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Setting robust biodiversity goals

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Abstract

The new global biodiversity framework (GBF) being developed under the Convention on Biological Diversity must drive action to reverse the ongoing decline of the Earth's biodiversity. Explicit, measurable goals that specify the outcomes we want to achieve are needed to set the course for this action. However, the current draft goals and targets fail to set out these clear outcomes. We argue that distinct outcome goals for species, ecosystems, and genetic diversity are essential and should specify net outcomes required for each. Net outcome goals such as "no net loss" do, however, have a controversial history, and loose specification can lead to perverse outcomes. We outline seven general principles to underpin

net outcome goal setting that minimize risk of such perverse outcomes. Finally, we recommend inclusion of statements of impact in action targets that support biodiversity goals, and we illustrate the importance of this with an example from the draft GBF action targets. These modifications would help reveal the specific contribution each action would make to achieving the outcome goals and provide clarity on whether the successful achievement of action targets would be adequate to achieve the outcome goals and, in turn, the 2050 vision: *living in harmony with nature.*

1 | INTRODUCTION

Loss of the Earth's species and deterioration of its ecosystems continues unabated (IPBES, 2019; WWF, 2020). Explicit, precise, and measurable goals—supported by clearly aligned targets for action—are important to set the bar for governments and society globally to act and report on the effectiveness of efforts to stop and reverse this trend (Díaz et al., 2020). Such goals should reflect the outcomes that are needed for biodiversity, and ensure ecosystems can meet the demands humanity makes of them (Maron et al., 2018).

This year, a new global framework for action on biodiversity conservation to 2050 will be agreed by the Parties to the Convention on Biological Diversity (CBD). This global biodiversity framework (GBF) aims to halt this loss, and, to the furthest extent possible, drive recovery. Importantly, the updated zero draft of the GBF sets *outcome goals*, which are supported by 2030 milestones and action-oriented targets (CBD, 2020b). This is a key advance on the Aichi Targets, which guided action under the CBD from 2010 to 2020, but suffered for lack of outcome focus and specificity, and hence, accountability (Butchart et al., 2016; Maxwell et al., 2015).

The updated draft GBF, however, still suffers from a lack of precision and clarity in its outcome goals (Díaz et al., 2020). For example, while the original draft of the framework called for "no net loss of ecosystem area and integrity" by 2030 and "net gain" by 2050 (CBD, 2020c) (CBD/WG2020/2/3), the updated version removed the explicit net outcome language from goals and targets, instead using a vaguer reference to "increase" in ecosystem area, connectivity and integrity (CBD, 2020b) (CBD/POST2020/PREP/2/1). This vagueness opens the door to alternate interpretations of the GBF's intended biodiversity outcomes. It also rolled the previously distinct goals for ecosystems, species, and genetic diversity into one single goal covering all three. Two "2030 Milestones" under Goal A add some detail for species and ecosystems (for example, that the increase referred to in the ecosystem goal should be at least 5%), but these statements still fall short of a clear statement of a desired outcome. There is concern that this move toward less-specific and measurable goals risks repeating the shortcomings of the Aichi Targets (Butchart et al., 2016; Maxwell et al., 2015).

We argue that more clearly specified net outcome goals can help strengthen the GBF—and conservation goal setting in general. The Paris Agreement target, to limit global warming to ideally 1.5°C, provided a net outcome statement in the form of a global "carbon budget," to be divided among the world's nations. Although proposed national contributions are so far insufficient to meet this target, the clarity with which it was stated allows transparency about how far we are from reaching it, and which actors are contributing equitably and which are not. Nevertheless, in contrast to carbon goals, the intrinsic variability and place-specificity of biodiversity mean far more attention to detail is required to ensure that biodiversity goals are framed clearly enough to yield a useful and effective framework for driving and monitoring progress.

Net outcome goals carry the risk of misuse and perverse outcomes (Maron et al., 2018) so here, we propose ways to mitigate that risk, not only within the global context of the CBD negotiations, but also for national strategies and other jurisdiction-wide commitments. With a focus on the current draft "Goal A," pertaining to ecosystems, species, and genes, we further argue for improved alignment of the action targets proposed in the draft GBF with its outcome goals, to ensure a coherent road map to better biodiversity outcomes.

2 | THE NEED FOR NET OUTCOME GOALS

As the updated Zero Draft of the GBF outlines, the CBD must act in concert with other agreements capturing the globally agreed ambitions of humanity (Maron et al., 2018). For example, achieving the UN Sustainable Development Goals will require massive investments in infrastructure and agriculture to transform our energy, food and transportation systems (Sachs et al., 2019). Even if done sensitively, these investments will place enormous pressures on natural habitats and ecosystems, resulting in inevitable losses of biodiversity. Therefore, net (rather than gross) halting and reversal of declines of ecosystems, species populations, and genetic diversity is likely to be a necessary framing for the CBD's outcome goals, so that nature and people can thrive together (Díaz et al., 2020).

A net outcome implies that some biodiversity in some places might still (in certain circumstances) be lost, so long as in other places, biodiversity is gained, resulting in either an overall balance ("no net loss") or increase ("net gain") of biodiversity. Net outcome goals are increasingly prominent in environmental discourse. Indeed, over 60 governments already have or are developing policies on no net loss, net gain, compensation, or offsets (GIBOP, 2021). For example, the UK is in the process of legislating for a goal of "Biodiversity Net Gain" as a mandatory condition on developments that impact biodiversity (DEFRA, 2020), and BP has committed to a "net positive" impact on biodiversity in future projects (BP, 2020). However, most of these commitments, applying to specific projects, are fundamentally different to overarching goals that specify the goal state for the biodiversity of entire jurisdictions or the planet, as the new GBF must do (e.g., www.naturepositive.org).

Reticence about the concept of net environmental goals is understandable, as it has a controversial history (Maron et al., 2018). Such goals are rarely articulated clearly, allowing for loose interpretation and poor environmental outcomes. Careful wording of net outcome goals must establish the fundamental distinction between net outcomes at a global or jurisdictional scale, and their more familiar context of offsetting project-level impacts. For example, a goal of no net loss of ecosystems might imply that ecosystems cease to degrade and be lost unless those losses are directly replaced with gains. However, the most common use of terms like "no net loss" is in offsetting the impacts of individual projects—where it can have quite a different meaning.

Perhaps the most significant distinction to draw is between the concepts of *relative* net outcomes—often used in biodiversity offsetting—and *absolute* net outcomes (Maron et al., 2018)—appropriate for conservation goals. Relative net outcomes are measured by comparison to a counterfactual scenario—what would have happened without the intervention in question. This implies that if biodiversity was declining even without the intervention, then maintenance of that 'background' decline over time is considered to be no net loss *relative to the counterfactual* (and anything above that would be net gain). However, it would make no sense to have a global goal of no net loss of biodiversity that locked in business-as-usual declines (Díaz et al., 2020). Given the widely established negative consequences of biodiversity loss, and that we have already exceeded acceptable limits, cessation of declines in an absolute sense, and a "bending back" of the curve of biodiversity decline, are necessary (Mace et al., 2018).

3 | PRINCIPLES UNDERPINNING ROBUST OUTCOME GOALS

We propose seven principles to limit the risk of perverse outcomes from net outcome goals, and help ensure they are explicit, unambiguous, and practical (Figure 1). An example is provided in Box 1.

1. **Recognize limits:** Net outcome goals are necessary because pressures on biodiversity can never be eliminated entirely and everywhere. It is important to define where losses are acceptable in exchange for gains elsewhere—and where they are not. Net outcomes for species conservation need careful nuancing—species themselves are irreplaceable, so talking about losses and gains at the species level makes little sense. Similarly, some ecosystems are genuinely irreplaceable (Le Saout et al., 2013; Ricketts et al., 2005), such that no alternative gains are possible to counterbalance their loss. Some elements of genetic diversity represent millennia of evolution and their loss would also be effectively irreversible. Some biodiversity losses, while not irreplaceable in themselves, could impair our ability to achieve other goals and targets, such as on climate or sustainable development (Goldstein et al., 2020).

These limits on acceptable loss mean "no-go" biodiversity components need to be defined. For these, *no loss* must be the required standard, rather than no *net* loss (Díaz et al., 2020). These components often translate into areas containing high levels of irreplaceable biodiversity, such as Key Biodiversity Areas, those containing key populations of critically endangered species, UNESCO natural World Heritage sites and areas of national priority. Recognizing limits also implies the need to retain not only "most" of the dwindling remaining current intact ecosystems, as foreshadowed by Target 1 of the Draft Monitoring Framework (CBD, 2020a),

7 Ambitious, not merely adequate
Adequate level of ambition to account for uncertainty and likely shortfall in achievement.

1 Recognise limits
Specify clear limits to the ability to counterbalance loss: no loss must be the requirement, rather than no net loss, for irreplaceable and/or imminently imperilled ecosystems or species populations, or where loss is unacceptable.

6 Avoid unintended substitutions
Losses should be counterbalanced with gains of the same type: e.g., no trading of connectivity or integrity for area; losses and gains should be within the same species and ecosystem unless an out-of-kind trade is safe and acceptable (i.e., 'trading up').

2 Net outcomes
Acknowledge that some losses (e.g. of ecosystem integrity or individuals of a species) will be unavoidable; require spatial planning to identify where impacts must be avoided, less-risky locations for development, and where opportunities exist for restoration to achieve gains.

5 Capture key biodiversity
Include all important elements: e.g. integrity, area, and functional connectivity for ecosystems; all species, and evolutionarily important populations within species.

3 Clarify timeframe
Specify a reference year as well as years for achievement of milestones, e.g. net gain in area, connectivity and integrity of 5% relative to the 2020 state, by 2030. Factor in restoration time lag.

4 Set goal state for net gains
Specify a goal state for net gains e.g. populations recovered to 1970 levels; ecosystems recovered to 5% above 2020 levels.
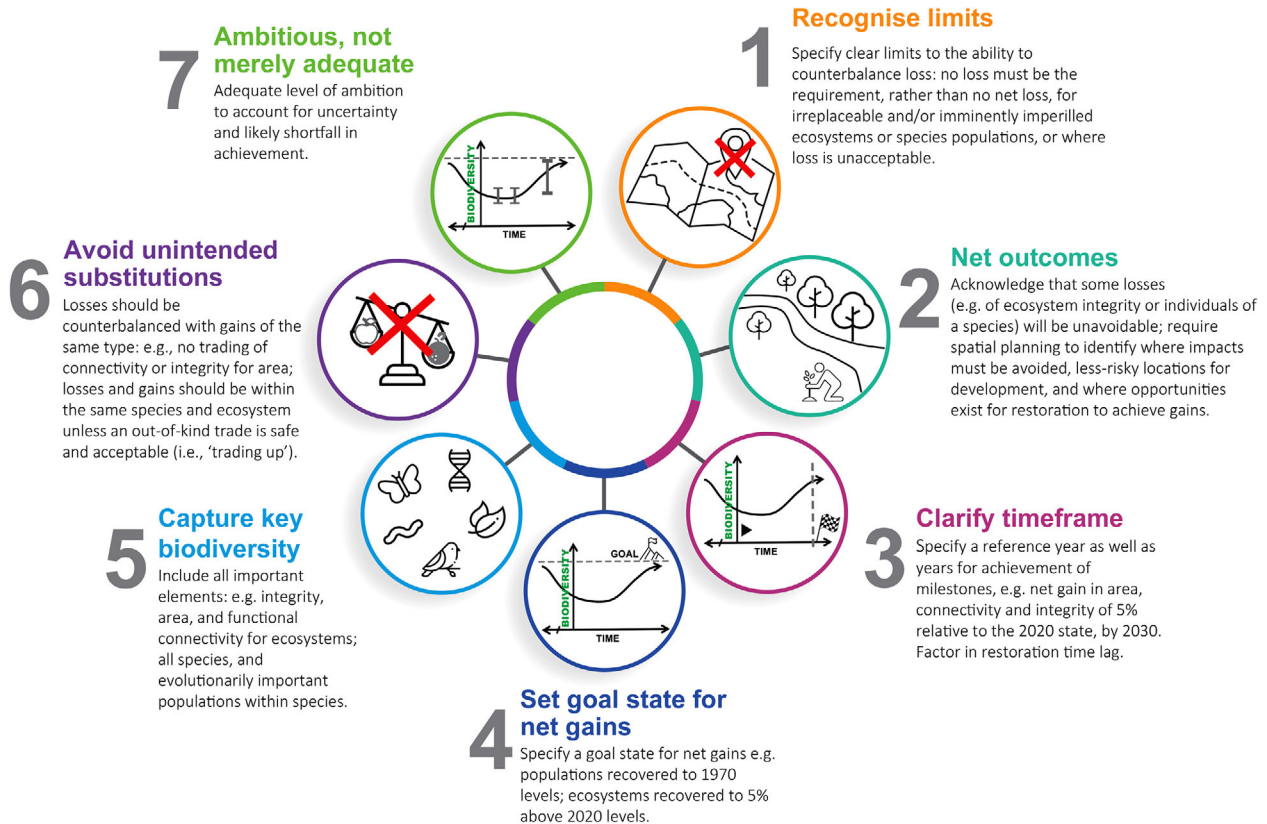
FIGURE 1 Seven principles to underpin outcome-oriented conservation goals at all levels, from global to local

but indeed all of them (Watson et al., 2018). If the objectives of the CBD are to be reached, acceptance of strict "no go" areas is essential; if Parties decide to breach such limits, they must recognize such action precludes achieving genuine no net loss, let alone net gain, of biodiversity.

2. **Net outcomes are necessary:** Despite the primacy of limiting biodiversity loss, accepting the need for goals to be framed in net terms allows for a pragmatic approach to conservation in the face of justifiable sustainable development pressures (Bull et al., 2020; Maron et al., 2020). If appropriate safeguards and policies are applied, the approach could even support concerted investment in conservation (Arlidge et al., 2018) and optimize land use. However, a net outcomes approach comes with attendant risks. Balancing competing pressures with strong protection of biodiversity will require spatial planning that incorporates trade-offs and thresholds in the provision of ecosystem services and economic returns (Leclere et al., 2020). These spatial blueprints would need to: identify areas that are off-limits to development; support rigorous management of development impacts; and guide the restoration of degraded areas. This is equally necessary to support the post-2020 framework's goals for nature's contribu-

tions to people, as to achieve the direct biodiversity outcomes we focus on here.

3. **Clarify timeline:** Net outcome goals require a reference against which the outcome is to be achieved. The phrasing in the draft framework so far lacks a reference year, and thus could be interpreted in different ways. For example, an "increase" could be interpreted as merely achieving improvement upon a business-as-usual scenario of continued decline. Setting a reference year (e.g., 2020) avoids this by setting a static state against which increase must be achieved (Díaz et al., 2020). Indicators are then measured relative to their fixed value at that point, clearly showing progress toward a goal state.

4. **Set a goal state for net gains:** While no net loss relative to 2020 effectively makes 2020 the goal state, many biodiversity elements are already so depleted that significant *net gains* will be required to ensure their long-term persistence and ecological function (Ferrer-Paris et al., 2019). Without further specification, the concept of net gain allows many possible interpretations (Bull & Brownlie, 2017)—including a negligible advance on no net loss—and so a goal state should be set. The required increase could be linked to levels of historical biodiversity loss, with greater net gains required in more

depleted ecosystems and regions (Maron et al., 2020). A species goal state might thus be based on recovery relative to past conditions, as per the IUCN Green Status of Species (Akcakaya et al., 2020), or to requirements for an acceptable probability of long-term persistence.

5. **Capture key biodiversity:** A goal of no net loss of biodiversity requires specification of the elements of biodiversity for which that outcome is sought. Distinct net outcome goals for ecosystems, species, and genetic diversity will help to ensure all elements are addressed (Hoban et al., 2020; Rousevell et al., 2020). For example, a species goal might require *no loss* of species or evolutionarily distinct lineages, but also no *net* loss of abundance and range for species, and key functions related to species persistence such as migration. For ecosystems, Parties to the CBD could agree how similar a biodiversity gain must be to validly counterbalance a loss. These rules of exchange must balance the need for some flexibility with the reality that ecosystems are heterogeneous and unique. For genes, net maintenance of at least current levels of genetic diversity within species might be the goal, with a similar like-for-like approach to compensating for losses of locally-adapted genotypes.

6. **Avoid unintended substitution:** It is essential that a net outcome goal does not allow unacceptable exchanges of gains and losses between biodiversity components. For example, accepting limited population decline of one species but achieving recovery in another may only be an acceptable net outcome if the first species is not threatened, but the second one is. Similarly, would both area and integrity of ecosystems be required to be maintained or improved, or is it acceptable for a decrease in area to be substituted for an increase in integrity of a comparable ecosystem elsewhere? Limiting substitution geographically—such as to within the same ecoregion—seems an important minimum safeguard to ensure that losses and gains are broadly similar. Separate net outcome goals for each of ecosystems, species, and genetic diversity within species could help allay concerns about the risk of inappropriate substitution.

7. **Ambitious, not merely adequate:** There are many reasons why goals ought to be ambitious but achievable, rather than the bare minimum (Mace et al., 2018). The experience of the last 20 years suggests we are likely to undershoot whatever goal we set. Actions to compensate for biodiversity loss still routinely overlook cumulative impacts; ambition needs to be at scale rather than piece wise. A precautionary approach is warranted as estimates of what is necessary to prevent species extinction and ecosystem collapse are still highly uncertain. Compensatory biodiversity gains are usually deferred and more uncertain than losses

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Box 1. Example: net outcome goal for ecosystems*

Current goal A: The area, connectivity, and integrity of natural ecosystems increased by at least [X%] supporting healthy and resilient populations of all species while reducing the number of species that are threatened by [X%] and maintaining genetic diversity

Reformulation of goal for ecosystems compliant with the seven principles: Net gain of 5% in both area and integrity of all freshwater, marine, and terrestrial ecosystems relative to 2020 levels by 2030, and net gains of at least 20% by 2050, and no loss of irreplaceable ecosystems essential for biodiversity conservation and earth system function.

*Additional, separate net outcome goals for species and genetic diversity are also required

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(Weissgerber et al., 2019). Allowing for this uncertainty compels us to build in a buffer to avoid irreversible losses.

4 | ALIGNING ACTION TARGETS WITH OUTCOME GOALS

The current Zero Draft of the GBF includes seven "action targets" intended to support achievement of the 2050 Goal A and its 2030 milestones. These targets focus on actions and inputs, as steps toward the goal outcomes. All are key components of the theory of change described in the updated Zero Draft of the GBF, which calls for the transformational change needed to support the mainstreaming of actions to protect biodiversity across society (CBD, 2020b).

Alignment between the targets and goals is key; together, they must specify both the destination and the roadmap for reaching it. However, as currently worded, all action targets could be fully met without achieving the outcomes implied by Goal A. A way to bridge this gap is to ensure that each action target specifies both the outcome it seeks to achieve within its domain of influence, and the difference the action is expected to make to that outcome. Several, but not all, of the draft action targets include some reference to impacts. This could be built upon to improve clarity on the alignment between action targets and outcome goals.

For example, Target 2 is currently worded as "By 2030, protect and conserve through well connected and effective system of protected areas and other effective area-based

conservation measures at least 30 per cent of the planet with the focus on areas particularly important for biodiversity." However, protection of 30% of the Earth could make an enormous difference to retention of area and condition of ecosystems and populations—or alternatively, it could make little difference, depending on the extent to which the protection is focused on areas under genuine threat. Providing clarity on the expected impact of each action target should reveal how much of a contribution each should make toward the outcome goals of at least no net loss, and net gain, of biodiversity. This would reveal whether the action targets, taken together, are adequate.

5 | CONCLUSION

Even clearly specified net outcome goals agreed at the international level will be challenging to translate to country-level targets, or to smaller jurisdictions. There are vast disparities among countries, both in terms of how much relatively untransformed natural habitat remains, and in levels of wealth and human development (Bull et al., 2020; Maron et al., 2020). To be realistic and equitable, socio-economic circumstances and historical impacts must be considered in defining the scope and application of no net loss/net gain of biodiversity within each jurisdiction. As such, different countries might have different targets for biodiversity outcomes—but they must sum globally to no net loss/net gain of biodiversity (Maron et al., 2020). These different targets might also consider heterogeneity in the practical challenges associated with resources and capacity for implementation—factors often overlooked by decision-makers developing net outcome policies (Bull et al., 2020).

Including these seven principles in the outcome goals of the post-2020 GBF would mean several key changes to the current wording.

However, outcome goals that are unambiguous and action targets that demonstrably support their achievement through real impact are essential for an effective GBF. This same consilience will greatly help in monitoring and accounting over the next decade to assess progress toward the 2030 vision (Milner-Gulland et al., 2021). This will require a far better system for monitoring and evaluating the net outcomes of national biodiversity policies than we have hitherto seen.

AUTHOR CONTRIBUTIONS
All authors apart from PHV conceived and drafted the basis of the original submission during a workshop and the ideas were further developed in discussions with PHV. All authors subsequently contributed to the drafting and revision of the manuscript. HB developed the original Figure 1 concept.

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The authors conducted no data collection that required ethics approvals.

CONFLICT OF INTEREST
The authors declare no conflict of interest.

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No data were collected or accessed in the preparation of this manuscript, with the exception of that published in the cited literature.

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