# Avoiding impacts on biodiversity through strengthening the first stage of the mitigation hierarchy

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## Abstract

The mitigation hierarchy is a decision-making framework designed to address impacts on biodiversity and ecosystem services through first seeking to avoid impacts wherever possible, then minimising or restoring impacts, and finally by offsetting any unavoidable impacts. Avoiding impacts is seen by many as the most certain and effective way of managing harm to biodiversity, and its position as the first stage of the mitigation hierarchy indicates that it should be prioritised ahead of other stages. However, despite an abundance of legislative and voluntary requirements, there is often a failure to avoid impacts. We discuss reasons for this failure and outline some possible solutions. We highlight the key roles that can be played by conservation organisations in cultivating political will, holding decision-makers accountable to the law, improving the processes of impact assessment and avoidance, building capacity, and providing technical knowledge. A renewed focus on impact avoidance as the foundation of the mitigation hierarchy could help to limit the impacts on biodiversity of large-scale developments in energy, infrastructure, agriculture and other sectors.

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## Introduction

The development of mines, infrastructure, buildings and plantations changes landscapes and seascapes profoundly, putting pressure on biodiversity and often reducing the provision of important ecosystem services. The mitigation hierarchy is a decision-making framework developed with the aim of preventing and remediating environmental impacts from such developments. It requires developers to first avoid impacts where possible. Where impact avoidance is not possible, developers should strive to minimise impacts, to restore affected areas, and finally, to offset any remaining residual impacts (McKenney & Kiesecker, 2010; Clare et al., 2011; BBOP, 2012a; Gardner et al., 2013).

The first part of the mitigation hierarchy – impact avoidance – requires developers to "anticipate and prevent adverse impacts on biodiversity before actions or decisions are taken that could lead to such impacts" (Ekstrom et al., 2015). Impact avoidance is typically identified as the most important stage of the mitigation hierarchy (McKenney & Kiesecker, 2010; Clare et al., 2011; Ekstrom et al., 2015). In principle, impact avoidance can reduce the need for remediation, thus side-stepping problems such as restoration time lags, limits to what can be offset, and negative social implications of removing people's access to nature locally and attempting to replace it elsewhere (Bendor, 2009; Maron et al., 2010; Pilgrim, Brownlie, Ekstrom, Gardner, von Hase, ten Kate, Savy, Stephens, Temple, Treweek, Ussher, et al., 2013; Ives & Bekessy, 2015).

In practice, there are concerns that impact avoidance is often ignored, misunderstood and poorly applied by developers, impact assessment practitioners and regulators (Clare et al., 2011; Villarroya et al., 2014). At the same time, there are signs of offsetting being situated in policy as a means to legitimise development which would not otherwise have been permitted (Walker et al., 2009; Ferreira et al., 2014; Sullivan & Hannis, 2015). Situating offsets as a "license to trash" runs counter to the principle of avoiding negative impacts to the maximum extent practicable, a core tenet of the mitigation hierarchy (US EPA and DA, 1990; McKenney & Kiesecker, 2010; BBOP, 2012a).

We review the incentives and requirements for impact avoidance, identify challenges for achieving it, and outline some possible solutions, with an emphasis on the ways in which conservation organisations can advocate for better impact avoidance. The issues discussed here, and a wider range of case studies, are detailed further by BirdLife International et al. (2015) and Ekstrom et al. (2015).

## Current incentives, requirements and criteria for impact avoidance

National laws, voluntary sustainability standards, corporate commitments and pressure from civil society organisations all have roles to play in creating incentives and requirements for impact avoidance. Most countries require impact avoidance to be considered as part of the Environmental and Social Impact Assessment (ESIA) process (Pope et al., 2013). Sustainability standards include those set by financial institutions, such as Performance Standard 6 of the

International Finance Corporation, as well as sector-specific standards such as those of the Roundtable on Sustainable Palm Oil (RSPO). Companies are increasingly adopting commitments to No Net Loss (NNL) or Net Positive Impact (NPI), which seek to ensure that negative impacts on biodiversity and ecosystem services are balanced (for NNL) or outweighed (for NPI) by impact avoidance, minimisation, restoration and offsetting (Gardner et al., 2013; Rainey et al., 2015).

In Table 1, we summarise some of the key components (actions and criteria) of standards and laws requiring avoidance, for a set of illustrative instruments. Commonly-required actions include consultation, impact assessment, consideration of cumulative impacts, and monitoring. Consulting with local communities and conservation organisations is an important step in identifying impacts that might be considered serious or unacceptable, and which might otherwise go un-assessed. Conducting an ESIA is now standard practice in most countries for large developments, but it is less common to consider the cumulative impacts of multiple developments, including offsite, cryptic and secondary impacts (Pope et al., 2013; Raiter et al., 2014). Transparent long-term monitoring and evaluation is essential for demonstrating that commitments to avoid and remediate impacts have been successfully upheld.

Our examples illustrate four recurrent criteria for moving past the avoidance stage of the mitigation hierarchy. The first is that alternatives are given full consideration by regulators and developers, both before and during the ESIA (Table 1). These can include a “no-project” alternative, alternative site locations (spatial impact avoidance), alternative scheduling of activities (temporal impact avoidance), and use of technology and planning within a site (design-based impact avoidance) (Table 2).

Early consideration of alternatives is advisable, alongside early engagement with a full range of stakeholders to identify appropriate alternatives (Ekstrom et al., 2015). The cost of altering a project is lower early in the planning process, before decisions about locations and technologies are locked in and the range of feasible alternatives is narrowed. Planning tools can facilitate access to data on existing conservation designations and thus help to screen alternative sites, such as the Integrated Biodiversity Assessment Tool (http://www.ibatforbusiness.org) and national land-use planning and protected area databases.

A second common criterion for proceeding past the avoidance stage is that the societal benefits of a project should outweigh its environmental costs. The European Habitats Directive provides some of the clearest guidance here. Impacts on priority habitats and species are only permitted for reasons of human health, public safety, environmental benefit, or if there are “imperative reasons of overriding public interest” for the project to proceed (Council of the European Commission, 1992; European Commission, 2007). Even here, however, defining when societal benefits are sufficient to justify environmental harm is subjective and often highly political, a challenge explored further in the next section.

A third common criterion for moving past avoidance is delivery of NNL or a net gain in biodiversity (BBOP, 2012a; Gardner et al., 2013). NNL is typically only assessed for priority biodiversity features such as endangered species, Critical Habitat and areas of High Conservation Value, even though it might be most successfully applied to common species and ecosystems (Pilgrim, Brownlie, Ekstrom, Gardner, von Hase, ten Kate, Savy, Stephens, Temple, Treweek, & Ussher, 2013). There are partial exceptions: the UK National Planning Policy Framework, for example, covers wider biodiversity in addition to designated sites (Department for Communities and Local Government, 2012). However, the Framework's reliance on the concept of "significant harm", means in practice that small, cumulative impacts to common species are likely to be ignored. NNL obligations can often be met through a promise of remediation as well as through impact avoidance and minimisation (BBOP, 2012b).

Fourth, legal requirements can help to define opportunities for impact avoidance, such as through identifying protected sites and species. Laws also set requirements for planning and define how ESIA should be carried out, and where they are contravened, they provide the basis for conservation organisations to challenge failures to avoid impacts in the courts.

**Challenges for effective impact avoidance**

We surveyed the literature and drew on our experiences to identify challenges for effective impact avoidance in five broad and often overlapping categories: political will, regulation, process, capacity, and technical knowledge (Table 3). Political will refers to the perceived importance among decision-makers of avoiding impacts on biodiversity, relative to other concerns. In the absence of political will, laws are less likely to be enforced, expensive alternatives are more likely to be ruled "infeasible", and legal protection is at risk of being weakened or corrupted to cater for powerful private interests. Mascia et al. (2014) found over 500 cases of downgrading, downsizing, or degazettement of protected areas in 57 countries, most commonly to facilitate industrial-scale resource extraction and development. For companies in the public eye, reputational risk is an incentive to develop the political will to ensure that impacts are reported and avoided (Dawkins & Fraas, 2010), but for smaller companies, and those without shareholders for whom environmental issues are important, it may not be.

The effectiveness of regulation depends both on the quality of legislation, and its implementation in practice. In Indonesia, there is often a mismatch between official maps and the physical reality of landcover, and thus it can be easier for oil palm companies to obtain concessions in primary forest which is classified as "nonforest estate" on official maps, rather than in the millions of hectares of degraded land which – because it is mapped as "forest estate" – is legally unavailable for development (Rosenbarger et al., 2013). This is a failure of the legal system for land classification, arising perhaps from a lack of political will to protect primary forests. A review of 11 European projects affecting sites protected under the Habitats Directive found consistent failures by the European Commission in the interpretation and application of the Directive (Kramer, 2009). In only three of these cases were alternative locations assessed, as required by the Directive, and in few if any cases was a robust argument established for the project being of "overriding public interest" (for further details see Kramer, 2009). In these cases, although the law seems to provide strong protection in principle, it appears to have been undermined by interpretations that privileged economic development and marginalised environmental protection. In the Democratic Republic of Congo, mining rights have been granted within protected areas, even though such areas are legally protected from extractive activities (Javelle & Veit, 2012). This results from contradictory regulations, inconsistent and outdated government information, a lack of cooperation between the two relevant ministries, and ultimately, opposing interests.

Even while acting within the law, regulators and companies have choices about how to pursue the process of identifying and acting on opportunities to avoid impacts. For example, if impact avoidance is not considered until the ESIA, opportunities to fundamentally rethink project alternatives may no longer be available. There are incentives, for those who would benefit from a project, to ensure that "no-project" alternatives are not considered, and to overlook indirect and cumulative impacts. Because ESIA and standards are typically applied at a project rather than landscape scale, they are not ideally suited to identifying strategic opportunities for impact avoidance. Within standards, requirements vary, and there is scope for criteria such as those for identifying High Conservation Values to be interpreted differently by different assessors (Senior et al., 2015). Responsibility for ensuring permanent protection of avoided areas may be unclear: areas avoided during an early phase may be demanded in later stages of a project, and areas avoided by one company may not be avoided by others. For example, Sakhalin Energy's avoidance plans (Table 2) were undermined by Exxon's plans to conduct seismic surveys in the same area (Western Grey Whale Advisory Panel, 2015).

Government departments, companies and civil society organisations all too often lack sufficient capacity and resources to properly understand, develop and implement sound environmental policies (Quétier et al., 2014). National and local governments often lack (or do not allocate) sufficient resources to audit compliance with legislation. Small and medium-sized companies may be unable to afford in-house expertise on biodiversity and the mitigation hierarchy. Effective impact avoidance may require upfront investments in assessment and planning at a time when there may be uncertainty about whether a project will proceed. Even large companies may be unwilling to incur these costs. The influence of civil society organisations may be limited if they are poorly-resourced and have limited expertise, as is common with local groups.

Although knowledge is increasing, there are still many gaps in technical understanding of the spatial distributions and population status of species, especially for plants and invertebrates (Pimm et al., 2014). This makes it difficult to identify and prioritise the sites of most importance in advance of developments. Information on the success and costs of restoration and offsetting efforts is also sparse. Unrealistic assumptions about the capacity and cost of restoration and offsetting could result in promises of remediation being a more attractive option for companies than avoiding impacts early in the project cycle. A further challenge is that there may be trade-offs between impact avoidance and other conservation strategies. For example, one way to avoid expanding into natural habitats is to consolidate timber production, farming and infrastructure in existing zones or corridors of disturbance. There is widespread evidence that 'sparing' land in this way would be beneficial for many wild species, even if it increases the per-hectare impacts of development (Edwards et al., 2014; Balmford et al., 2015; Stott et al., 2015). However, some degree of 'sharing' land with multiple uses to reduce the per-hectare impacts of land uses is also desirable, and clear guidance on how to balance these strategies is not available in most places.

## Confrontation or compromise?

Conservation organisations have strategic choices to make about when to collaborate with developers, or oppose them. Campaigning against harmful developments is important, and this strategy of 'saying no' can help to counterbalance the ambit claims (extreme initial demands) of developers (Laurance, 2016). Opposition is thus an important conservation strategy.

Conservation organisations can also play a role in identifying where developments *should* take place. A key problem with focusing exclusively on impact avoidance is the risk of leakage, or displacement of impacts. Development avoided at one location is likely to take place elsewhere. Even project cancellation is no guarantee that impacts have been avoided, unless regulation also constrains the demand drivers incentivising development. Insofar as development is driven by market demands for minerals, energy and other resources, those demands will continue to incentivise further development (Meyfroidt et al., 2013). Thus, it may be as important for conservationists to get involved in defining where development is acceptable, as where it is not (Venter et al., 2013; Dinerstein et al., 2015). Mapping priority areas for avoidance often also by implication identifies locations for development which may be more appropriate (Bright et al., 2008; Martin et al., 2015).

There are risks involved in both confrontational and collaborative strategies. As conservation interests are typically less powerful than development interests, opposition might leave conservation organisations marginalised and without input into decisions. On the other hand, too much willingness to compromise could result in 'greenwash', conferring an image of environmental responsibility on companies in exchange for minimal concessions or donations (Robinson, 2012). The best strategy will be context-dependent, and in some situations a combination of principled opposition and pragmatism might have most success. For example, conservation organisations engaged with local and national authorities to develop standards for new housing developments near the Thames Basin Heaths in the UK. Disturbance-sensitive bird species were protected by avoiding construction within a buffer zone, while developers were required to provide dog-walking areas alongside new housing nearby to minimise additional disturbance (BirdLife International, 2015).

**Opportunities for more effective impact avoidance**

There are multiple ways in which conservation organisations can work towards, and support, more effective impact avoidance (Table 3). They can harness and broadcast public support for conservation, thus creating political space for decision-makers who want to support impact avoidance (Downie, 2015) and increasing the reputational cost on those who ignore it (Ivanova, 2015). When they can establish or promote particular ways of thinking about issues ('frames'), they influence the extent to which ecological values are considered in policy development (Sullivan & Hannis, 2015). Conservation organisations could also play a greater role in challenging corrupt or undemocratic institutions that give private or political interests excessive influence (Greenwald et al., 2012). The success of high-profile campaigns in persuading companies to adopt sustainability standards and zero-deforestation commitments shows how corporate policies can be influenced (Newton et al., 2013; Gibbs et al., 2016).

Regulation can be improved, both in the letter of the law and – perhaps more often – in its application. Conservation organisations can advocate for more stringent requirements for impact avoidance and clearly-defined legal protection for sites and species. They can also campaign against subsidies and other perverse incentives for development in areas of biodiversity importance, such as the proposal by Brazil to open up to 10% of its strictly-protected areas to mining (Ferreira et al., 2014). Conservation organisations could also campaign to extend stronger protection to common species and habitats, which are sometimes overlooked in legislation (Gaston, 2010). Working informally with state agencies and developers might be fruitful: Malcolm and Li (2015) suggest that informal dialogue in advance of submitting project proposals may have helped to reduce the number of proposals submitted in the United States that would put endangered species in jeopardy.

There are opportunities for conservation organisations to hold governments and companies accountable to the processes and plans they have signed up to. They can track compliance with legislation and standards, especially in jurisdictions where there is limited capacity for public authorities to do so. They can also push for voluntary actions that make success more likely, such as inclusion of indirect and other enigmatic impacts in ESIA and genuine consideration of "no-project" options. Perhaps the most important demand that they can make is for decision-makers to consider impact avoidance from the earliest stages of the planning process (Ekstrom et al., 2015). Had this been done in the case of the Via Baltica, referenced in Table 2, for example, the case might not have gone to the European Court of Justice and considerable legal costs and delays could have been avoided.

Building the capacity of individuals and institutions plays a pivotal role in the success of conservation efforts (Brooks et al., 2012). Conservation organisations can support the development of biodiversity-inclusive landscape and regional-level zoning plans, as well as better policy guidance material to support the implementation and enforcement of legislation on impact avoidance. They can contribute to developing voluntary or regulatory mechanisms to ensure avoided areas receive long-term protection – such as developing new legal mechanisms for permanently retiring grazing leases on public land (Leshy & McUsic, 2009). They have also played an important role in the development of voluntary standards, and will continue to do so. For example, Greenpeace played a key part in developing a methodology for identifying areas with high carbon stocks that should be avoided, in order to address a key gap in the RSPO standard for oil palm (Dinerstein et al., 2015).

Conservation organisations can provide tools and technical data to make it easier to conduct cumulative, strategic and environmental impact assessments. Examples include the Biodiversity Risks and Opportunities Assessment tool, and the Migratory Soaring Bird Sensitivity Map (BirdLife International, 2015). Conservation organisations can work with other civil society organisations to understand synergies and trade-offs between multiple objectives, and find common ground in advocating for impact avoidance. This may require understanding complex interactions such as those between conservation and other human interests. It may also involve identifying places where developments might be acceptable, as well as where they should be avoided. A final, crucial role is in better evaluation and communication of the success (or otherwise) of efforts to avoid impacts (Baylis et al., 2016).

## Conclusion

We suggest that a renewed focus on the first stage of the mitigation hierarchy could help to limit the biodiversity impacts of large-scale developments in energy, infrastructure, agriculture and other sectors. Conservation organisations play an important role in cultivating political will, holding decision-makers accountable to the law, improving the processes of impact assessment and avoidance, building capacity, and providing technical knowledge. Ensuring that impact avoidance is considered as early as possible in the planning process, and that it is placed even more firmly at the heart of the mitigation hierarchy in both policy and practice should be key demands on their agenda.

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**Table 1. Examples of voluntary standards and national legislation which set requirements for impact avoidance by defining actions and criteria. Parentheses indicate cases where a requirement is acknowledged but not clearly defined.**

| | Standard or law | Actions | | | | Criteria for moving past avoidance stage | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Consult with stakeholders | Assess environmental and social impacts | Consider cumulative impacts | Implement long-term monitoring | No viable lower-impact alternative | Overriding public interest | No net impact on critical biodiversity features | Compliance with the law |
| Standards and guidance | Business and Biodiversity Offsets Programme: Standard on Biodiversity Offsets (2012) | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Cross Sector Biodiversity Initiative: A cross-sector guide for implementing the Mitigation Hierarchy | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| | European Bank for Reconstruction and Development: Performance Requirement 6 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | International Finance Corporation: Performance Standard 6* | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| | World Bank: proposed Environmental and Social Standard 6 | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| Legislation | Australia: Environment Protection and Biodiversity Conservation Act, environmental offsets policy | | ✓ | | (✓) | ✓ | | ✓ | ✓ |
| | British Columbia (Canada): Policy for Mitigating Impacts on Environmental Values | (✓) | ✓ | ✓ | (✓) | ✓ | | | ✓ |
| | European Union: Habitats Directive 92/43/EEC, EIA Directive | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| | United Kingdom: National Planning Policy Framework 2012 | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |

*Requirements for consultation and impact assessment are established in IFC Performance Standard 1

**Table 2. Different types of impact avoidance, with examples. Inclusion of projects is solely to illustrate the range of actions that can be taken to avoid impacts on biodiversity, and should not be interpreted as endorsement, nor as a suggestion that best practice was necessarily followed.**

| Type of impact avoidance | Where appropriate | Example | References |
|---|---|---|---|
| No-project | Irreplaceable features with no viable alternatives, and where offsets unlikely to succeed | Development permit refused for São Luiz do Tapajós dam in Brazil | (Vidal, 2016) |
| | | Titanium mine in Cardamom Mountains of Cambodia cancelled | (Hance, 2011) |
| Spatial avoidance | Lower-impact alternative locations can be identified | Site for desalination plant in Namibia selected to avoid tern colony | (Aurecon & SLR, 2015) |
| | | Via Baltica road re-routed to avoid Rospuda Valley and other protected sites in Poland | (Niedziałkowski et al., 2012) |
| Temporal avoidance | Time periods when activities will not affect vulnerable features can be identified | Construction and seismic surveys suspended during breeding season of Steller's Sea Eagles and seasonal presence of Gray Whales in Okhotsk Sea, Russia | (Sakhalin Energy, 2009) |
| | | Logging activities in United States scheduled during dry periods to avoid erosion and sediment runoff | (Bilby et al., 1989) |
| Design-based avoidance | Technology and planning can be used to modify project components to avoid specific impacts | Tunneling equipment used to install pipeline underground below estuary in Ireland | (Shell, 2014) |
| | | Logging operations to re-use old access roads instead of creating new ones in Central Africa | (Kleinschroth et al., 2016) |

**Table 3. Reasons for the failure of plans and policies to avoid impacts on biodiversity and ecosystem services, and some possible solutions.**

| | Reason for failure | Possible solutions |
|---|---|---|
| Political will | Lack of political will to support impact avoidance | Harness and broadcast public support for conservation; expose conflicts of interest; reform institutions giving private interests undue influence |
| | Culture within planning authorities of not valuing biodiversity | Make biodiversity education mandatory for all staff of planning authorities |
| Regulation | Legal protection insufficient to ensure impact avoidance | Incorporate mitigation hierarchy principles into legislation; resist efforts to weaken legislation |
| | Ineffective judicial frameworks for holding decision makers to account | Make full use of those judicial frameworks which are effective; lobbying for stronger legislation |
| | Failure to avoid impacts to biodiversity that is not considered "important" | Set avoidance requirements for biodiversity of all kinds, including common species and habitats |
| | Weak requirements for restoration and offsetting make remediation more attractive than impact avoidance | Enforce detailed, stringent requirements for restoration and offsetting, including higher bond requirements and penalties for failure to remediate |
| Process | Impact avoidance not considered until ESIA | Make early stakeholder engagement the industry norm; assess biodiversity risks before ESIA |
| | Failure to anticipate and identify likely impacts | Audit impact assessments; require assessment of indirect and cumulative impacts |
| | "No-project" option not considered | Require assessment of "no-project" option |
| | Poor communication between ecologists, engineers, other technical consultants | Require direct cooperation between consultant teams as part of ESIA contract |
| | Failure to adhere to plans | Hold governments, companies accountable to plans |
| | Decision to proceed is made on basis that remediation will compensate for impacts | Separate the decision to proceed from any assessment of remediation possibilities |
| Capacity | Lack of resources and ecological expertise within planning bodies | Dedicate resources to create ecologist roles within planning bodies; improve planner-ecologist liaison |
| | Poor coordination between conservation and planning authorities | Provide resources to integrate conservation planning into local, regional and national land-use planning |
| | Lack of permanent protection for avoided areas | Develop voluntary or regulatory mechanisms to ensure avoided areas receive long-term protection |
| Technical knowledge | Biodiversity data inaccessible or difficult to use | Improve data availability through platforms that increase ease of use by non-specialists |
| | Important biodiversity not prioritised and identified before development | Comprehensive assessments of important biodiversity at local, regional and national levels |
| | Limited understanding of trade-offs | Incorporate trade-off analysis into ESIA |
| | Perception that impact avoidance is too costly | Neutral analysis of costs and benefits of impact avoidance, including non-monetary |
| | Discounting of future costs relative to costs today | Estimation and communication of future costs and limitations of restoration and offsetting |
| | Unrealistic assumptions about technical capacity to restore makes remediation more attractive than avoidance | Collate evidence on efficacy of restoration and offsetting; communicate limits of remediation; use offset multipliers commensurate with uncertainties |