

## Dealing with uncertainty and risk: Use of multipliers and discount rates

Biodiversity offsets are more appropriate when the uncertainty around offset outcome and the temporal scale of delivery are transparently addressed and minimised. Uncertainty and risk around the success of a biodiversity offset are relevant at all stages of offset planning. The BBOP (BBOP 2012a) defines several main sources of uncertainty<sup>1</sup>:

1. All biodiversity losses are not accounted for in designing and implementing an offset.
2. Impacts on some components of biodiversity cannot be offset
3. Dissimilar biodiversity between impact and offset sites
4. Uncertainty in offset performance
5. Uncertainty in ecological system
6. Uncertainty in offset implementation success
7. Time delays in offset delivery

There are a variety of ways of dealing with the different sources of uncertainty and risk. Particular emphasis needs to be paid to the precautionary principle at all stages of offset planning where risk and uncertainty are high, to limit the chances of a poor outcome. Dissimilarity in biodiversity between impact sites and offsets (i.e. like for unlike) is best dealt with early in the planning process. This should be done through careful selection of the measures and currencies that will be used to account for changes in biodiversity, and the use of exchange restrictions to prevent undesirable and unexpected outcomes (see [currencies and accounting systems](#)) rather than by increasing the amount of an uncertain offset. Uncertainty associated with a lack of obtainable data or knowledge can be addressed through adequate investment in field work and research. In contrast, uncertainty in the ecological system itself, uncertainty in offset implementation, and time delays associated with offset delivery are most commonly dealt with through the use of defensible multipliers (see BBOP 2012a; Moilanen et al. 2009). Multipliers are grounded in the precautionary principle and serve to increase the basic size of an offset (as set by the underlying biodiversity currency and associated accounting system), thereby helping to account for concerns that the offset may not be sufficient to deliver a no net loss outcome.

The BBOP (BBOP 2012a) describes at least three types of commonly applied multipliers in biodiversity offsetting:

- 1. Generic risk-aversion multipliers.** These multipliers attempt to deal with the risk of offset failure or underperformance due to uncertainty in the ecological system, and uncertainties in offset implementation and long-term viability. It often makes sense to identify different multipliers to address specific risks. For example, if there is only a 50% chance of seedlings maturing into adult trees in a restoration project then it makes sense to double the number of seedlings planted to achieve the desired outcome, rather than simply increasing the size of the area where restoration is undertaken. Often in practice, however, generic multipliers (frequently linked to area) are employed to bundle together a variety of concerns about uncertainty in offset outcomes. The size of generic-risk multipliers is often linked to the conservation significance of the target biodiversity in question. Policy-driven multipliers do not exist in New Zealand and are outside the scope of the guidance.

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<sup>1</sup> Further detail can be obtained on page 18 at [http://www.forest-trends.org/documents/files/doc\\_3103.pdf](http://www.forest-trends.org/documents/files/doc_3103.pdf)

Another way of establishing multipliers in offset specifications is relative to known or estimated margins of error; for example, where confidence levels can be constructed using available and reliable data distributions for a particular biodiversity measure and projections of offset gains.

- 2. Time-discounting multipliers.** This kind of multiplier can be calculated through the discounting procedure and estimation of 'Net Present Biodiversity Value' (Overton et al 2012) and then applied to the basic offset recommendation from the non-temporal accounting model. Offsetting discount rates adopt principles from accounting that devalue biodiversity in the future compared with its present value, resulting in a larger offset. Discount rates are intended as a composite measure of social willingness to accept certain loss of biodiversity now in exchange for uncertain gain in the future (Denne & Bond-Smith 2011; BBOP 2012a). The use of discount rates is not universally agreed because there are differing views about whether society values biodiversity in the same way that it does money.

Multipliers based on time discounting can be very large when used with offset activities that take a long time to deliver biodiversity gains (such as ecological restoration of highly degraded habitats or habitats that develop slowly (Moilanen et al. 2009). Accordingly, if a decision is made to use a discount rate, it is important to understand the implications of the discount rate applied to the calculation. It is also good practice to justify the discount rate used in a transparent manner with stakeholders and decision makers.

*If a decision is made not to apply time discounting, then it is good practice to provide for stakeholder participation when addressing uncertainty associated with time delays. Ultimately, the best way to avoid uncertainty is to deliver an offset before the impact occurs (Bekessy et al. 2010).*

- 3. Conservation outcome multipliers.** The essential aim of these multipliers is ensuring that landscape- or regional-scale conservation goals are met. They can help to ensure that already threatened ecosystems or habitats do not become more threatened as a result of development impacts. As such, they can be designed to reflect systematic conservation planning processes (Margules & Pressy 2000) to meet national or local conservation targets. Thus, where a biodiversity component is of particular conservation importance (e.g. limited in spatial extent), or where a specific conservation target (such as '30% remaining' or 'at least 5000 ha') has been set, conservation outcome multipliers can be applied that move biodiversity towards that target. The size of the multiplier depends upon the amount of the biodiversity component that remains, its current conservation status, and a decision about what represents an acceptable level of accumulated loss across the landscape scale (see Brownlie et al. 2007 (cited in BBOP 2009b) for an example in Western Cape, South Africa). Currently, conservation outcome multipliers have not been used in New Zealand, but systematic conservation planning could make them available for future developments.

The advantage of multipliers is that they tend to be easy to understand, implement, and audit. Yet, in practice, they are difficult to calculate accurately and thus do not always meet with broad agreement. Therefore it is *good practice to include stakeholder participation when making decisions about the size of multipliers and to justify their size rather than to make decisions on an unjustified precautionary basis.* For example, offset designers should ask themselves 'what is the logic behind proposed offset ratios? Do the ratios ensure replacement of like ecosystems with like and restoration of spatially dependent processes?' (Walker et al. 2009). Where uncertainty is high, multipliers may need to be very large if they are to provide adequate protection against failure to deliver no net loss (Moilanen et al. 2009).

Multipliers are not a silver-bullet solution and are inappropriate for dealing with many types of risk. Thus, area-based multipliers cannot account for the risk that an offset activity may fail (as opposed to falling short of achieving complete success). If a restoration project uses untested techniques (see [Limits to Offsetting in New Zealand](#)) and fails to secure any measurable biodiversity benefits, increasing the size of the offset area will contribute little towards improving the chance of success. *Accordingly, it is good practice to avoid using multipliers to address uncertainty in the technical ability of an offset to deliver no net loss.*

## Alternatives to the use of multipliers

Alternatives to using multipliers to limit uncertainty and spread risk include employing more rigorous methods for calculating biodiversity losses and gains (e.g. see Gibbons et al., 2009), using multiple and complementary field-tested biodiversity currencies and accounting models, and selecting a larger, more varied portfolio of offset sites and activities. For example, combining restoration- or pest-management-based offset activities with averted loss offsets can help limit the risk of offset failure. An example would be placing a covenant over an area of forest and including restoration plantings to increase its size as well as managing pests to improve condition and successful establishment of seedlings and existing vegetation. Where they can be found, averted-loss offsets that reduce or halt ongoing or expected threats to biodiversity may provide more assured and immediate benefits than restoration-based offsets. This is because the uncertainty of success for restoration plantings is high due to a range of issues, including maintenance problems and unexpected ecological trajectories. This is especially true for highly complex, species-rich ecosystems such as old growth forest, or other slowly regenerating systems where there is little, if any, evidence that full habitat restoration is possible within meaningful time scales (Gardner et al. 2007; Maron et al. 2012).

An alternative method for addressing uncertainty is the use of the conservation planning tool, RobOff (Pouzols et al. 2012). RobOff is a framework and software for conservation planning, including the design of biodiversity offsets. Its strength lies in its ability to explicitly account for both uncertainty and time-lags between biodiversity loss and the predicted offset gains. It compares a range of possible scenarios to determine the optimal allocation of resources to ensure that offsetting gains are sufficient to balance development losses. More detail on RobOff can be found in [Currencies and accounting systems](#).