



Impact Mitigation and
Ecological Compensation
Thematic Group

Measuring Loss and Gain: Additionality

How to ensure that offsets deliver conservation benefits above and beyond what would happen without them

A core principle of biodiversity offsets and compensation is additionality: they must deliver measurable benefits for conservation over and above what would have occurred if the offset had not taken place. Only these ‘additional’ benefits (gains) can be used to counterbalance a residual loss from project development. Additional conservation benefits can be achieved through activities that improve the state of biodiversity, such as restoring degraded or disturbed areas, more effective ecological management or rewilding; or, by activities that maintain the state of biodiversity, such as legal protection that avoids imminent loss of biodiversity. The amount of additional benefit expected from an offset depends on the counterfactual scenario, or baseline, used for comparison. The anticipated gain is usually adjusted based on factors such as uncertainty and the time lag before the biodiversity benefits accrue. Estimating additionality is often challenging, and there is a series of best practice principles to consider. When forms of compensation other than offsets might be used, such as target-based ecological compensation, a modified approach to estimating benefit and their adequacy for addressing a given impact is needed.

The mitigation hierarchy should be applied and, as part of this hierarchy, offsets should be designed to achieve at least no net loss—and preferably a net gain—of biodiversity. To achieve this outcome, offsets have to benefit the same biodiversity that suffered the loss, and they must be at least as large as the loss (see *Brief 6: Steps 3 and 4 in the Mitigation Hierarchy: Restore and Offset* and *Brief 8: Metrics for Quantifying Biodiversity*). Importantly, that benefit must be ‘additional’—that is, it would not have occurred had the offset action not been done. Exchanging a loss of biodiversity for a conservation outcome that would have occurred anyway simply means that there is a net loss relative to ‘business as usual’, and so the requirements of the mitigation hierarchy are not met. Estimating the size of an anticipated benefit, or gain, due to an offset therefore requires careful consideration of this principle of additionality.

Estimating benefit from an offset

When estimating or measuring the expected benefits from a proposed offset, it is important to ensure that they are measured using the same biodiversity metrics as those used to measure the expected losses from project development (see *Brief 8: Metrics for Quantifying Biodiversity*). This approach enables a reliable comparison between losses and gains, and an estimate of net outcome.

There are different ways to estimate the expected benefit from an offset, but in all cases, an estimate of the change in the value of the relevant biodiversity metric from implementing a given set of offset actions at a site is required. This is called the 'with offset' scenario. For example, if the chosen metric is the number of individuals of a threatened plant, and the offset action involves implementing fire regimes that are beneficial for that plant, the response of the plant population to that action needs to be estimated. This involves 1) measuring how many plants are at the site now, under the current fire regime; 2) determining how quickly and to what extent the plant's numbers are expected to respond to the modified (beneficial) fire regime; and 3) accounting for other factors that might affect the future size of the threatened plant population.

Considering the 'with offset' scenario is not enough on its own to identify the benefit of the offset. To satisfy additionality requirements when designing and implementing biodiversity offsets, it is necessary to show that the expected conservation outcomes would not be achieved without the offset. They must also be over and above outcomes for biodiversity expected from existing conservation commitments and requirements, or from 'doing nothing'. Often, part of a conservation outcome at an offset site might have occurred anyway, but the offset actions create further benefit, over and above this outcome. The size of this extra benefit needs to be separated from what would have occurred anyway.

There are two ways that this separation is typically done. One approach is to compare the expected biodiversity outcome of a scenario 'without the offset' with the outcome of a scenario 'with the offset'. The 'without' scenario is called a 'counterfactual' scenario, or sometimes, a 'dynamic baseline' or frame of reference (see Figure 1). A second approach is to compare the 'with the offset scenario' to the state of biodiversity before the offset action is implemented, thereby using a 'fixed baseline' as the frame of reference (see Figure 2). In each approach, the difference in the number of threatened plants between these two scenarios is the additional benefit, or gain, that can be attributed to the offset action.

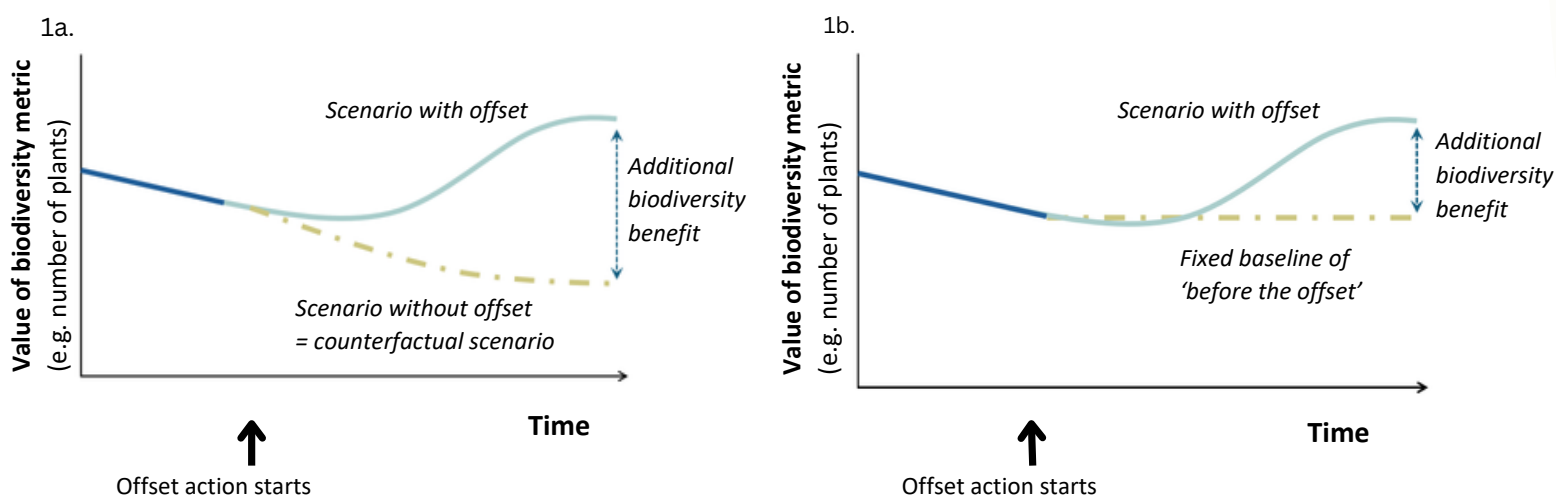


Figure 1a. How additional biodiversity benefit is estimated using a counterfactual scenario approach. Figure 1b. How additional biodiversity benefit is estimated using a fixed baseline approach.

Counterfactual scenarios are challenging to develop (see below) and uncertain, especially when compared with fixed baselines, which are more straightforward to apply and understand. Some jurisdictions avoid the challenges of counterfactuals altogether by requiring that offsets only consider the baseline state of the offset site prior to an intervention when determining losses and gains of biodiversity (*Figure 2*).

This approach improves certainty and simplifies the process of calculating offset gains. However, it limits offsetting to interventions that actively improve biodiversity outcomes at a site, such as restoration efforts, and excludes gains from averted loss interventions.

How to estimate counterfactual scenarios

Often, the most challenging aspect of estimating biodiversity benefits from an offset involves developing an appropriate counterfactual (or ‘without offset’) scenario. Counterfactual scenarios are tricky to develop and there can be temptations to adopt pessimistic counterfactuals that exaggerate background biodiversity declines and thus overestimate offset gains. Here are a few best practice principles for the development of counterfactual scenarios.

One simple approach is to consider what has been happening to the relevant biodiversity (e.g., the threatened plant population) at similar sites, on average, under management regimes similar to the site where the offset will be done. For example, have the numbers of the threatened plant species recently been declining at similar sites, or are they fairly stable? It is important that the counterfactual scenario reflects the most plausible outcome for the proposed offset site, if the offset actions were not done. That means it is not usually appropriate to use the maximum loss that is possible, or legally permissible, as the counterfactual scenario—this would result in overstating the offset benefit, and the net outcome will be a net loss.

Another important factor to consider is that the counterfactual scenario should not include declines or losses caused by actions that, if they occurred, would themselves trigger a requirement for an offset. So, if on average, other sites where our plant occurs are being impacted by road development, this might make us think that if we didn’t protect and manage our offset site, there is (for example) a 50% chance that over the next 20 years our site would be lost for road development. But if road developments that affect this species are subject to a mitigation policy that triggers an offset requirement, then the net outcome of preventing the road development should be zero. So, this type of risk of loss should be excluded when estimating our counterfactual scenario.

Because of their inherent uncertainties, scenarios are best developed with the involvement of relevant stakeholders, and their use in the context of the mitigation hierarchy should include revision mechanisms to enable adaptive management to achieve the no net loss or net gain goals.

Once the assumptions about what the ‘with offset’ scenario and the ‘without offset’ or counterfactual scenario are clear and well justified, the difference between these two scenarios becomes the unadjusted estimate of the additional benefit, or gain, from the offset. This estimate may need to be further adjusted to account for factors such as uncertainty and time lag.

Box 1: Improvement gain and maintenance gain

When using a counterfactual approach, it may be easier to estimate the biodiversity benefits of an offset by thinking separately about two different types of gain: 1) improvement gain: the absolute increase in the state of biodiversity at a site over time as a result of an offset action (for example, an increase in the number of plants) and 2) maintenance gain: how much biodiversity would have been lost without the offset action (in this case, the avoided reduction in the population of the plant species at the site that was otherwise expected, under the counterfactual scenario). If biodiversity values at a site are genuinely under imminent threat, then maintenance gain (sometimes called averted loss or avoided loss) may be a valid type of benefit to include in the overall calculation of gain or benefit resulting from the offset. However, if the aim is to achieve either absolute no net loss or net gain for the biodiversity in question, rather than relative gain (as in the case using averted loss), then only improvement gain can be included (see *Brief 2: Aligning Mitigation Outcomes with Biodiversity Goals and Targets*).

Adjustments to estimates of gain—uncertainty and time lag

As with most conservation measures, estimates of additional biodiversity benefits from offsets and compensation are often uncertain, and most benefits take time to be achieved. For example, restoration may take many years to achieve the anticipated outcomes, and different methods may have variable results. Therefore, the estimate of additional benefit from an offset usually needs to be adjusted to account for both of these factors.

Unless the offset provides the required benefits before the impact from the development project occurs, which is considered best practice, there will be a time period when losses exceed gains. This time lag can have serious implications for impacted biodiversity and the livelihoods of people who rely on the impacted ecosystem services. Long time lags are generally not acceptable, especially if the consequences may be irreversible for the targeted biodiversity (e.g. the species goes extinct before habitats are restored to enable its recovery). However, shorter time lags may be acceptable, and the preference for benefits that are achieved sooner rather than later can be reflected through appropriate adjustments to the expected benefit (e.g. through time discounting).

One way that time lags and uncertainty can be factored into offset calculations is by applying a 'multiplier' to the amount of benefit required in order to compensate for a given impact. Such multipliers effectively increase the offset or compensation requirements to ensure that they achieve the intended outcomes for conservation and people. Research suggests that appropriate multipliers often need to be very large. However, appropriate multipliers can be difficult to determine, and should be relied upon cautiously, as they do not correct all deficiencies. For example, an increase in the area of an offset cannot address the risk that the restoration may fail, and time lags are best resolved by proactively creating offset sites that deliver gains before development impacts occur (e.g. through so-called conservation or mitigation banks).

Box 2: Target-based ecological compensation: key differences

As outlined in *Brief 2*, approaches to ecological compensation that are a bit different to typical biodiversity offsetting might be appropriate. In particular, compensatory approaches can be designed to contribute to jurisdictional target outcomes for biodiversity. This type of target-based ecological compensation means that the way the amount of benefit from a compensatory action is estimated differs, and a typical counterfactual scenario approach is not used. However, general additionality considerations are still relevant, as in the case of using a fixed baseline as a frame of reference (see Figure 1b above).

For example, if a jurisdiction has set a goal of increasing a particular biodiversity component, for example, increasing the population of a threatened plant species by 20%, then only improvement gains can be used to compensate for losses (see Box 1). If ten of the plants were lost due to the impact, at least 12 new plants must be established at the offset site (although this number would likely be larger after accounting for uncertainty and time lag). Any benefits must be estimated relative to the condition of biodiversity at the offset site prior to the offset action (Figure 2) to ensure that the net outcome of the impact and the offset is an absolute increase in the number of plants over time. In some cases, a target might be set that allows some further loss of a common or widespread biodiversity component, but sets a limit to that loss ('managed net loss'; see *Brief 2*). In these cases, maintenance of already-existing biodiversity can be considered as valid compensation, with the amount of maintenance scaled relative to the managed net loss target.

Ensuring additionality: key principles and issues

Estimating the additional benefit from an offset can be challenging, and many judgements are required. Following best practice in making these judgements is important to avoid overestimating the additional benefit from an offset.

Common characteristics of offsets that yield genuinely additional conservation benefits are that the offset actions and outcomes:

- Go beyond existing legal commitments or requirements;
- Entail different activities and results to those already planned or underway;
- Involve extra investment of time and financial resources;
- Provide long term guarantees (legal, financial and social) that outcomes will not be reversed.

Further issues to consider when checking additionality include:

Attribution

The biodiversity benefits must be demonstrably due to the offset activities. For example, if a site is regenerating over time, and would continue to do so even if there were no management at the offset site, the benefits of that regeneration are not additional.

However, if the offset management is necessary to allow that regeneration to occur, then those benefits are additional. Exaggerating the benefits that are caused by the offset activities means that offsets will be inadequate to counterbalance impacts and the delivery of no net loss outcomes is compromised.

Cost shifting

The offset should not replace investments that a government would otherwise have made to fulfil their existing conservation commitments in particular areas. This is called 'cost shifting' or crowding out. Cost shifting can occur at a site level, whereby compensation activities and resources provided by project developers can replace funds and resources already committed to an offset area, or at the programme level, whereby the existence of a flow of offsets is used to justify reduction in government spending on biodiversity conservation. Such cost shifting undermines additionality.

Protected areas

The risks of 'cost shifting' are particularly high in cases where compensation or biodiversity offsets are proposed within existing government-sanctioned protected areas. These areas are, by definition, supposed to be protected and managed to conserve biodiversity. Given that context, it is essential to account separately for proposed offset or compensation actions, to show that they address essential protection and/ or management activities not already committed, planned and budgeted by government to meet their biodiversity targets.

Existing requirements

Pre-existing land management activities already required of a project developer or landowner by law (for purposes other than compliance with legal requirements on mitigation and offsets) should not count towards gains for offset or compensation activities.

Frame of reference

The frame of reference used to calculate biodiversity gains from an offset or compensation should not include any decline in biodiversity caused by projects or actions that themselves require offsets. The overall outcomes of these development activities should mean 'no change' in biodiversity if mitigation is to achieve no net loss or net gain, and a fixed rather than a declining baseline should thus be used.

Leakage

Offsets or compensation should not result in displacement of negative impacts from the offset site to other natural areas. This phenomenon is called 'leakage' and is a particular risk where biodiversity offsets result in displacement of livelihood or cultural activities, and compensation provided to affected parties for loss of ecosystem services is insufficient to meet their needs. This means that the impacts on biodiversity are not fully mitigated, but instead are shifted elsewhere. In these cases, there may be no, or reduced, additional conservation outcomes.

Volunteer activity

Volunteer conservation activities already planned, for example, by civil society groups, should not be claimed as contributing to additional conservation outcomes for use as an offset. In addition, redirecting volunteer activities from other areas of conservation work to offset areas would not satisfy additionality requirements.

Stacking and bundling

Often, offset actions generate benefits for multiple different components of biodiversity, as well as various ecosystem services. A developer may wish to account for these other benefits and use them to fulfil other environmental or social commitments. There are two main approaches to packaging multiple biodiversity and ecosystem benefits from a single site. These are 'bundling' and 'stacking'.

Bundling involves one single package containing a range of biodiversity and ecosystem services associated with a site. For example, a site could contain regenerated forest that is sequestering carbon and supporting threatened species. Because all these benefits are connected to the regenerated forest, they can be sold as a bundle and used to counterbalance an impact on the same set of biodiversity and ecosystem services at another impact site.

Stacking involves selling separately each of these different benefits from the one site, in a way that allows them to be used to compensate for multiple separate types and instances of impacts elsewhere. The different credits thus form a 'stack', and each layer of the stack can be traded to different developers. However, many ecosystem services and components of biodiversity are intrinsically linked, and so stacking presents a risk of 'double dipping' where the same ecosystem component is sold more than once, and 'double counting', where the same ecosystem component is used to counterbalance several different impacts. There is thus a failure to demonstrate additional conservation outcomes

The most risk-averse option is not to stack credits but recognise all the benefits a given offset action created and to use them as a bundle of connected benefits.

About COMBO+ and IMEC

From 2016 – 2025 AFD and FFEM financed the **Conservation, Mitigation and Biodiversity Offsets Programme (COMBO+)**, as part of which technical briefs 1 -10 were drafted, in collaboration with the IUCN Thematic Group Impact Mitigation and Ecological Compensation. COMBO has been implemented across six countries in Africa and Asia, together with government, private sector and civil society, to help reconcile economic development and biodiversity conservation through application of the mitigation hierarchy in policy and practice to achieve no net loss or net gain of biodiversity and contribute to national biodiversity targets aligned with the Kunming-Montreal Global Biodiversity Framework. The initiative was led by the Wildlife Conservation Society in partnership with Biotope, BIOFUND, Guinée Ecologie, Myanmar Biodiversity Fund and the University of Queensland.

The **Impact Mitigation and Ecological Compensation (IMEC)** Thematic Group of the IUCN's Commission on Ecosystem Management (CEM) serves as an international community of practice, guiding best practice application of the mitigation hierarchy and improving alignment of impact mitigation and ecological compensation with biodiversity targets.

Useful resources

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