Perverse incentives risk undermining biodiversity offset policies

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Summary

1. Offsetting is emerging as an important but controversial approach for managing environment-development conflicts. Biodiversity offsets are designed to compensate for damage to biodiversity from development by providing biodiversity gains elsewhere.

2. Here we suggest how biodiversity offset policies can generate behaviours that exacerbate biodiversity decline, and identify four perverse incentives that could arise even from soundly-designed policies.

3. These include incentives for (i) entrenching or exacerbating baseline biodiversity declines, (ii) winding back non-offset conservation actions, (iii) crowding out of conservation volunteerism, and (iv) false public confidence in environmental outcomes due to marketing offset actions as gains.

4. *Synthesis and applications.* Despite its goal of improving biodiversity outcomes, there is potential for best-practice offsetting to achieve the opposite result. Reducing this risk requires coupling offset crediting baselines to measured trajectories of biodiversity change and understanding the potential interaction between offsetting and other environmental policies.

Key words: baseline, biodiversity offset, carbon offset, crediting baseline, offset policy, perverse incentive, policy evaluation
Introduction

Environmental offsetting—compensation for environmental impacts with equivalent benefits generated elsewhere—is emerging as an important approach for balancing the competing demands of development and conservation (Madsen et al. 2011). Although policy requiring forms of environmental offsetting has existed since the 1970s, carbon offsetting has only become common since the turn of the century, and biodiversity offsetting is experiencing a rapid expansion (McKenney & Kiesecker 2009; Spash 2010; Madsen et al. 2011). Compared to approaches where ‘gains’, such as additions to reserve networks, are celebrated in isolation from the losses (McDonald-Madden et al. 2009), offsetting represents a step towards a more holistic view of responsibility for the environment, integrating both environmental losses and gains.

Yet controversy around environmental offsetting is growing. This has been in relation to issues specific to offsetting such as the fungibility of losses and gains (Bull et al. 2013), as well as design, implementation, and compliance issues (e.g. Walker et al. 2009) which are challenges to many conservation approaches. However, broader critiques of offsetting are also emerging; for example, claims that market-based approaches create a distraction from urgently-needed changes in human behaviour and institutions (Spash 2010) or corrupt the social good of the environment (Nyberg & Wright 2013). In addition, poorly-conceived policy introductions, especially those designed in isolation from the system in which they are embedded, have the potential to introduce perverse incentives that can undermine their effectiveness (de Gorter, Drabik & Just 2013). Here, we examine whether the introduction of biodiversity offset policies produce perverse incentives that could result in worse environmental outcomes?

Biodiversity offset policies

Biodiversity offsets aim to address environmental damage associated with development by achieving additional biodiversity gains elsewhere (Fig. 1a; Kiesecker et al. 2009). They are generally implemented as part of a ‘mitigation hierarchy’ requiring losses are avoided, then minimized, with unavoidable losses being fully compensated for by offsets that achieve ‘no net loss’ of biodiversity (BBOP 2012). Biodiversity gains can usually be
generated in two ways: active habitat creation or restoration to improve existing biodiversity values in a given location (Maron et al. 2012), or so-called ‘averted loss’ offsets such as protecting vegetation at risk of being cleared (Gordon et al. 2011).

The scientific literature on biodiversity offsetting generally concludes the approach is sound in principle (e.g. Gibbons & Lindenmayer 2007; Maron et al., 2012; Bull et al., 2013), but has yet to reliably demonstrate no net loss of biodiversity in practice, due to the few empirical assessments of its effectiveness available (Curran, Hellweg & Beck 2013). There is also general agreement about many conceptual and practical challenges to their successful implementation (Moilanen et al. 2008; Maron et al. 2012) but there has been no discussion of perverse incentives that may arise.

*Perverse incentives and offset policies*

With the creation of an incentive structure, there is a risk of unintentionally introducing perverse incentives, whereby a policy intended to solve a problem inadvertently results in an incentive for behavior that actually worsens the problem. A well-known example resulted from the US Endangered Species Act, which aimed to protect the habitat of endangered species through restricting land use. This introduced a perverse incentive for landowners to deliberately clear habitat for endangered species preemptively in order to avoid landuse constraints on their property (Lueck & Michael 2003).

Here, we argue that biodiversity offsets risk the creation of multiple perverse incentives, which may reduce their effectiveness or at worst, increase rates of biodiversity loss rather than reducing them. Below we illustrate perverse incentives that could arise and discuss approaches for mitigating them.

*Perverse incentives relevant for biodiversity offset polices*

Biodiversity offsetting potentially introduces incentive structures that need to be carefully managed, even when offsetting follows best-practice guidelines (BBOP 2012) and fully
implements the mitigation hierarchy. Below we describe what we believe to be the four most important perverse incentives, though others are also likely to be produced.

1. **Entrenching or exacerbating baseline declines**

Implicitly or explicitly, most offset policies are intended to achieve no net loss of biodiversity relative to a “business as usual” baseline trajectory (e.g. Commonwealth of Australia 2012; DEFRA 2013a; Quétier, Regnery & Levrel 2013; Fig. 1). In other words, the amount of ‘credit’ a given offset action yields is the difference in the biodiversity outcomes expected from the offset action (thick dashed line in Fig. 1), and those expected without the offset action—the “crediting baseline” in Fig. 1 (sensu Angelsen 2008). By this definition, no net loss occurs at the point when the combination of loss from the development and the gain from the offset reaches the crediting baseline, depicted as \( t_2 \) in Fig. 1. Selection of a plausible baseline against which to calculate credits is thus central to offset effectiveness, because to meet the “no net loss” requirement, offset credits are only required to be sufficient to maintain the trajectory of the selected baseline across the impact and offset sites collectively (Fig. 1).

Because of this, the crediting baseline becomes “locked in” by the offset policy: it becomes a self-fulfilling prophecy across impact and offset sites. Further, the more widespread offsetting becomes, the more the selected crediting baseline influences overall biodiversity trajectories. If an unrealistically steep baseline of decline is used due to uncertainty or an incentive to exaggerate it (see Incentive 2), this steeper rate of decline is then made real by the policy (Fig. 2). Worse still, most evaluations of offset policy outcomes have found that no net loss compared to the selected baseline has not been achieved (Maron et al. 2012; Bull et al. 2013; Curran, Hellweg & Beck 2013), resulting in net loss of biodiversity compared even to a declining baseline.

Whilst the challenges of specifying accurate baselines are common to most conservation interventions (Maron et al. 2013), they are of particular importance in
offsetting as an incorrect baseline can result in biodiversity loss. For other types of conservation interventions this is more likely reduce potential gains.

2. Incentive to wind back other conservation actions

Not only may declines be unintentionally entrenched due to the choice of baseline, but where the policymaker has an interest (direct or indirect) in facilitating development, there is an incentive to maintain steep baselines of decline, or even to worsen them (Pattanayak, Wunder & Ferraro 2010). This arises because a steeper baseline generates more credits from the ‘averted losses’ resulting from the offset, and averted loss offsetting is often less-expensive and easier than generating new biodiversity (Maron et al. 2012). This steeper baseline is then locked in by the policy (Fig. 2a & b; Incentive 1).

Government-mandated offset schemes often state an intention to use offsets to ‘reduce green tape’ and ensure offset credits can be obtained at reasonable cost (Commonwealth of Australia 2012; DEFRA 2013a). Yet any conservation action done outside the offset policy effectively competes within the offset market, reducing opportunities for buyers of credits. For example, the designation of land for conservation extinguishes the potential for these areas to be used as offsets. At worst, the desire to ensure a liquid offset market with affordable credits may incentivize the winding-back of environmental regulations (Lloyd 2010). Similarly, conservation initiatives that improve the trajectory for threatened species reduce the opportunity for generating offset credits—averted loss cannot be a means of credit generation for something not expected to decline. A ‘well-functioning’ offset scheme—from the perspective of having a relatively large and liquid biodiversity market—therefore risks being in direct conflict with conservation investment.

3. Crowding out of volunteerism

Unpaid, voluntary conservation work is a significant contributor to conservation outcomes globally (Conrad & Hilchey 2011). In some countries, such as Australia, offsets are increasingly being used as ‘community engagement’ opportunities,
whereby volunteers or even schoolchildren are invited to assist in an offset action. For example, restoration works required as part of an offset for clearing of *Banksia* woodland near Perth were performed by community volunteers (DEC 2012), and past volunteer restoration work in a public park was retrospectively claimed as an offset for urban development in Canberra (Gibbons & Zeil 2014). Whether participants in such cases are aware their labor is providing a service that developers otherwise would be required to pay for is arguable.

If such volunteer participation in offsets redirects activities from other voluntary conservation works, shifting volunteer efforts to actions that would have been required regardless of their participation, then additionality of conservation outcomes from the offset is eroded, resulting in a net loss of biodiversity. This same risk plagues carbon offsets (Spash 2010). Further, if individuals begin to view conservation activities as only occurring so that losses can occur elsewhere, they may withdraw from such activities more generally, further exacerbating this perverse incentive.

4. **False confidence in environmental outcomes due to marketing offset actions as gains**

There is a tendency for stakeholders involved in offset trading to focus on the environmental “gain” side of the trade, and to sell offset trades as beneficial conservation outcomes in their own right. For instance, the proposed UK (no net loss) biodiversity offset policy has been lauded as “an exciting opportunity to look at how we can improve the environment as well as grow the economy” (DEFRA 2013b). Yet no net loss offset policies are by definition neutral, not positive, in their environmental outcomes, and if the baseline is one of decline, then that decline continues. Developers overselling their offset gains may reinforce this false confidence in offsets (Jones *et al.* 2014).

Presenting offsets as environmental ‘wins’ can generate false confidence amongst the public regarding environmental outcomes: the impression could be gained that
biodiversity in general is improving, even as decline continues. This can lead to complacency and reduced pressure on governments to invest in conservation actions, resulting perversely in poorer environmental outcomes, given the significance of public pressure in achieving environmental gains (Layzer 2011). Further, such false confidence in offsets can mean approval of damage that would otherwise not be approved.

**Reducing the risk of perverse incentives**

Managing the risk of perverse outcomes driven by the introduction of biodiversity offset policies will require a range of approaches, some of which may be challenging to implement. Nonetheless, as the use of biodiversity offsetting continues to increase globally, it is important such risks are acknowledged and addressed explicitly. Below we discuss measures that may reduce or mitigate the negative outcomes from the perverse incentives we have identified.

*Transparent baselines that are updated over time*

Transparency regarding crediting baselines in biodiversity offsetting is generally poor (Maron, Rhodes & Gibbons 2013), despite recognition of the importance of the issue in the carbon offsetting literature. For example Griscom et al. (2009) found that depending on assumptions about the baseline, carbon credits calculated from avoided emissions ranged over two orders of magnitude for the same quantity of actual emissions reductions. Thus, if a dynamic crediting baseline is used in an offset policy (e.g. Fig. 1b), then this baseline needs to be clearly articulated. This includes providing the reasoning, assumptions and evidence underlying the baseline estimation.

Regular reviews—for example, every 10 years—of crediting baselines can help determine if they should be revised based on the background trajectory of biodiversity (Griscom et al. 2009). Ideally, if background trajectories of biodiversity eventually improve and trend upwards, this should result in the obsolescence of declining crediting baselines, and therefore of averted loss offsetting. Though it is important to note that the
baseline does not need be declining, and in some cases flat or even increasing baselines may be appropriate (Bull et al. 2014). Indeed, limiting credits to gains achieved relative to a flat baseline even where background declines of biodiversity are ongoing may be a desirable short-cut to stemming declines. However, this implies proponents would be required to offset not only the impact for which they are responsible, but also a component of ‘background’ decline.

**Linking crediting baselines to biodiversity trajectories**

If offset gains are measured against a dynamic baseline, and averted loss offsetting is permitted, then offset schemes become inseparably linked to the broader range of activities occurring in the landscape, and their positive and negative consequences for biodiversity. This is because biodiversity trajectories beyond the offset scheme determine the crediting baseline used in the scheme (Pattanayak, Wunder & Ferraro 2010). This subtle point has important consequences. For example, conservation interventions outside the scheme may change the background biodiversity trajectory, and should therefore impact the crediting baseline, changing the requirements for an offset to achieve “no net loss”. However, if the offsets scheme is systematically failing to deliver no net loss, then the offset scheme itself will result in steepening the baseline of decline. Updating the crediting baseline to reflect this would then allow more credit to be generated from avoided loss offsets (Fig. 2) potentially resulting in a feedback loop of increasing biodiversity decline.

One way of mitigating the risk of positive feedbacks exacerbating declines is by explicitly coupling crediting baselines and biodiversity trajectories, such as through parallel reporting of the assumptions behind offset requirements and the wider biodiversity trends from which those assumptions are drawn. This could help mitigate perverse incentives 1 and 2 by clarifying the link between the baseline in the offset scheme and the conservation outcomes being achieved in the absence of the offset. Any incentive to overestimate averted loss credits from an offset action could then be tempered by its corollary—that background trends under current government policies are undesirable. Another approach for dealing with this issue is to implement strategic
approaches that integrate offset schemes with other relevant policies at larger spatial and managerial scales, a point has been made in the recent literature (Hayes 2014).

*Transparent accounting*

A crucial element to mitigating some of these perverse incentives is clear and publicly visible accounting. This should record the environmental losses (impacts) and associated gains (offsets) as well as the legal agreements and financial flows associated with the offset. Two examples that go some way towards achieving these goals are the US Regulatory In lieu fee and Bank Information Tracking System (RIBITS; [http://geo.usace.army.mil/ribits](http://geo.usace.army.mil/ribits)) and the Western Australian Government’s Environmental Offsets Register ([http://www.offsetsregister.wa.gov.au/public/home](http://www.offsetsregister.wa.gov.au/public/home)), set up to create a searchable public record of offset agreements. Having this information publicly available should also help with understanding the extent to which offset funding is (or isn’t) additional.

*Better education about offsets*

Outreach and education can help counter the public’s poor understanding of the objectives of environmental offsetting. A balanced exposition of offsetting would explain its utility as a market-based instrument as well as its limitations (Bull 2013). This includes the fact that offset activities are not “conservation gains” but are making up for losses elsewhere and are neutral at best. It should also include issues around baselines and counterfactuals, which are often misunderstood (Ferraro 2009). The most intuitive, and anecdotally most common, interpretation of “no net loss” in the context of offset policies is no net loss of biodiversity relative to what was present at the time of development. Correcting this perception may substantially change public understanding of what offsets can achieve.

To reduce crowding out of volunteer conservation effects, governments should be careful not to succumb to the temptation to oversell offsets, or claim them as conservation gains. Genuine gains from offsets are possible, but are only likely where a “net gain” in biodiversity has been explicitly intended, and even in this case, only a subset of any
offset can be celebrated as a gain. Despite this, no net loss offsetting continues to be promoted as achieving conservation benefits. For example, the UK Environment Bank states that “the industry [offsetting] creates is one of wildlife restoration projects across the country, which is badly needed” (Environment Bank 2013). Although restoration projects are certainly needed to compensate for past damage, the new industry planned for generating future restoration offsets will not meet this need, as the no net loss objective of the UK offset policy means at best they will only compensate for future losses.

Conclusion

The issue of perverse incentives resulting from biodiversity offsetting has not been yet been explored in the academic literature, nor is it well-recognized amongst policymakers. We believe, as argued here, that as offset policies continue to proliferate and mature, an awareness of these issues is crucial to avoiding grave environmental risks. Development impacts on biodiversity are unlikely to cease or even abate in the near future. In this context, offsetting remains one of few options for delivering truly ‘sustainable’ development, and both internal and external policy critiques will assist in improving such schemes.

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References


Fig. 1 The self-fulfilling nature of crediting baselines for “no net loss” biodiversity offsets. The development impact occurs at $t_1$ with a loss of biodiversity $b_1$. Biodiversity gains are measured from the “crediting baseline” which should characterize the change in biodiversity that would have occurred without the offset. We assume offsets are implemented at the time of development and the gains from the offset actions accrue gradually over time (as is allowed in many policies). In (a) the baseline is assumed to be static and fixed at the biodiversity value at $t_1$; (b) shows the more typical case wherein losses and gains are measured against a declining “business as usual” crediting baseline.
Fig. 2 The consequences of an overly steep crediting baseline compared to a realistic one. If the crediting baseline is implausibly steep, an offset that achieves no net loss relative to (a) does not achieve no net loss relative to a realistic baseline (b). In addition, the gain from the offset as measured from the realistic baseline (b) is smaller than what would be estimated from the steeper baseline.