



FOREST-SMART MINING: Offset Case Studies





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TABLE OF CONTENTS

Acknowledgements	iv
Attributions	iv
Abbreviations and Acronyms	v
1 Introduction	2
2 Key Lessons Learned from Offset Case Studies	3
2.1 The Enabling Environment.....	3
2.2 The Social Implication of Offsets	3
2.3 The Complexities around “Metrics” and No Net Loss or Net Gain.....	4
2.4 Securing Long-Term Protection of Land.....	5
2.5 Have Intended Outcomes Really Been Achieved?	5
2.6 Partnerships and Benefits of Local Knowledge.....	5
2.7 “It’s the Governance, Stupid”	6
2.8 Sustainable Financing to Ensure Offsets’ Success in Perpetuity.....	6
3 Nimba Biodiversity Conservation Programme, Liberia	8
3.1 Context	9
3.2 Biodiversity Values	9
3.3 Residual Impacts after Mitigation	10
3.4 Nimba Biodiversity Conservation Programme / Offset	11
3.5 Successful Outcomes to Date	12
3.6 Refining the Program.....	12
3.7 Key Elements Contributing to Success.....	12
3.8 Key Challenges	14
3.9 Conclusion.....	15
4 Akyem Gold Mining Project, Ghana	16
4.1 Context—Forests Loss and Degradation	17
4.2 Akyem Gold Mining Project.....	18
4.3 Restoration	20
4.4 Residual Impacts, Offset, and Metrics.....	20
4.5 The Search for a Suitable Offset Site.....	20
4.6 Key Challenges of Finding and Securing an Offset Site.....	22
4.7 Looking Forward.....	23
4.8 Conclusion.....	23
5 Moyen Bafing National Park, Guinea	24
5.1 Context	25
5.2 Compagnie des Bauxites de Guinée and Guinea Alumina Corporation	25
5.3 Biodiversity Values	25
5.4 Residual Impacts after Mitigation	25
5.5 Metrics to Determine Net Gain	27
5.6 The Selected Site—Moyen Bafing National Park / Offset.....	27
5.7 Financing.....	30

5.8	Ensuring the Long-Term Security of the Offset.....	30
5.9	Governance	32
5.10	Successful Outcomes to Date	32
5.11	Key Elements Contributing to Success.....	32
5.12	Key Challenges	32
5.13	Conclusion.....	33
6	Kasigau Corridor REDD+ Project, Kenya	34
6.1	Introduction.....	35
6.2	The Project.....	35
6.3	Project Activities.....	36
6.4	Biodiversity Values	37
6.5	Carbon Offset	39
6.6	Governance Systems.....	39
6.7	Monitoring.....	39
6.8	Funding	40
6.9	Successful Outcomes to Date	41
6.10	Key Elements Contributing to Success.....	42
6.11	Key Challenges	43
6.12	Conclusion.....	43
7	Maules Creek Coal Mine–Biodiversity Offset, Australia	44
7.1	Context.....	45
7.2	Biodiversity Values and Impacts.....	45
7.3	Residual Impacts after Mitigation	45
7.4	Offset Strategy Agreed	47
7.5	Mechanisms for Safeguarding in Perpetuity	50
7.6	Environmental Trust Fund and Coordinated Forest Conservation.....	50
7.7	Key Elements Contributing to Success.....	50
7.8	Key Challenges	50
8	Practical Challenges Encountered in Offset Implementation	54
8.1	Reliance on Charcoal Production Puts Pressure on Forests.....	54
8.2	Reliance on Fuelwood Puts Additional Pressure on Forests.....	55
8.3	Use of Fire as a System of Land Management.....	57
8.4	Offsetting Where Agricultural Land Is Scarce Can Be Especially Challenging.....	58
8.5	Access to Logging at Various Scales Can Undermine Offset Implementation.....	59
8.6	Bushmeat Hunting Can Significantly Undermine Offset Efforts.....	60
8.7	Limiting Access Protects Forests.....	62
8.8	Forest Restoration Does Not Result in Short-Term Biodiversity Gains.....	62
9	Conclusions	64
	References	65

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55	Charcoal	Thomas Johannesson
56	Man pushing firewood	Thomas Johannesson
56	Woman carrying branch	Thomas Johannesson
57	Fire	Thomas Johannesson
58	Rice farming	John Howell
59	Pit sawing	John Howell
60	Pit sawing	John Howell
61	Cane Rat	Thomas Johannesson
61	Domestic Rat	Katherine Howell
62	Revegetation	John Howell
63	Revegetation	John Howell

ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
AML	ArcelorMittal Liberia
BBOP	Business and Biodiversity Offsets Program
BCP	Biodiversity Conservation Programme
CA	Conservation Alliance
CBG	Compagnie des Bauxites de Guinée
CBO	community-based organization
CF	community forest
EEC	endangered ecological community
EIS	Environment Impact Statement
ENNR	East Nimba Nature Reserve (Liberia)
ESIA	environmental and social impact assessment
FAO	Food and Agriculture Organization (of the UN)
FDA	Forestry Development Authority (Liberia)
GAC	Guinea Alumina Corporation
GEF	Global Environment Facility
GHI	Genetic Heat Index
GSBA	Globally Significant Biodiversity Area
IFC	International Finance Corporation
KBA	Key Biodiversity Area
KCRP	Kasigau Corridor REDD+ Project (Kenya)
LCC	Locational Carbon Committee
MCCM	Maules Creek Coal Mine
NGO	nongovernmental organization
NGRL	Newmont Golden Ridge Limited
OGUIPAR	Office Guinéen des Parcs et Réserves
PS6	Performance Standard 6
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RMSC	Resource Management Support Centre
VCS	Verified Carbon Standards
VCU	Verified Carbon Unit
WCF	Wild Chimpanzee Foundation

All \$ are U.S. dollars unless otherwise indicated.

1. INTRODUCTION

Despite its relatively modest footprint, mining is an important driver of deforestation and degradation in tropical forests, often as a result of indirect impacts from associated infrastructure, unplanned development, and in-migration. The World Bank program on “Extractive Industries in Forest Landscapes” aims to ensure that this sector does not erode forest capital, but rather enables client countries and the World Bank Group to make better-informed decisions about minimizing trade-offs and maximizing benefits from “forest-smart mining.”

An increasing number of mining projects are implementing biodiversity offsets as a result of their own policies; performance requirements from lenders such as the International Finance Corporation (IFC), African Development Bank (AfDB), European Bank for Reconstruction and Development (EBRD), export credit agencies, commercial banks; and, in a few countries, legislation. Offsets are 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, long term, and additional to any other (ongoing or planned) conservation measures. If implemented correctly, offsets can and have contributed to the protected area network, either by setting aside new areas for conservation or through supporting existing protected areas that are currently very underfunded and not managed effectively.

However, mining causes fundamental changes to forest ecosystems, and it can take around 40 years (or more) for degraded land to return to a botanical mixture broadly similar to that found in largely undisturbed forests (URS 2013). Compensating for biodiversity loss is complex, time-consuming, and costly—and in some cases not possible. A lot has been written about the importance of the technical and ecological elements of offset implementation. However, compensation is not simply

about ensuring that offsets are ecologically acceptable—that is, that they protect similar or better biodiversity values to those that were lost—but also that they are socially and politically acceptable. In a world where demands on land are increasing inexorably and the rights of communities are paramount, finding, securing, financing, and managing sites that meet all these criteria is very challenging. This is particularly the case outside highly regulated markets such as Australia and the United States. In the medium term, the complexity of implementing offsets is likely to result in governments, companies, and nongovernmental organizations (NGOs) encouraging the implementation of aggregated offsets over large landscapes where the technical, social, and financial costs can be shared.

This document presents five detailed case studies: (1) ArcelorMittal’s iron ore project in Liberia, (2) Newmont’s Akyem project in Ghana, (3) Compagnie des Bauxites de Guinée and Guinea Alumina Corporation’s bauxite projects in Guinea, (4) Wildlife Works’ carbon offset project in Kenya, and (5) Aston Coal’s Maules Creek coal mine in Australia. Together, they highlight the spectrum of challenges faced by those aiming to implement enduring offsets. The selection of studies was based on their different types of forest landscapes, inclusion of World Bank Group projects, variety of minerals, and, most importantly, availability of data, which constrained the geographical spread of case studies.

Section 2 presents the key lessons learned (and related conclusions in text boxes). The detailed case studies are presented in sections 3–7. Section 8 summarizes some practical challenges that may undermine the successful implementation of offsets. This is not an exhaustive list, but it highlights a number of the challenges faced by the implementing partners profiled in sections 3–7. Finally, section 9 offers some concluding observations.

2. KEY LESSONS LEARNED FROM OFFSET CASE STUDIES

2.1 The Enabling Environment

If offsets are to contribute permanently to the conservation estate of a country after the application of the mitigation hierarchy, there needs to be an enabling environment for this to happen. Offsets typically involve a public-private partnership. The private sector can bring management skills and financing, but governments can either enable or impede companies from fulfilling their commitments to implementing offsets.

In the ideal, governments would establish appropriate legal provisions requiring companies to apply the mitigation hierarchy to achieve no net loss or net gain, for example, in sectoral and environmental and social impact assessment (ESIA) legislation. In addition, legislation that enables the long-term protection of areas while also recognizing the rights of users is also important. If companies are to invest significant financial resources into an area to ensure long-term biodiversity protection, they need to have a high level of comfort that these areas will remain legally protected. Other helpful policies may include a national offset policy and policies that prevent deforestation, such as REDD. However, the existence of relevant legislation is not sufficient for offsets to succeed. The successful implementation of offsets requires institutional willingness and capacity plus champions within government.

Companies are not well positioned to implement offsets unilaterally, so other enabling factors include the availability of willing conservation partners and an engaged civil society. In the developing world, an ability to provide realistic opportunities for alternative livelihoods should there be restrictions imposed on communities within the offset area is fundamental.

While not all of these enabling factors will be present in every country, their absence complicates the successful implementation of offsets. For example, the Ghana case study highlights the problems encountered when several offset sites originally proposed by the Forestry Commission failed to materialize due to other competing land uses. The lack of clarity within Ghana's legislative and policy framework regarding the ability to protect forest

reserves in the long term exacerbated the problem.

The Guinea case study highlights how institutional willingness and the presence of some supportive figures in government supported the project in an environment with few enabling factors. The government established an interministerial commission that was an extremely helpful forum in which different ministries could discuss and resolve possible conflicts and issues relating to the proposed offset site.

In Liberia, although there is no specific legislation, the government received \$3.6 million from the World Bank's Forest Carbon Partnership Facility (FCPF) to develop Liberia's national plan for engaging in REDD+. The Forestry Development Authority was a key government agency involved in the program, so there was a lot of knowledge and willingness within government on the need to protect Liberia's forests and to partner with ArcelorMittal in the protection of the East Nimba Nature Reserve.

If offsets are to contribute permanently to the conservation estate of a country after the application of the mitigation hierarchy, there needs to be an enabling environment for this to happen. Governments should ensure there exists a supportive environment that enables offsetting through legislation, policy, and willingness to partner with the private sector.

2.2 The Social Implication of Offsets

In the developing world, one of the biggest challenges common to almost all the case studies presented here, and to many other offsets, is reconciling the needs of communities who depend on forests with the need to preserve species and their habitat. In a populated rural landscape where there may be many demands on ecosystem services and where communities may enjoy traditional or usufructuary rights within forests, it is not possible to conserve biodiversity in an enduring manner without addressing the value of forests to communities

even where these represent key threats to their existence. Offsets will only succeed with the support of local communities. That support is conditional on ensuring that communities' subsistence and livelihood needs are not adversely affected or are adequately compensated for; otherwise, offsets are simply not sustainable. Companies that do not ensure this have been accused of "green grabbing" and impacting the poorest in society.

In reality, the values of forests to communities are often at risk due to a range of threats. Ideally, community support for offsets will depend not only on their needs being met or compensated for but also from mutual recognition that the offset offers the potential for community needs to continue to be met in the long term rather than suffer an inexorable decline. Addressing these social dimensions is not straightforward, and the costs and time associated with these aspects of offset implementation need to be assessed and considered in the planning phase. In the Liberia case study, the consultation period took more than three years before all key stakeholders reached consensus on the offsetting strategy. Programs are now under way to reduce the threat posed by unsustainable community practices on the protected area, but challenges remain.

In Guinea, the Office Guinéen des Parcs et Réserves (OGUIPAR) and the Wild Chimpanzee Foundation (WCF) are about to embark on an informed consultation process for the communities within the national park. This approach recognizes that the success of the offset depends on respecting the rights of the communities, to secure their support for establishing the different management zones prescribed within the park. Cognizant of the importance of the social dimensions, the WCF and OGUIPAR are also bringing in other partners such as World Vision to assess the feasibility of climate-resilient agricultural projects. In Kenya, to provide alternative livelihoods, Wildlife Works created an "eco-factory" that employs over 50 people; it manufactures an organic cotton fashion collection and other sustainable private label lines. Nevertheless, competing with clothing made in India or China at a much cheaper cost proved challenging until the value of the brand established itself. The development of effective models of community-based conservation is still in its infancy.

Offsets will only succeed with the support of local communities. That support is conditional on ensuring that subsistence and livelihood needs are not adversely impacted or are adequately compensated for. Ideally, community support for offsets stems from mutual recognition that the offset offers the potential for communities to thrive sustainably.

2.3 The Complexities around "Metrics" and No Net Loss or Net Gain

Many offsets need to address more than one species and habitat and be designed to support landscape- or seascape-scale goals. As a result, it is not always possible or practical to establish reliable quantitative and qualitative metrics for every biodiversity component affected by a project. A critical challenge for the conservation community and companies is to derive pragmatic, defensible, and replicable measures and units of exchange as the basis for assessing losses and gains, quantified wherever possible. These might include surrogates or proxies that represent biodiversity overall, combined with measures that separately account for rare, threatened, or particularly important components of biodiversity.

The Liberian case study is interesting because ArcelorMittal Liberia quickly implemented conservation measures by protecting the East Nimba Nature Reserve rather than concentrate on the derivation of metrics; this approach has for the most part been successful. While the program now needs revising to take account of specific species not in the original program, this example highlights that the absence of metrics should not prohibit the implementation of practical early conservation efforts. This case study also highlights the challenges of offsetting endangered species dependent on unpolluted streams; the streams are not degraded in the offset areas, and therefore are not enhanced by the work under the Nimba Biodiversity Conservation Programme.

Metrics provide a structured way of assessing losses and gains. However, this does not mean that companies need to establish reliable quantities and qualities of every biodiversity component affected. In some cases, it is also valuable to initiate conservation activities that will contribute positively to the landscape.

2.4 Securing Long-Term Protection of Land

Much to the frustration of conservationists and companies alike, some potential offset sites have been identified with an in-principle agreement from government but then later developed for other purposes. Typically, this results when there is inadequate protection or competing demands from other, more lucrative land uses. This is an important consideration when implementing offsets. The legal mechanisms to ensure lasting protection of land in many countries may be lacking. Where protective

measures are either weak or absent, considerable time, political engagement, and financial resources may be required to secure an adequate level of protection. One challenge this poses is that companies may have no option other than to pursue the highest form of protection (such as national park status) to implement an offset. In practice, companies may be unwilling or unable to apply the necessary resources and political capital to pursue this option.

For example, in the Maules Creek case study many of the offsets lie over high-grade coal, and there is some concern that in the long term, there could be a change of policy within government that would overturn the requirement to protect these areas. In Guinea, what started out as a potential offset area became a national park. However, this involved a considerable investment of resources on the part of all parties involved. In Ghana, legislation around the protection of forest reserves is confusing, thereby making offset implementation that involves forest reserves (as opposed to protected areas) complicated. In Liberia, there is a reluctance to create any more protected areas due to the concerns about reconciling community rights with conservation. As countries develop economically and land values increase, continuing to make carbon payments or other payments for ecosystem services (PES) competitively compelling (see the Kenya case study) will be challenging when other economic opportunities present themselves to landowners or developers.

Securing the long-term protection of land is essential to provide companies with a sufficient degree of certainty to invest in offsets, and civil society needs to know that these offset areas will not be eroded in the future. Where protective measures are weak or absent, considerable resources may be required to secure an adequate level of protection. Government should ensure that there are options for long-term protection while also recognizing the rights of communities.

2.5 Have Intended Outcomes Really Been Achieved?

A recent review by the Nature Conservation Council of five existing offsets schemes in New South Wales, Australia, concluded that offsetting was not resulting in good conservation outcomes (NCC 2016). One offset was deemed disastrous, three were described as poor, and two considered adequate. Although this is a small sample, it does highlight the importance of effective implementation and monitoring of outcomes. However, the time frame for achieving genuine outcomes may

be long term, so how can it be determined whether outcomes are truly effective without the costs being excessive? This is particularly difficult for projects where multiple biodiversity values are involved and no single metric can objectively capture the full extent of biodiversity. There are numerous situations where measures of habitat area and quality are not a good substitute for losses at the species level.

In Liberia and Guinea, where the offset is on a landscape scale and numerous external factors influence outcomes, attributing changes in variables to the project may be very difficult. If the desired outcome is no net loss or net gain, it is necessary to use a structured approach with some form of accounting method to ensure that all significant residual impacts are addressed. This reinforces the need to derive pragmatic, defensible, and replicable measures and units of exchange as the basis for quantifying and assessing losses and gains.

Effective implementation and monitoring are important if conservation outcomes are to be demonstrated, but this may happen over the long term and monitoring can be expensive. No single index can monitor all outcomes; a suite of indicators is likely to be needed. This reinforces the need to derive pragmatic, defensible, and replicable ones.

2.6 Partnerships and Benefits of Local Knowledge

Partnerships are very important for offsets to be successful. Only in a few situations has a company alone secured complete and permanent control over a significant area of land. The success of a project depends on a long-term partnership between the company and the local communities. In addition, companies rarely have access to the broad sets of skills required to manage land and natural resources, or to successfully engage the communities and authorities that almost certainly need to be involved. Thus, a range of partnerships is needed, as shown by the Liberia and Guinea case studies.

Protected area management requires negotiation and participation with local communities, the provision of developmental support, and alternative livelihoods strategies. It may require special skills for devising interventions to ensure that a protected area evolves in appropriate ways. Also important is a transfer of skills to the relevant agencies so the protected area can be successfully managed in the long term.

Partnerships are intrinsically complex, however, and they need to be actively managed if they are to succeed. At their

most basic, they involve cooperation to advance mutual interests and increase the prospects of success beyond what any of the partners could achieve by going it alone. But partnerships also require partners to compromise, to progress at a pace that may be uncomfortable for some (or all) partners, and to relinquish ownership and control. So having a commitment in principle to partner is essential for all parties, but so is the explicit recognition of the importance of putting time into actively managing the partnership.

Communities can feel resentment when they are not included in the decision making on offsetting and when monitoring and management is undertaken by outside experts. Allowing communities to participate and become partners in the process helps to build trust. The communities also have very valuable knowledge about not only local biodiversity but also local agricultural systems that complement more technical understanding of soil fertility and plant growth and can assist in identifying suitable interventions.

Partnerships are essential for offsets to be achieved and then to endure. The requisite authority and skills to implement and ensure protection of an offset successfully are rarely present within a single organization. However, partnerships are also intrinsically complex and require active management if the collaborative advantage that partnerships promise to deliver is to be achieved.

2.7 “It’s the Governance, Stupid”

Given that all offsets depend on partnership approaches, putting effort into establishing the effective governance and oversight of offsets is extremely important. Optimally, this would involve the potential winners and losers from offset implementation. The skill lies in balancing the need for participatory oversight while limiting bureaucracy. The partners in an offset have conservation as a shared objective, but they also have individual objectives. For the company, demonstrating the success of conservation efforts may be important to its lenders or international stakeholders. For the government, showing progress toward meeting commitments under the Convention on Biological Diversity may be one factor—while demonstrating that they represent the interests of voters in communities. For communities, securing their subsistence and livelihood needs may be paramount. This reinforces the need for a governance or oversight mechanism that reflects and balances these interests.

In Kenya, Wildlife Works supported the establishment of six Locational Carbon Committees to administer the

accruing benefits on behalf of the communities and required that each committee identify community-based organizations as the implementing agencies for any projects funded by the Kasigau Corridor REDD+ Project. In Liberia, ArcelorMittal worked with Community Forest Management Bodies and, for the nature reserve, a government-community Co-management Committee. These entities were all set up separately during the program’s consultation period under the development of community forestry rights that happened to be occurring at the same time. Involvement in the offset program helped to give purpose and capacity to these nascent institutions.

Given that all offsets depend on partnerships, their effective governance and oversight is extremely important. The skill lies in ensuring participatory oversight while limiting bureaucracy.

2.8 Sustainable Financing to Ensure Offsets’ Success in Perpetuity

Offsets need long-term sustained financial commitment. In regulated markets (such as the United States and Australia), brokers can in some circumstances provide “off-the-shelf” offsets, or there is funding in place or a range of financing options available. For example, in the Maules Creek case study in Australia, the company submitted a Conservation and Biodiversity Bond to the New South Wales state government.

Outside these regulated markets, the lack of adequate finance to support offsets is a major risk in achieving their desired outcomes. While conservation trust funds such as the Mozambique Bio Fund and Liberia Conservation Fund are useful as a means of channeling funds, they are not themselves a source of income.

The two major financing options are committed regular operational funding and an endowment. Endowments involve up-front capital, which requires a commitment of the complete financing costs at the outset, while ongoing finance requires ongoing payment contributions to satisfy the recurrent costs of an offset project through to completion of that project. Few companies appear willing or able to provide the financing costs up front; in the featured case studies, the companies pay into the offsets on an annual basis. The Kenyan project has had to cope with the vagaries of the carbon market and the Liberian project has had to weather fluctuations in the iron ore market. Some companies are exploring whether they can combine carbon and biodiversity offsets as a way to leverage more income.

The 2017 paper “Options and Financial Mechanisms for the Financing of Biodiversity Offsets” by Conservation Capital and the Wildlife Conservation Society explores other options to those highlighted above, such as financial guarantees, insurance products, and leveraging financial institutions to wrap offset costs into general project finance. It is important that these other financing mechanisms are explored and further developed so that companies can secure long-term finance at the outset.

Outside regulated markets, securing adequate finance from project proponents to support offsets is a major risk to implementation. Companies should ensure there is adequate financing, and financial and other institutions should expend more effort to establish a broader range of financing options.



3. NIMBA BIODIVERSITY CONSERVATION PROGRAMME, LIBERIA

SUMMARY

ArcelorMittal has been mining iron ore in the Nimba region of northern Liberia since 2011, although exploration and mining has taken place intermittently there since the 1950s. The Biodiversity Conservation Programme was established in 2011 after three years of consultation. The case study assesses six years of implementation.

Key Features

- The mining project results in the loss of forest and other habitats and species of high biodiversity value, but good opportunities exist close by where carefully planned conservation actions are likely to compensate for the losses if funding continues over the long term.
- The Biodiversity Conservation Programme strengthened the management of an existing protected area that had no funding or management plan and enhanced the management of existing community forests to promote sustainable management that incorporates conservation.
- Strong partnerships. The government of Liberia's Forestry Development Authority is the key implementing agency at the national level and has been an active partner throughout the process together with Fauna and Flora International and Conservation International.

Key Outcomes

- Better protection of the East Nimba Nature Reserve and surrounding Gba, Blei, and Zor community forests
- Increased capacity of partners and heightened awareness of the importance of forest conservation and the fragility of the biodiversity

and ecosystems services

- Nearly 10 years of data collected in the area, significantly contributing to understanding of species in the region

Key Challenges

- Establishing effective partnerships took years to achieve.
- The lack of landscape-scale planning means that schemes of this nature are working largely in isolation and are threatened by external factors.
- The development of effective models of community-based conservation is still needed. Liberia's introduction of community forestry legislation in 2009 is aimed more at localized resource exploitation rather than conservation.
- Alternatives to slash-and-burn agriculture are still not readily available. The inherent fertility of the soils and difficulties in nutrient management, along with the limited availability of labor and other agricultural inputs, make the development of sedentary smallholder farming very difficult in humid West Africa in general.
- It is not always possible to offset impacts on certain species and some translocations were undertaken. How successful those translocations will be over the long term has yet to be determined.
- The establishment of a long-term governance system, supported by endowed sustainable funding, is in progress but by no means assured. The very volatile commodity price cycles since 2000 make it hard for mining companies to commit significant endowment funding.

Key Lessons Learned

- Not all residual impacts on certain species can be offset and the effectiveness of translocations is not known for many species.
- In some situations, measures of habitat area and quality are not a good substitute for losses at the species level. If the desired outcome is no net loss or net gain, it is necessary to use a structured approach with some form of accounting method to ensure that all residual impacts are addressed.
- Monitoring outcomes in a complex landscape is very difficult and takes time.

3.1 Context

ArcelorMittal Liberia (AML) has been mining iron ore in the Nimba region of northern Liberia since 2011, although exploration and mining had taken place intermittently in the region since the 1950s, by the Liberian-American-Swedish Mining Company (LAMCO). The Nimba Range extends from Liberia into Guinea and Côte d'Ivoire. The mountains are covered in moist evergreen, montane, and secondary forests. In addition to mining, forest ecosystems are under severe pressure from the livelihoods pursued by rural communities as they depend on bushmeat, charcoal, firewood, medicinal plants, and subsistence agriculture. The prevailing slash-and-burn agricultural system may historically have been a sustainable form of agriculture on these tropical soils when population density was low and allowed for long rotations, but this is no longer the case due to additional pressures on land resources.

3.2 Biodiversity Values

The Nimba forests are widely recognized as having outstanding biodiversity value, with both national and international designations. The layout of the forests is shown in Figure 3.2. The East Nimba Nature Reserve (ENNR) is formally protected by law and recognized as an important Alliance for Zero Extinction site. Both the ENNR and the main West Nimba forest are designated as Key Biodiversity Areas (KBAs). These blocks contain a wide range of habitats and plant and animal species, including a number that are both threatened and range restricted. AML's mining activities directly affect several parts of the West Nimba forest and can reasonably be expected to have indirect impacts on the wider forest and agricultural landscape.

The hilly terrain of the area has a mixed cover of primary and secondary forests, agriculture, and fallowed agricultural land returning to secondary forest. This results in a mosaic of habitats and vegetation types, ranging from highly disturbed habitats of low biological quality with relatively few species of global conservation concern, to high-value habitats of intact forest with large numbers of globally rare or restricted range species. The West Nimba forest comprises a large area of relatively intact moist evergreen forest with a high global heat index, indicating that it contains many globally rare species and is of high conservation value. West Nimba also includes patches of submontane and secondary forest. The ENNR includes lowland moist evergreen forest of high conservation value, both submontane and montane forests, disturbed upland vegetation, some secondary forest, savanna, and edaphic savanna.

The habitats provided by the Nimba forests overall, including the wider area that stretches across the nearby borders into Guinea and Côte d'Ivoire, are globally important for fauna and support numerous species of conservation concern, including the critically endangered Mount Nimba viviparous toad (*Nimbaphrynoides occidentalis*) and the endangered Nimba otter shrew (*Micropotamogale lamottei*). The areas close to the company's mine sites host several species of conservation concern, chief among which are the critically endangered western chimpanzee (*Pan troglodytes verus*)—an estimated population of 26 individuals (confidence interval range from 10 to 67)¹—and two threatened species each of freshwater crabs and bats. There are also a number of threatened amphibians, a threatened reptile, and several restricted range fish.

¹ Based on secondary evidence such as nests, giving a wide confidence range.

Figure 3.1 The Main Nimba Ridge (Designated the East Nimba Nature Reserve), Seen from the West Nimba Forest



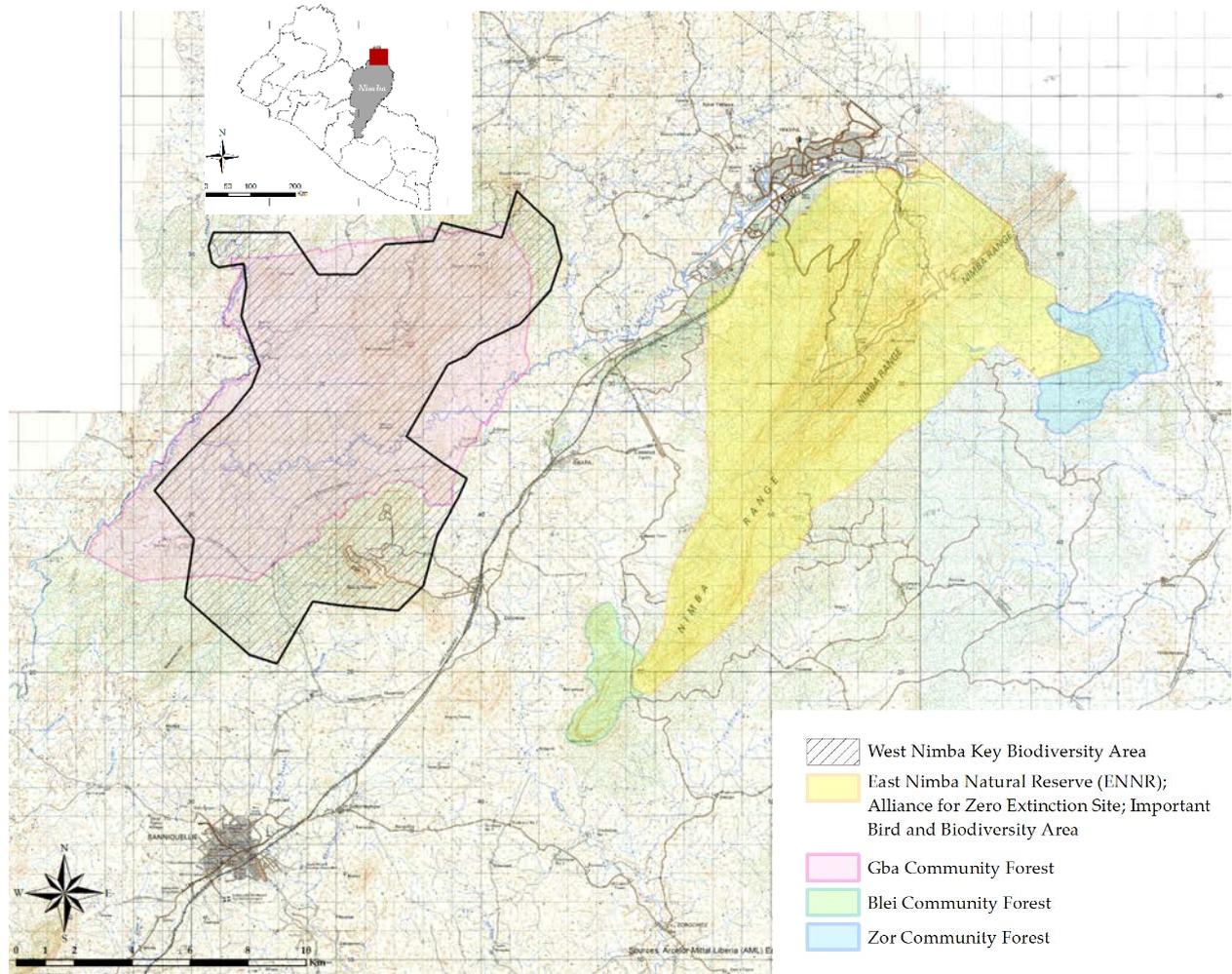
3.3 Residual Impacts after Mitigation

ArcelorMittal's stated approach has been to avoid environmental damage wherever possible by incorporating criteria at the design stage that limit the land-take and disturbance of biodiversity as far as it is possible to do so. Further ameliorative measures are then applied to minimize and restore impacts. Nevertheless, in West Africa most iron ore deposits form raised mountains in the landscape, giving rise to a strong concordance with forest habitat through its unsuitability for conversion to agriculture as has happened on the lower-lying terrain. Steep slopes also make mine drainage particularly difficult to control in the humid climate. Restricting the land-take—and consequent loss of vegetation—and controlling runoff have proved more difficult in practice than the company anticipated. Furthermore, the true restoration of forests of this nature

is such a long-term undertaking that the company accepts that this alone is not sufficient to safeguard biodiversity. Consequently, AML considers that forest disturbance must be compensated for adequately even though subsequent rehabilitation is also intended.

In the most recent study (2017), residual impacts from mining were predicted for the following biodiversity: moist evergreen forest habitat, and part of a KBA; western chimpanzee; western black and white colobus; Nimba otter shrew; two bat species; a reptile; three species of frog; four species of fish; and three species of freshwater crab. All trigger critical habitat under IFC's Performance Standard 6 (PS6).

Figure 3.2 Northern Nimba, Showing ArcelorMittal’s Two Iron Ore Mines, Tokadeh and Gangra



Source: ERM 2017.

Note: The focus area for the offset is the East Nimba Nature Reserve.

3.4 Nimba Biodiversity Conservation Programme / Offset

It was clear from the outset of ArcelorMittal’s involvement in Nimba that biodiversity was very significant in its concession area but under such threats that it also needed active conservation support. This provided an opportunity for offsetting locally what was widely considered by stakeholders to be very worthy of support. While it was clear that the impacts of mining would be major in some areas (totaling 20 square kilometers), it was also evident that extensive areas of forest were being affected by other land uses.

The Biodiversity Conservation Programme (BCP) was therefore established to undertake the following main actions:

- Strengthen the management of the ENNR, a protected area that covers 115 square kilometers of the Liberian Nimba Range. Although gazetted in 2003, it did not have a formal management system until one was agreed in 2014 by a consensual process supported by the BCP.
- Enhance the management of the Gba, Blei, and Zor community forests (CFs), covering 126 square kilometers in total, through agreements with the three Community Forest Management Bodies to promote sustainable management that incorporates conservation.
- Negotiate and manage conservation agreements that provide benefits to communities in exchange for effective conservation of high-priority areas and species, by incentivizing behavior.
- Support sustainable livelihood projects to reduce dependence on hunting and forest products, particularly through improved agricultural practices that should help to reduce shifting cultivation.

- Undertake research on key fauna, focusing on species that are endemic (such as the Nimba otter shrew) or are found in unique concentrations (such as the giant African swallowtail butterfly).

3.5 Successful Outcomes to Date

“The BCP is an ambitious programme which seeks to address multiple threats to biodiversity in a complex landscape, and should be recognised as a genuine application of conservation and development practice at a landscape scale” (ERM 2017, 186).

This quote summarizes ArcelorMittal’s BCP succinctly, and its noteworthy intent to improve forest conservation over some 240 square kilometers of forest in recognition of its own major alteration of around 20 square kilometers of forested terrain and riverine wetlands. But an offset scheme of this type is a long-term undertaking and its real outcomes and successes will not be visible for some years. The company will need to continue its initial levels of activity for the decades of mine life and closure. After six years of implementation, however, the following significant progress can be recorded:

- Better protection of the ENNR and community forests, through significant activities on the ground organized by management groups with enhanced capacity, and heightened awareness of the importance of forest conservation and the fragility of the biodiversity and ecosystems services
- A consensual management plan that formalized the way to manage the ENNR for the first time
- Communities, government, NGOs, and a mining company all working together, implementing plausible plans for the effective management of what was previously only a theoretical nature reserve, and community forests that lacked strategic vision
- Development of incentivized alternatives to forest exploitation through conservation agreements with 10 communities in the areas around the target forests
- Recognition of the limitations of agricultural sustainability and development of a subprogram aimed at finding robust solutions to address this

Behind these statements of achievement lie a large amount of activity and changed behavior. These suggest an excellent start for a long-term program, and the establishment of an institution that is likely to succeed in its aims if it is continued.

3.6 Refining the Program

The BCP devoted resources principally to field conservation rather than to detailed studies of species populations and ranges, and metrics of impacts and outcomes, and for the most part the program has been successful. AML’s 2017 review of its BCP shows that while the program addressed many residual impacts, the program needs some additional elements if it is to fully address residual impacts associated with the expansion project. These include species that are very restricted range or species such as chimpanzees, which have a low fecundity rate and require a large number of chimpanzees to achieve net gains. A lesson learned is that if the desired outcome is no net loss or net gain, it is necessary to use a more structured approach with some form of accounting method (that is, with formal metrication) to ensure that all residual impacts are addressed.

3.7 Key Elements Contributing to Success

Implementation Partnerships

ArcelorMittal has worked in close partnership with the local communities (see Box 3.1), county and national authorities, and county, national, and international NGOs. All have been instrumental in providing the broad teamwork necessary to implement a long-term program at landscape scale.

- The government of Liberia’s Forestry Development Authority (FDA) is the key implementing agency at the national level. It has been an active partner throughout the process and has continued to provide staffing of the ENNR and to support the community forests. One strength of the FDA over the years of this partnership has been its candid recognition of its own limitations (a consequence of Liberia’s post–civil war economy, further affected by volatility in the commodity markets of its national exports) and the openness of its management to collaborate in forest conservation.
- Conservation International has both undertaken activities funded by ArcelorMittal and provided its own resources for community-based forest conservation in Nimba. It has also been instrumental, with the FDA, in establishing a Liberia Conservation Fund as an endowment to provide sustained funding, with an initial tranche dedicated to Nimba.
- A number of community-based organizations have worked closely with the BCP. They are mainly the management entities for the ENNR and the community forests. By providing the low levels

of funding required to pay for the time of these otherwise largely voluntary contributions, the BCP has enabled them to initiate considerable changes.

- Fauna and Flora International has brought its expertise in protected area management to establish and implement the strategy for enhanced protection of the ENNR, through support to the FDA and community staff.
- IDH has contributed funding in collaboration with the Norwegian government for specific activities, including broader-scale land use planning.

Enabling Environment

At the local level, the growing pressure of population, the decline of development through the years of civil war, and the increasing understanding of the importance of ecosystem services have also contributed to a growing awareness of the importance of conserving biodiversity. Hunters have been aware for some years that animal numbers are shrinking in all but the core forest areas. Hence, rural communities already understood the fundamental issues behind the BCP's aims, and were receptive of proposals for safeguarding the forests. The contribution of this awareness is examined in more detail in Box 3.1.

At the national level, the direct partnerships listed above have been key to the success of the offset. Less direct but just as important has been the enabling environment created by the previous activities of the partners, and by others. The concept of forest conservation was not new in Liberia, having been discussed widely in the 1980s and 1990s, before the civil war. In the years after the ending of hostilities, with new laws in place for forest protection, it was part of the policy agenda. The national and international conservation organizations worked with the Forestry Development Authority to develop concepts and implement conservation management initiatives in some key areas. International donors provided strategic support, although most projects focused on postwar humanitarian support rather than conservation. However, in recent years, three major donor partners have supported Liberia's forest sector with major financial inputs:

- The World Bank has focused on support linked to the Reducing Emissions from Deforestation and Forest Degradation (REDD+) initiative, which has involved an expansion of capacity in the management and monitoring of forest quality.
- The United States Agency for International Development (USAID) has supported a number of natural resources development projects, including

several to promote the designation and sustainable management of community forests.

- The government of Norway has provided significant funding to improve the control of logging and overall stabilization of the national forests.

All of these, along with the preparatory discussions and previous projects that have led to the current initiatives, aided the design and implementation of the BCP by helping to provide an environment supportive of forest conservation. Internationally, a similar shift of consciousness was occurring as ArcelorMittal developed its mining plans in Liberia. Initiatives such as the Business and Biodiversity Offsets Program had raised awareness of the need for mining companies to compensate for unmitigable environmental damage. This message was reinforced through the 2012 update of IFC's Performance Standards, which were in turn supported by agencies such as the International Council on Mining and Metals and the Initiative for Responsible Mining Assurance.

Financing

The BCP has allocated financial resources into biodiversity conservation on a landscape scale. Additional inputs by partner organizations, especially the FDA, Conservation International, and IDH, have also been substantial: while these cannot be counted as part of the mining offset, they nevertheless represent contributions toward the overall shared goal of conserved biodiversity and protected ecosystems services.

Committed Staff

ArcelorMittal's approach has been to minimize administrative costs, to ensure that the greatest amount of funding possible is directed toward actual conservation activities. Thus, the BCP has been set up and is being managed by a very small team, who are relying on the motivation of the partner organizations that could be achieved by using the company's committed resources to enable the forest conservation and community development that were the aspiration of them all.

The company's staff brought some of the private sector's energy and innovation to the program. They also based its activities on sound science, using many of the findings of the environmental impact assessment studies to inform the targeting of initiatives. In addition, they looked closely at the development interventions that were required to reduce dependence on forests, and ensured that partners were focusing on solutions that would not repeat past failures.

Box 3.1 The Importance of Local Knowledge

The formal partnerships listed in this case study relate to the implementation administrative arrangements of the BCP. However, the local forest-dependent communities are partners too. The premise behind the BCP's approach to the communities is that modern pressures on their environment are making their livelihoods unsustainable, and the program is interested in working with them to find ways to safeguard the biodiversity and ecosystems services on which they depend.

The rural population in the northern Nimba region of Liberia is largely illiterate and unable to express the area's environmental problems in the same terms as the international development community. Their special skills are in deriving an agricultural livelihood from infertile soils, with no machinery or agricultural inputs, and to continue doing that on a declining land resource through a long civil war and beyond. These are resilient people from whom the development community can learn useful lessons.

In 2011, a botanical team from Oxford University arranged a workshop for Zoes—specialists in indigenous herbal medicine—from the areas around ArcelorMittal's mine sites, to identify the most important species in the forests. Seventeen Zoes (nine women and eight men) participated and selected 421 out of 651 species as useful for some purpose. Of these, 257 are used medicinally, 173 provide materials, 103 have social uses, and 76 species provide food. Smaller numbers of species are used for shade, fertilizer, poison, animal food, or food additives. Of these, 65 species were prioritized as particularly important, and included with a number of very rare

and ecologically important species in a published guidebook, "Important Plants of Northern Nimba County, Liberia" (Marshall and Hawthorne 2013). This information assists in the detailed planning of conservation interventions, as it provides the listing of both the ecological and socioeconomic importance of plants.

The Zoes were aware of the impacts of the declining forest resource on the supply of plants, just as the hunters were aware of declining bushmeat. These groups understood the need to conserve the forest but lacked the resources to do so without assistance. Their concerns contrasted with the behavior of the dominant farming population, which still perceives the core primary forests as land over which they have rights of clearance and cultivation.

Working with those farmers, the BCP has collected other valuable local knowledge—information about agricultural cropping systems that offer a potential for continuous cropping on a sedentary basis, and the market opportunities for those crops.^a This complements the technical understanding of soil fertility and plant growth (see Box 3.2) to help the program identify suitable interventions. Without understanding farming practices and the incentives behind them, and the reasons they have developed as they have, it is not possible to design alternatives that will have the effect of reducing pressure on the remaining forests.

a. See, for example, Manvell's 2013 "Report of an Investigation into Continuous Cropping Opportunities in Northern Nimba."

3.8 Key Challenges

Since the BCP is offsetting mining impacts through a major landscape-scale intervention, a number of challenges are inevitable, due mainly to external factors and uncertainties. The paragraphs below give details of some of the key external challenges and how they relate to the implementation of the offset. They cover a range of issues with disparate underlying causes, affecting the offset in a number of ways.

Policy Conditions

Community forestry was introduced in Liberia when ArcelorMittal started the consultations around its BCP in 2008. While there is a very strong case for this approach, it

remains to be tested as a valid forest management system that can ensure equitable use of resources in a landscape of complex and overlapping ownership claims. Targets, timelines, and resource constraints have driven some aid agencies promoting this system in ways that have led to agreements that may not be sufficiently robust to be fully sustainable. Furthermore, the relationship between community forestry (essentially one of locally managed exploitation) and the conservation of biodiverse forests appears to be somewhat contradictory. Reconciling these differences is a key challenge for the BCP as it works through its agreements with the various forest management bodies.

Lack of Alternatives to Slash-and-Burn

A significant part of the offset depends on the development of agricultural alternatives for the communities reliant on the forests. The preexisting systems (shifting cultivation, hunting, small-scale logging, and the gathering of non-timber forest products) are well suited to an extensive forest landscape with a low population density. The heavily weathered lateritic soils are not amenable to sustained agricultural cropping without carefully devised inputs. Despite many efforts by development agencies, sustainable alternatives remain elusive, as explained in Box 3.2.

Long-Term Financing

ArcelorMittal has provided adequate financing for the implementation of the BCP during its mine operational period to date. Financing for the longer term is essential (the offset must be sustained indefinitely beyond the life of the mine) but requires a significant endowment to ensure that forest conservation can be continued once the company leaves. The company had plans to do this when commodity prices were high and investment was greater, but that has been delayed with lower levels of both. Yet at some point it will need to be addressed. A good vehicle for this might be the Liberia Conservation Fund, set up jointly in 2017 by the Forestry Development Authority and Conservation International.

Institutions, Governance, and Enforcement

ArcelorMittal considered the merits of implementing the BCP directly or outsourcing it to an external agency. Although the latter would have been more straightforward, the company's assessment of the available agencies was that capacity was not strong, but that many different entities offered valuable partnership support in different ways. By managing the program itself, the company was able to use those strengths most effectively, contracting each entity to contribute to the BCP wherever it was best placed.

The reason why the partners' capacities are generally weak, at both local and national levels, lies in the legacy of Liberia's long civil war. Through that, a generation's education was severely disrupted and unavoidably needs a lengthy recovery period. This limits the success of some program interventions and is one of the reasons why the BCP needs to maintain a long-term strategy.

It is difficult to assess the ecological outcomes of biodiversity and development programs, especially where they are being implemented at scale in a complex landscape, because the intended results are influenced by external factors such as climate, migration, land-based livelihoods, natural disasters, and civil unrest.

Therefore, even with a sophisticated monitoring and evaluation system in place, it would be difficult to track the influence of the BCP on biodiversity within its zone of activity. ArcelorMittal chose not to invest in regular formal external monitoring, opting instead to reduce administration costs in order to maximize the funds available for actual conservation. The extensive biological baseline surveys from a number of environmental and social impact assessments form a significant database against which to measure change overall at future dates.

As well as the matter of sustainable financing discussed above, ensuring a sustainable system of governance for forest conservation in Nimba is also challenging. With many customary rights held over the biodiverse forests, conservation must be a participatory process for the foreseeable future. Until there are viable alternatives for the forest-dependent population, full enforcement of forest protection laws remains morally questionable. Yet while the BCP strives to develop the technically and socially acceptable alternatives (as discussed in Boxes 3.1 and 3.2), there need to be broader developments in Liberia's forest management policies and land use allocation strategies. Forest management is based on a mixture of commercial, community, and conservation forestry, with known overlaps but as-yet-undefined administrative boundaries. Regional land use planning remains hampered by government capacity and the difficulties placed on short-term economic needs in a setting where the country's main income-earning resources—rubber, iron ore, and gold—are subject to major swings in the world's commodities markets; this makes long-term strategies very necessary but difficult to achieve. Establishing a viable rural management entity in this context, capable of bridging sectors and coordinating forestry, agriculture, and other land uses, remains a major challenge to be addressed.

3.9 Conclusion

ArcelorMittal's Nimba Biodiversity Conservation Programme is a good example of a mining company's commitment to offset its impacts on biodiversity in a complex forest landscape. Challenges are considerable, but the successes to date, combined with its innovative and adaptive approach, suggest that the program is well placed to succeed in its objectives.

Box 3.2 Soils, Plant Growth, and Agriculture: The Reason Why Farmers Need to Cultivate Forests

For most of the year, the landscape of Liberia is a lush green, dominated by a stunning growth of vegetation. This gives the impression of rich fertility. Certainly many crops do grow well here—rubber trees, for example—but the situation is more complex than it first appears. This is an ancient landscape that has been subject to intense weathering over hundreds of millions of years. The soils are weathered to the extent that the minerals are either very inert or are incapable of retaining large amounts of the elements needed as plant nutrients. Heavy rainfall leaches what nutrients are formed, and with the tropical heat, it causes rapid decomposition of organic material. These factors also lead to acidity and high iron concentrations, which further inhibit nutrient availability. While trees grow well because their deeper roots find what available nutrients there are, shallow-rooted plants are limited to herbaceous vegetation tolerant of infertile soils, and despite a lot of leaf growth, they are not very productive. Sustaining agricultural crop yields for more than a few years is very difficult.

One of the reasons that shifting—or slash-and-burn—cultivation is practiced so widely is that there exists a nearly closed nutrient cycle between a mature tropical forest and the soil. This cycle has two main nutrient storages: the biomass and the topsoil, which are connected by several pathways. The high supply of organic nitrogen (and probably sulfur) left in the topsoil after burning, plus the large quantities of phosphorus, potassium, calcium, magnesium, and probably other micronutrients added in the ash, almost ensures no fertility limitations to the first crop grown in most tropical soils in cleared forest. Research in West Africa and elsewhere indicates that farmers abandon their fields when crop yields reduce to half of that obtained in the first year. If fertility can be maintained at a slow decline, it should then be possible to crop a field for more than one season. But farmers in Nimba tend to abandon their fields after one year. As the soils of this area are found widely throughout West Africa, this suggests that there is another reason—possibly that they cannot cope with the weed growth that competes with their crops, or with crop diseases or other pests—and find it easier to clear new land to maintain their food supply.

There are two keys to maintaining the fertility of these soils:

- Building and maintaining the organic content. This provides the bulk of the cation exchange

capacity (CEC), given that the dominant clay fraction in all these soils (kaolinite) has an inherently low CEC.

- Having enough deep-rooted plants in the mix to recycle plant nutrients washed deeper down the soil profile.

Simply stated, the land should be managed in such a manner that an adequate amount of biomass is produced and incorporated into the topsoil to maintain high levels of organic matter, and the crops grown should be a mix of deep- and shallow-root species to maintain a healthy nutrient cycle.

Resolution of these difficulties can appear straightforward on the basis of revised agronomic practices. But it is important to appreciate that a technology-led approach to stimulating agricultural change is bound to end in costly failure if it does not consider the diverse constraints of smallholder farmers. Over recent decades, there has been strong reliance on a technology design process in which the measurable physical variables (soils, water, growth rates, and so on) have obscured all social variables in farming. This approach has become economically very powerful because it is able to prescribe neat packages, demonstrable if necessary on research stations, to meet political desires for increased production, food security, and the like. People understandably want straightforward answers and reassurances for complex problems. But throughout Africa, smallholder agriculture remains generally unproductive and many societies still rely on shifting cultivation. Liberia is no exception.

Developing and sustaining alternatives to slash-and-burn cultivation remains the elusive goal of numerous agencies across Africa. The boundaries of the remaining forests will not be stabilized until these are achieved. Since every region of every country has its own particular requirements, especially with regard to farmers' needs and constraints, there are no single-fix solutions. ArcelorMittal's Biodiversity Conservation Programme is supporting the development of adapted systems for its own area of working, and to a large extent it is on these as-yet-unknown measures that the long-term success of the offset depends.

Source: AML (2014).

4. AKYEM GOLD MINING PROJECT, GHANA

SUMMARY

Newmont Golden Ridge Limited (NGRL), a subsidiary of Newmont Mining Corporation, has been mining gold at the Akyem Project in the Eastern Region, Ghana, since 2013. The 2008 Environmental Impact Statement (EIS) for the mine included a commitment to implement a pilot offset for the loss of key biodiversity values associated with the open-pit area, which impacted a portion of the Ajenjua Bepo Forest Reserve. Despite sustained engagement between NGRL, their partners, and the Ghana Forest Commission, the offset has not yet been implemented due to multiple competing land uses on the potential offset sites selected.

Key Features

- The project aims to conserve key biodiversity values that were lost, such as moist deciduous forest and components of upland evergreen forest, and in particular some globally rare plant species, such as *Cola boxiana*.

Key Challenges

- The enabling environment for offsets in Ghana is challenging. Competing demands on land and resources have led to a lack of coherence between forest law and other laws and policies to achieve protection of biodiversity values.

Key Lessons Learned

- Implementing offsets is highly complex in countries where governance and planning processes are suboptimal in terms of conservation outcomes. In such circumstances, companies need to put as much emphasis on engaging governments to help find sites where long-term protection can be secured as on other technical or ecological aspects of offset implementation.

4.1 Context—Forests Loss and Degradation

Ghana has had many developmental successes. Economic growth in 2017 averaged 7.35 percent, significant progress has been made in poverty reduction, and the country is now considered a middle-income country. Nevertheless, despite numerous forest sector reforms, Ghana has not managed to stem the loss and degradation of its natural forests.

According to the Food and Agriculture Organization of the United Nations (FAO), forest covers 21.7 percent of Ghana's land (FAO 2010). Of this, 8 percent is classified as highly biodiverse and carbon dense primary forest. Although statistics vary according to differing publications, the FAO (2010) estimates Ghana has lost more than 33.7 percent of its forest since the early 1990s. Between 2005 and 2010, deforestation was at 2.19

percent per year, one of the highest rates globally for that period (FAO 2010). This was due to overexploitation of timber species, poor forest management, unsustainable farming practices, and population pressure. Research in the 1990s showed that only 2 percent of the total area of forest reserves was in a "very excellent" condition and over 70 percent of the entire Forest Reserve State was degraded (Hawthorne and Abu Juam 1995). Despite the increase in forest cover more recently, much of this is exotic timber species and the overall quality of forests has declined (Ghana, Ministry of Lands & Natural Resources 2016). High levels of hunting place additional pressures on forests: Ghana consumes an estimated 380,000 tonnes of bushmeat annually in Ghana, valued at about \$350 million (Ghana 2016).

Ghana has 280 forest reserves, many of which were constituted under the Native Authority Ordinance Forest

in 1927, now under the management of the Forest Services Division (Forestry Commission). Forest reserves were classified as either production reserves (75 percent) or protection reserves (25 percent). Protection forest reserves were seen as protecting watersheds or serving as shelterbelts, while productive forest reserves were designated to be logged.

4.2 Akyem Gold Mining Project

Newmont Golden Ridge Limited (NGRL), a subsidiary of Newmont Mining Corporation, mines gold at their Akyem operation, which lies approximately 3 kilometers west of New Abirem in the Eastern Region. Production started in 2013 and as of 2016, annual production was approximately 470,000 ounces. The mine life is expected to be 15 years.

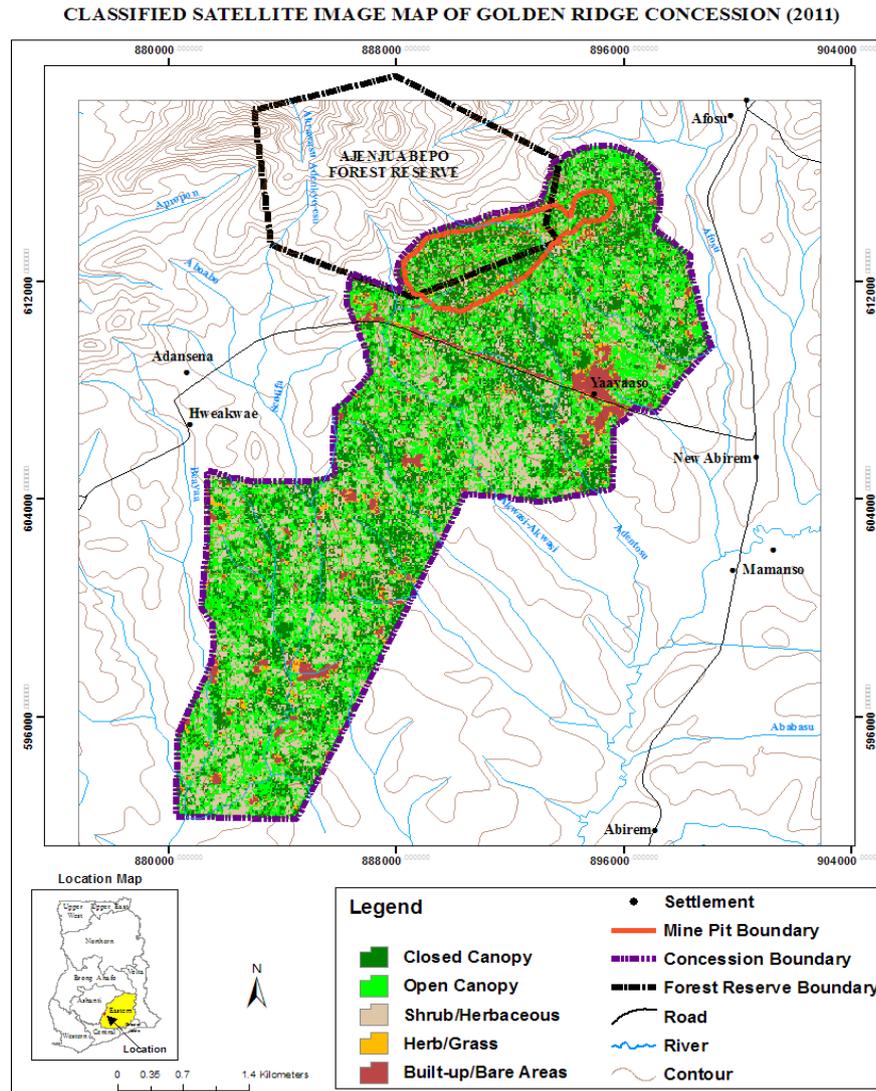
NGRL's concession (see Figure 4.1) largely comprises a mosaic of modified habitat with smaller areas of natural habitat. The concession supports degraded secondary forest along with oil palm, citrus and cocoa plantations, maize, cassava, plantain, and some exotic timber species such as *Cedrela*. The concession also partially extends into the southern end of the Ajenjua Bepo Forest Reserve, which due to the presence of some globally rare plant species also supported patches of critical habitat. While the project planning was developed to minimize impacts through avoidance, minimization, and restoration, significant residual impacts existed relating to the loss of 74 hectares (13 percent) of the forest reserve. As part of its mitigation strategy, NGRL made a commitment to implement an offset to achieve no net loss and if possible net gain of the key biodiversity values and to replace lost timber resources at a ratio of 3:1 for the project footprint in the forest reserve.

Biodiversity Value

The mining area is located within the Upper Guinean Forests subregion of the Guinean Forests of West Africa Biodiversity Hotspot. Numerous assessments were made to characterize the biodiversity value of the area, including surveys undertaken by Conservation International, Forestry Research Institute of Ghana, Ghana Wildlife Society, and Geomatrix. Many of the surveys focused on the forest reserve.

The Ajenjua Bepo Forest Reserve was established in 1930. It is a relatively small reserve, compared to other forest reserves in Ghana, with a hilly topography. The vegetation is moist semi-deciduous secondary forest (but with aspects of upland evergreen vegetation type) and is characterized by large gaps and an open canopy. It has been impacted by agricultural encroachment (and hunting) and is considered to have a forest condition score of 4, that is, mostly degraded (Hawthorne and Abu-Juam 1995). Some of the reserve has been replanted with an exotic timber species, *Cedrela odorata*, as part of a reforestation program. Despite the condition of the reserve, it nevertheless contains pockets of high biodiversity supporting typical forest species, especially on the hilltops. Several globally rare and threatened flora species are present.

Figure 4.1 NGRL's Concession Area and Overlap with the Ajenjua Bepo Forest Reserve



A system was developed (Hawthorne 1996) to determine the “Bioquality” (Hawthorne and Abu Juam 1995; Hawthorne 2012) of areas of vegetation in Ghana. It uses the Genetic Heat Index (GHI) to give a quantitative score for a community of plants. GHI is calculated by assigning each species a “Star” representing a category of global rarity. There are four Star categories: Black Star species represent the world’s most narrowly distributed plant species; Gold Star and Blue Star species are intermediate; Green Star species have the widest global distributions. A sample with the highest GHI does not necessarily have the highest diversity of species, but it does have the highest abundance of rare and globally significant species and therefore the highest bioquality in conservation terms.

Prior to mining commencing, a total of 434 plant species were recorded in the area, including three Black Star species (*Monocyclanthe vignei*, *Berlinia occidentalis*,

and *Albertesia cuneata*) and four Gold Star species (*Cola boxiana*, *Cussonia bancoensis*, *Albertesia scandens*, and *Antiaris toxicaria*). The International Union for Conservation of Nature (IUCN) lists *Monocyclanthe vignei* and *Cola boxiana* as endangered (and found at only three sites globally), and *Berlinia occidentalis* and *Cussonia bancoensis* as vulnerable.

The forest reserve supports a range of fauna species, although hunting has clearly impacted it. A few species of concern are present, including the near threatened green-tailed bristlebill (*Bleda eximius*), Tai forest tree frog (*Leptopelis occidentalis*) (Figure 4.2, left image), Buettikofer’s shrew (*Crociodura buettikoferi*), the vulnerable tree pangolin (*Phataginus tricuspis*), the data deficient tortoise species *Kinixys erosa* and Pel’s flying squirrel (*Anomalurus pelii*), the critically endangered hooded vulture (*Necrosyrtes monachus*), and the endangered gray parrot (*Psittacus erithacus*).

Figure 4.2 Two Species of Concern in the Ajenjua Bepo Forest Reserve



Taï forest tree frog (*Leptopelis occidentalis*)

Lime reed frog (*Hyperolius fusciventris*)

4.3 Restoration

NGRL has established a 60-hectare mixed deciduous plantation with indigenous species and *Cedrela odorata* within the mine site. It is also undertaking a reforestation program of a further 257 hectares of degraded forest in Kwekaru Forest Reserve, which has large areas of abandoned fallow areas.

4.4 Residual Impacts, Offset, and Metrics

Approximately 1,428 hectares are directly impacted by the project. Although all mine-related infrastructure and other nonessential activities are positioned outside the forest reserve, 175 hectares of that was forest habitat. Approximately 40 percent of this (74 hectares) was within the forest reserve. Biodiversity management measures included completion and implementation of plant salvage and nursery program for *Cola boxiana* and 127 other important plant species, and development of a critical species management plan.

The 2008 EIS for the Akyem Mine included a commitment to implement a pilot offset at a target site for the loss of key biodiversity values associated with the open-pit area that impacted the Ajenjua Bepo Forest Reserve. Preliminary calculations determined an offset requirement of 5,000 hectares. This was based on the direct loss of 1,428 hectares and an indirect loss in the region of 5,360 hectares, which equated to 420 quality hectares given that much of it was degraded. Further analysis will take place when the offset site is finalized.

4.5 The Search for a Suitable Offset Site

Business and Biodiversity Offsets Program

At the time of the offset commitment in 2008, biodiversity offsets were just being conceptualized and the financial and technical specifics of the commitment were poorly defined. Newmont partnered with the Business and Biodiversity Offsets Program (BBOP) initiative to prepare a case study to gain experience in the tools and methods that were being developed by the BBOP. A number of possible offset options were suggested, including protecting the Mamang River Forest Reserve, the Nsuensa Forest Reserve, the Auro River Forest Reserve, or to contribute to a Globally Significant Biodiversity Area Fund or the establishment of a District Assembly Environmental Fund (NGRL 2009).

Although these forest reserve options were potentially interesting, they were however designated as production forest reserves, which under Ghanaian law allows timber harvesting and other uses. Areas within these forests had already been leased to timber companies, local communities, and other leaseholders. The transition from a production forest to a protected forest reserve would have involved extensive and possibly protracted negotiation with multiple companies, leaseholders, and communities, and required the restoration of livelihoods.

Globally Significant Biodiversity Area Forest Reserves

Given the constraints associated with using production forest reserves as offset sites, the search shifted to identifying offset sites in forest reserves classified as Globally Significant Biodiversity Areas (GSBAs). In the late 1990s, the Global Environment Facility (GEF) supported

the “High Forest Biodiversity Conservation Project,” which aimed to increase the security of globally significant biological resources within Ghana’s forests. The project identified 30 forest reserves in their entirety or with specific compartments as GSBA for either full (11) or partial (19) protection that would also be managed by the Forestry Commission. The GEF project resulted in all the GSBA being surveyed and demarcated, the development of management plans, and capacity development for Forestry Commission staff. The concepts of Community Biodiversity Advisory Groups, a GSBA Trust Fund, and a Community Investment Fund (CIF) were also developed to provide financial support for alternative livelihoods to communities who depended on the forest reserves.

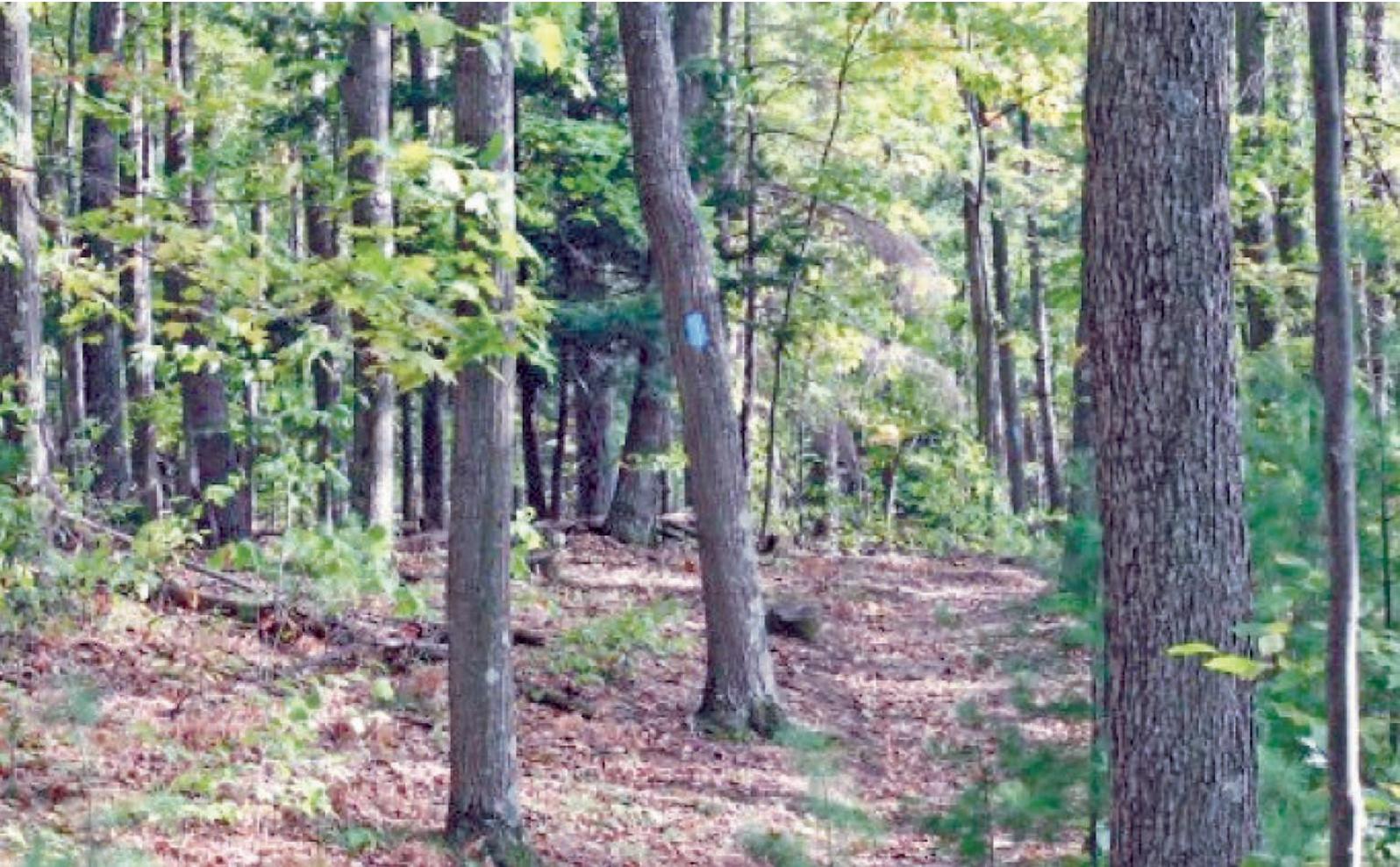
Newmont worked with the Resource Management Support Centre (RMSC), part of the Forestry Commission, a specialist consulting company (The Biodiversity Consultancy), and an NGO (Conservation Alliance, CA) to screen the 30 GSBA according to a range of criteria. These included size, specifically whether they would be sufficiently large to achieve no net loss or net gain if possible; presence of similar vegetation types; and presence of *Cola boxiana* and other key biodiversity values. Screening criteria also included sociopolitical

aspects such as types and patterns of land use by local communities; drivers for deforestation such as agricultural expansion, illegal logging, hunting, fire, and invasive species; and also the number of stakeholders, traditional authorities support, and past success of forest guards.

Three potential forest reserves containing GSBA compartments were chosen: Tano Offin, Atewa, and Krokosua. The Forestry Commission granted permission for the Tano Offin and Krokosua GSBA to be candidate offset sites and to undergo a site assessment and evaluation to choose a preferred option; the Forestry Commission did not consider Atewa GSBA appropriate because of the number of other conservation projects and third-party interests already working there. Tano Offin and Atewa are both KBAs.

The Forestry Commission sent a formal letter to NGRL confirming the identification of the two candidate sites. Based on a comparative evaluation process, Tano Offin (Figure 4.3) was finally selected as the preferred offset site, and during January–April 2015, CA and RMSC conducted a pre-feasibility study.

Figure 4.3 Tano Offin Globally Significant Biodiversity Area



Tano Offin contains compartments designated as GSBAs and is one of only three forest reserves in Ghana to have the upland evergreen forest type. It also supports *Cola boxiana*, a key biodiversity value for the project. Conservation Alliance undertook an extensive pre-feasibility study of Tano Offin to assess the viability of implementing an offset. This study included an assessment of its biodiversity values, forest improvement potential, assessment of past interventions, social conditions, stakeholder groups, and current and future threats. While the GEF project had envisaged that the GSBAs would be formally re-gazetted, thereby affording them additional protection, this did not take place, and some of these GSBAs' compartments were subsequently allocated mining exploration licenses. Subsequently, it transpired that a prospecting and forest entry permit had been allocated within Tano Offin for bauxite mining. Although these permits were rescinded, the courts later quashed this.

4.6 Key Challenges of Finding and Securing an Offset Site

It has been 10 years since NGRL made their commitment to offset and five years since production started and they have yet to find a suitable offset site despite effort and numerous studies: Why is this the case?

Gaps within the Enabling Environment

If offsets are to contribute permanently to the conservation estate of a particular country after the application of the mitigation hierarchy, there needs to be an enabling environment for this to happen. Offsets are essentially a public-private partnership. The private sector can bring management skills and financing, but governments need to enable the process by finding mechanisms through which the companies can fulfill their obligations. This may include implementing ESIA legislation or policies (National Offset policy, REDD+), building institutional willingness and capacity within government, supporting appropriate governance of offsets sites over the longer term, and creating certainty of land tenure. Other enabling factors include securing willing conservation partners, engaging civil society, and supporting realistic opportunities for alternative livelihoods.

While not all enabling factors will be present in every country, their absence renders the successful implementation of offsets very challenging. If companies are to invest significant financial resources into an area to ensure its long-term protection, there needs to be a high level of certainty that these areas will remain protected.

Inconsistency in Forest Governance

In Ghana, the Ministry of Lands and Natural Resources has the overarching responsibility for forests. The Forestry Commission of Ghana is responsible for the regulation of utilization of forest and wildlife resources, and the conservation and management of those resources. Within the Forestry Commission, the Forest Services Division is responsible for the preservation and management of forest reserves and the Wildlife Division is responsible for conserving wildlife in general and managing wildlife protected areas. Both divisions have institutional capacity constraints, low budgetary allocations, inadequate staffing, and a lack of infrastructure and basic field equipment.

Ghana has invested significant resources in strengthening forest governance in collaboration with multiple international donors (World Bank, European Union, AfDB, DFID, RNE, JICA, DANIDA, GTZ, WFP, GEF), the private sector, civil society, and traditional leaders. Initiatives have included the Ghana Natural Resources and Environmental Governance (NREG) program, the Natural Resources Management Project (NRMP), the Forest Resource Management Project (FRMP), the Forest Sector Development Project (FSDP-I and II), the Forest Law Enforcement, Governance and Trade (FLEGT) initiative, and the Voluntary Partnership Agreement (VPA). In addition, the Forest and Wildlife Policy of 2012 represented a paradigm shift from earlier policies by placing emphasis on nonconsumptive values of the forest and the creation of community resource management areas. This has helped communities manage their own forest resources. Unfortunately, many policies have not been fully implemented or enforced, or are inconsistent with other legislation governing the use of forests.

Lack of Coherence between Forest Law and Other Policies/Legislation

There is a lack of clarity around what is and is not permissible within forest reserves and GSBAs. Forest law does not appear to prohibit mining in forest reserves or GSBAs, yet some policies and guidelines are inconsistent with those laws. The Environmental Guidelines for Mining in Production Forest Reserves in Ghana (2001) indicate that no more than 2 percent of a Forest reserve can be used for both exploration and mining and GSBAs, hill sanctuaries, and special protection areas are exempt from mining exploration. The Forest and Wildlife Policy of 2012 includes a policy objective *“to strengthen the legal framework to give permanency to gazetted forest reserves and Protected Areas (PAs) and to reduce as much as possible the prospecting and mining of mineral resources in gazetted Forest Reserves.”*The National Land

Policy of 1999 states that *“All lands declared as forest reserves, strict nature reserves, national parks, wildlife sanctuaries and similar land categories constitute Ghana’s permanent forest and wildlife estates, and are ‘fully protected’ for ecosystem maintenance, biodiversity conservation and sustainable timber production.”*

One of the objectives of the Forestry Development Master Plan (2016–2036) is to ensure the reduction of mineral prospecting and mining in forest reserves and to eliminate it completely, but not until 2030.

This dissonance between law, policy, and guidelines creates a climate of legal uncertainty that translates into practical challenges for companies to implement offsets with the confidence of long-term protection. The lack of alignment on priorities between different ministries (forestry, land, agriculture, and mining, among others) is a further complicating factor.

4.7 Looking Forward

NGRL is working with the Forestry Commission and other potential partners to look at other sites that are more aligned with national priorities so they can fulfill their original 2008 EIS commitment. The Environmental

Protection Agency (EPA) and other stakeholders have now successfully developed the framework and guidelines for implementing Ghana’s Biodiversity Offset Business Scheme—expected to commence in 2017 on a pilot basis—which may improve the enabling environment for NGRL.

4.8 Conclusion

The main body of literature around biodiversity offsets centers on the technical or ecological aspects, such as ensuring similar biodiversity values at proposed offset sites to those lost (“like for like”), or assessment methodologies (metrics) that aim to ensure no net loss (or net gain) of biodiversity. These aspects are extremely important. However, the reality is that implementing offsets is highly challenging in countries where governance and planning processes are not focused on conservation, the regulatory environment is either immature or contradictory, and where there are multiple competing demands on land. In such circumstances, companies need to put as much emphasis (or more) on engaging government as on securing sites that can be protected over the long term.

5. MOYEN BAFING NATIONAL PARK, GUINEA

SUMMARY

Compagnie des Bauxites de Guinée (CBG) is an existing bauxite mine in the Boke region and Guinea Alumina Corporation (GAC) is looking to construct a new mine in an adjacent concession. Despite the application of the mitigation hierarchy, both projects have residual impacts on the western chimpanzee and are collaborating on an aggregated offset.

Key Features

- CBG and GAC are working together to aggregate their offsets to establish a national park in the Moyen Bafing area of classified forests, where approximately 4,400 chimpanzees can be safeguarded.
- Strong partnerships with the government of Guinea, the Wild Chimpanzee Foundation (WCF), and IFC.

Key Challenges

- Offsetting biodiversity in a landscape also settled by humans will require considerable effort to reconcile the needs of the communities and the requirement for a net gain in the chimpanzee population.
- The perception that communities far from the mine bear the brunt of restrictions on their way of farming.

- To secure a suitable governance structure that accommodates a number of different objectives. The structure should allow the Office Guinéen des Parcs et Réserves (OGUIPAR) to fulfill their mandated role to manage protected areas but at the same time enable management support from other implementing partners where required, and lastly for companies to have strong financial governance.

Key Lessons Learned

- Offset areas are not always available locally to a project due to the presence of other valuable concessions, or they lack the appropriate attributes—in this case, a sufficiently large population of chimpanzees. Moyen Bafing is 200 kilometers from the mining projects.
- Partnerships with government, NGOs, and financial institutions are important in moving an offsetting scheme through the complicated setup process.
- Individuals with passion can help drive schemes through.
- Aggregated offsets have many advantages but need “drivers,” such as the requirement to meet PS6.

5.1 Context

Mining remains a very important component of Guinea's economy and poverty alleviation strategy. Guinea's mineral sector accounted for more than 25 percent of the country's gross domestic product (GDP) and about 95 percent of export earnings in 2011, and the GDP grew at 6.6 percent in 2016, driven by an increase in production of bauxite and gold. In September 2017, the government announced that China had agreed to loan Guinea \$20 billion over almost 20 years in exchange for mineral concessions, mainly bauxite.

The cumulative effects of mining, particularly on the bauxite plateau in Guinea, will result in the loss of habitat and put additional strain on the critically endangered western chimpanzee (*Pan troglodytes verus*), which has declined by over 80 percent in West Africa between 1990 and 2014 (Kühl et al. 2017). The species is particularly vulnerable due to its late age at first reproduction, long inter-birth intervals, and low population density.

5.2 Compagnie des Bauxites de Guinée and Guinea Alumina Corporation

IFC has invested in the Compagnie des Bauxites de Guinée, an existing bauxite mine in Sangaredi, and is looking to invest in Guinea Alumina Corporation, a greenfield operation in the neighboring concession. Even after the application of the mitigation hierarchy, there are likely to be significant residual impacts on the western chimpanzee. This led both companies to collaborate and also to partner with the Wild Chimpanzee Foundation (WCF) and the national government's OGUIPAR to create a new national park, Moyen Bafing National Park, as an offset. IFC has strongly supported this process on many levels. The park is located approximately 200 kilometers east of the mine sites (Figure 5.1).

5.3 Biodiversity Values

The concessions comprise a mix of natural and modified habitats, including wooded savanna, bowal,² gallery forests in the valleys,³ agricultural land, and freshwater habitats. The remaining natural habitats have been significantly degraded through harvesting of wood, shifting agriculture, and the planting of oil palm and cashew trees; nevertheless, the concession still supports significant populations of chimpanzees.

² Bowal, or bowé, is a heavily weathered plateau rich in iron and aluminium oxides, with thin ferrallitic soils usually only supporting grassland.

³ Gallery forests are formed as corridors along rivers or wetlands and project into landscapes that otherwise have only very sparse tree cover.

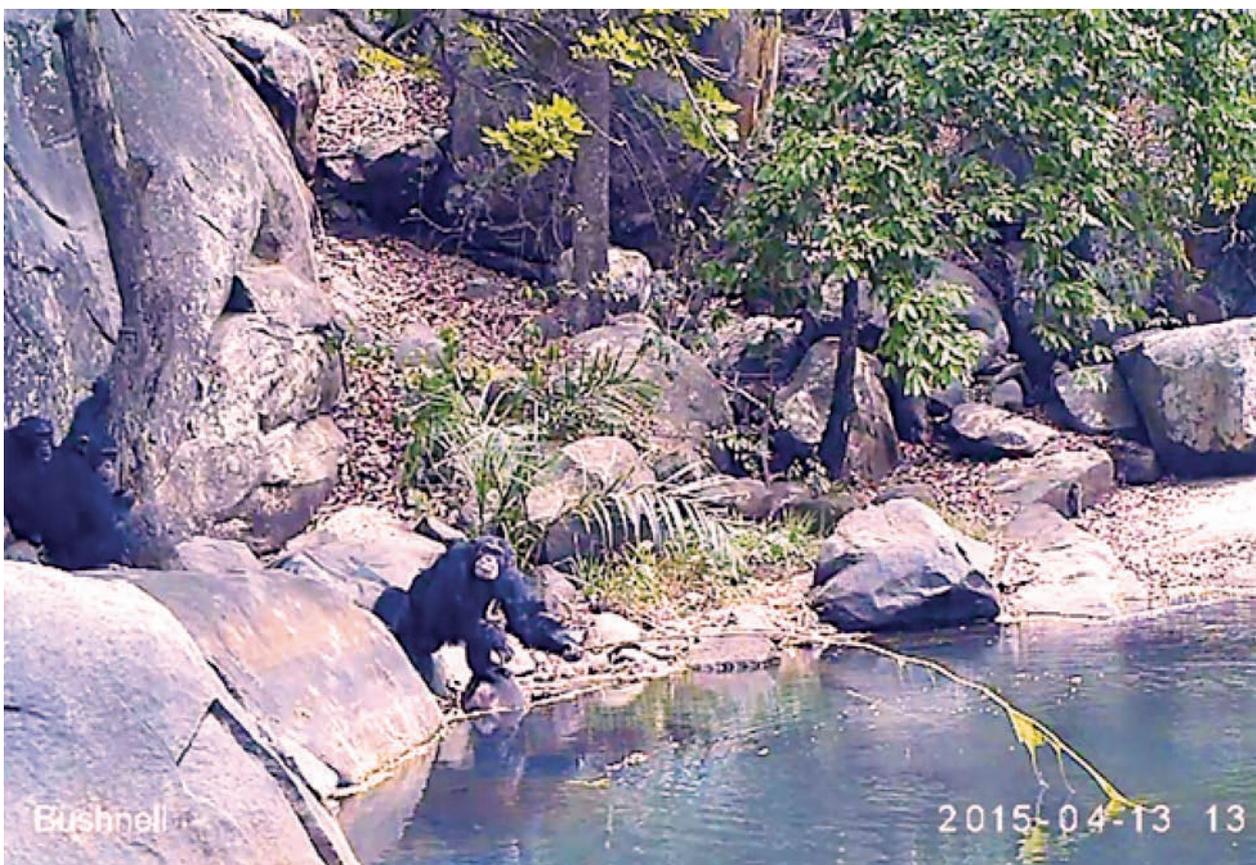
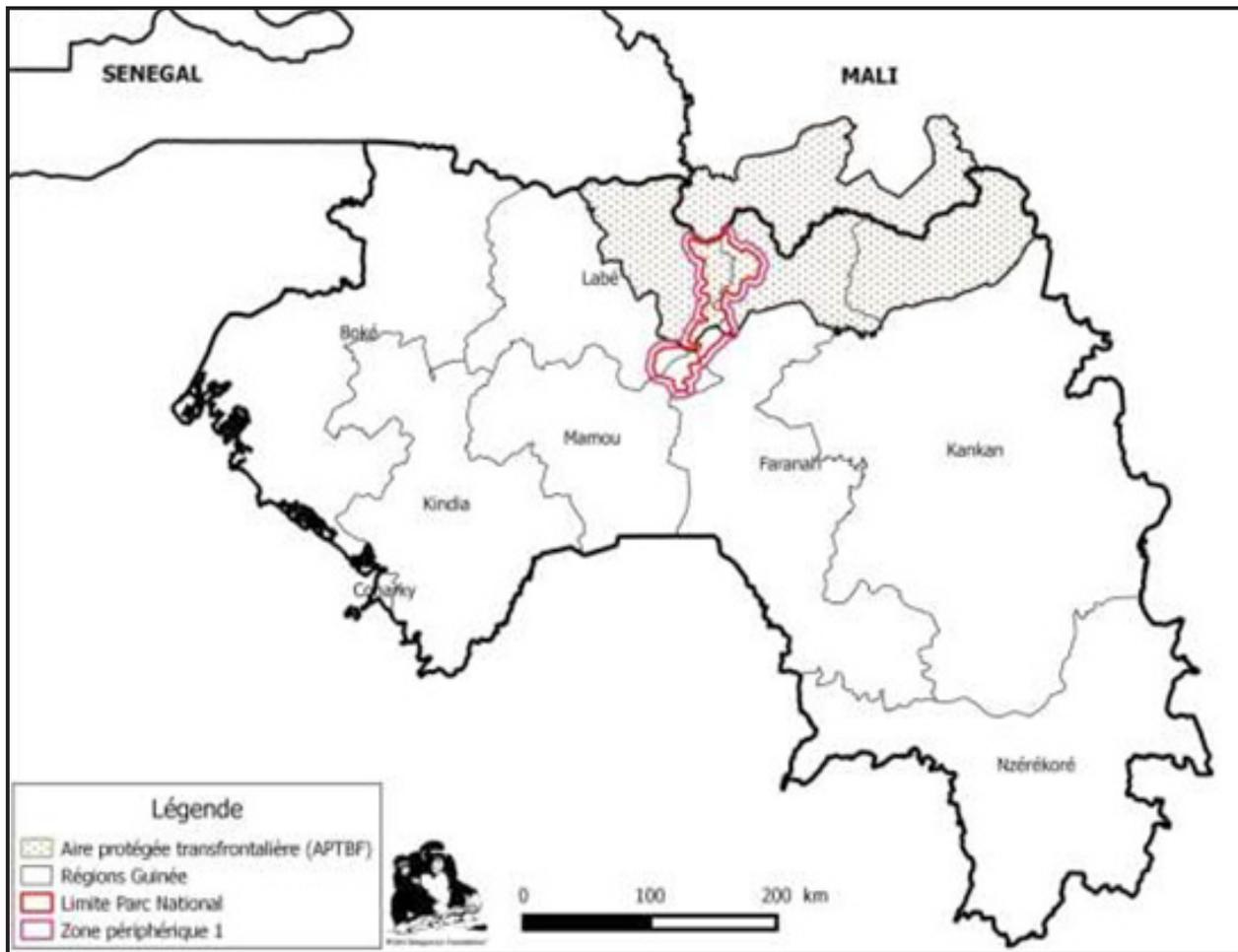
Extensive surveys were undertaken to develop an understanding of the chimpanzee populations on both concessions. The WCF undertook surveys over a four-year period (2010–2014) in the GAC concession. This work estimated the population to range from 152 to 277, with a mean of 160. The CBG concession population ranged from 33 to 118 (mean 62), with a confidence interval of 95 percent. Updated transects and a detailed genetics study were under way at the time this case study was written, to refine these estimates and allow for more targeted mitigation and **habitat restoration**.

5.4 Residual Impacts after Mitigation

Impacts expected at the mine sites relating to chimpanzees include direct loss and degradation of habitats through fragmentation, noise, air pollution, and unsustainable use of ecosystem services. The extent of indirect losses is difficult to define accurately. Both GAC and CBG have prepared biodiversity management and monitoring plans to ensure effective mitigation activities on their mine concession. The companies have placed emphasis on avoidance of environmental impacts through the development and implementation of "avoidance buffers" around priority habitats and features, within which the vegetation must not be disturbed.

The main residual impacts after mitigation will be direct effects on chimpanzees, since they use a variety of habitats, including those that will be lost to mining. Chimpanzees rely on several hundred different plants and ripe fruit for food as well as trees for building their nests. Furthermore, fragmentation of the habitat will affect the migration of females between groups, disturbing reproductive patterns. The concessions will also be under increasing human pressure. The 2016 study estimated impacts in the GAC and CBG concessions could be in the order of 30 to 70 percent loss.

Figure 5.1. Location of Moyen Bafing National Park, and Chimpanzee “Fishing” for Algae



Source/photo credit: WCF/Christophe Boesch

5.5 Metrics to Determine Net Gain

Each company undertook a pre-feasibility study, performed by the Biodiversity Consultancy, to determine whether net gains could be achieved, and what the minimum population at the proposed offset site would need to be to achieve those gains (Escalas et al. 2016; Starkey et al. 2016). Precautionary metrics were used that were commensurate with the sensitivity of great apes and uncertainty around offset implementation, particularly in a Guinean context, where few successful conservation projects exist. A detailed analysis is not provided here, but the key elements are as follows:

- The density-independent chimpanzee population growth was estimated at 1.65 percent per year (Walsh et al. 2003).
- A net background loss rate (due to hunting, habitat loss, and degradation not associated with the mine) of about 1 percent per year is expected at potential offset sites. The actual rate of loss is likely to be site-specific and to vary over time.
- It was estimated that the offset would result in a 50 percent reduction in background loss, leading to a population growth rate of approximately 0.3 percent.
- Two offset multipliers were used, one (x3) to accommodate for uncertainty and one (x1.8) to account for the long time lag between impacts and gains. The minimum population estimates required for GAC was 2,100; for CBG, 1,280.

5.6 The Selected Site—Moyen Bafing National Park / Offset

Numerous potential offset sites were explored. The WCF conducted a nationwide chimpanzee survey in 2009–2012 to better understand chimpanzee distribution and abundance throughout Guinea. These surveys confirmed the great potential of the Fouta Djallon landscape for chimpanzee conservation. Additional chimpanzee surveys were undertaken in another potential site, Badiar National Park, in 2016. However, no other single site had sufficient populations of chimpanzees to achieve net gain. The selected site, Moyen Bafing, located in the Fouta Djallon highlands, encompasses seven classified forests and covers around 6,400 square kilometers. It was subjected to detailed assessment (Box 5.1). It supports one of the largest populations of the western chimpanzee—about 4,400 individuals, approximately 12 percent of the species' global population. With only five protected areas dedicated to the conservation of biodiversity, two of which are national parks, the Republic of Guinea has one of the smallest protected area networks in West Africa, both in terms of number of protected areas and the proportion of the country protected.

Box 5.1 The Importance of Detailed Scientific Knowledge

An important feature of the Moyen Bafing National Park offset is the provisional zoning, which is based on extensive data gathered by the WCF and OGUIPAR on the distribution and abundance of animals living in the area, and on data on the demography and the socioeconomy of the local human communities (Figure B5.1.1). This data informed the provisional zoning for different land uses within the national park (Figure B5.1.2).

Figure B5.1.1 Data on Biodiversity and Local Communities in Moyen Bafing Offset Area

WCF work on zoning

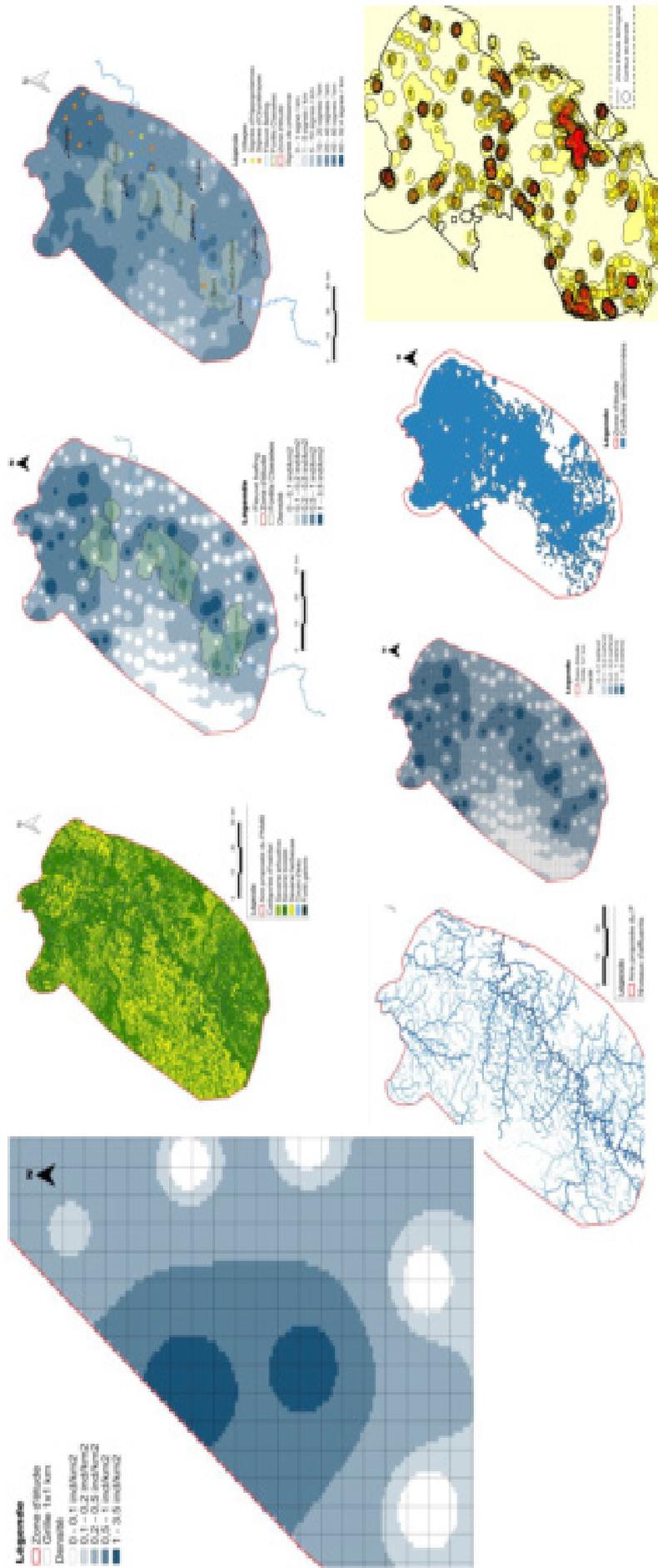
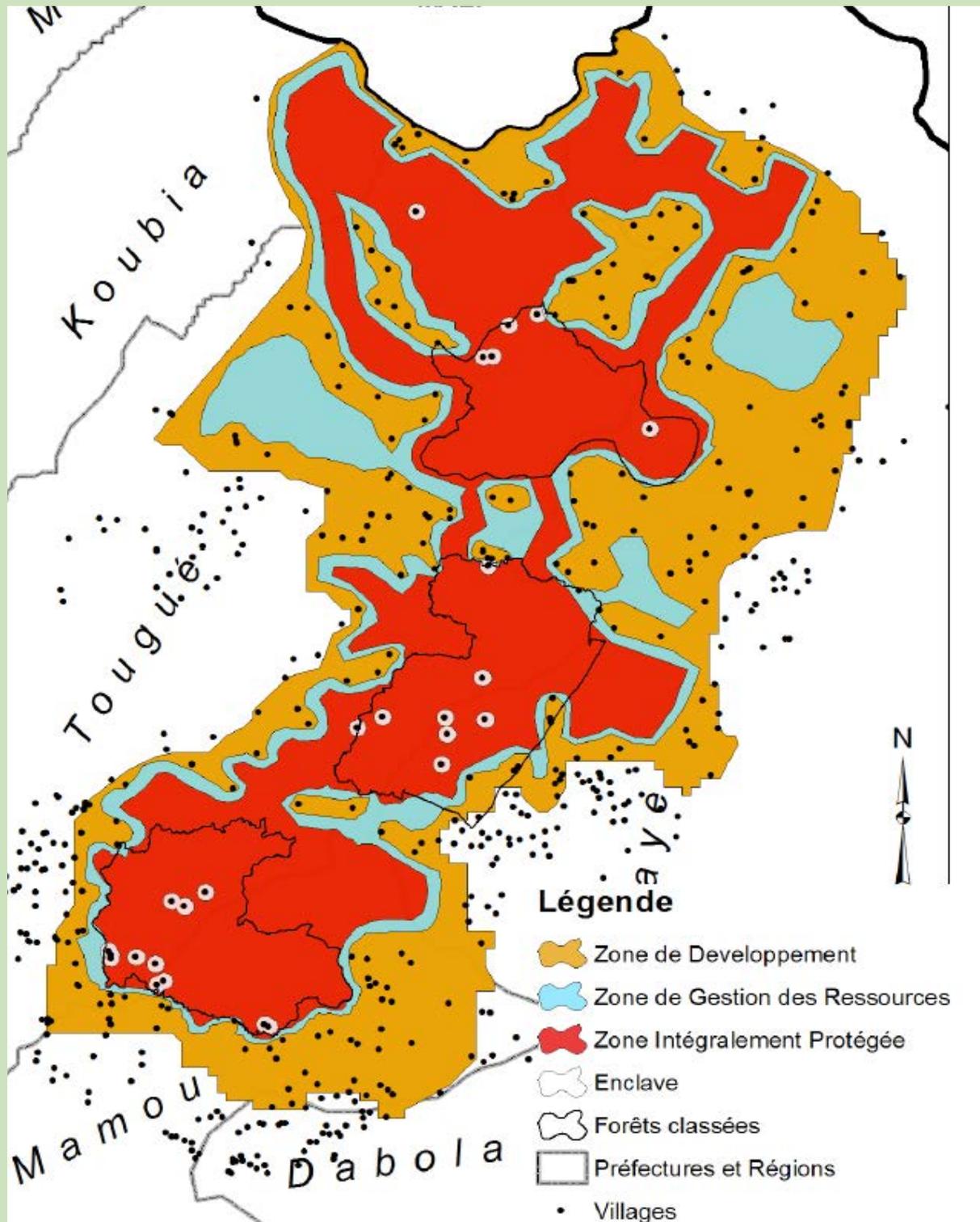


Figure B5.1.2 Provisional Zoning for Moyen Bafing National Park



5.7 Financing

The feasibility study estimated the field costs of establishing and managing a protected area with multiple zones of the area proposed for Moyon Bafing over 20 years. The amount is what is expected to be required to cover both the setup and 20 years of implementation of the protected area, which is the forecast duration for delivering a net gain of chimpanzee numbers. It is in proportion to the scale of the investment being made and planned by CBG and GAC combined. Without this level of understanding and commitment by senior management, the offset scheme would not be feasible.

5.8 Ensuring the Long-Term Security of the Offset

To ensure permanence, the offset will become a

national park. In Guinea, national parks are created by Décret (decree), after the completion of a two-phase process: one, receiving ministry-level approval, and two, securing the full presidential decree. The government set up an interministerial commission to consider the establishment of the new protected area. OGUIPAR, the department within the Ministry of Environment, Water, and Forestry that is responsible for protected areas, worked with other ministries and the WCF to temporarily set up and define the park limits using a ministry-level Arrêté temporaire de classement. This process was completed in late 2017 by the signing of a ministerial order. The next phase, securing the full presidential decree status, takes approximately another two years to complete. Box 5.2 summarizes much of the work required in this phase.

Box 5.2 Gaining Acceptance of the Offset by Informed Consultation with Affected Communities

The Moyon Bafing landscape is home to a relatively large human population—around 67,000 people in about 400 villages, many of whom depend on access to land and natural resources for livelihoods, cultural values, and well-being. Villages make strong traditional claims to land, in some cases within the existing classified forests.

The informed consultation process for the communities local to the national park is closely integrated with the environmental and social impact assessment. The success of the offset depends to a large extent on the accommodation of the rights of the communities and their support for the establishment of the park and its prescribed different management zones. There are three types of zones: core zones, for conservation; buffer zones, where limited nonintrusive activities are permitted; and development zones, where a range of land uses will be permitted and supported by the national park management body. Between the interim designation of boundaries under the *Arrêté temporaire de classement* and the final agreed boundaries that will be fixed by the *Décret*, a number of steps must be undertaken as part of the informed consultation process:

- Development of a stated understanding of the socioeconomic context and ways of life of the affected communities, and their uses of resources and livelihoods needs.
- Informing and discussing the provisional plans with the communities and their traditional leaders, and the ways in which these plans must be

developed with their inputs over the consultation period.

- Consultation on the existing land tenure systems in the national park, and the ways in which these systems are likely to be affected by the proposed threefold zonation.
- Physical displacement is not considered necessary, but instead restrictions on utilization may need to be placed on some landholdings. Detailed consultations on these matters are important.
- Discussion on the details of access and restrictions on natural resources for communities, and the implications of the changes that would be imposed by the national park.
- Discussion with the communities affected on the characteristics and effectiveness of early conservation actions, to gain their support.
- Full information and discussion with the communities on the management mechanism for the national park, the communities' involvement, the enforcement of the conservation provisions, and the implications for this.
- Demonstration that the communities have been fully involved in the delineation of the final boundaries of the national park and the three levels of zoning.
- Demonstration that the communities broadly support the establishment of the national park, and accept its implications.



5.9 Governance

Moyen Bafing National Park needs strong governance, and the structure for this was being explored by all parties concerned at the time this case study was written. It must recognize the financial input from the companies, the responsibilities of OGUIPAR to manage protected areas, and the need for other technical partners to play a role in management.

5.10 Successful Outcomes to Date

At the time of writing this case study, the offset scheme had completed its preparation phase and was embarking on its setup phase, with the main implementation period due to start two years in the future. It is therefore premature to refer to successes as final outcomes, but in terms of establishment, some important milestones have been achieved:

- Identification of a viable offset scheme to compensate for the loss of chimpanzees, thereby allowing the economic gains of the CBG and GAC bauxite mining ventures to be realized.
- Securing of very significant funding from the mining sector for the protection of a large area of high and global biodiversity significance. This is particularly noteworthy given the absence of public funding, and the fact that it would otherwise be unlikely to receive adequate funding for protection in the foreseeable future.
- Designation as a national park by the government, thereby legally safeguarding an appreciable proportion of the global population of western chimpanzees.
- Preparation of a detailed action plan that guides the setup phase.

5.11 Key Elements Contributing to Success

Strong Implementation Partnerships

The companies have developed a strong partnership with each other, the Wild Chimpanzee Foundation, and the government through OGUIPAR. The companies bring financing and management skills, the WCF brings legitimacy with great ape conservation, and OGUIPAR has the mandate to manage protected areas. This is supported by IFC. The partnership is guided by a shared vision and purpose, and over time has built trust between all members.

Enabling Environment

Guinea does not have a requirement for offsets within its legislation, nor does it have an offset policy. Despite the lack of specific legislation, the project benefited from the presence of IFC, and willing partners within government. Both companies needed to comply with Performance Standard 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012), which requires clients to manage environmental and social impacts resulting from development opportunities; thus, the residual impacts required an offset scheme.

Looking forward, the Wildlife Conservation Society, Forest Trends, and Biotope have commenced a four-year project to create the enabling conditions for development projects to achieve no net loss of biodiversity: CONservation, impact Mitigation and Biodiversity Offsets in Africa (COMBO). This may greatly help projects in the future.

5.12 Key Challenges

Offsetting in Guinea is still in its relative infancy and the success of any offset will require the successful collaboration of the companies, the government of Guinea, NGOs, and communities. In the Moyen Bafing National Park offset, one of the main challenges is how to reconcile the reliance on the forest by both the large human communities (see Box 5.3) and the smaller chimpanzee communities. Resolving these issues is the task of the environmental and social impact assessment and the informed consultation process. They must develop a management system that ensures that the national park's benefits will outweigh its disadvantages. These are the key activities to be undertaken during the setup phase for the scheme, a roughly two-year period leading up to the presidential Décret that will complete the legal process. Another issue relates to the implications of potential future development in the area on the national park.

Policy Conditions

The Republic of Guinea's laws are somewhat ambiguous in terms of land rights in protected forests. Therefore, the presidential Décret that forms the legislative basis of a national park must clarify the situation for each particular area. This may need to be done sensitively—for example, where existing land tenure rights are extinguished—and requires advance consultation and appropriate compensation. For Moyen Bafing, it may be that different zones need to be treated in different ways.

Institutions, Governance, and Enforcement

The process of creating a national park is fully embedded in Ghana's national institutional setting, being first driven by the Ministry of Environment, Water, and Forestry and OGUIPAR, and then moving toward a presidential Décret. The arrangement for long-term governance is currently being explored.

Enforcement of the offset should be ensured through the management and monitoring plans that are integral to the scheme. The requirement of full disclosure under the IFC Performance Standards will add weight to the process of ensuring that it is implemented fully.

Box 5.3 Forest-Based Livelihoods of the Moyen Bafing Communities

Agriculture is the principal livelihood activity in the Moyen Bafing landscape, practiced in three main forms: high-intensity farming of fertile soils in bas fonds, which are frequently wetlands developed for perennial farming; high-intensity farming in gardens called tapades, usually in riparian zones near villages that are watered in the dry season and where fertility is actively maintained; and extensive, unirrigated upland farming of grains and groundnuts. Raising livestock is extensive as part of the agricultural system. Cattle are the most important source of wealth and wealth accumulation in the region, followed by goats and sheep, then chickens and ducks.

Bushmeat hunting is important, but wildlife is scarce. Many villages report having been founded (long ago) because of the local abundance of game. However, game is now rare and hunting is a sensitive topic in villages. This suggests an unsustainable level of exploitation. Fishing is less widespread than hunting, and is principally for local consumption due to the difficulties of transport to markets. It is practiced in many villages, especially those closest to the Bafing River and its larger tributaries.

The main uses of local wood consumption are for firewood, charcoal, fences and posts, and

construction timber, all principally for subsistence. Non-timber forest products are important, also mainly for subsistence uses. The four most significant ones, and those which bring people into contact or conflict with wildlife, are reported as honey, straw, medicinal plants, and wild fruits.

The issue of water availability is not entirely understood. At the broad scale, availability of water is clearly a determining factor in the siting and size of villages and agricultural land. Surveys have found differing impressions of the quantity and quality of local watercourses. In many places, they are considered to be good for drinking, and especially for bathing, cleaning, and livestock. Water wells are generally preferred over creeks for drinking; they are available in many rural villages.

Fire is an important land management tool and used every year for different purposes. The two primary reasons given are to clear fields for farming and to regenerate pasture for livestock. Secondary reasons cited are to reduce brush so that hunters can see game better, and to smoke out hives for their honey. Although it seems to have been used widely for many years, fire is now discouraged by the forest authorities, and is therefore a source of tension.

5.13 Conclusion

The Moyen Bafing National Park offset scheme has been designed with care and with excellent collaboration from the many stakeholders. It has been many years in the planning and at the time of writing this case study was entering its setup phase. There is strong evidence to suggest that it should succeed. Good progress has been made with the institutional and legal basis for the offset, and it is underwritten by sound scientific surveys and analyses. Two main challenges remain: one, the reconciliation of the needs of the human communities who derive their livelihoods in the fringes of the forests where the chimpanzees dwell; and two, to manage the construction of the major development projects in the region so they do not undermine the park.

6. KASIGAU CORRIDOR REDD+ PROJECT, KENYA

SUMMARY

Wildlife Works (a U.S.-based company using a market-based conservation approach) has supported wildlife conservation in the Kasigau Corridor in southeastern Kenya since 1997. In 2009, it began managing the project through a REDD+ mechanism. The project compensates landowners and community land users to adopt pro-conservation land management practices throughout a defined area of predominantly *Acacia-Commiphora* forest. It was the first REDD+ project in the world to achieve gold level certification by the Climate, Community and Biodiversity Alliance (CCBA) for exceptional biodiversity and climate change adaptation benefits.

Although this project is not directly related to mining, as a case study it contributes valuable complementary lessons. It shows a market-based approach to offsetting, into which a smaller mining company could invest instead of establishing its own scheme. It also demonstrates how other sectors share the challenges to offsetting, such as using community-based development models to gain access to land for conservation purposes, and the complex institutional arrangements necessary to ensure genuine long-term safeguarding. In addition, the world's largest mining company, BHP Billiton, is providing a price support mechanism of \$12 million, which ensures the project can sell a predefined minimum quantity of carbon credits.

Key Features

- The project conserves biodiversity of high importance in a belt of land between Tsavo East and Tsavo West National Parks. Conservation is achieved by protecting forests to allow them to regenerate while providing financial compensation or livelihood alternatives for the affected people.
- Extensive community support includes an on-site factory, which has been manufacturing garments

for exports since 2005, as well as schools, school bursaries, water systems, clinic equipment, and support to women's groups. These provide the social benefits that help to secure community approval for conservation.

Key Outcomes

- Through its first two phases, the project now safeguards some 200,000 hectares. The large numbers of wildlife present, including big herds of elephants, attest to the success in the protection of their habitats.
- Major cash funding has been brought into the area, giving landowners and other community members a range of new opportunities and benefits.

Key Challenges

- Lack of a consistent carbon market and fluctuating carbon prices
- Long-term protection. Continuing to make carbon payments competitively compelling when other economic opportunities present themselves to landowners in the project area as Kenya's economy grows
- The ongoing challenges of climate change and poaching

Key Lessons Learned

- A sound baseline of the socioeconomic conditions of the people affected demonstrates how a project has benefited local communities.
- Putting effort into establishing institutional capacity and governance systems is extremely important for all offset projects.

6.1 Introduction

The United Nations Framework Convention on Climate Change (UNFCCC) developed the Reducing Emissions from Deforestation and Forest Degradation (REDD) in 2005 to incentivize changes in the way forest resources are used. It creates a financial value for the carbon stored in forests by offering incentives to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. Developing countries receive results-based payments for results-based actions. REDD+ goes beyond deforestation and forest degradation, including the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks. Some private sector-driven REDD+ projects use voluntary carbon credits as a method of financing their projects too. The Kasigau Corridor REDD+ Project (KCRP) in Kenya is one such project.

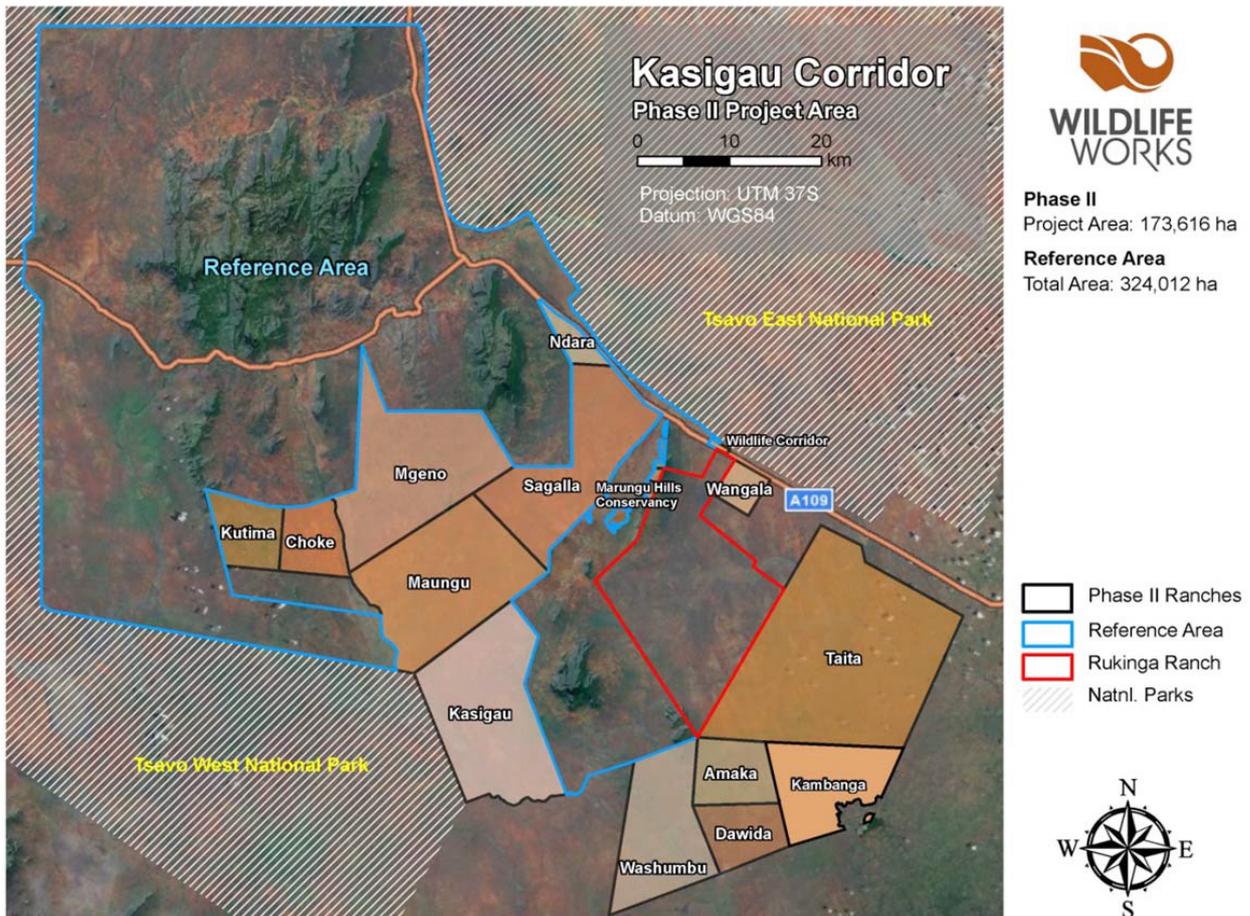
6.2 The Project

Group ranches were established in the Tsavo area of Kenya in the 1970s under the postcolonial governments, in a system whereby people jointly held title to land. The ranches were intended to formalize cattle rearing

among the local Taita communities; communities could buy shares using either cash or cattle. Over the ensuing decades, the ranches failed to prosper and by the late 1990s were unproductive and largely disused. Meanwhile, encroachment had occurred, mostly in the form of grazing, firewood, charcoal production, and hunting, but also some human settlement. The forests were degraded, and the wildlife within them was under threat.

Wildlife Works signed conservation easements with the owners of several group ranches in the area to prevent unsustainable land use practices. The ranches form a corridor of land (the Kasigau Wildlife Corridor) between the Tsavo East and Tsavo West National Parks. The objectives of the project are to (1) protect in perpetuity the dryland Acacia-Commiphora forests that form a wildlife dispersal and migration corridor between the two national parks, (2) provide alternative sustainable development opportunities for the local communities that live adjacent to the forests, and (3) prevent the emissions that would otherwise occur were those dryland forests converted to subsistence agriculture using the slash-and-burn methods typical of this area.

Figure 6.1 Kasigau Corridor, Taita Taveta County, Kenya



The red polygon shows Rukinga Ranch, the area covered by the first phase of the project. The 13 ranches of the second phase are shown with their names. The reference area is used to determine the “without project” baseline.

The first phase started in 2005 with only Rukinga, a large ranch of 32,000 hectares. It was initiated with investor funding and continues to this day through the sale of carbon credits, which began in 2011. The second phase started in 2010 and covers 13 ranches with a combined area of nearly 170,000 hectares (Figure 6.1); it is also financed on the basis of carbon credits.

6.3 Project Activities

The KCRP undertakes a number of key activities to achieve its objectives:

- Protection of the designated forests, to allow natural regeneration
- Production of tree seedlings in nurseries for planting
- Patrolling of the forests to enforce protection of wildlife, to reduce hunting pressures
- Development of a clothing and apparel-production business, employing people from the project area to manufacture items from organic cotton for export to the United States (see Figure 6.2)
- Support for the production of “ecocharcoal,” which provides a sustainable means of generating charcoal for local and more distant markets
- Management of community-level development initiatives (such as village water systems, school facilities and education bursaries)

Figure 6.2 The Clothing and Bag Factory, and a Project-Supported Schoolroom





6.4 Biodiversity Values

The project area is part of the greater Tsavo ecosystem in southeast Kenya, which consists of a semiarid area of dryland forest interspersed with savanna grasslands that spreads north to the Tana River and south into Tanzania. The ecosystem has significant species diversity of large mammals and birds, and the vast majority fall within Tsavo East and Tsavo West National Parks. The KCRP forms a corridor between the two parks, and almost all the species present in the parks are also present there, including many of special conservation concern.

The southern Acacia-Commiphora bushlands and thickets ecoregion includes species of *Acacia*, *Commiphora*, and *Crotalaria*, and the grasses *Themeda triandra*, *Setaria incrassata*, *Panicum coloratum*, *Aristida adscencionis*, *Andropogon* species, and *Eragrostis* species. In the Kasigau area, the average canopy height is 5–7 meters, but trees such as *Terminalia* and *Melia* extend higher. Above about 600 meters, there are small remnants of montane forest, and savanna occurs in the lowest-lying areas of land. The Acacia-Commiphora forest adjacent to the project forest area had been badly degraded through slash-and-burn agriculture, the gathering of firewood, and making of charcoal.

Figure 6.3 Landscape in the Kasigau Corridor



The KCRP is an important corridor for migration and dispersal of large mammals and is home to several key species of concern. A significant number of the vulnerable African elephant (*Loxodonta Africana*)—as many as 1,500—use the corridor, either as a dispersal and feeding area or to move between the two national parks seasonally. Other notable species include the endangered Grevy's zebra (*Equus grevyi*) (approximately

3 percent of the global population are here), the endangered African hunting dog (*Lycaon pictus*), and the vulnerable cheetah (*Acinonyx jubatus*), lion (*Panthera leo*), and giraffe (*Giraffa camelopardalis*). A wide range of other species are present in the area, including serval cat, spotted hyena, 12 species of ungulates, primates, rodents, reptiles, amphibians, over 20 bat species, and more than 300 avian species.

Figure 6.4 Elephants and Cheetah in the Kasigau Corridor



6.5 Carbon Offset

Within its first two phases, the project aims to avoid the deforestation of 1.8 million tonnes of CO₂ equivalent as carbon offsets every year for its anticipated 30-year life. The carbon offset is verified and monitored by Verified Carbon Standards (VCS), a U.S.-based international accreditation organization.

6.6 Governance Systems

When the KCRP was being established, a lack of institutional capacity in the rural community meant that considerable effort was needed to work with communities to build capacity and governance systems. To find a means of ensuring accountability for the responsible management of incomes to communities, the project oversaw the establishment of six Locational Carbon Committees (LCC) to administer the accruing benefits on behalf of the communities. Each LCC is required to identify community-based organizations (CBOs) as the implementing agencies for any projects funded by the KCRP. Project staff oversaw the election of the LCCs, to ensure the committees reflected the diversity that the communities themselves had determined to be important in each committee.

Each LCC has seven voting members, plus chiefs and councillors as ex officio members. The LCC has responsibility for determining the priorities and overseeing the implementation of community projects for their respective location, but the CBOs receive the funds for implementation directly from the Wildlife Works Carbon Trust, the entity established by Wildlife Works to disburse funds to the community from the KCRP. Each LCC represents 15,000–20,000 community members. The CBOs are either existing or new, and comprise a membership of local citizens on the basis established soon after Kenya's independence in 1963. To be eligible, they are obliged to demonstrate a tendency toward conservation.

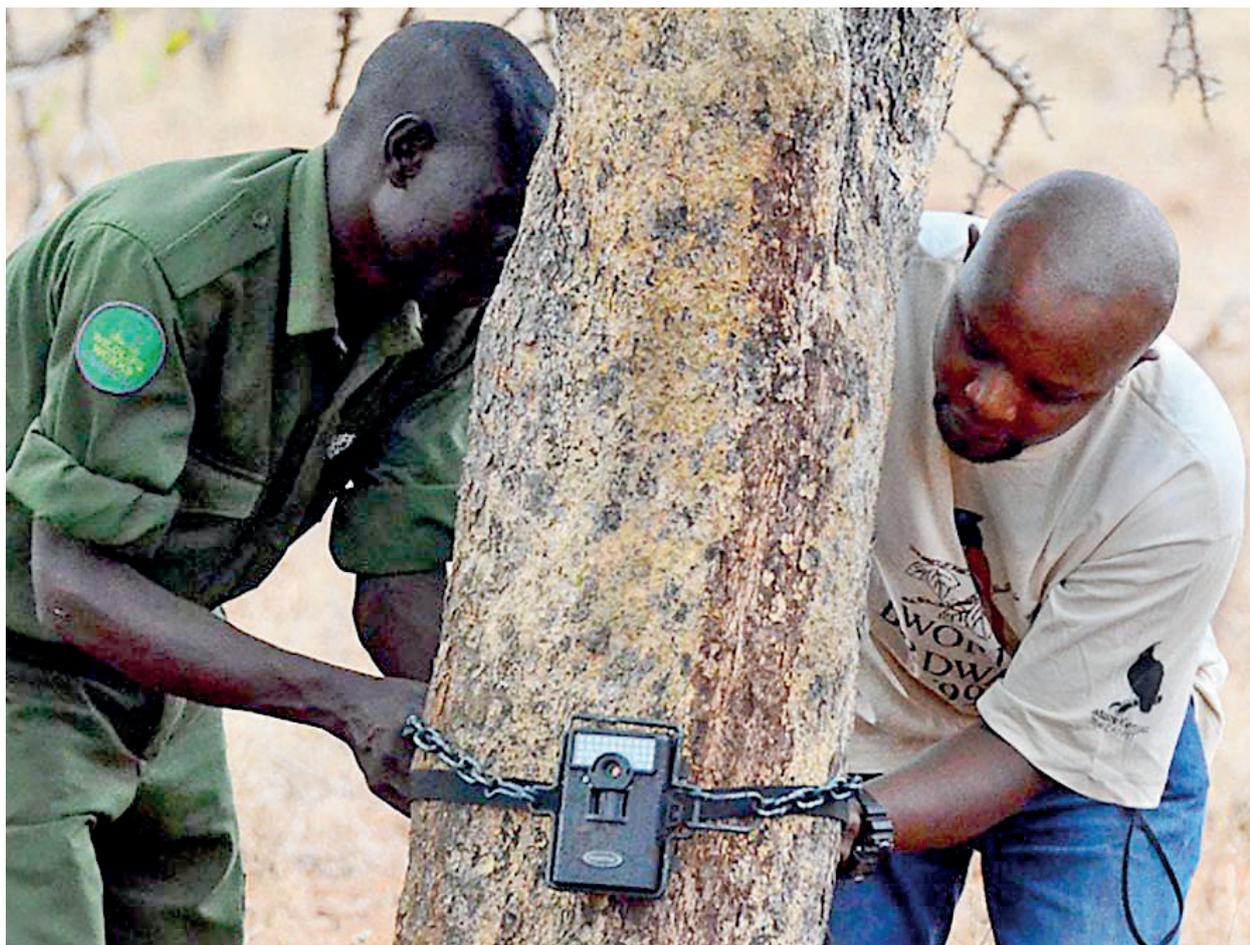
6.7 Monitoring

Biodiversity, social, and carbon monitoring is undertaken. Biodiversity is monitored using a number of methods, including permanent transects. Rangers record encounter rates of species together with threats. Wildlife Works also initiated a pilot community-based wildlife monitoring scheme, with the goal of demonstrating that the KCRP is delivering on the stated commitment to improving the situation of the species of concern in the project area. All collected biodiversity data are organized and analyzed.

There are 512 permanent carbon biomass sampling plots across both phases of the KCRP, containing 15,136 individually measured trees. They will be monitored over the project lifetime for forest carbon stock measurement purposes. In addition to the carbon stocks of the forest, the tree database provides an opportunity to assess vegetation diversity, composition, and structure.

The first (baseline) community surveys were completed in April 2012 and comprised 180 households; the second survey was completed in August 2013 (183 households). In the 2013 survey, 29 of the original 180 households were not interviewed, mainly because they had relocated, so 32 new households were added. The intention is that with 212 households in total, and a baseline of either 2012 or 2013, annual repeat surveys will resample at least 180 households.

Figure 6.5 Securing a Camera Trap for Wildlife Monitoring in the Kasigau Corridor



6.8 Funding

The project's funding has varied over its 20 years of existence. The main sources of finance are highlighted below.

- **Initial investment by Wildlife Works, Inc.:** From the establishment of the first phase of the project at the Rukinga Ranch in 1997. The first decade of the project was as a private wildlife conservation initiative, working in a specific location to dedicate land to forest conservation purely for the preservation of wildlife habitat. Alternative livelihoods were developed for as many of the community members affected as possible, and locally hired and trained rangers enforced the nonencroachment rules on behalf of the community landowners.
- **Carbon credit sales:** After the launch of the REDD schemes in around 2010 (see below), Wildlife Works used voluntary carbon credits as a method of financing the project while proceeding with its much larger second phase. Companies wishing to achieve a reduction or neutralization of net carbon emissions pay Wildlife Works at market rates for an agreed volume of emission reductions earned

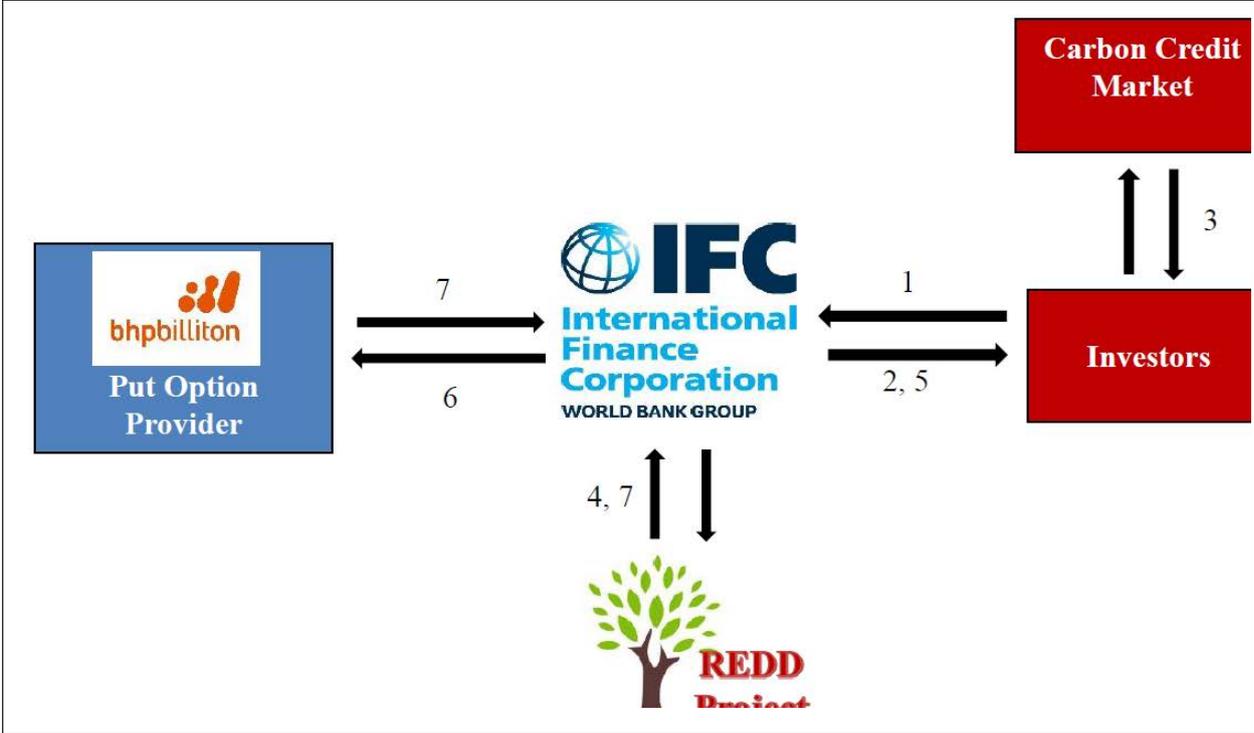
through the protection of the project forests. This system is monitored and verified by two separate accreditation systems.

- **IFC-led Forests Bond:** In 2016, IFC led the establishment of a Forests Bond. BHP Billiton, the world's biggest mining company, underwrote the bond. Their support for the bond is part of their commitment to scale up private sector investment in REDD+, stimulate demand for REDD+ credits, and demonstrate the value of reducing deforestation as a cost-effective climate change solution. Investors in the bond can receive credits from IFC in lieu of cash interest, and IFC in turn pays Wildlife Works for the emission reductions. The Forests Bond arrangement is shown in Figure 6.6.

Carbon credits have proven to be a substantial source of support for the KCRP; however, they have not been consistent because market-based carbon finance remains highly volatile due to its heavy dependence on conditions in the broader global carbon market. Difficulties in sales in the voluntary market, along with fluctuations in credit values, have made it hard to ensure a consistent income stream to the KCRP. For

example, revenues were effectively halved between 2010 and 2011, when carbon values fell dramatically. This inconsistency is reflected in the compensatory payments to beneficiaries, which are consequently variable. While project operating costs are relatively static year over year, the funds available for distribution to beneficiaries have varied.

Figure 6.6 Schematic Diagram of the Forests Bond



Source: IFC 2016.

Note: Summary of flows:

1. When the bond was issued, investors paid \$152 million in aggregate, against Notes issued by the IFC.
2. Note holders receive an annual cash coupon with an option on a coupon deliverable in Verified Carbon Units (VCUs), at \$5 per VCU.
3. The Note holder may retire the VCUs or sell them in the carbon market.
4. IFC will buy 469,984 of the VCUs generated by the project on an annual basis.
5. IFC will use the VCUs purchased from the project to meet investors’ demands for delivery of VCUs; it will put all unused VCUs to BHP Billiton.
6. Investors are not exposed to any credit or performance risk of BHP Billiton.
7. The total price support provided by BHP Billiton will be escrowed (that is, placed in trust) before the Notes are issued. If any part of the support of BHP Billiton under the Put Option (that is, BHP Billiton’s obligation to purchase VCUs) is not used, it may use the remainder to purchase VCUs from the project, via IFC.

6.9 Successful Outcomes to Date

The project had been established for nearly 20 years at the time this case study was written. Although an undertaking of this nature is long term, with outcomes that will take many years to be realized, a number of successes appear to be emerging.

- The company behind the project, Wildlife Works, has been effective in attracting significant funding to support conservation. It was innovative in finding a way to harness money from the carbon market for this purpose, early in the process of the REDD+ initiative.
- The company has established a modus operandi for biodiversity conservation in an inhabited and degrading environment, in a setting where wildlife was under threat and unsustainable agriculture-based livelihoods were strongly prioritized over conservation.

- Large areas of forest have been protected from cattle ranching, slash-and-burn agriculture, hunting, and fuelwood collection. Some areas are also being replanted. This ensures that the forest is gradually regenerated and restored, improving the habitat for the faunal biodiversity, preventing the release of substantial amounts of carbon, and storing more carbon in the vegetation and soils.
- Alternative livelihoods have been established for some of the community so they are not dependent on access to land. In particular, the project's clothing and bag factory has created an entirely new source of livelihood for people living in the project area. With Kenya's agricultural reform stalled in this area (through the failure of cattle ranching and the impacts of climate change on rainfall), any move away from forest clearance and land-based subsistence agriculture represents a valuable aspect of the development of the locality.
- A considerable number of community projects have been implemented using a portion of the revenues accruing to the project, providing better water supplies and giving children in the area greatly improved access to schooling, among other things.
- Significant funds have been distributed to shareholders in the ranches. This amounts to more than 4,000 individuals from families representing over 30,000 community members. The levels of funding injected into the local economy through this means are far greater than brought by any previous development initiatives.

6.10 Key Elements Contributing to Success

Determination and Permanency

Before the availability of carbon credits, it took a lot of determination and vision to switch the Rukinga Ranch from agriculture to wildlife conservation. That decade of experience made it possible to start the REDD+ project much more quickly and effectively, and on a bigger scale, than would otherwise have been possible. Wildlife Works has now been in the area for nearly 20 years, providing continuity and consistency.

Access to Finance

Wildlife Works has been able to attract significant funds to the area. This has been critical in providing alternatives to the preexisting agricultural subsistence systems, which made the population dependent on the forests and the

animals they contained. The funds have mostly flowed into the Kasigau area through impact investments and purchases of carbon credits from companies in other countries. However, the clothing and bag factory, which provides the local people with something more tangible to sell, has helped to broaden the revenue stream and ensure that the project is not so dependent on fluctuations in the carbon market.

Elephants Attract Funding

While many of the techniques used in this case study offer significant promise elsewhere, it is also true that some of the enabling conditions here may not be readily duplicated in other areas. These conditions include the many years of investment before emissions reductions became a basis for financing, the critical need to create a corridor between preexisting national parks, and the possible additional interest from investors due to the presence of charismatic wildlife species such as elephants, lions, and cheetahs.

Legal Agreements

Gaining access to very large areas of contiguous land can be difficult almost everywhere. Without being able to make legal agreements to secure the use of land principally for biodiversity conservation, it would have been impossible for the project to realize its purpose of restoring huge tracts of wildlife habitat. Fortunately for Wildlife Works, the government's previous policy of designating areas for group ranches meant there were relatively few entities to deal with. Although each ranch has numerous shareholders, it is generally more straightforward to deal with a corporate entity than with a more diverse group of individuals. Phase 1 involved only a single large group ranch. The more extensive phase 2 involved 13 ranches; however, this number of negotiations was still easier to achieve than the thousands of individual discussions that would have been necessary were individual households rather than group ranches the legal owners. With these agreements, the project secured access to the land that was required, and the basis for its pro-conservation management.

Enabling Environment

The government didn't establish any specific policies or take any actions to enable the project. However, it did provide armed antipoaching support when the ivory crisis resurfaced between 2010 and 2015. While not directly related to the project, the establishment of legal title to land a long time prior to the initiation of the project was also strategically important.

6.11 Key Challenges

Market and political uncertainties: Market and country risk have presented significant barriers to private investment in REDD+ activities. The lack of a consistent revenue stream due to carbon market volatility and lack of investors willing to enter this space as a consequence has been challenging. This has had a knock-on effect on needing to effectively manage expectations through the ups and downs of the carbon market. Political upheavals have also proved challenging during the life of the KCRP, notably in 2007–2008 and more recently in 2017.

Evolving REDD+ policy: The slow development of the REDD+ policy resulted in Wildlife Works forging their own path. As there was no methodology for REDD+ under VCS when the project started, the KCRP developed its own methodology and got it double validated by VCS's experts. This took time and was costly. In addition, there have been a number of UN developments since the project began, which has meant that the project has had to adjust its approach over time. For example, the UN Sustainable Development Goals are now the criteria by which nonfinancial goals of the project must be measured.

Private sector REDD+ projects: Not everyone is supportive of private sector REDD+ projects as they are difficult to scale up and some projects have not addressed the rights of communities. Nevertheless, protecting landscapes is challenging, and it is likely that this will require a range of actors, including biodiversity offsets, private sector REDD+ projects, as well as national and regional programs and initiatives.

Customers for the eco-factory: The products made at the factory are not competitive with lower-priced alternatives originating in India and China, so finding sufficient customers is challenging. This has improved as more companies appreciate the uniqueness and eco-credentials of the products.

Poaching: Armed elephant poaching continues. The project has invested in gyrocopters for aerial surveillance and has a partnership with the Kenya Wildlife Service, which provides armed support on an as-needed basis.

Climate fluctuations: Changes in weather patterns are making food security even more difficult to achieve in the region through agriculture, leading to increased pressure on wildlife and forests. However, it has made the rationale for the project easier to communicate locally as the impacts of climate change on the region intensify.

Crop failure: Substantial and repeated crop failure in surrounding communities (linked to climate change) could lead to increased poaching and use of the forests for financial benefit. The risk of the occurrence of this is high. Virtually all alternative economic development efforts are aimed at mitigating this risk.

Climate-related payments as basis for long-term protection: Despite market volatility, carbon credits have represented a compelling alternative to other sources of income. However, as Kenya's economy grows, other economic opportunities may become more financially attractive to landowners in the project area.

Lack of local institutional capacity: By working with two largely new institutions (LCCs and CBOs), the project was able to provide the capacity support required in rural society to manage substantial projects such as the construction of a water system or a school, or the administration of multiple scholarships. In addition, it was able to monitor and audit the processes closely, to ensure that there was no corruption.

6.12 Conclusion

The Kasigau Corridor REDD+ Project has succeeded in protecting an area of high biodiversity importance and generating significant funding for community development schemes, to an extent not achieved in this region before, or which could currently be conceived through other sources. Although voluntary carbon markets are losing ground, new opportunities exist with the recent signing of sector agreements (such as in civil aviation) and agreements between countries and major funds supporting REDD+, as well as other approaches such as the use of taxes or public funds, perhaps related to national policies on countering climate change.

7. MAULES CREEK COAL MINE – BIODIVERSITY OFFSET, AUSTRALIA

SUMMARY

The Maules Creek Coal Mine (MCCM) is located in the state of New South Wales (NSW) in eastern Australia. Much of the native forest has been cleared in the past for agriculture although some forest areas remain, one of which is the Leard State Forest. It provides a significant area of native vegetation in an otherwise fragmented landscape and around half of the Maules Creek mining lease lies within the forest. The project requires an offset.

Key Features

- Agriculture, urban development and coal mining in NSW has resulted in the loss of 80-90% of native Eucalyptus (Box-Gum) woodland which is now listed as an endangered ecological community (EEC) at the state level and critically endangered (CEEC) federally.
- The project involves the loss of 1665 ha of native vegetation, 544 ha of which is Box-Gum. The total proposed offset area comprises numerous sites and covers 13,113 ha.

Key Lessons

- Native forest remnants in a largely deforested landscape have high value, leading to wide interest on the part of many stakeholders. MCCM has been the subject of significant opposition. Some of this related to loss of native forest and

other environmental issues but the project also became the focus of a national and global fossil fuel divestment campaign.

- Cumulative effects of a number of land users impacting the area resulted in a requirement for MCCM and other mines in the area to fund a coordinated Regional Biodiversity Strategy.

Key Challenges

- In a complex landscape of agriculture, forests, mining, and other land uses, and the involvement of multiple government agencies, securing suitable like-for-like offsets that have sufficient integrity and are under suitable tenure arrangements is challenging.
- Woodland restoration has been successful elsewhere in Australia, however the restoration of Box-Gum habitat is not proven.
- The effectiveness of using relatively narrow corridors to link fragmented offset areas in order to provide a degree of habitat integrity in a largely agricultural and industrial landscape will only become apparent over the long term.
- Finding ways to ensure the conservation management of the offsets in perpetuity appears relatively straightforward, but a number of long term questions remain

7.1 Context

The Maules Creek Coal Mine (MCCM) is located in the Gunnedah Coal Basin near Boggabri in the state of New South Wales (NSW) in eastern Australia. The MCCM is operated by Maules Creek Coal Pty Ltd, a wholly owned subsidiary of Whitehaven Coal Limited. The project was approved at state level in October 2012 and at national level in February 2013.

The terrain consists of undulating hills and basins. Vegetation within the region is highly fragmented, with large expanses of cleared land associated with extensive agricultural activities. However, the vegetation within the Leard State Forest provides a significant area of native vegetation in an otherwise fragmented landscape. Leard State Forest is part of a number of local corridors with partial connectivity to the Leard State Conservation Area. Three open cast coal mines currently operate within, and adjoining, Leard State Forest. The Boggabri Coal Project (Boggabri Coal Pty Limited), Tarrawonga Coal Project (Tarrawonga Coal Pty Limited) and MCCM. Approximately half of the Maules Creek lease is in Leard State Forest.

7.2 Biodiversity Values and Impacts

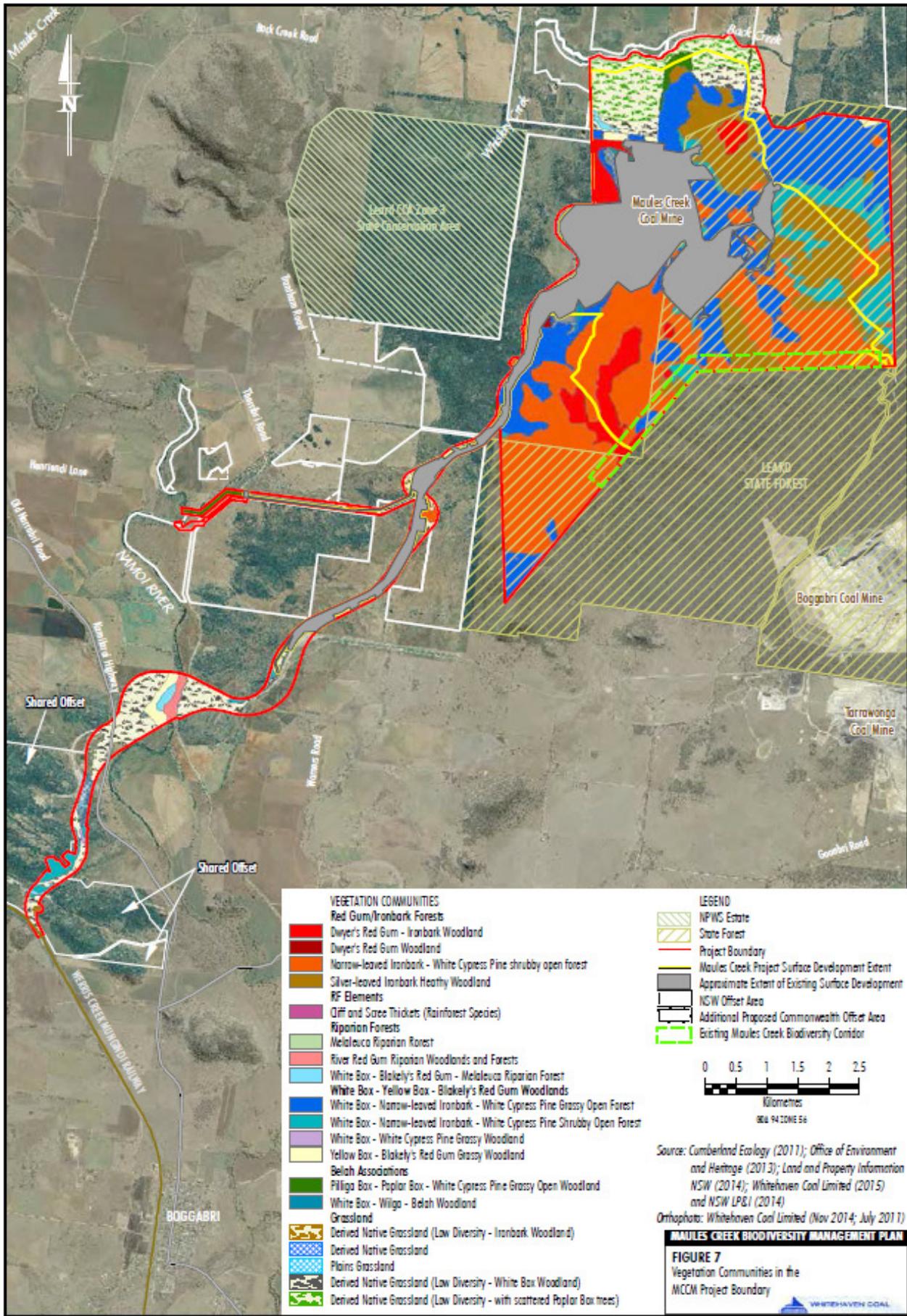
Prior to the commencement of mining, the Leard State Forest covered an area of approximately 8,134⁴ ha of native vegetation. Approximately 3,214 ha of the forest comprised White Box (*Eucalyptus albens*) - Yellow Box (*Eucalyptus melliodora*) - Blakely's Red Gum (*Eucalyptus blakelyi*) Woodland and Derived Native Grassland, commonly called "Box-Gum woodland". It is considered an endangered ecological community (EEC) under the Biodiversity Conservation Act (2016) and a critically endangered ecological community (CEEC) under the Commonwealth Environment Protection and Biodiversity Conservation Act (1999). The forest also supports a range of threatened fauna and any further losses will also result in the loss of valuable habitat for hollow dwelling fauna. The Maules Creek project will eventually involve the clearing of 1,665 ha of native vegetation, 544 ha of which is Box-Gum woodland and associated grassland.

⁴ Umwelt (2017) Leard Forest regional biodiversity strategy stage 2 report

7.3 Residual Impacts after Mitigation

MCCM employs a range of biodiversity protection measures in its operational areas. These include the marking of clearance areas, pre-clearance fauna and flora surveys and relocation of fauna, sensitive timing of clearance, seed collection and propagation, site rehabilitation, the control of weeds, erosion prevention and other activities. Ultimately, rehabilitation is a key goal. This comprises both physical measures – re-creation of stable, properly drained and naturally shaped landforms – and biological measures – the establishment of native woodland suitable for a conservation end use. It is acknowledged that the biodiversity quality of the mined land will decline in the short term and there are difficulties re-creating natural climax habitat and ecological communities.

Figure 7.1 Vegetation Types in the Maules Creek Project Area



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Around 40 million tonnes of the coal resource have been sterilised to provide for a “vegetated corridor”. This 500m width corridor runs along the southern edge of MCCM’s lease, against the adjacent Boggabri Coal Mine and connects forest areas approximately 6 km apart. By its nature this corridor will incur significant edge effects and disturbance from the mines on either side. Box 7.1 gives further details of the issues of fragmentation and connectivity in relation to forest integrity. Nevertheless, if maintained successfully, it should help to improve connectivity between the fragmented blocks of forest. Despite mitigation, residual impacts require the implementation of an offset.

Box 7.1 Forest Fragmentation and Corridors

Habitat integrity and connectivity are key uncertainties in both defining offset needs and creating viable offsets in landscapes where multiple projects cause fragmentation, or where it is not possible to create large contiguous blocks of land for offsetting.

As pointed out in the NSW Government’s 2012 review of the Maules Creek Coal Project, the patch size and connectivity of vegetation can affect the long-term viability of the ecosystem. In general terms, larger and more intact patches are more diverse and more resilient. In particular, they are less susceptible to edge effects, for example from invasive weeds and pests. They are more likely to support a higher species richness and larger populations of individual species, with greater genetic diversity and resilience to disease, natural disasters and human impacts. Larger and more connected patches are also more likely to be able to adapt to the impacts of climate change. Conversely, clearing and fragmentation produces barrier effects and genetic isolation.

The MCCM offset has a number of corridors built into it, to link the various components. While this is admirable and is currently considered good practice, corridors by their nature are narrow and suffer disproportionately from edge effects. They are much harder to manage than forest areas with greater minimum dimensions to buffer biodiversity against dust, noise and other intrusions. Species will adapt to and exploit corridors differently, which may lead to a change in the overall species mix. A difficulty for offset managers is a lack of detailed knowledge of individual species behaviour when subjected to change, in complex and often unpredictable ways which cannot be modelled.

7.4 Offset Strategy Agreed

The company has committed to minimise the significance of the predicted biodiversity impacts by acquiring and securing areas of similar vegetation to be managed for biodiversity conservation. MCCM is also committed to accelerating and enhancing mine site rehabilitation so that rehabilitated areas might provide habitat and movement corridors for some species as quickly as possible.

In a complex landscape of forests, agriculture, mining and other land uses, and multiple Government agencies including (state and Commonwealth), MCCM has reached agreement on what the offset should be. The NSW offset areas cover a total of approximately 12,168.9 ha. The total proposed Commonwealth offset areas for the MCCM covers 13,113.7 ha (i.e. a sum of the NSW revised offset areas and additional proposed Commonwealth offset areas). An independent reviewer has verified that the Commonwealth offset areas contain no less than 5,532 ha of White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland). It has also verified that the Commonwealth offset areas contain no less than 9,334 ha of equivalent or better quality of habitat for the Regent Honeyeater (*Xanthomyza phrygia*), Swift Parrot (*Lathamus discolor*) and the South-eastern Long-eared Bat (*Nyctophilus corbeni*) (previously Greater Long-eared Bat). In addition, MCCM will provide \$2.5 million of indirect offsets through the investment of \$1 million for research on methodologies for achieving rehabilitation and restoration of the Box-Gum Woodland CEEC and a further \$1.5 million to deliver conservation activities for the Regent Honeyeater, Swift Parrot and the South-eastern Long-eared Bat. This research work has commenced.

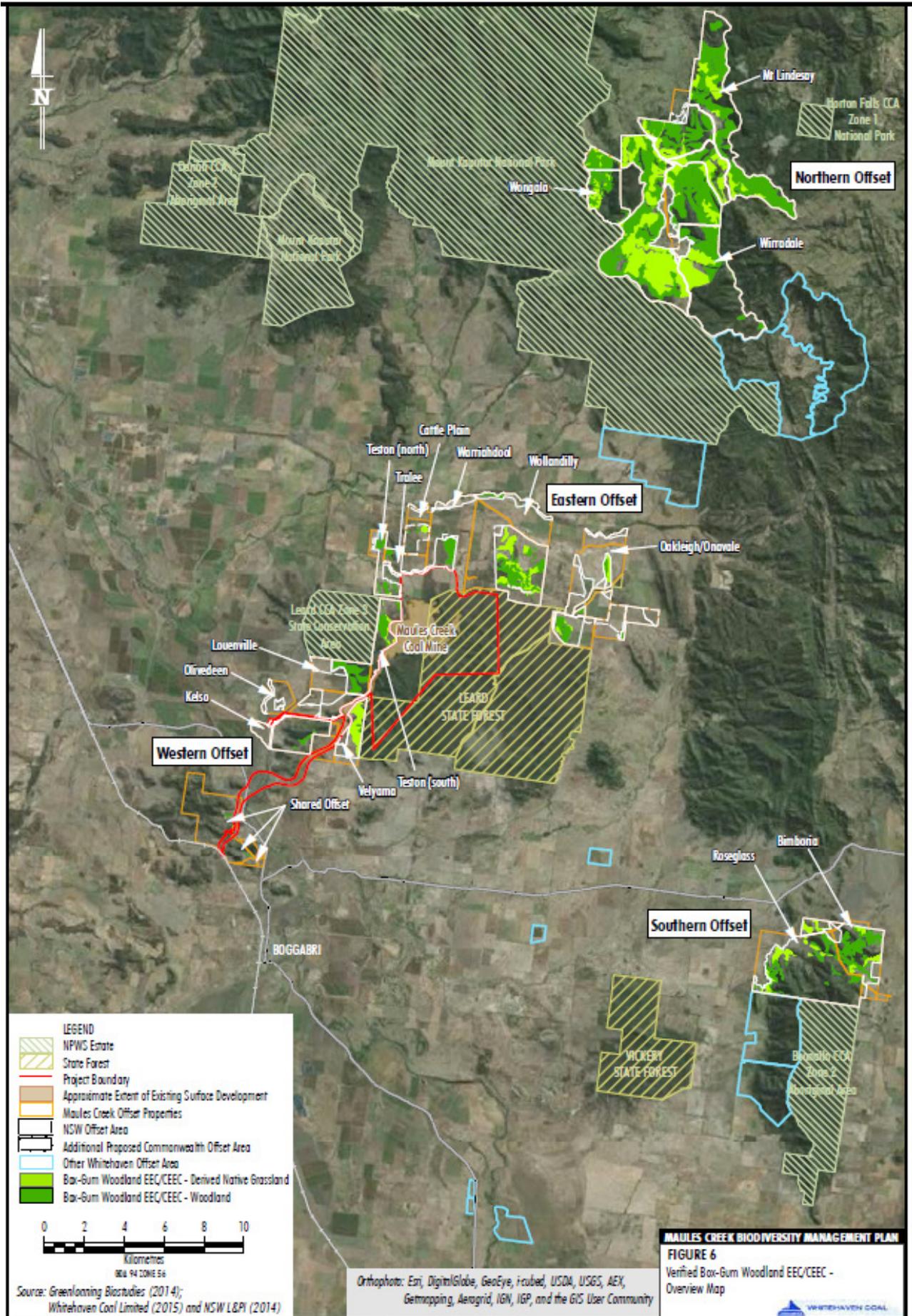
The company is undertaking habitat management and restoration, and corridor enhancement, on a number of land parcels in the region. This and other native vegetation occurring on these sites are likely to provide suitable habitat for many of the threatened species which have been identified on site. The revised Biodiversity Management Plan approved by NSW Government in 2017, for the implementation of the Biodiversity Offset Strategy, followed considerable community consultation and government reviews. This plan provides details as to how additional offset areas will be determined and managed to achieve compliance with the larger areas required by the permit conditions.

Through the combined rehabilitation of offsite conservation lands and the onsite mine rehabilitation areas, the company expects that the project would eventually increase the amount of native vegetation in the region. The land has also been strategically selected in order to consolidate existing areas of forest such as the Mount Kapatour National Park and Boonalla Community Conservation Area. The intention is to progressively hand over management control of the northern offsets to the National Parks Estate.

As Figure 7.2 shows, the areas available for offsetting have led to a network of different forest blocks. This approach is far from ideal as there will be issues of fragmentation and disturbance to smaller forest areas rather than to a single large contiguous forest block (see Box 7.1). The strategy agreed will also be more complicated to manage and to safeguard in perpetuity than if it were a single large block, and consequently more expensive to implement. However, due to historical land-clearance for agriculture, there is no option to set aside a single area of Box-Gum woodland of the size required.

The strategy which has been agreed by stakeholders is in the process of implementation. Over the last two years, MCCM has completed over 1,500 ha of active woodland/forest revegetation on former agricultural properties (via direct seeding of understory species and planting overstorey seedlings). It has also assisted natural regeneration processes in existing woodland areas through removal of grazing, and implementation of weed control measures. The execution of the MCCM Biodiversity Management Plan is subject to independent audits.

Figure 7.2 Location of Potential Offset Sites at Maules Creek



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7.5 Mechanisms for Safeguarding in Perpetuity

Two options are available to MCCM to secure its offset areas in perpetuity. One is to establish a tenure of high conservation status, such as a national park or nature reserve, that would be protected by law. Where this cannot be achieved, the alternative arrangement would be a legally binding conservation agreement that would be registered on the property title and would remain in perpetuity. Parts of the northern offset adjoining Mount Kaputar National Park appear to be most straightforward to transfer to the National Parks Estate. The offset implementation costs in perpetuity will be determined by calculating the costs of all offset management other than land acquisition, and a conservation and biodiversity bond lodged with the NSW Government's Department of Planning and Environment to ensure that the strategy is fully implemented. This is an obligation on the company under the conditions of the project approval⁵.

7.6 Environmental Trust Fund and Co-ordinated Forest Conservation

MCCM is responsible for the management of its offsets in accordance with the requirements of their various approvals including the costs associated with their implementation. However, given the presence of other mines and their offset areas in the vicinity, a Regional Biodiversity Strategy (2017) was developed to provide an overarching framework. The strategy is overseen by the NSW Government's Department of Planning and Environment and it guides the implementation and management of biodiversity offsets for these projects, future mining proposals and other significant land use changes in the region. The strategy acknowledges that complementary management of these offsets will ensure they achieve the best possible biodiversity outcomes from a regional perspective.

In addition, an Environmental Trust Fund was established in 2014. The three mining companies, Maules Creek, Boggabri Coal and Tarrawonga Coal contribute to the fund, which is then managed by Narrabri Shire Council to provide grants for environmental projects in the community, although these funds are not restricted to biodiversity projects.

⁵ *Maules Creek Coal Mine: Biodiversity Management Plan. April 2017. Whitehaven Coal Limited.*

7.7 Key Elements Contributing to Success

Strong Regulatory Environment and Civil Society

NSW has a strong regulatory framework on offsets. The NSW biodiversity offsets policy for major projects commenced in 2014. The policy standardises the requirements for biodiversity offsetting for major projects. The Biodiversity Conservation Act 2016 outlines the framework for addressing impacts on biodiversity from development and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme. The project has also been the subject of a number of reviews. The offset is also independently audited.

The Maules Creek Community Consultative Committee first convened in June 2013, has since met approximately quarterly. An independent chairperson is employed to run meetings. This gives an opportunity for regular liaison between the company and the community. For the broader area, a combined Boggabri - Tarrawonga - Maules Creek Community Consultative Committee was also formed and meets annually. This reviews activities at each mine, and discusses progress on cumulative impact, environmental issues, Aboriginal heritage, regional biodiversity strategies, and the MCCM-funded Environmental Trust Fund.

Transparency

The company has been transparent in terms of making its documents publicly available, perhaps partly because this is required by the government regulators. These include all of the ESIA documents, and subsequent revisions and independent reviews. It also includes all of the monitoring results required by permit conditions, and the minutes of all public meetings. This enables informed debate with community representatives.

7.8 Key Challenges

Public Opposition

MCCM has faced public opposition to its project. A long-standing protest camp attracted large numbers of protestors from all over Australia. Some of this was genuinely related to concerns over loss of forest and other biodiversity values but other protestors were connected to the anti-coal movement.

Figure 7.3 Protestors at the Maules Creek Coal Mine



Rehabilitation Techniques and Effectiveness

Rehabilitation works need to incorporate some of the important habitat features. Tree hollows and decaying plant debris will eventually be created naturally, but initially they have to be provided artificially. Other features, such as ephemeral streams and rocky outcrops, must be created during the initial re-landscaping. Seed collection, raising seedlings and re-establishing forest communities are all skilled and involved activities, and all have complications. While the skills required for this work are available, the sheer scale of rehabilitation, and

the re-development of the complex ecology of the Box-Gum woodland habitats, is a large-scale and long-term undertaking.

Securing sufficient land

The task of acquiring and securing regionally significant areas of remnant vegetation to be managed for biodiversity conservation is complicated. This is due to the lack of suitable areas of similar habitat, and the fact that many areas have been nutrient enriched or support invasive species as a result of historic land use.



The enabling environment also appears to prioritise agriculture thereby constraining options further, as offsets must not impact agricultural or pastoral enterprises.

Threats to Offset Areas

Despite a strong regulatory framework, critics state that legislation is not always implemented effectively, nor does it provide for ‘no-go zones’ for irreplaceable biodiversity values. It has also been suggested that regional planning frameworks prioritise mining and agriculture over the long-term protection of biodiversity

and its services. The issue of offset permanence (as in many areas around the world) is therefore an issue. The Maules Creek offsets lie on proven reserves of high-grade coal. Will the government continue to respect the offset areas in the decades to come? Even if they are not mined, there are long-term questions over whether they will be retained for the maintenance of biodiversity rather than forestry or other agricultural objectives if they are not transferred into the National Parks Estate.

Figure 7.4 Box-Gum Woodland with Characteristic Grassy Understory, New South Wales



8. PRACTICAL CHALLENGES ENCOUNTERED IN OFFSET IMPLEMENTATION

This section summarizes a number of the complex practical challenges faced by the partners engaged in implementing the offsets profiled in sections 3–7.

8.1 Reliance on Charcoal Production Puts Pressure on Forests

Charcoal is the preferred cooking fuel in many parts of Africa. Artisanal charcoal production is therefore a key cash-earning livelihood in rural areas served by roads (Figure 8.1). In Liberia, for example, the capital Monrovia’s approximately 1 million people, roughly 20 percent of the national population, greatly depend on charcoal produced in the rural hinterland. Anecdotal evidence

strongly suggests that the production of charcoal close to roads is not sustainable, with forests retreating farther and farther from the supply routes. The upgrading of roads in the main south-north central corridor of Liberia saw an increase of charcoal production into the northern Nimba County after 2010. By then, the quality of roads made transport to Monrovia much cheaper, making charcoal a commercially viable product.

While this effect must have improved household incomes in the area, it also increased pressure on forests. Most charcoal comes from already degraded forests, but their further degradation pushes other land uses into areas of conservation importance, including offset areas.

Figure 8.1 Charcoal Production in the Forests of Liberia





8.2 Reliance on Fuelwood Puts Additional Pressure on Forests

Firewood is used for cooking in rural areas where people do not have the household resources to use charcoal. This might be due to one or more reasons: a scarcity of sufficiently large trees to make charcoal, lack of access to common woodland resources, lack of labor, or lack of cash to buy charcoal. Firewood production is frequently based on poorly organized use of common resources and therefore is often not sustainable. In the fringes of offset areas, it can be a cause of gradual cumulative decline to forest quality.

If an offset area cannot be managed to produce firewood, then alternatives must be provided. These must ensure an equitable distribution because often the poorest and most excluded members of a community are the most reliant on its use. A community forestry system may be appropriate for buffer zone areas.

Figure 8.2 Firewood Collection from the Forests of Liberia



8.3 Use of Fire as a System of Land Management

Dry season burning of crop residues and scrub vegetation is an essential part of soil nutrient management in many tropical farming systems (see Box 3.2). For biodiversity conservation, however, it can be extremely damaging, especially where it gets out of control in forest areas (Figure 8.3). In some conservation zones, fire is illegally used specifically to make hunting easier, although in the long term it will cause a decline.

Figure 8.3 Dry Season Burning of Scrub Vegetation and Impact on Biodiversity



In northern Mozambique, for example, areas of forest refuges on isolated mountains have been stripped of their biodiversity because of repeated burning to reduce habitat for monkeys which loot crops on the surrounding farms. This represents a classic example of animal-human interactions that lead to resentment against conservation efforts by subsistence farmers with few alternatives.

Fire is difficult to prevent in many offset areas, especially those close to international borders, where cross-border poaching can be problematic.

8.4 Offsetting Where Agricultural Land Is Scarce Can Be Especially Challenging

In many landscapes, premium agricultural land such as that shown in Figure 8.4 is scarce. Establishing an offset in an area where this type of land is taken out of the farming system requires both compensation and the development of alternative livelihoods for the people affected. In terms of conservation, the conversion of valley bottomland back into forest can greatly enhance biodiversity because of the relatively high importance of aquatic zones in the overall ecology. Where such land is taken for a development project and must be compensated for, the resulting offset can be more difficult to achieve because of the greater complexity of riverine and swamp ecosystems.

Figure 8.4 Rice Farming in a Bas Fond in Guinea



8.5 Access to Logging at Various Scales Can Undermine Offset Implementation

Where there is a demand for construction timber but strong restrictions on commercial logging, a response is often pit sawing. The left panel of Figure 8.5 shows planks taken from a protected forest in northern Liberia. Local villagers were paid to fell trees, convert them to planks using chain saws, and stack them at the roadside. The planks were then picked up by a truck hired by powerful individuals based in Monrovia. The sawyers had few alternative livelihoods options and were glad to receive

cash wages for this work. They felled the closest and easiest suitable trees they could find, so the management of the forest was unplanned, and it degraded steadily.

In many remote areas, the control of logging in protected forests is very difficult. As with pit sawing, larger-scale illegal logging tends to be opportunistic and does not include good principles of forest management, making it both destructive for biodiversity and unsustainable. Although it should be possible to control activities on this scale, the value of tropical logs is such that the perpetrators may use corrupt means to bypass the authorities.

Figure 8.5 Illegal Logging by Stealth through Pit Sawing, and at a Larger Scale





8.6 Bushmeat Hunting Can Significantly Undermine Offset Efforts

Bushmeat—essentially any wild animal product—is widely eaten in many parts of the world. In many rural areas in Africa, it serves an important source of protein in areas where domesticated livestock are scarce or difficult to raise. Many species such as those shown in Figure 8.6—a cane rat (left) and a domestic rat (right)—are so common that their consumption also helps control pests. However, in many areas bushmeat derives from forests and can be a significant cause of population decline in species of conservation concern. Controlling bushmeat hunting is a major challenge for many offset areas and conservation forests in general.

Figure 8.6 Cane Rat Caught at a Rubber Plantation in Liberia, and a Domestic Rat Being Cooked in Mozambique



8.7 Limiting Access Protects Forests

Across the world, the more accessible that forests are, the more pressure there is on their utilization and exploitation. For extractives projects, often the transport infrastructure they create gives rise to the greatest impacts overall rather than the mining, oil production, or logging itself—because of the difficulty in controlling ad hoc activities by people who utilize the industries' access routes.

8.8 Forest Restoration Does Not Result in Short-Term Biodiversity Gains

Restoration of badly degraded land is a very long process. The left image of Figure 8.7 shows the initial stage of restoration on severely degraded land; here, local species of grasses are being planted on an abandoned

construction laydown yard at a mine in northern Liberia. This system uses indigenous species adapted to a long-established forest-agriculture system, where forest is cleared, the land cropped for one or two years, and then abandoned as fallow for at least 20 years (see Figure 8.7, right image). The farms are invaded by pioneer species, with grasses among the first and serving useful roles in conserving both water and soil. Pioneer shrub and tree species then start to colonize. Once these have established a canopy, climax forest species can begin to reestablish.

Studies suggest that it takes around 40 years for agricultural fallow to return to a botanical mixture broadly similar to that found in largely undisturbed forests (URS 2013). However, the restoration of fully degraded areas that have lost the seedbank in the topsoil may take longer even with appropriate seeding or planting with nursery-raised seedlings. Beyond this, full habitat restoration can take considerably longer.

Figure 8.7 Forest Restoration



Vegetation regrowth at Nimba mine-c



9. CONCLUSION

Compensating for biodiversity losses in complex forest ecosystems can be technically difficult, time-consuming, costly, and in some cases not possible. This is due to competing demands for land and the often-conflicting requirements of protecting community rights while securing lasting outcomes for nature conservation. If companies are either required to implement offsets or choose to do so voluntarily, they need to fully understand the complexities and provide the right resources for effective implementation. In addition, governments need to give consideration to the enabling framework for either supporting—or not impeding—the effective implementation of offsets. The following conclusions primarily apply to governments and companies, but they are also relevant to civil society partners that engage in offset implementation.

- If offsets are to contribute permanently to the conservation estate of a country after the application of the mitigation hierarchy, there needs to be an enabling environment for this to happen. Governments should ensure that there is a supportive environment that enables offsetting through legislation, policy, and willingness to partner with the private sector.
- Offsets will only succeed with the support of local communities. That support is conditional on ensuring that subsistence and livelihood needs are not adversely impacted or are adequately compensated for. Ideally, community support for offsets stems from mutual recognition that the offset offers the potential for communities to thrive sustainably.
- Metrics provide a structured way of assessing losses and gains. However, this does not mean that companies need to establish reliable quantities and qualities of every biodiversity component affected. In some cases, it is also valuable to initiate conservation activities that will contribute positively to the landscape.
- Securing the long-term protection of land is essential to provide companies with a sufficient degree of certainty to invest in offsets, and civil society needs to know that these offset areas will not be eroded in the future.
- Where protective measures are weak or absent, considerable resources may be required to secure an adequate level of protection. Government should ensure that there are options for long-term protection while also recognizing the rights of communities.
- Effective implementation and monitoring are important if conservation outcomes are to be demonstrated, but this may happen over the long term and monitoring can be expensive. No single index can monitor all outcomes; a suite of indicators is likely to be needed. This reinforces the need to derive pragmatic, defensible, and replicable ones.
- Partnerships are essential for offsets to be achieved and then to endure. The requisite authority and skills to implement and ensure protection of an offset successfully are rarely present within a single organization.
- Partnerships are also intrinsically complex. They require active management if the collaborative advantage they promise to deliver is to be achieved.
- Given that all offsets depend on partnerships, their effective governance and oversight is extremely important. The skill lies in ensuring participatory oversight while limiting bureaucracy.
- Outside regulated markets, securing adequate finance from project proponents to support offsets is a major risk to implementation. Companies should ensure that there is adequate funding, and more effort is needed by financial and other institutions to establish a broader range of financing options.

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