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Analysis

Counterintuitive Proposals for Trans-boundary Ecological Compensation Under 'No Net Loss' Biodiversity Policy

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ABSTRACT

'No net loss' (NNL) policies involve quantifying biodiversity impacts associated with economic development, and implementing commensurate conservation gains to balance losses. Local stakeholders are often affected by NNL biodiversity trades. But to what extent are NNL principles intuitive to stakeholders when they are not experts? We surveyed 691 students with limited or no knowledge of NNL policy across three countries, eliciting perceptions of what constitutes sufficient ecological compensation for forest habitat losses from infrastructure development.

NNL policies assume that biodiversity compensation should be: close to development impacts; greater than losses; smaller, given a background trend of biodiversity decline; and, smaller when gains have co-benefits for biodiversity. However, survey participant proposals violated all four principles. Participants proposed substantial forest compensation abroad, did not always require commensurate compensation within their own country, and required more forest creation if background trends were for habitat decline or if forest creation had fauna co-benefits.

Our findings suggest that, under certain circumstances, international biodiversity trades could deserve consideration. The findings also support proposals to incorporate social considerations into compensation ratios for NNL. Wherever the rationale underlying NNL is discovered to be counterintuitive insofar as relevant stakeholders are concerned, careful communication of policy intentions is required.

1. Introduction

1.1. No Net Loss

Environmental policies and legislation that incorporate a 'no net loss' (NNL) of biodiversity objective have been widely adopted over recent decades (Maron et al., 2016). The theoretical assumption underlying all approaches to NNL is that if the negative biodiversity impacts associated with economic development are quantified, and commensurate biodiversity gains correspondingly achieved through additional conservation interventions, then losses and gains can be summed to demonstrate a neutral net outcome for nature (Bull et al., 2013a). Normally, when seeking NNL, it is required that the impacts predicted to occur as a result of a given development project are mitigated through a sequential 'mitigation hierarchy' of preferred measures. A widespread framing of the mitigation hierarchy is 'avoid, minimize, remediate, offset' i.e. predicted impacts are first avoided or minimized wherever possible, then remediated immediately if they are only temporary, and finally, all residual predicted impacts are compensated for through biodiversity offsets (Gardner et al., 2013; Bull et al., 2016).

The most controversial component of the mitigation hierarchy is biodiversity offsetting (Apostolopoulou and Adams, 2017; Maron et al., 2016). Biodiversity offsets (henceforth, offsets) involve the implementation of conservation actions, such as habitat creation, that provide quantified biodiversity gains which would not have been achieved otherwise – thereby fully and demonstrably compensating for any unavoidable impacts from the associated development project. Out of this simple premise, a large body of theoretical literature has emerged, detailing what form and magnitude the biodiversity gains that constitute offsets must take in order to ensure that the overarching NNL objective is met (Calvet et al., 2015). Widely held theoretical principles of good practice for biodiversity offsetting include that: offset gains should be realised in close proximity to development losses (Pilgrim et al., 2013); gains must be larger than losses by some factor, to account for restoration uncertainties and other considerations (Moilanen et al., 2009); and, NNL should be explicitly calculated against some counterfactual capturing background biodiversity trends (Bull et al., 2014). The first of these principles, the proximity requirement, can also be interpreted as meaning 'functional' proximity e.g. a wetland offset being implemented in the same watershed as the development for

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which it compensates. In the case of either spatial or functional proximity, the assumed preference for proximity means that offsets in different countries to the associated development have not widely been countenanced.

Environmental policies involving trade-offs can be difficult to implement if local stakeholders do not view the trades favourably (Daw et al., 2015). Furthermore, in addition to technical requirements, the amount of ecological compensation necessary to achieve NNL is thought to require consideration as to what local stakeholders are willing to accept (Bull et al., 2017). For both reasons, the potential perception of biodiversity offsets held by laypeople should be an important consideration in NNL policy development. Survey methods have previously been employed to understand perspectives on the effectiveness of offsetting as a process from those involved in NNL trades (Coggan et al., 2013; Vaissière and Levrel, 2015), and to understand perceived offset needs from other local stakeholders (Burton et al., 2016; Kermagoret et al., 2016). However, to date, there has been no study that determines whether, or to what extent, basic principles underlying NNL are generally intuitive to those with little prior experience of the concept. Consequently, in this article, we focus upon stated choices for biodiversity compensation requirements from survey participants who are not NNL experts, and compare this with the logic underlying offsetting. In particular, we are interested in the application of NNL in a trans-boundary conservation context, how much compensation participants consider necessary, and how this amount is influenced by different background biodiversity trends.

1.2. Trans-boundary Biodiversity Conservation

Nature conservation is always challenging across socio-political boundaries, and interventions must be designed in such a way as to acknowledge differences in societal values (Dallimer and Strange, 2015). It has been shown that people are generally willing to contribute more towards conservation in their own country than elsewhere (Dallimer et al., 2015). That finding has been replicated for NNL by Burton et al. (2016), who show that offsets implemented to compensate for development impacts are more acceptable the closer they are to the development site, and can become unacceptable if proposed for implementation in another country. We should therefore not be surprised if the public is less likely to accept NNL policies when the outcome of the policy is trans-boundary conservation interventions, and indeed, such an idea is controversial (Žydelis et al., 2009). But it has been shown that trans-boundary offsets might be necessary to achieve NNL in the case of some highly mobile biodiversity conservation targets e.g. migratory species (Wilcox and Donlan, 2007; Bull et al., 2013b). Therefore, it is important to clarify whether there are any conditions under which trans-boundary offsets might be considered acceptable, and by whom.

1.3. Multipliers and Counterfactuals

A fundamental component of NNL is deciding to what extent 'multipliers' are necessary. Multipliers are factors applied to predicted losses, to determine how large gains must be in order to ensure that NNL is achieved once restoration uncertainties and other technical considerations are accounted for (Pilgrim and Ekstrom, 2014). Beyond such standard uses, multipliers could feasibly be employed to incorporate social considerations such as human risk aversion into NNL schemes (Bull et al., 2017). However, there has been no previous empirical study that surveys people's perceptions as to how large a multiplier they would instinctively deem reasonable. Accounting purely for ecological considerations and time preferences, it is considered that achieving NNL always requires multipliers to be greater than or equal to unity, and often in the tens or hundreds (Moilanen et al., 2009; Overton et al., 2012; Laitila et al., 2014).

Achieving NNL also requires an understanding of the background biodiversity trends in the policy region, as these then act as one counterfactual against which any losses and gains can be evaluated. That is to say, biodiversity gains realised under NNL policy do not necessarily have to be absolute gains, but rather, gains against what would have happened in the absence of the NNL policy (Ferraro and Pattanayak, 2006; Bull et al., 2014; Maron et al., 2015). So, if the background biodiversity trend providing the counterfactual for evaluation is one of decline, then a smaller absolute conservation gain can be considered to have achieved NNL than the case in which the trend is for stability (so-called 'averted losses'; Maron et al., 2015). Counterfactuals are not a straightforward concept, and no one has yet explored how the layperson might vary their stated compensation requirements under different counterfactual biodiversity change scenarios.

1.4. Non-expert Perception of No Net Loss

Here, we use the results of an international study conducted across three countries (Denmark, Ghana, and Spain) to explore perceptions of what might constitute NNL on the part of certain 'non-experts'. We consider an NNL expert to be someone who has either published peer-reviewed literature on NNL, or who has specifically worked on delivering NNL projects on the ground. Anyone else, including experienced or even highly educated ecologists, is unlikely to have much technical understanding of delivering NNL. Since our survey respondent group was almost entirely undergraduate students (see Sections 2, 3), we assume likely to have included very few, if any, NNL experts. Consequently, we did not expect participants to consider compensation requirements for NNL on technical grounds. Rather, the survey was employed to elicit stated choices as to the amount of ecological gains considered appropriate to compensate for development impacts (from which we could calculate the implicit multiplier), where these should be implemented, and the influence upon offset requirements of different background habitat trends (i.e. counterfactual scenarios). In the survey itself, we made no mention of the phrases "biodiversity offset" or "no net loss" to avoid priming participants, as such phrases can be highly loaded (e.g. Apostolopoulou and Adams, 2017; Bull et al., 2016).

The survey left open to participants the possibility of proposing offsets in different countries, allowing us to consider whether and when trans-boundary offsets might be deemed reasonable. The main scenarios investigated were those in which losses and gains were achieved in terms of forest cover (an important habitat for nature conservation activities). We also included a scenario in which forest creation could provide incidental benefits for a migratory bird species, allowing us to consider how conservation preferences might change if offset gains explicitly benefitted more than one component of biodiversity and therefore had greater conservation value. Finally, we link the elicited conservation offsets to preferences of risk, trust, collaboration, and other beliefs of the participants about the other countries named in the survey.

Given the context discussed throughout Section 1, our hypotheses are that:

1. Participants will on average overwhelmingly prefer compensation (in the form of absolute area of proposed forest creation) in their own country, rather than abroad;
2. Proposed multipliers, constituting an average gain:loss ratio in forest area, will be equal to or greater than unity, for losses and gains within the participant's own country;
3. Participants will require equal or less compensation if the background trend in forest habitat cover trend is one of decline, than if it is stable or increasing; and,
4. Participants will require less compensation if forest creation provide incidental benefits for other components of biodiversity.