Aligning ecological compensation policies with the Post-2020 Global Biodiversity Framework to achieve real net gain in biodiversity

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Abstract

Increasingly, government and corporate policies on ecological compensation (e.g. offsetting) are requiring 'net gain' outcomes for biodiversity. This presents an opportunity to align development with the United Nations Convention on Biological Diversity Post-2020 Global Biodiversity Framework's (GBF) ambition for overall biodiversity recovery. In this perspective, we describe three conditions that should be accounted for in establishing or revising net gain policies to align their outcomes with the Post-2020 GBF: namely, a requirement for residual losses from development to be compensated for by (1) absolute gains, which are (2) scaled to the achievement of explicit biodiversity targets, where (3) gains are ecologically feasible. We show that few current policies meet these conditions, and thus we demonstrate a major disconnect between existing biodiversity net gain approaches and the achievement of the Post-2020 GBF milestones and goals. We conclude by describing how this gap can be bridged through a novel ecological compensation framework.

Keywords: biodiversity offset; Convention on Biological Diversity; environmental impact assessment; mitigation hierarchy; net positive impact; no net loss; sustainable development; target-based ecological compensation; threatened ecosystems; threatened species

Introduction

The proposed Post-2020 Global Biodiversity Framework (GBF) under the United Nations Convention on Biological Diversity (CBD) places a strong emphasis on recovering biodiversity, not just halting declines. The updated 'Zero Draft' of the GBF (August 2020) embeds explicit commitments to achieve gains in ecosystems and species populations (e.g. 5% for ecosystems) by 2030, as a foundation for even greater gains by 2050 (Secretariat of the Convention on Biological Diversity 2020). While its proposed 'goals', 'milestones' and 'targets' do not explicitly refer to net outcomes, the updated Zero Draft of the Post-2020 GBF does note the need for *net* improvements by 2050, implying that some ongoing losses to biodiversity are inevitable (Secretariat of the Convention on Biological Diversity 2020). Indeed, delivery of 'no net loss' and 'net gain' (e.g. of ecosystems and species populations) to address these losses is fundamental to the achievement of the draft GBF's bold agenda (Bull al. 2020; Maron al. 2021; Subsidiary Body on Scientific Technical and Technological Advice (CBD) 2021). However, these endeavours come with a strong caveat: "Net gain, or no net loss approaches, if not qualified, carry high risk of harmful outcomes" (Subsidiary Body on Scientific Technical and Technological Advice (CBD) 2021).

These concepts – 'no net loss' and 'net gain' – are already well-established in environmental policy and commitments by governments, corporations and NGOs. Most prominently, no net loss is associated with application of the mitigation hierarchy, including biodiversity offsets – a form of ecological compensation where residual biodiversity losses (e.g. from a development like a new mine, port, road, or similar) are counterbalanced by gains of biodiversity elsewhere, preferably of the same kind (Quétier & Lavorel 2011; Business and Biodiversity Offsets Programme (BBOP) 2012a). Increasingly though, mitigation policy including ecological compensation, requires project developers to achieve more than no net loss, and is framed around net gain objectives (Rainey al. 2014; Bull & Brownlie 2017; de Silva al. 2019; zu Ermgassen al. 2021). This policy shift towards net gain outcomes seems well-timed and neatly aligned with the increasing ambition of the Post-2020 GBF, where no net loss alone will be insufficient to achieve the biodiversity increases called for by 2030 and 2050. However, for net gain from mitigation measures, including ecological compensation, to be consistent with the desired biodiversity outcomes under the Post-2020 GBF, key conditions relating to policy design and implementation must be met.

Here, we set out three conditions that should guide the development or revision of policies that regulate development, to ensure better alignment with the post-2020 agenda and its explicit focus on biodiversity recovery. The conditions we describe are not exhaustive (we note here, but do not cover further, important topics like the need for additionality and robust metrics in compensatory policy), but they do represent the constituents of policy that can guide delivery of the amount of biodiversity gains needed in a post-2020 world. To this end, we also highlight four key risk factors that can undermine the on-ground delivery of biodiversity net gains. In presenting this framework, we briefly discuss the extent to which existing net gain policies are positioned to contribute (or detract) from achieving the outcomes that will likely underpin decision-making under the Post-2020 GBF.

Condition 1: gains are absolute and result in biodiversity increases through time

Much has been written about the way in which gains are delivered in ecological compensation (Bull & Brownlie 2017; Maron al. 2018; Bull al. 2020; Moilanen & Kotiaho 2020). Broadly speaking, gains can be 'relative' (i.e. to a predicted future trend of biodiversity decline), or absolute (i.e. real increases over time). Relative gains can be achieved by protecting existing biota (e.g. a site containing a particular ecosystem) and thus averting its anticipated future loss. If used to counterbalance a loss, the outcome will be a net loss for biodiversity compared with 'now' (when the decision is made), since the gains are measured against an expected decline (Gordon al. 2015). This contrasts with absolute gains, where conservation actions improve the state of biodiversity, often through the demonstrable creation of new biota over time (e.g. restoring a degraded site; increasing the population of a species by countering threats like invasive species) (Maron al. 2018). Where policies purport to achieve net gain outcomes in a post-2020 world, absolute rather than relative gains are required to be consistent with the GBF agenda.

As it stands, a number of policies with a stated biodiversity net gain objective (or a synonymous intent such as 'net positive impact') enable the use of averted loss, so they only deliver relative gains. Such policies include guidance under the International Finance Corporation's (IFC's) Performance Standard 6. Clients with residual impacts on 'critical habitat' (e.g. sites supporting critically endangered species) can, under specific conditions, use averted loss offsetting to meet a net gain requirement under this policy (IFC 2019). The International Union for Conservation of Nature (IUCN) Policy on Biodiversity Offsets also recognises averted loss offsetting as an approach for delivering gains to counterbalance residual losses from development (IUCN 2016). The same is true of guidance on biodiversity offsetting produced by the World Bank (World Bank Group 2016), relating to implementation of its Environmental and Social Framework (ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources) (World Bank Group 2018). At a jurisdictional level, regulations governing ecological compensation that allow for averted loss approaches have come under scrutiny. For example, an independent review of Australia's key national environmental legislation concluded: "Environmental offsets are often poorly designed and implemented, delivering an overall net loss for the environment" (Samuel 2020). This was found to be a result of policy design and implementation, given that most compensation is delivered using averted loss offsets (Australian National Audit Office 2020; Samuel 2020).

To achieve the 2030 milestones, 2050 goals and 2050 vision of the proposed GBF, actions that improve biodiversity like restoration are needed. Nonetheless, much of the compensation delivered under compensation instruments around the world (be they seeking to achieve net gain or no net loss) is founded entirely, or in part, on relative gains (Bull & Strange 2018; Gibbons al. 2018; zu Ermgassen al. 2019; Samuel 2020), with notable exceptions in the United States (for wetlands) and Europe (for largely semi-natural and modified habitats). Relative gains that are based on averting losses are likely to have an important role to play in helping address the rampant erosion of biodiversity in some parts of the world. However, it is important to note that such actions do not translate (at least not in isolation, nor in the short term) to the absolute gains and resultant outcome of ecosystem and species population increases promoted in the Post-2020 GBF (Figure 1).

England's Biodiversity Net Gain policy (DEFRA 2020) provides an example of a jurisdictional instrument in which unavoidable losses *must* be compensated for by absolute gains on the ground (zu Ermgassen al. 2021). Although there are concerns around the amount of gain required per unit of loss (see below), this policy is founded on increasing the extent and/or condition of habitat to compensate for damage from project development. On a similar note, offsets policy under the Queensland (Australia) *Environmental Offsets Act* 2014 requires that losses of habitat for the threatened koala (*Phascolarctos cinereus*) be delivered by providing three new koala habitat trees for every one lost to development – an approach consistent with government policy to achieve a net gain in koala habitat (Queensland Government 2020). The Mozambican biodiversity offsets regulation, currently under development, also embeds requirements for no net loss and net gain to be absolute. To achieve the "significant net increase in area, connectivity, and integrity of natural ecosystems" (Subsidiary Body on Scientific Technical and Technological Advice (CBD) 2021) needed to achieve the 2050 vision of the CBD, absolute gains in biodiversity must be a fundamental element of net gain compensation policy.

Condition 2: the amount of gain required is linked to the achievement of clear conservation outcomes

We are aware of very few net gain policies that specify a rationale for the amount of gain required per unit of loss. Intuitively, net gain requires an outcome whereby the ratio of absolute gain for every unit of loss exceeds 1 (i.e. >1:1). Often, though, this compensatory ratio appears arbitrary. For example, in the Guidance Notes to IFC's Performance Standard 6, net gain is simply defined as "no net loss plus" (IFC 2019). IUCN-produced guidance for reviewing biodiversity net gain activities makes reference to biodiversity targets, upon which the achievement of net gain can be judged (IUCN 2017). However, these appear to be case-by-case indicators of when net gain is achieved, rather than outcomes-based targets for affected biota upon which to scale net gain contributions (IUCN 2017). The IUCN policy, the World Bank's ESS6 and guidance from the Business and Biodiversity Offsets Programme (BBOP) note that achieving net gain from offsetting is 'preferable' to no net loss (IUCN 2016; World Bank Group 2018), without explicitly specifying how much more than no net loss is 'enough'. French law is no more precise, and includes a blanket goal to "aim for an objective of no net loss of biodiversity, or even strive for a gain in biodiversity" in its mitigation requirements (Republique Francaise 2021). It does, however, require absolute gains from compensatory actions (Andreadakis al. 2021). The question of 'how much' gain should be provided for a given loss is the subject of an increasing literature (Bull & Brownlie 2017; Weissgerber al. 2019; Moilanen & Kotiaho 2020; Simmonds al. 2020; Simpson al. 2021) – a timely response to the emergence of policies and corporate commitments that promote net gain, but for which key details like 'how much' gain is required are frequently implicit or unstated.

Even where compensatory gains are absolute, the arbitrary determination of how much gain is required per unit of loss (e.g. England's Net Gain policy = 10% gain; Queensland offsets for koala habitat trees = 3:1) may mean that the gains necessary to help achieve desired conservation outcomes (such as the anticipated 2030 and 2050 GBF milestones and goals) are not fully realised. The recent history of offsets policy for koala habitat loss in Queensland illustrates the enigmatic nature of the question 'how much gain is enough?'. The ratio of absolute gain (new koala habitat trees for every one lost) was reduced from 5:1 to 3:1 in 2014, with apparently no scientific justification.

In a post-2020 world, the increases achieved from arbitrary net gain requirements, although helpful, may not be enough to recover and improve biodiversity in line with the GBF (Figure 1). The uncertain and potentially trivial nature of such contributions could be overcome by ensuring that mitigation policies scale the amount of (net gain) compensation required for a given residual loss at the project-level, relative to outcomes-based goals and targets such as those expected to be agreed by parties to the CBD under the Post-2020 GBF (Watson al. 2020; Williams al. 2020; Maron al. 2021) (see Figure 1; Conclusion). This approach would harness compensation towards making a legitimate and proportional contribution to the Post-2020 GBF agenda, and allow those delivering compensation to truly account for the extent to which their activities are contributing to these key global biodiversity imperatives. Further, it would provide a robust framework for businesses and other organisations that have made 'net gain' or similar commitments to operationalize them.

The notion of framing compensatory policy in national-level biodiversity targets, reflective of global commitments, is not altogether new (Buschke al. 2017). South Africa's provincial biodiversity offset guidelines scale the amount of compensation required per unit loss based on ecosystem-specific, scientifically-formulated targets (albeit, these are not targets to increase ecosystem extent, but rather, to limit drawdown to fixed area-based thresholds using protection offsets) (e.g. DEA&DP (2015)). Similarly, the wording of the European Union's Habitats Directive claims to scale compensatory requirements by overarching targets (favourable conservation status for habitats and species), which some member states have transposed into national regulations or guidance that may mean, for some losses, that net gains are delivered (Tucker al. 2020). However, we are not aware of any policy that is currently implemented in which net gain compensation is explicitly and systematically linked to the achievement of outcomes-based biodiversity targets.

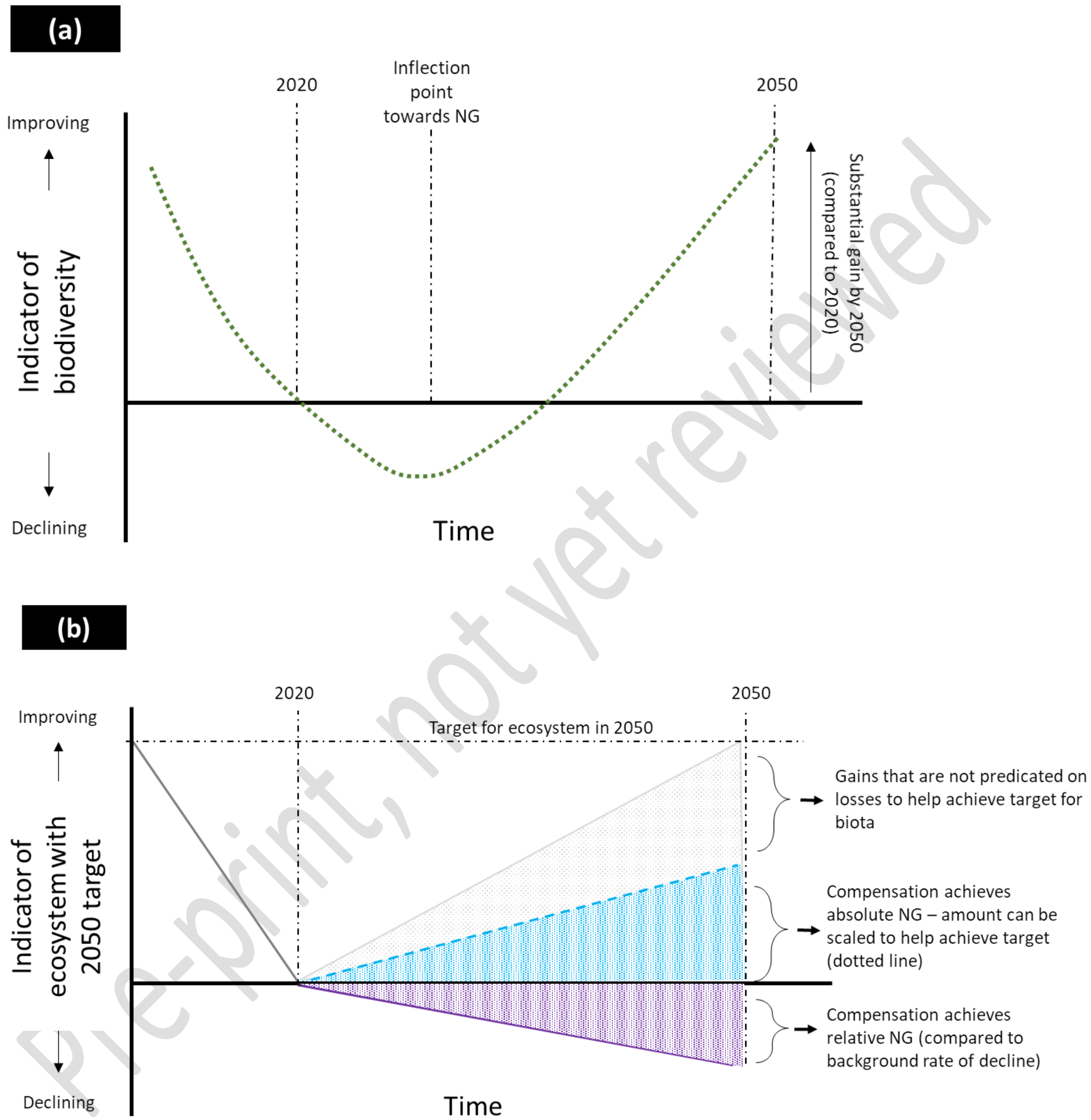

Figure 1. (a) A representation of a plot presented in documentation to guide deliberations on the Post-2020 GBF (Subsidiary Body on Scientific Technical and Technological Advice (CBD) 2021), highlighting the substantial gains in biodiversity to 2050 that the GBF aims to support. **(b)** Potential post-2020 trajectory of a specific ecosystem for which a 2050 target has been set, and to which ecological compensation for any losses incurred applies. Relative gains (purple) may slow the pre-2020 rate of decline of this ecosystem, but these do not (directly) reverse the trajectory of the ecosystem. The amount of absolute gain (blue) per unit of loss

determines the extent to which the ecosystem state improves towards the target (e.g. in extent and condition) through ecological compensation. In this example, the blue dotted line indicates an example of how the amount of compensation can be scaled to achieve a desirable outcome – here, to help double the amount of the ecosystem, compared to its 2020 extent. We emphasise that net outcomes from ecological compensation are but one (small) way to help achieve the required substantial gains **(a)** in biodiversity needed to align with the Post-2020 agenda. Additional gains, not tied to losses, are essential (grey line).

Condition 3: losses are avoided where the achievement of absolute compensatory gains is highly uncertain or not feasible

Factors 1 and 2 above address issues of how gains are measured (relative to what), and how much gain should be provided for a given loss, respectively. Absolute gains, set to align with measurable outcome-based targets, represent an avenue to aligning project development with the milestones, goals and vision of the Post-2020 GBF. However, this is underpinned by the fundamental premise that gains can be delivered on-the-ground with a high likelihood of success. For many reasons, this may not be the case – some biodiversity losses can simply not be counterbalanced through ecological compensation (Business and Biodiversity Offsets Programme (BBOP) 2012b; Pilgrim al. 2013). There are two elements to this:

a. Some biota are irreplaceable and must be off limits to development if absolute no net loss or net gains are to be achieved, meaning ecological compensation is not an option (e.g. Mozambican legislation determines which biota is not offsetable, with impacts thereupon constituting a 'fatal flaw' for development projects);
b. Some biota may be able to absorb a degree of loss and be recovered. In such cases, ecological compensation may be an option after rigorous application of the first three steps of the mitigation hierarchy (avoid, minimise, restore). However, even then, there are situations where it may not be feasible to provide absolute gains to compensate for residual losses. While there are a range of factors that jeopardise the successful delivery of on-the-ground compensatory actions, we highlight four key risk factors that apply particularly to efforts aimed at delivering absolute gains to compensate for losses to ecosystem/species (Figure 2).

While point (a) above should translate to 'no-go' edicts in instruments that regulate development and its impacts, for point (b), where some future losses *may* be acceptable, policies must include appropriate safeguards and require assurance of project developers to ensure that gains can be feasibly and realistically delivered (Maron al. 2012; Sonter al. 2020). As it stands, compensation policies, including those with net gain (or synonymous) requirements, often have flexible trading rules (zu Ermgassen al. 2020), and/or a reliance on averted loss approaches (Samuel 2020), thus enabling losses which are not counterbalanced by absolute gains. Additionally, many ecological compensation (e.g. offset) systems secure gains through measures based on unreasonable assumptions about the long-term effectiveness of governance (i.e. biodiversity gains may be feasible in theory, but governance limitations mean they are unlikely to be delivered in reality or beyond the short term (Calvet al. 2019; Damiens al. 2021)). If absolute gains cannot be reliably delivered to compensate for residual losses, this must be explicitly acknowledged. The response to this by decision-makers may be to refuse to permit such actions and their associated impacts, or, less satisfactorily, to allow losses with compensation that is insufficient in amount or does not lead to absolute gains (e.g. protection offsets). The latter concedes that a net loss, which detracts from the achievement of the Post-2020 GBF, will be the outcome of the trade.

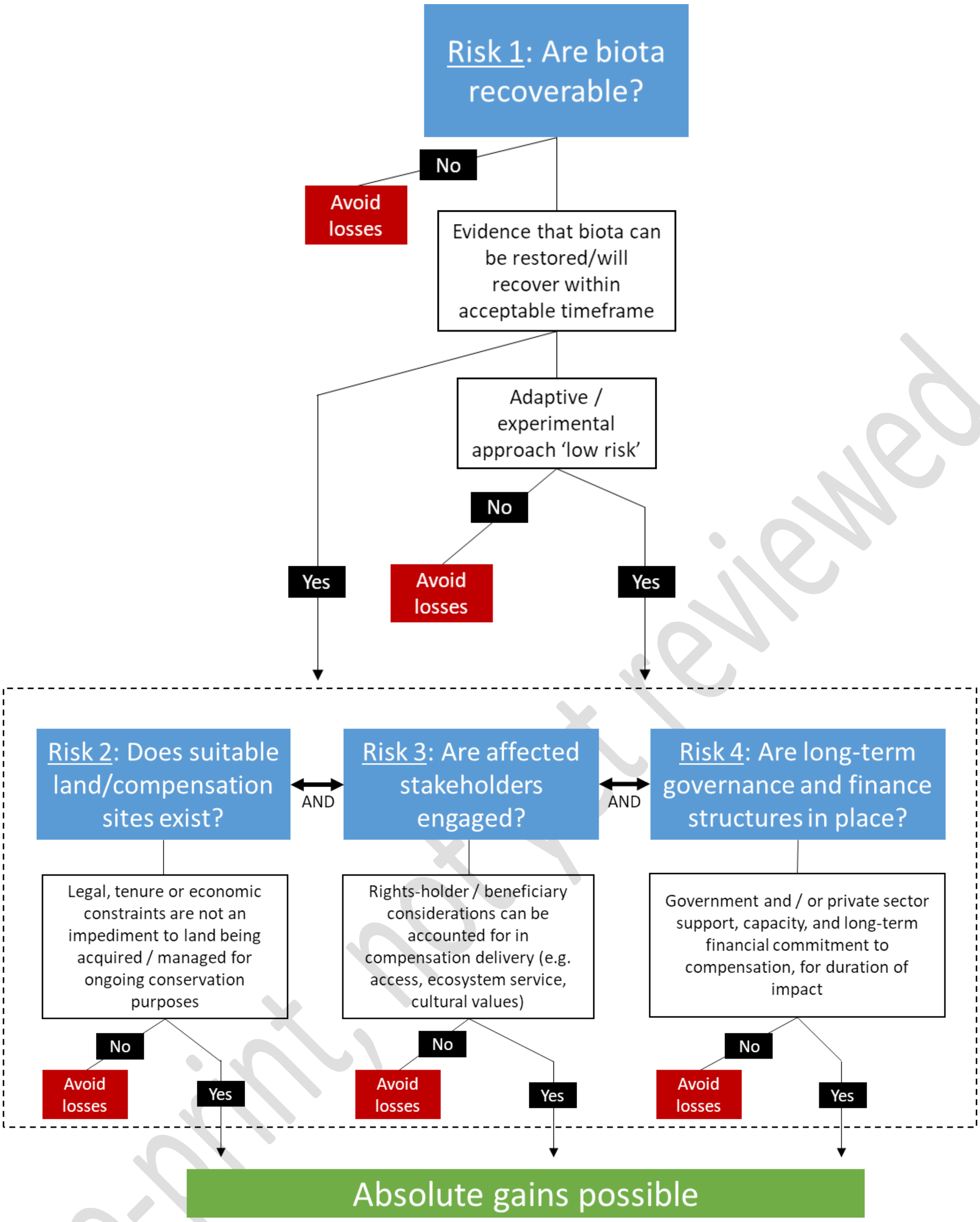

Figure 2. Four risk factors, posed here as questions for policy makers and proponents of development to consider, when determining whether absolute gains can be feasibly delivered with certainty on-the-ground (i.e. condition 3 of our proposed framework for net gain in a post-2020 world). The first and most fundamental of these risk factors to consider when determining whether absolute gains are deliverable is: are the biota affected by the proposed loss recoverable? Central to this are questions of uncertainty (how to conserve/recover biota), and the time taken for gains to be realised (whether timeframe is acceptable – e.g. in accordance with the 2030 mission/2050 vision of the Post-2020 GBF. Even if these challenges are tractable, other context-specific impediments to achieving gains in biota on the ground (e.g. insufficient land; legally-enshrined stakeholder veto; lack of financial or other resources or commitments), which are common to all compensation endeavours, may render proposed losses unacceptable. Net gain compensation that seeks to

deliver absolute gains can only succeed where all four risk factors outlined in this decision tree can be satisfactorily addressed.

Biodiversity net gain in a post-2020 world

We highlight three conditions to ensure net gain policy contributes to the outcomes that are expected to headline the Post-2020 GBF. To align net gain policy with outcomes of increased ecosystem extent and condition, and species recovery, we suggest that required compensatory gains for residual losses must, at a minimum, be (1) absolute, (2) scaled to conservation outcome targets that reflect the milestones and goals of the Post-2020 GBF, and (3) feasibly deliverable on-the-ground. We are not aware of any existing net gain policy that satisfies these conditions – indeed, many are founded on relative, uncontextualized gains.

Target-based ecological compensation is an emerging framework which can satisfy conditions 1 and 2, and provide clarity on condition 3 (Simmonds al. 2020). It is based on the delivery of absolute gains that make a proportionate contribution to an explicit outcomes-based target for the affected biodiversity. In target-based ecological compensation, the greater the difference between the status of a particular element of the biota (e.g. the population 'now' of some threatened species) and its target state (e.g. the number of individuals of that same species needed to meet a policy commitment to recover threatened species), the greater the amount of compensation needed per unit of loss (Simmonds al. 2020) (Figure 1). In the context of the Post-2020 GBF, such targets are explicit (e.g. a 5% increase in ecosystem extent, integrity and connectivity and condition by 2030) or implicit (e.g. recovering threatened species, for which an explicit target can be based upon IUCN Red List criteria). The principles of target-based ecological compensation are already being incorporated into net gain policy in Australia's Northern Territory (Northern Territory Government 2020) and Mozambique (national level) (Ministério da Terra 2015). In Mozambique, projects are expected to contribute to the achievement of national biodiversity targets (e.g. by 2035, rehabilitate at least 15% of the degraded ecosystems or habitats, restoring their biodiversity and ensuring its sustainability, contributing to mitigate the effects of climate change and combating desertification). Although no net loss as an outcome is permissible under certain conditions established in the policy, its rationale is that compensation (e.g. offset) activities must always result in absolute biodiversity gains.

Such target-based framing has been used to challenge language about carbon offsetting undertaken to mitigate carbon emissions in the context of the UN Framework Convention on Climate Change. For example, many of today's corporate claims of carbon neutrality are based on the purchase of 'carbon credits', to counterbalance some of the estimated emissions from a business's operations.

Often, these involve avoided emissions by third parties – a controversial approach analogous to the protection offsets (averted loss) we refer to here vis-à-vis biodiversity (Blum 2020). They also do not consider the requirement to reduce global emissions by 3% to 7% per year in absolute terms if we are to comply with the Paris Agreement. In this light, neutrality is not enough, and a number of initiatives around 'science-based targets' have pushed for a framework for corporate climate mitigation that is aligned with the challenge posed by the global climate crisis (Krabbe al. 2015; Rogelj al. 2018; McLaren al. 2019). The same reasoning is true for the CBD – and we anticipate the same arguments will ensue for science-based targets for biodiversity.

We advocate the further uptake of target-based ecological compensation as a policy framework to align ongoing, essential development activities (and the biodiversity losses they entail) with the achievement of the targets enshrined in the Post-2020 GBF. However, we stress that ecological compensation must only be but a small component of the suite of actions needed to deliver the Post-2020 GBF. Crucially, gains to ecosystems and species that are not premised on losses will be the fundamental driver of achieving a world in 2050 where we live in harmony with nature.

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