Biodiversity Risk Management for Challenging International Projects

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1. Introduction

Effective biodiversity risk management (BRM) in international projects is important for several reasons, reflecting both ethical considerations and pragmatic concerns tied to environmental sustainability, social responsibility, and regulatory compliance. Integrating BRM into corporate and development strategies is essential for mitigating human-caused biodiversity losses and ensuring the sustainability of global economies and societies (Hummel et al., 2008; Addison et al., 2018; Carvalho et al., 2022).

Achieving No Net Loss (NNL) and Net Gain (NG) for biodiversity is an essential part of the Mitigation Hierarchy (MH; avoiding, minimising, restoring, and then offsetting residual impacts) to avoid the negative impacts of development activities. These goals ensure that unavoidable biodiversity losses are balanced by measurable gains, contributing to overall biodiversity conservation (Gardner et al., 2013; Sonter et al., 2020; Pope et al., 2021). In the corporate context, the implementation of certifiable standards on biodiversity management reflects a proactive environmental strategy by organisations and emphasises the importance of effective BRM in corporate sustainability (Boiral et al., 2017).

Applicable standards and requirements for biodiversity offsetting outline the integration of biodiversity offsets within the MH to achieve NNL in natural habitats (NH) and a NG in critical habitats (CH), as mandated by IFC Performance Standards (PS6) (IFC, 2012) and Guidance Notes (GN6) (IFC, 2019). The development of a Biodiversity Offset Management Plan (BOMP) adheres to international good practices, including the Business and Biodiversity Offset Programme (BBOP) Standard and the Biodiversity Offset Design Handbook, alongside guidance from the World Bank.

Key principles for designing and implementing biodiversity offsets involve aiming for overall benefits to biodiversity and ecosystem services, applying the MH, seeking long-term benefits, and using a landscape approach. Offsets should achieve additionality, align with existing initiatives, and be developed through participatory processes involving stakeholders. Offsets must deliver measurable biodiversity gains, be like-for-like or of higher conservation value, and not compromise ecosystem functions.

1.1. Challenges

The pursuit of achieving NNL and NG of biodiversity in international projects is fraught with challenges, many of which stem from safety risks, socio-political conditions, and the inherent complexity of measuring and mitigating impacts, sometimes remotely. These challenges underscore the need for robust, innovative strategies in BRM.

Biodiversity impacts and the benefits of conservation measures often manifest over different temporal and spatial scales. Immediate impacts may lead to long-term losses, while the benefits of mitigation or offset activities may take years to materialise, making it challenging to ensure true NNL or NG. The variability and complexity of natural ecosystems make it difficult to establish clear baselines and quantify losses and gains in a scientifically robust manner. Importantly, international projects may span a range of ecosystems, from forests and wetlands to deserts and oceans, each with its unique biodiversity and ecological functions. The complexity of ecosystems make it challenging to assess, monitor, and mitigate impacts comprehensively. Furthermore, different ecosystems require different management strategies and conservation approaches, requiring a deep understanding of local ecological conditions and Priority Biodiversity Values (PBVs). Making matters more challenging, the availability of existing biodiversity data is often limited in such areas, leading to incomplete or biased baselines that fail to represent the true biodiversity patterns and dynamics (Zizka et al., 2021).

Safety risks, particularly in remote or unstable regions, pose significant challenges for biodiversity conservation efforts. Projects located in areas with difficult terrain, extreme weather conditions, or limited access can make field surveys and conservation activities hazardous for personnel. This not only hampers the collection of crucial baseline data but also affects ongoing monitoring and mitigation efforts required to achieve NNL or NG (Dallimer & Strange, 2015; Busscher & Vanclay, 2018; Zizka et al., 2021). Furthermore, the presence of dangerous wildlife or concerns about health risks (e.g., diseases) further complicates fieldwork, limiting the ability to conduct thorough assessments and implement conservation actions.

Socio-political conditions in project locations can significantly impact BRM efforts. Political instability, conflict, or weak governance can obstruct the implementation of biodiversity conservation measures and undermine the enforcement of environmental regulations. Moreover, in regions where land tenure issues prevail, the establishment of biodiversity offsets or conservation areas may be challenged by competing land uses or unclear land rights, complicating efforts to achieve NNL or NG (Busscher & Vanclay, 2018). The socio-political context also affects stakeholder engagement (crucial for the success of biodiversity initiatives) as it may hinder effective communication and collaboration with local communities, indigenous peoples, and government entities.

1.2. Solutions

Innovative techniques and tools have revolutionised the way biodiversity assessments and conservation efforts are conducted, particularly in the context of achieving NNL and NG objectives for biodiversity (White et al., 2021). Techniques such as drone surveys, environmental DNA (eDNA) sampling, and camera trapping have significantly enhanced the capacity for biodiversity assessment (including the establishment of robust baselines and the identification of often elusive species) and monitoring, supporting the achievement of NNL and NG objectives (Table 1) (Meek et al., 2016; Bevan et al., 2018; Varela-Jaramillo et al., 2023). These advancements allow for more efficient, accurate, and less intrusive monitoring of wildlife and ecosystems, supporting effective BRM. These technologies can enable data collection from remote or inaccessible areas, reducing the need for physical presence in potentially hazardous locations. In areas with socio-political instability, involving local communities and stakeholders in data collection and monitoring efforts can not only provide valuable insights but also create a sense of ownership and cooperation, contributing to the sustainability of biodiversity management initiatives. Moreover, the sharing of data collected during baseline and monitoring surveys with relevant local, national, or global biodiversity databases has been identified as a specific opportunity for businesses to improve biodiversity impact mitigation (White et al., 2023). By contributing to these databases, organisations can enhance the overall knowledge base and facilitate collaborative efforts to address biodiversity challenges in regions with safety risks and socio-political instability.

Table 1. Innovative methods for biodiversity surveys and their advantages for achieving NNL / NG.

Method	Advantages
eDNA sampling	Used to quickly assess the biodiversity of an area, including detecting rare or elusive species, which is critical for designing effective NNL and NG strategies. It is particularly useful in aquatic environments where traditional survey methods may be less effective.
Drones	Drone surveys support NNL and NG objectives by providing comprehensive data on habitat quality and extent, enabling precise impact assessments and the monitoring of restoration efforts. Drones can also access remote or difficult terrain with minimal disturbance to wildlife.
Camera trapping	Helps identify species composition and population trends, informing the development and success of biodiversity offsets and conservation measures. This method is especially useful for nocturnal or cryptic species that are otherwise difficult to observe.

Method	Advantages
Remote sensing and GIS	Critical for planning and monitoring NNL and NG initiatives, allowing for the assessment of large-scale environmental impacts, the identification of potential conservation areas, and the evaluation of habitat restoration efforts.

2. Case studies

RSK has been at the forefront of supporting numerous international projects across a diverse array of sectors, for clients operating with a commitment to environmental sustainability and biodiversity conservation. The following case studies exemplify RSK's multidisciplinary approach, showcasing innovative strategies and collaborative efforts employed to achieve NNL or NG in biodiversity. These examples highlight strategies to navigate the complexities of large-scale international projects, ensuring that BRM is integrated into project planning and execution.

2.1. Linear development project in Northern Angola

In Northern Angola, a linear development project presented significant challenges for BRM due to lingering threats from landmines remaining from the civil war between 1975 and 2002. The presence of landmines rendered comprehensive baseline surveys difficult, as traditional survey methods were constrained by safety concerns. Consequently, surveys were limited to areas along roads, with precautionary approaches such as critical habitat assessment (CHA) and residual impact assessment (RIA) being employed to identify PBVs and impacts and mitigate risks.

Remote sensing technologies were utilised to infer habitat presence and species distribution as proxies for direct monitoring, facilitating the identification and management of biodiversity risks. The detonation of landmines posed additional environmental threats, including habitat loss and fragmentation, edge effects, soil erosion, sediment loading in water sources, and the emission of fugitive dust (Berhe, 2006).

The CHA identified several PBV species, including three reptiles—Slender-snouted Crocodile (*Mecistops cataphractus*), African Softshell Turtle (*Trionyx triunguis*), and Angolan Adder (*Bitis heraldica);* five birds—White-headed Vulture (*Trigonoceps occipitalis*), Bateleur (*Terathopius ecaudatus*), Braun's Bush-shrike (*Laniarius brauni*), Grey Parrot (*Psittacus erithacus*), and Red-footed Falcon (*Falco vespertinus*); three fishes—Congo Blind Barb (*Caecobarbus geertsii), Oreochromis macrochir*, and *Labeobarbus ansorgii*; and six plants—*Rotala robynsiana*, *Rotala smithii*, *Genlisea angolensis*, *Leiothylax quangensis*, *Dalbergia macrosperma*, and *Inversodicraea cristata*.

Further surveys were recommended to refine PBVs from the CHA, including targeted bird surveys along road edges and aquatic eDNA surveys. Key BRM strategies encompassed the avoidance of wetlands, plant translocation if necessary, progressive habitat restoration following landmine clearance, avoidance of breeding bird seasons, and additional baseline surveys post-clearance. In some cases, biodiversity offsets might be required to compensate for unavoidable impacts.

Overall, the project in Angola underscores the complexities of BRM in regions with challenging socio-political conditions, highlighting the necessity for innovative approaches and adaptive management strategies to safeguard biodiversity in the face of significant environmental and safety constraints.

2.2. Project in West Africa

Mali, a West African nation has faced significant socio-political challenges, including persistent instability and conflict since a coup in 2012. Subsequent coups in August 2020 and May 2021 have further disrupted efforts to establish stable governance. The country grapples with various armed groups, including jihadist organisations linked to al-Qaeda and ISIS, and ethnic militias, which exploit ungoverned areas in the northern and central areas to launch attacks on military and civilian targets. This ongoing conflict has created a severe humanitarian crisis, with millions requiring aid and facing displacement, food insecurity, and health crises exacerbated by environmental factors like droughts.

In this challenging context, our project focused on monitoring PBVs. During this monitoring, camera trap footage in April 2019 captured an African Wild Dog (AWD; *Lycaon pictus*), a species not recorded in the country for 30 years. This sighting of a young female AWD, likely dispersing from Senegal's Niokolo-Koba National Park or an unrecorded nearby pack, highlights the complexities of BRM in unstable regions. AWDs have extensive home ranges of up to 1,500-2,000 km², leading to low population densities and significant conservation challenges (Ginsbery et al., 1997). The habitat in the project area does not support a resident AWD pack, but the dispersal behaviour observed is critical for understanding the species' movements and conservation needs.

Globally, AWD populations are fragmented and endangered, with fewer than 1,409 mature adults in West Africa. They face severe risks from habitat fragmentation, human conflict, and diseases (Woodroffe & Sillero-Zubiri, 2020). The sighting underscores the urgent need for effective conservation strategies in Mali, where illegal semi-mechanized artisanal mining along rivers and creeks degrades habitats and disrupts wildlife movement. These activities threaten not only AWDs but also other species like hippopotamuses (*Hippopotamus amphibius*) that rely on these aquatic ecosystems. The degradation of critical wildlife corridors due to mining and other human activities necessitates immediate measures to mitigate impacts and protect biodiversity in the region.

This case study illustrates the intricate challenges of managing biodiversity risks in areas with complex socio-political conditions. The incidental discovery of the AWD emphasises the importance of continued monitoring and adaptive management strategies to address both conservation challenges.

2.3. Barrick Gold's offset: the Fina Project

Barrick Gold initiated the Fina Project to offset biodiversity impacts from the Loulou Gold Mine in Mali. The project is situated within the Fina Reserve, part of the UNESCO-classified Biosphere Reserve Boucle du Baoulé, located 80 km northwest of Bamako and covering 104,900 hectares. The region faces a severe biodiversity crisis, with threats of permanent wildlife loss. The Fina Project, launched on October 7, 2021, is a 15-year initiative beginning with a 5-year commitment from Barrick Gold, which pledged $5 million through its Loulou Gold Mine subsidiary for initial funding.

The project is managed by the NGO BIO.DUR.SHAHEL (Bios) under a contract with the Direction Nationale des Eaux et Forêts (DNEF). The offset strategies include habitat restoration and measures to prevent further biodiversity loss. Additionally, the project encompasses the development of a business and management plan that focuses on community development, livelihood restoration, habitat management, and education.

Despite these well-structured plans and commitments, the Fina Project faces significant challenges due to the security situation in the region. The area has been classified as a red zone, plagued by banditry and the risk of terrorism, which places the project's staff and operations in jeopardy. This instability threatens the achievement of the project's biodiversity goals and NG objectives.

Such extrinsic factors highlight the limitations faced by companies operating in isolation in unstable regions. Even with adherence to best practice standards, the security risks can undermine project outcomes. A potential solution to mitigate these challenges is to centralise offset funds and strategies for all similar projects within unstable regions. This approach could provide a coordinated response to security threats and improve the resilience and effectiveness of biodiversity offset initiatives in challenging environments.

3. Conclusions

Addressing BRM in regions afflicted by political unrest and safety issues necessitates innovative approaches to ensure NNL and NG targets are met. The argument for national offset strategies, as highlighted by Kormos *et al*. (2014) in the context of great apes in countries with socio-political risks such as Mali, underscores the need for a coordinated response to protect biodiversity effectively. Implementing centralised offset funds and strategies could mitigate the challenges faced by isolated projects operating in unstable regions.

One model is South Africa's National Biodiversity Offset Policy, which links compensatory actions to achieving specific targets, such as limiting ecosystem loss to predefined thresholds (Simmonds et al., 2019). This policy demonstrates the potential benefits of a unified national approach, ensuring that biodiversity conservation efforts are resilient to extrinsic threats. By adopting similar centralised strategies, other regions facing political and security challenges can enhance the effectiveness of their biodiversity offset initiatives, securing better outcomes for biodiversity conservation.

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