO Fauna and Flora International. These activities will be built upon, and capacity gradually developed, until they can qualify as formal offset monitoring. Until that time, the program will not claim to be a quantified offset program, but rather a pragmatic, landscape-level approach to the compensation of biodiversity impacts.

## Financial Sustainability

Under Phase 1 of the mining (since 2011), ArcelorMittal has been funding the BCP by itself, although CI is bringing some complementary funding support. In 2016, AML also entered an agreement with the IDH Sustainable Trade Initiative, which provided counterpart funding to allow the program to expand. For the longer term, the feasibility is being examined of establishing a Conservation Trust Fund that would sustain the program in perpetuity.

## Successes and Lessons Learned

With three years of operational experience, the BCP-area communities, local and national government, and non-governmental organizations are very engaged in the program and a large number of initiatives have been implemented. Nevertheless, true conservation outcomes still require lengthy interventions, and the longer-term Phase 2 will further demonstrate the extent to which the program can genuinely deliver biodiversity Net Gains.

A more specific lesson relates to the need for very extensive dialogue between stakeholders, which can be inconclusive. As a result, it is often necessary to proceed with a good-faith compromise and demonstrate results on the ground, rather than trying to achieve the full consensus that may never be possible among a complex range of stakeholders.

As time passes and experience is gained, the inter-linkages between all aspects of forests and society make it more and more apparent that a landscape scale and a long time horizon are essential in this context. Without addressing the local needs for land and livelihoods, little progress can be made in protecting biodiversity. Better agriculture to produce more food on less land is essential, but bringing about this needed transition is challenging and needs to be done over the wider landscape.

# ANNEX 2

# Case Study: Madagascar Ambatovy Minerals

## Project Overview

The Ambatovy Joint Venture is a large-scale nickel and cobalt mining and processing operation in central eastern Madagascar. The mine is close to Moramanga, 80 km east of the capital Antananarivo, and is linked by a 220 km pipeline to the processing plant at Toamasina on the east coast. Ore is extracted from two pits, mixed with water to create slurry and then transferred by gravity flow to the coastal processing plant. The mine site footprint is approximately 2,000 ha, including 1,800 ha of intact and degraded natural habitats. The processing plant footprint is 320 ha but the site was previously degraded and does not involve significant impacts on biodiversity. The most significant impacts to biodiversity are at the mine and upper pipeline areas. The expected useful life of the mine is 29 years.

Ambatovy is a joint venture between Sherritt International Incorporated (40%; main operating partner), Sumitomo (27.5%), KORES (27.5%) and SNC-Lavalin, the construction partner (5%). Ambatovy has received US$2.1 billion in debt financing from 14 lenders and has raised an additional $5 billion through the project partners. It is the largest ever foreign direct investment in Madagascar. The project became operational in the latter half of 2013 and commercial production was attained in January 2014.

## Biodiversity Significance

Madagascar is a global hotspot for biodiversity, with exceptionally high levels of endemism.

**Ambatovy is a large-scale nickel and cobalt mining and processing operation in central eastern Madagascar. Ambatovy has identified multiple offset sites, totaling 18,225 ha, that support numerous threatened species including the world's largest lemur, the Indri *Indri indri*.**

*Photos: Ambatovy Project*

Only about 10% of the country's original forest cover remains. The Ambatovy mine lies in a high biodiversity region at the southern tip of a large section of remnant eastern rainforest corridor. To the north-east lies the Ankeniheny-Zahamena Forest Corridor (CAZ), while to the east lie the Torotorofotsy wetland (a Ramsar site) and the Mantadia National Park. Connecting the mine forests to the CAZ and Mantadia is an area of mostly intact forest—the Analamay-Mantadia Forest Corridor (CFAM).

These forests are collectively known to support 14 species of lemurs, 32 other mammals, 122

birds, almost 200 reptiles and amphibians, 50 fish (including 25 endemic species) and over 1,580 plants (including 250 orchids), representing more than 10% of Madagascar's known flora. To date, about 150 species of conservation concern are recognized from the mine footprint, including 109 species of plants and 48 species of animals.

## Mitigation Measures

Ambatovy adheres to IFC Performance Standards on Environmental & Social Sustainability (IFC, 2012), required through its lender agreements, and has made a voluntary commitment to the Biodiversity Offset Standard (BBOP, 2012). Ambatovy's commitment to these standards requires application of the mitigation hierarchy, including offsetting significant residual impacts.

**Avoidance** measures include:

- Minimising the project footprint during the design phase and continuing today with the systematic avoidance of any unnecessary forest clearance.
- Establishing two set-aside areas of azonal[5] Forest (totalling 306 ha) over the ore body, set within a larger matrix of conservation forest within the concession, known as the Conservation Zone.
- Routing the slurry pipeline to avoid forest fragments, cultural sites and local habitations, such that it mostly traverses degraded areas of secondary vegetation. Where the pipeline crosses the Torotorofotsy Ramsar site, it avoids sensitive wetland areas and the breeding habitat of the critically endangered Golden Mantella Frog *Mantella aurantiaca*.
- Locating the processing plant on degraded coastal land, far from any natural or critical habitats.

**Minimization** measures include:

- Paced directional forest clearing, using non-mechanised, labor-intensive methods; clearing from the center of a plot to allow mobile wildlife to escape; rescue and relocation of high-value plants and less mobile animals to the Conservation Zone within the mining concession; protection of nesting species; and captive breeding of amphibians: Manual salvaging and captive breeding of a critically endangered frog species has increased knowledge of its habitat requirements which will be used to restore and enrich natural ponds to augment the wild population.
- Recovery of timber, brushwood, and topsoil, with timber being distributed to the government and local communities, brushwood being mulched, and topsoil being stored for restoration.
- Burying the slurry pipeline throughout most of its length and actively controlling erosion along its entire length.

**Restoration** measures include:

- Implementing a program of restoration within the project footprint where mining operations have been completed; the first mined areas became available for restoration in 2015.
- Setting restoration targets to reflect forest conditions prior to project development, with a biologically diverse forest habitat harboring protected species to the north and an ecologically functional forest of native species delivering ecosystem services to the south.
- Establishing laboratory and nursery trials on project land to propagate priority flora species for the restoration.

[5] "Azonal" forest refers to an atypical forest type associated with the ferruginous crust overlying the ore deposit, of similar species composition but differing structurally from the surrounding "zonal" forests typical of the region.

- Rehabilitating the slurry pipeline along its entire length.

Given the uncertainty surrounding restoration efforts, predicted gains from restoration will not be included in the biodiversity accounting towards the No Net Loss target.

## Biodiversity Offset

Ambatovy aims to deliver No Net Loss, and preferably a Net Gain, of biodiversity with no net harm to Madagascar's ecosystems. Ambatovy joined the Business and Biodiversity Offsets Program (BBOP) as a Pilot Project in 2006, with the intention of benefiting from and contributing to best practice in achieving its biodiversity goals. Malagasy law requires a thorough environmental impact assessment for all major investment projects, but biodiversity offsetting is not as yet a legal requirement.

Ambatovy is in the process of implementing its biodiversity offset program. In designing the offsets, residual impacts from Ambatovy's mining and related activities were considered to be "absolute" and were not discounted to take account of background loss and degradation within the project area that would have occurred even without the project. "Averted loss" was chosen as the most appropriate approach for offsetting, in light of Madagascar's high background rates of forest loss outside of well-protected areas. Ambatovy has identified multiple offset sites, including two azonal forest areas and a large block of zonal forest within the Conservation Zone, totaling 3,634 ha. In addition, there are three off-site forest offsets totaling 18,225 ha: (i) Ankerana Forest 70km to the north and part of the CAZ (5,715 ha); (ii) a portion of the CFAM forest connecting the Conservation Zone to Mantadia National Park (7,269 ha); and (iii) forest on the northern and western sides of the Torotorofotsy wetland to the east (1,597 ha) (Figure A2-1). Additionally, Ambatovy supports forest conservation in community management areas around the mine (2,937 ha).

Biodiversity gains would be made through improved on-the-ground management, with the assumption that the Ambatovy Joint Venture would achieve the same success in averting forest loss as the Madagascar Protected Areas Administration had achieved in recent projects. While Ambatovy has predicted a Net Gain for all forest types combined over 40 years, it is not considered possible to achieve Net Gain for the azonal forest habitat, due to its low representation in the offset areas.

The remote offset sites contain most of the mobile species (including all of the lemurs and most small mammals) that occur in the project-impacted area, and at least 50% of the plant species. Surveys in forest around the mine (within the concession) show a greater similarity of flora species, but the extent of this overlap has not yet been fully defined. In addition to habitat-based offsets, specific conservation programs have been developed for three critically endangered fauna species—two lemurs, Diademed Sifaka *Propithecus diadema* and Indri *Indri indri,* and the Golden Mantella Frog *Mantella aurantiaca*—as well as five endemic fish and 10 flora species.

## Monitoring

Habitat Hectares—calculated as the number of hectares multiplied by a factor for habitat condition—was chosen as the basis for determining losses and gains. The Ambatovy Joint Venture is developing a biodiversity monitoring program that aims to detect changes in species population viability over time for lemurs, birds, amphibians, and certain other species groups.

Adverse edge effects from forest clearing and mining operations, such as dust penetration

and noise, have been taken into account in loss calculations by extending an impact zone 50–100 m beyond the actual working footprint. In addition, satellite monitoring has been set up to examine deforestation rates around the mine, pipeline, and off-site offset areas in order to determine whether there are detectable effects of "leakage" (deforestation displaced from the project-protected offset areas to other forested areas in the vicinity). For the Ankerana offset and concession forests, satellite monitoring has demonstrated a 90% decline in deforestation rates, which are attributed to active protection measures. To date, it has not been feasible to monitor deforestation in the adjacent unprotected forest area, where some unknown amount of leakage-type forest loss might possibly be occurring.

Compliance with Ambatovy's commitments on biodiversity is evaluated by (i) the National Environment Office (Malagasy regulator) through site visits and review of the Company's annual reporting on biodiversity; (ii) an independent Scientific Consultative Committee (SCC) which meets annually; (iii) quarterly visits of the Independent Engineers on behalf of Ambatovy's lenders; and (iv) through a separate audit in 2012–13 done jointly by Golder Associates and Forest Trends.

## Long-term Plans

The biodiversity conservation set-asides and offset areas will be managed for the life of the Ambatovy project and beyond. The offsets and set-aside areas within the Conservation Zone of the concession will be directly under Ambatovy's control, in accordance with provisions of the land lease taken from the Malagasy Government. Community management associations have been established to protect forest around the concession boundary from degradation (90% of the boundary is thus covered); a similar approach is planned to protect the boundaries of remote forest offset sites in future. Temporary protection has been agreed with the Malagasy Government for the Ankerana Forest, Analamay-Mantadia Forest Corridor (CFAM) and the Conservation Zone (including the azonal forest areas), while permanent legal protection is being pursued.

## Stakeholder Engagement

Ambatovy is (i) developing community forest management zones adjacent to the conservation offset forests; (ii) conducting community awareness and education; and (iii) developing alternative livelihood programs, including more efficient rice production, sustainable cash crops, and woodlots for fuelwood. Community management associations contribute to Ambatovy's ecological monitoring program.

Technical partners include the Missouri Botanical Garden (responsible for surveying flora, prioritizing species of concern, and establishing an orchid shade house); Conservation International (forest corridor conservation); Wildlife Conservation Society and Forest Trends (biodiversity offsetting); Duke Lemur Center (lemur spatial and biomedical monitoring); IRD (France) (ecosystem services & restoration); University of Antananarivo (departments of Animal Biology, Plant Biology, and Earth Sciences); and various technically specialized NGOs including Vahatra (biodiversity surveys), Asity (bird conservation), GERP (lemur conservation), Madagasikara Voakajy (amphibian conservation), Mitsinjo (captive breeding of amphibians), and GAF & IOGA (forest change assessment through earth observation systems).

## Successes to Date

- The Ambatovy Joint Venture has enabled the protection of over 20,000 ha of forest that was previously unprotected.

- Net local populations of two species of critically endangered lemur (Diademed Sifaka and Indri) have measurably increased since Ambatovy was established.
- New approaches have been developed to mitigate project impacts upon wildlife, including lemur bridges, which enable lemurs to move across mine tracks, thus reducing the impacts of fragmentation.
- Through its biodiversity survey work, Ambatovy has contributed a considerable body of information on plants to Tropikos, an online flora database, as well as increasing knowledge on the distribution and ecology of the critically endangered Golden Mantella Frog. The project has also confirmed a range extension of the Northern Shrew Tenrec *Microgale jobihely,* a species previously known only from the north of Madagascar.
- In recognition of its achievements, the Ambatovy biodiversity program received the Nedbank Capital Sustainable Businesses award in October 2014, as the winner in the Resources and Non-renewable Energy category.

## Lessons Learned

- High-quality data and defensible mitigation design are an important foundation for sound biodiversity management and decision-making aimed at achieving NNL. However, some of the most significant challenges lie with the implementation of these measures, including offsetting. Therefore, it is wise to prioritize planning for implementation as early as possible.
- Early engagement with stakeholders and the development of partnerships are essential to the success of the mitigation and offsetting program. This applies especially in the challenging context of Madagascar and necessitates a wide range of partnerships, such as with Government authorities, national and international NGOs, research institutions, community-based organizations, and independent experts.

# ANNEX 3

# Case Study: Cameroon Lom Pangar Hydropower

## Project Overview

The objective of the Cameroon Lom Pangar Hydropower Project is to store water in the wet season and to release it in the dry season by building a regulating dam on the Lom River, four km downstream of the confluence with the Pangar River. These are tributaries of the Sanaga River, the largest river in Cameroon. The dam will reduce water flows by 20% in the wet season and increase them in the driest month from 210 $m^3$/sec to 900$m^3$/sec. By creating more consistent dry season water flows, the Lom Pangar Dam will enable the downstream development of up to 6,000 MW of hydropower in the medium to long term, including for the expansion of aluminium smelters. It will also enable a 120 MW increase in power generation from two existing downstream hydropower plants. The Project includes its own 30 MW hydropower plant and transmission lines to provide power to 2,400 households in the Eastern Province. Twelve km of the existing Chad-Cameroon pipeline required strengthening prior to being inundated by the Lom Pangar Dam.

**Western Lowland Gorilla *Gorilla gorilla gorilla*, one of the species protected within Cameroon's Deng Deng National Park, established as a biodiversity offset for the Lom Pangar Hydroelectric Dam project, shown here under construction.**

*Photos: World Bank Group*

At this writing, the dam construction is about 45% completed. When fully completed, the dam will flood 54,000 ha, including 30,000 ha $km^2$ of natural forest. Some additional forest will be cleared for associated infrastructure, including an access road and power transmission lines. If left unmanaged, induced impacts such as illegal logging and poaching will increase the dam's ecological footprint. Around 1,200 households will require some form of resettlement or compensation for lost assets, due to the construction of the dam and transmission lines.

The World Bank's loan for the Project includes the funding needed to establish and strengthen the management of the Deng Deng National Park a biodiversity offset, along with a range of other environmental mitigation measures.

The Project owner is the state-owned Electricity Development Corporation (EDC) of Cameroon. The Project overall is expected to cost US$494 million, with funding provided by four development banks including the World Bank. Some US$73 million has been allocated to implement the Environmental and Social Management Plan including the biodiversity offset among other mitigation measures.

## Biodiversity Significance

The main natural habitats in the area of Project influence include a variety of natural forest and savanna ecosystems. The diversity of mammal species is high, with 68 species found thus far. The Project area harbors 54% of the large mammal species found in Cameroon. Bird fauna is highly diverse; 221 bird species have been found in a single month of observation. While the Project's inundation zone does not contain any Critical Natural Habitats as defined by the World Bank's Natural Habitats Policy (OP 4.04), the area adjacent to the dam includes critical habitat for a geographically isolated but important population of about 300 Western Lowland Gorillas *Gorilla gorilla gorilla,* along with Chimpanzees *Pan troglodytes,* Black Colobus Monkeys *Colobus satanas,* and other globally threatened mammals. The river contains a diverse fish fauna, with about 130 species known to occur, of which about 26 are regularly caught for food. Well downstream of the Project area, the river empties into the extensive Douala-Edea estuary, an important ecosystem for fisheries as well as biodiversity conservation.

## Mitigation Measures

**Avoidance.** Various options were considered for the location of the dam, taking into account technical, financial, dam safety, social, and environmental considerations. The Project was designed in conformity with the World Bank's Safeguard Policies on Environmental Assessment, Natural Habitats, Forests, Pest Management, Physical Cultural Resources, Involuntary Resettlement, and Safety of Dams. The dam wall location was selected based on a careful analysis of alternatives; as a result, the footprint of the dam, reservoir, and ancillary infrastructure avoids Critical Natural Habitats. The alignment of access roads and planned location of a quarry were reviewed and changed in order to avoid gorilla habitat.

**Minimization.** The project includes a series of measures to minimise adverse biodiversity impacts, including:

- Careful water flow modeling led to a reduction in the operating level of the reservoir (equivalent to 6 billion instead of 7 billion $m^3$ of water storage); this reduced the flooded land area by 5,000 ha.
- Civil works contractors and construction workers are prohibited from entering the Deng Deng National Park.
- The main contractor camp was located well away from the construction area, as well as outside of the Deng Deng National Park. This helped to prevent a major influx of people into the Project area, which could have led to increased bush-meat poaching and the planting of crops in the Park. Project construction workers are transported to and from the work site each day. They are provided with meals to discourage roadside shops and restaurants (which might sell illegal bush-meat) from establishing in the area. The main civil works contractor has to purchase all food in towns that are some distance away from the construction site, to discourage the illegal planting of crops within the Park to sell to workers.
- All Project civil works contracts contain penalty clauses, including fines, for non-compliance with the environmental requirements

that are specified in the Environmental and Social Management Plan.

- The filling of the dam is scheduled to take place over 18 months, to enable many animals to flee the rising water levels. This slower filling scheduled also serves to help maintain adequate river flows, reducing adverse downstream impacts on river ecosystems.
- During the filling of the dam, law enforcement is to be strengthened to reduce poaching as animals leave the flooded area.

**Restoration.** The Project requires civil works contractors to restore cleared areas where feasible, following construction. Project budget has been set aside to address unforeseen environmental issues which might arise.

## Biodiversity Offset

Studies undertaken during Project preparation, including by the Wildlife Conservation Society, demonstrated the suitability of the Deng Deng forest to help maintain the viability of the 300-strong Western Lowland Gorilla population. As a biodiversity offset for the Lom Pangar Dam, an area comprising 58,000 ha of the Deng Deng forest was gazetted as a National Park in March 2010. In terms of area, this was a 1-to-1 offset for the 54,000 ha of inundated land and the 4,000 ha footprint of associated Project infrastructure. However, the habitat quality was (and remains) distinctly higher within the offset area than in the inundated and cleared Project areas; for example, the offset area includes the core habitat for the gorillas and other globally threatened primates. In 2013, the Government of Cameroon expanded the National Park to 74,753 ha, thereby helping to increase the long-term viability of its wildlife populations. The Park's first Management Plan was adopted in December 2015. This plan spells out the management needs and priorities for the Park, including revised budget requirements that are in line with international standards for protected area management. Cameroon's Ministry of Finance, Ministry of Forestry and Wildlife, and EDC recently signed a Memorandum of Understanding concerning Park management responsibilities and funding. Under this Memorandum, the Ministry of Forestry and Wildlife has committed 60 game guards to focus especially on preventing poaching, illegal logging, and agricultural or housing encroachment within the Park. The Park now also has year-round, 24-hour checkpoints to monitor and check vehicles crossing key potential wildlife or timber trafficking points.

## Legal Framework

As yet, Cameroon does not have specific legislation for biodiversity offsets. However, the country legally requires environment assessments and, through consultants, carried out a rigorous Environmental and Social Impact Assessment (ESIA) with an Environmental and Social Management Plan (ESMP) that fully complied with World Bank requirements.

## Stakeholder Engagement

Significant stakeholder engagement took place during project preparation including with Project-affected families and with local and international NGOs. Local communities have been made aware of their rights to monitor Project implementation progress and to make use of the established grievance redress mechanisms. Further consultation will take place on key issues, including adjustments in the water release regime during dam operation.

## Monitoring

The Deng Deng National Park Management Plan establishes the biodiversity monitoring

framework for the Park, including protocols for gathering species data and wildlife monitoring indicators. The Park also monitors its management effectiveness using the METT (described in Chapter 6). The annual census of the Park's gorilla population indicates that it is stable, a success attributable in no small measure to ongoing Park protection and management activities. Park rangers have recently been trained in the use of GPS and other Park monitoring tools.

Outside of the Park, key Project-level monitoring includes water flow, water quality, and fish species population monitoring, both upstream and downstream of the dam including the Doula Estuary. The Project also includes an estuarine monitoring system to track the status of mangroves, salinity, geomorphology, West African Manatees and other threatened species, and fishing communities. With respect to the dam and other Project civil works, independent auditors have been contracted to provide quarterly reports on the environmental and social aspects of Project construction. EDC has also appointed two independent Panels of Experts to advise, respectively, on (i) dam safety issues and (ii) the Project's environmental and social aspects.

## Financial Sustainability

During Project preparation, it was estimated that EDC would collect about US$29 million annually in water use tariffs from the two existing hydroelectric plants downstream of the Project. This was estimated to be more than sufficient to pay for the annual operating and maintenance costs of the Lom Pangar Dam, including the continued protection and management of the Deng Deng National Park as well as the other recurrent costs of Project environmental mitigation. Under the financing agreement with the World Bank, the Government is expected to either (i) adopt a water tariff structure which will pay for the recurrent costs of the Deng Deng National Park or (ii) provide an alternative financing mechanism to the satisfaction of the Bank. Until such a financing mechanism is in place, funding from the French Development Agency (AFD) loan for the Lom Pangar Project are being used to cover Park operating costs.

## Successes

The Project has resulted in significant conservation benefits, most notably the establishment, on-the-ground implementation, and subsequent expansion of the Deng Deng National Park. As a result of the investment provided through the Lom Pangar Hydropower Project and complementary conservation projects, this Park is now a key stronghold for Western Lowland Gorillas (classified by IUCN as Critically Endangered) as well as other globally threatened species. Taking into account the baseline deforestation rates and intense bushmeat poaching outside of protected areas in Cameroon, this offset appears to have achieved a very solid Net Gain from a terrestrial biodiversity conservation standpoint.

## Lessons Learned

Although still an ongoing work-in-progress, the Lom Pangar Project has (to date) implemented a very significant and successful biodiversity offset by establishing the Deng Deng National Park and supporting its on-the-ground protection and management. As is typically the case with large development projects and their associated biodiversity offsets, there are some lessons learned that could be useful for planning similar, future conservation initiatives. These lessons learned include:

- Because the downstream hydropower facilities have not yet been constructed, alternative funding had to be found to cover the recurrent operating costs of the Deng Deng National Park.

- Certain environmental management issues were addressed adequately during Project implementation, although they ideally would have been handled earlier: As an example, ecological baseline information (including species-specific data) would ideally have been obtained earlier, particularly for the downstream riverine environment including the Douala Estuary.
- Anti-poaching law enforcement was not sufficiently strong during the early years of Project construction, although (i) the gorillas and other highly threatened species were not adversely affected during construction and (ii) on-the-ground protection has markedly improved in recent years, largely in response to the Project's conservation investments.
- As is still the case for most dam and reservoir projects worldwide, this Project did not include a specific aquatic biodiversity offset for the free-flowing river habitat inundated by the Project.


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