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 (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 Mitigation Hierarchy 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 Mitigation Hierarchy, 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 African Linear infrastructure development project

The development of linear infrastructure through ecologically sensitive forests in Africa posed significant conservation challenges. Intersecting critical habitats required a stringent environmental and social governance framework. Environmental and Social Impact Assessments (ESIAs) and Critical Habitat Impact Assessments (CHIAs) were employed to gauge biodiversity impacts, leading to the creation of biodiversity offsets and Additional Conservation Actions (ACAs).

Despite efforts to minimise environmental damage, residual impacts included permanent habitat loss, notably in areas where deep-rooted plants could not be introduced. To compensate, a comprehensive biodiversity offsets plan was initiated based on ESIA and CHIA findings. Stakeholder engagement, from local communities to international conservation groups, was crucial in refining mitigation strategies and bolstering conservation support.

Detailed assessments identified critical habitats and at-risk species, guiding the development of targeted mitigation and conservation strategies. However, unavoidable residual impacts on critical habitats underscored the challenges of fully avoiding biodiversity loss in development. Strategies to achieve NNL and NG of biodiversity included habitat restoration and species-specific action plans, utilising advanced monitoring techniques like eDNA sampling and drone surveys. Conservation efforts also focused on a specific primate species in a protected area, initially hampered by limited data. Innovative survey methods and a participatory approach to developing a General Management Plan (GMP) were pivotal.

This plan, established in collaboration with national park authorities and backed by a conservation trust fund, aimed to enhance habitat quality and address threats like hunting and habitat fragmentation. The project outlined clear goals, budgets, and success metrics, emphasising multi-stakeholder collaboration, innovative strategies, and robust planning to enhance biodiversity conservation in challenging project settings.

2.2 African extraction project

A comprehensive Priority Biodiversity Value (PBV) monitoring study was conducted for an extractive project in West Africa, employing methods like camera trapping to assess wildlife dynamics and habitat use, focusing on key species such as Chimpanzees and the African Wild Dog. Analysis of camera trap data provided vital information on Chimpanzee populations, revealing their habitat preferences, group sizes, demographic structures, and territorial ranges, essential for crafting targeted conservation strategies. Notably, in April 2019, a camera trap captured a young female African Wild Dog within the project area, marking a potentially significant first sighting in three decades. This indicated either connectivity with a known population from a nearby national park or an unrecognized group in the region.

The surrounding habitat, impacted by human activities like artisanal mining, poses considerable conservation challenges due to habitat degradation and fragmentation. These conditions underscore

the endangered status of the African Wild Dog and the critical need for effective conservation measures. The project's strategy aimed NG in biodiversity, focusing on vital habitats such as wetlands, employing targeted restoration and conservation initiatives.

Collaboration with conservation organizations and local communities was prioritized to ensure the sustainability of these efforts. The project incorporated innovative conservation techniques, combining ecosystem services with biodiversity gains, and followed a structured Mitigation Hierarchy. Analytical frameworks such as the Pressure-State-Response and Before After Control Impact (BACI) methods supported an adaptive management approach, allowing the project to adjust conservation actions based on continuous environmental assessments and evolving conditions. This case study highlights the complexity of international biodiversity conservation, emphasizing the necessity for innovative, evidence-based strategies and collaborative endeavours to achieve and sustain conservation goals.

2.2 European linear development project

This project illustrates the implementation of a Biodiversity Monitoring and Evaluation Plan (BMEP) to address environmental impacts from large infrastructure projects, aiming for NNL and NG in biodiversity. The project crosses EU Annex 1 habitats and supports species of conservation concern. To compensate for the loss of >40 hectares of natural habitat, the project initiated the restoration and protection of similar habitats off-site, specifically targeting EU Annex 1 vegetation communities.

The plan specifies the habitat restoration required to meet NNL or NG goals and focuses on the conservation needs of PBVs. It includes both qualitative and semi-quantitative assessments of potential indirect impacts on large carnivores in Albania, demonstrating a comprehensive approach to BRM. Collaborative efforts with national forest authorities for afforestation and the establishment of Biodiversity Offset Management Plans (BOMPs) ensure that offset initiatives are quantitatively aligned with identified impacts.

The project adopts a participatory approach to conservation, engaging stakeholders in identifying biodiversity offsets and aligning with national forestry legislation to ensure compliance. Each BOMP has clearly defined objectives and Key Performance Indicators (KPIs) to measure conservation success. Post-installation, the majority of the project’s right of way (RoW) is planned to be restored to its natural state, minimising residual impacts.

Regular monitoring, annual reporting on results, and transparent communication of conservation outcomes are integral to the BMEP. This framework supports adaptive management and provides valuable insights into integrating biodiversity conservation in large-scale infrastructure projects, demonstrating strategies to achieve NNL and NG in biodiversity.

3 Conclusion

In this paper, we have explored a range of approaches implemented across international projects to identify project-related impacts, quantify impacts and guide NNL or NG strategies, These underscore the critical importance of comprehensive planning, stakeholder engagement, innovative conservation methods, and robust monitoring and evaluation frameworks.

Central to the success of these conservation strategies is the rigorous application of the Mitigation Hierarchy, complemented by detailed habitat assessments and quantifiable conservation planning. This approach ensures that efforts to avoid, minimise, and, where necessary, offset biodiversity impacts are based on sound scientific evidence and are tailored to the specific ecological contexts of each project.

The role of stakeholder engagement is clearly crucial. Collaborative efforts involving governments, non-governmental organisations, local communities, and international conservation bodies are pivotal in developing and implementing effective conservation strategies. Such participatory approaches ensure that biodiversity offsets and conservation actions are socially inclusive, culturally appropriate, and aligned with broader environmental and developmental goals.

In conclusion, achieving NNL or NG in biodiversity within the context of large-scale international projects is both a complex challenge and a critical imperative. The case studies discussed in this paper highlight the potential for success and the necessity for an integrated, adaptive, and collaborative approach to conservation planning and implementation.

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