

Biodiversity Offsets in New Zealand addressing the risks and maximising the benefits

Biodiversity offsets are proliferating globally, and are commonly offered or required in a development context to address residual impacts on biodiversity. Regulatory requirements for mitigating or offsetting ecological harm are now commonplace, with more than 60 countries having introduced relevant policies (ten Kate and Crowe, 2014; Madsen, Carroll and Moore Brands, 2010). Biodiversity offsets are commonly framed in policy as opportunities to reconcile the competing interests of economic development and environmental protection, and are also viewed as a crucial means of internalising environmental costs and achieving conservation goals. On the other hand, a mismatch in certainty between the guaranteed losses from development activity in exchange for uncertain gains for the public interest

in nature creates significant risk, exacerbated by often poor compliance, poor ecological outcomes and often superficial analysis of exchanges (Pilgrim et al., 2013). Of concern is their preponderance as a tool in a context of limited policy and weak evaluation. To safeguard biodiversity, New Zealand must manage their risks and maximise their benefits, and this article considers how that might be achieved.

Biodiversity offsets are one step in the mitigation hierarchy, which comprises the steps 'avoid', 'remedy' and 'mitigate', followed by 'offset' and 'compensation', and requires each lower stage to be completed as far as feasible before the next stage is attempted, thereby creating a hierarchy of preference (PricewaterhouseCoopers, 2010). Although the terminology varies around the world, biodiversity offsets can generally be defined as:

measurable conservation outcomes resulting from actions designed to compensate for significant residual

adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people's use and cultural values associated with biodiversity. (Business and Biodiversity Offsets Programme, 2012)

New Zealand has taken up the concept of biodiversity offsets with some enthusiasm, enthusiasm which almost entirely preceded a policy context for such

to access arrangements, generally for mining activities.

The Department of Conservation contends that under the Conservation Act 1987 offsets are not permissible to address residual impacts of activities undertaken on conservation land (New Zealand Government, 2014). However, evasion of a hard line 'no' to activities with significant impacts is possible via a land swap being arranged. A land swap is where an existing area of conservation land with stewardship land status is handed to a private entity in exchange for an addition of private land to the conservation estate. The statutory test for such exchanges is that the exchange must enhance the conservation value of land

actions undertaken outside the direct impact footprint. Compensation is any positive offering from a development proponent that does not meet the other two definitions (*Royal Forest and Bird Protection Society v Buller District Council* at [72]-[76]). While the article primarily focuses on biodiversity offsets, it is worth noting that often these activities are combined as 'packages', so may not be cleanly distinguished in practice. The most common policy setting for biodiversity offsets is regional policy and planning. Second-generation planning instruments under the RMA commonly identify biodiversity offsets as a tool to address residual impacts of development.

Losses and gains that are not equivalent across space lead to a net reduction in habitat availability, cause habitat fragmentation and disrupt ecological processes.

decisions. There is a growing body of case law, numerous subnational instruments, and the government's recently-released, non-statutory *Guidance on Good Practice Biodiversity Offsetting*, yet none truly mandate the practice. Biodiversity offsets are contemplated in different ways within the Resource Management Act 1991 (RMA) regime (although not explicitly within the act itself) and the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 (EEZ Act). They also have some relevance under the Conservation Act 1987 and the Crown Minerals Act 1991. Biodiversity offsets are negotiated separately under different legislation in the absence of an integrated consenting mechanism.

The EEZ Act is relatively new and does not contain specific guidance on biodiversity offsetting. Signals from consenting processes to date indicate that RMA jurisprudence is likely to provide substantial guidance in decision-making (for example, in the case of *Trans-Tasman Resources Ltd*). Under the Crown Minerals Act 1991, biodiversity offsets have been contemplated with respect

managed by the department and achieve the purpose of the Conservation Act. Such exchanges have sometimes attracted criticism (for example, the Crystal Valley swap to enable a ski field extension) (Parliamentary Commissioner for the Environment, 2013), and the exchange of part of the Ruahine Range to enable the Ruataniwha Dam is presently facing judicial review. There are no clear policies for addressing the complex exchange of values that must be considered for anything more than a very simple arrangement, which probably reflects the exchange provision's genesis as essentially a boundary adjustment provision.

This article primarily focuses on the use of biodiversity offsets under the RMA, via regional policy statements, regional plans and district plans. After some years of ambiguity, the Environment Court distinguished mitigation, offsets and compensation from one another under the act. 'Mitigation' is any action that directly addresses environmental damage within the impact footprints; offsets are explicitly calculated positive

Risks of biodiversity offsets

The risks of trading off biodiversity values are manifold and much discussed in the scientific, legal and planning literature (Business and Biodiversity Offsets Programme, 2010; PricewaterhouseCoopers, 2010; Maron, Gordon et al., 2012; Linterman, 2014). Here we present a digest of the risks for the sake of brevity. Risks fall into three key categories: (1) that offsetting will be used in cases where avoidance is most appropriate or necessary to safeguard biodiversity; (2) that the exchange will not be at least equivalent, which will both cause and obscure losses; and (3) that the positive actions will fail, through either non-compliance (the proponent does not carry out required tasks) or a lack of success with the method used (for example, plants will die or another restoration technique won't work).

A primary concern about biodiversity offsets is that they may be used when they are inappropriate. Offsets applied to irreplaceable biodiversity values will result in certain loss. Recognising offset limitations is crucial, and often where policy-based gateway tests do not perform well. Policy must direct when and where offsets may be considered and take full account of the implications of both providing for them and vetoing them.

The second key risk is that the values lost to development compared with the values gained in the offset will not be at least equivalent. Losses can occur over a number of dimensions, such as space,

type and time. Losses and gains that are not equivalent across space lead to a net reduction in habitat availability, cause habitat fragmentation and disrupt ecological processes. Offsets that create or restore one type of biodiversity where a different type is destroyed will always result in net loss of the original values, irrespective of the magnitude or importance of the gain that may be promised. And finally, a lack of equivalency in time tends to result from losses being upfront and certain (i.e. the development proceeds) and gains from long-term endeavours being both uncertain and distant (Salzman and Ruhl, 2002).

Nature does not invite easy accounting. Implicit in the concept of offsetting is a level of assumed fungibility that nature simply does not have. Yet through a sufficiently low-resolution lens, a workable level of fungibility may be identified. When combined with the need to simplify complex exchanges to a point where they can be understood by decision-makers, the likelihood of inappropriate application of this tool increases. For example, a policy framework that enables 'like for like' exchanges within a broad-scale environment type such as 'forest', without accounting for the differences between different forest ecosystems, will obscure the loss of many important values.

The third key risk is that the promised gains will not materialise. A lack of success can be due to a failure of method (the offset is not actually feasible or failed unexpectedly) or a failure to undertake required actions, or both. Uncertainty generated from a lack of understanding of biodiversity can be significant, and there is often significant pressure to approve conservation projects of indeterminate value or feasibility. This risk is exacerbated by the low monitoring and enforcement effort applied to following up such mechanisms (Brown, Clarkson et al., 2013). Uncertain governance arrangements also means that the risk offset mechanisms pose is exacerbated. Concern about the administration of the concept tends to match concerns about its technical aspects (Burgin, 2008; Walker et al., 2009)

Benefits to biodiversity

Notwithstanding the risks, there are potential benefits of biodiversity offsets.

Lessening the impact of development through requiring adherence to the mitigation hierarchy and mandating internalisation of common externalities (biodiversity loss) has been hailed as a major contribution of biodiversity offsets (Ecosystem Markets Task Force, 2013). As an extension of the ability to leverage conservation activity, the potential for mitigation and offset requirements to marshal resources to achieve wider conservation goals has not gone unnoticed (Gillespie, 2012). Biodiversity offsets are also recognised as tools to channel resources into landscape-scale conservation which complements the efforts of agencies to stem the tide of biodiversity loss. To examine

How are risks to nature managed in New Zealand?

This section assesses how New Zealand manages the risks identified and whether those strategies are likely to be sufficient. As outlined above, the three key categories of risks are: failing to observe avoidance where appropriate; lack of equivalency of exchange; and non-completion of the requirement through non-compliance or failure.

Reducing emphasis on avoidance

To manage the risk of inappropriate implementation of offsets, the mitigation hierarchy provides, as outlined earlier, a series of steps in preferential order, from

The mitigation hierarchy is present in much policy at regional levels in New Zealand, but the requirement of demonstrating that options at one stage have been exhausted before moving to the next stage is loose and ambiguous.

these proposals in a New Zealand context we first consider the denuded state of our natural heritage, stemming in part from a past failure to mitigate environmental harm.

Seven hundred years of human occupation have irreversibly modified New Zealand's landscapes, freshwater bodies and the surrounding marine environment. The uncontrolled clearance of more than two-thirds of our forests and drainage of 90% of our wetlands, relentless and widespread drainage and pollution of lowland rivers and estuaries, and the introduction of mammalian predators have erased, drained, fragmented and thus imperilled our vulnerable and unique biota (Brown, Stephens et al., 2015). The 'restoration debt' is significant and creates a context of urgency and, sometimes, desperation, as conservation funding is generally static at best. Given the parlous state of our biodiversity, tools which promise privately-funded gains are enormously attractive, and logically so.

avoidance (don't break things unless you have to) through to trading biodiversity to address 'residual' losses. Ensuring the steps are followed generally relies on regulatory instruments requiring that the mitigation hierarchy is clearly demonstrated to have been observed at each stage, before offsets are considered for approval. The mitigation hierarchy is present in much policy at regional levels in New Zealand, but the requirement of demonstrating that options at one stage have been exhausted before moving to the next stage is loose and ambiguous. In some present planning documents, recognising 'limits to offsetting' translates to restricting the use of biodiversity offsets to address particular effects, rather than the more logical application of avoiding the effect in the first place. For example, in the Canterbury regional plan, effects on significant biodiversity cannot be offset, but the plan does not go so far as to limit the effects themselves. Alternative strategies then become mitigation within the footprint, compensation, or no

reparation for the impacts at all, in the event that the project proceeds.

Ensuring equivalence

The second risk noted is that genuine equivalence will not be achieved. A non-equivalent exchange is when nature will be lost because the development project is allowed and an insufficient corresponding gain is required or delivered. To manage this risk, policies guiding implementation of offsets often include 'exchange restrictions'. Exchange restrictions can be considered to be any mechanism that controls the requirements of biodiversity gains relative to the expected losses from

thin on the ground and introduce further risks (Overton and Stephens, 2015).

Emerging policy under the RMA tends to state 'like for like' as a preference and provide for 'trading up', whereby an area of lower conservation value can be sacrificed for a more significant area in some instances. For example, the second-generation policy statement of the Waikato Regional Council provides for biodiversity offsets and includes principles to guide exchanges that include a preference for 'like for like'. The Waikato regional policy statement confines its direction on exchange restrictions to biodiversity offsets only, excluding all

gain is more difficult. Two key risks are: (1) that offsets will not be implemented, and (2) that if they are implemented, in part or in full, they will fail ecologically to achieve their stated goals.

The first risk can be managed with robust follow-through and legal requirements that offsets be implemented, and if they are not, proceeding with enforcement. In the words of Gibbons and Lindenmayer (2008), 'offsets are ultimately dependent on adequate compliance'. Therefore, if the resource management context cannot deliver reliable gains, then a further 'layer' of risk is introduced and resources expended at the front end of the process are lost. The second risk is managed through ensuring that offsets are feasible, sensible and affordable at the outset, or ensuring that the public interest is protected in the case of failure (such as by including triggers and thresholds and providing for iterative decision-making to review requirements).

Both matters in New Zealand can be addressed by robust administration of resource consenting, including having clear and enforceable conditions of consent. Compliance rates under the RMA are underwhelming (64.8% compliant overall), and poorest (49%) for requirements with the greatest ecological implications (Brown, Carkson et al., 2013). The compliance rates under the Conservation Act 1987 are very similar, despite the Department of Conservation yielding the Crown property rights to users of the estate they manage (Heijs, 2015). Neither of these data sets provide confidence that follow-through is currently sufficient in New Zealand.

Maximising the benefits in New Zealand

Potential ecological benefits of biodiversity offsets fall into two categories: (1) the potential for offsets to contribute to lessening the overall project-level and landscape-level impacts of development; and (2) the potential to leverage strategically important conservation gains from the exercise of these policy tools. In either case, the benefits of policy tools that formalise offsetting depend significantly on the inclusion of robust assurances of implementation.

... if New Zealand is to attain true prosperity, we will need to ensure that our economic aspirations are compatible with maintaining, restoring and enhancing the environment.

development. Exchange restrictions may limit risk by ensuring that gains are equivalent across time, space and/or type (Salzman and Ruhl, 2002; Walker et al., 2009). They are intended to minimise risks to biodiversity of the exchange of loss (from impact) and gain (from offset).

An example of a common exchange restriction is a requirement or preference for 'like for like' trades (biodiversity to be exchanged only with similar biodiversity), because of a greater chance of comparability in practice. Principled as this may seem, the complexity of biodiversity and its non-fungibility are sticking points (Pilgrim et al., 2013; Gardner et al., 2013). Even a habitat of the same type in macro terms which is managed as an offset will have functional differences and may be only superficially 'similar'. Thus, trading off one of these sites for another will lead to any values in the original site that are not in the compensation site being lost (Walker et al., 2009). The more unlike the biodiversity values of a development site are to the corresponding values of the offset site, the higher the risk of the exchange obscuring losses; and tools for accurate comparison are

other forms of trade-off. Other forms of reparation are routinely agreed upon outside of the bounds of this policy and in the absence of clear limits. This is in contrast to the Wellington Proposed Regional Policy Statement and the Proposed Auckland Unitary Plan, both of which require that mitigation, offsets and compensation all demonstrate their adherence to the principles (excluding the 'no net loss' goal, which is restricted to offsets only) and use this as a basis for assessing their acceptability for the purposes of implementing part 2 of the act. It is worth noting, however, that discretion is reserved in all cases and proposals can (and likely do) deviate from the principles to varying degrees. Assessing the equivalency of exchanges remains a process of grand discretion under the RMA.

Ensuring success

Poor compliance with requirements (that is, the offset does not eventuate) is a notable and common criticism of biodiversity offsets. While negative impacts from development occur with surety, providing a commensurate guarantee for the offset

Reducing environmental externalities is recognised as fundamental to sustainable development. Biodiversity offsets provide a means of requiring compensatory conservation projects for adverse effects, in contrast to historical approaches that have rarely demanded the same. This has proven challenging to many resource users, accustomed to obtaining access to natural resources at little or no cost. However, if New Zealand is to attain true prosperity, we will need to ensure that our economic aspirations are compatible with maintaining, restoring and enhancing the environment. The use of biodiversity offset approaches represents an early attempt to internalise the environmental costs of development activity. In the future, rather more sophisticated mechanisms, such as new economic institutions which penalise environmental degradation and incentivise conservation, may be introduced.

Because of predictable and perpetual underfunding, conservation is a triage exercise which relies on astute prioritisation to maximise the difference made by interventions (Margules and Pressey, 2000). In order to appropriately direct conservation funding from any source (including for biodiversity offsets), an understanding of the state of biodiversity and priorities for protection and management is needed. A lack of sufficient biological data to support this kind of decision-making, and indeed effective resource management in general, means that conservation actions are often not targeted to where they will make the most difference. New Zealand's capacity for and commitment to genuine prioritisation of conservation needs remain small and require attention if offsets are to be optimally directed (Brown, Stephens et al., 2015). As a result, offset requirements are usually scattered, disconnected and ultimately non-strategic, and, if the funds are used by agencies, may not even be additional to the status quo.

Conservation agencies are often criticised for financing core work tasks from mitigation funding, rendering them non-additional (Pilgrim and Bennum, 2014; Maron, Hobbs et al., 2015). For example, Maron, Hobbs et al. (2015) levelled criticism at government conservation efforts which drew on offset

funding to meet international goals such as the Aichi targets. The authors rightfully highlighted that the use of 'new' money to achieve 'old' goals by public entities led to a net loss at a landscape scale. Increasing concerns are evident about the application of offset funding to protected areas – such as proposed or approved offsets that entail pest control in already protected areas, and formal protection of marginal areas inappropriate for development anyway – and the use by public agencies of funds to bolster core tasks in general. It is fair to say, however, that if we accept that (from a conservationist point of view) conservation will always be

applied and subject to much bureaucratic slippage (Clare and Krogman, 2013; Linterman, 2014). The weak regulatory underpinning of biodiversity offsetting in New Zealand exacerbates the risks offsets pose to nature and does little to enable the potential benefits. Subnational instruments and non-statutory guidance are insufficient and leave much discretion in the hands of local interests, which is commonly regarded as reducing the likelihood of a good environmental outcome (Walker et al., 2008). It would seem that a coherent policy context at a national level is a minimum requirement to guard against their inappropriate

... to address the risks that biodiversity offsetting poses and leverage maximum gains, much work is still required.

underfunded and agencies are unlikely to have enough money to do what they need, then it would seem that brokering a logical middle ground to provide for 'temporary additionality' may be necessary to safeguard what is already protected (Pilgrim and Bennum, 2014).

What would it take?

Notwithstanding the lumpy road thus far, and taking into account the improvements that are evident, is it premature to reject offsets as being too risky and try to erase them from policy and investigate alternative methods? It would seem so, and it is politically unlikely to occur anyway. But to address the risks that biodiversity offsetting poses and leverage maximum gains, much work is still required. The necessary improvements fall into three categories: tighter controls on when, where and how these mechanisms are used; targeting their implementation to maximise conservation outcomes; and ensuring success through bolstering follow-up. This section outlines these areas of improvement and sets out what it would take to implement them.

Policy for offsets

In the absence of a clear mandate, goals and exchange restrictions are generally loosely

use locally. One option is introducing a national policy statement under the RMA which addresses biodiversity offsets (Christensen and Baker-Galloway, 2013; Brown, Clarkson et al., 2013; Brown, Stephens et al., 2015).

Policy development and bolstering scientific information and resources could be drawn together to promulgate clear national policy and a logical information basis for decision-making relating to offsets. It is important to note, however, that decisions and outcomes are likely to be non-uniform even with explicit and identical policy underpinning them (Clare and Krogman, 2013). To address the risks outlined, prescriptive policy should introduce: clear triggers for when avoidance of impact is required (limits to impact and observance of the mitigation hierarchy); consistent definitions; and clearly defined expectations of outcomes (such as no net loss, net gain).

Targeting implementation: making them count

The paucity of conservation funding in New Zealand is often a key driver for approval of projects that entail offsets, because the background decline in ecosystems is often significant (Norton and Warburton, 2015). Most biodiversity

offsets in New Zealand are ecological restoration projects to correct historical or ongoing harm and the opportunities are numerous. Ensuring that, where biodiversity offsets are allowed, they make a meaningful contribution to conservation is an area where much improvement is needed, and indeed possible, in New Zealand. To enable this demands greater focus on improving biodiversity information and implementing robust systematic conservation planning to highlight the most urgent conservation tasks. In compelling a stronger focus on improving biological information and enhancing conservation planning, offsets may serve to help align the interests of

and identify other conservation priorities that offsets could target.

Planning for success: follow-up and liability

Ensuring that gains, once agreed, are achieved is well supported in New Zealand law. Providing an offset requirement is enshrined within enforceable conditions, both the Conservation Act 1987 and the RMA having comprehensive enforcement provisions. Fines and prison terms are provided for in the legislation, and regulatory monitoring of permits and consents are cost-recoverable activities. Observed poor compliance monitoring would therefore appear to be rooted not in the inadequacy of the

deliver the conservation gains required. This is of utmost relevance in the marine environment. Eyed as the final frontier for economic development, the fragile marine environment will increasingly become the subject of offset requirements. It is highly unlikely that proponents of development there would be capable of efficient and effective marine conservation and alternative delivery modes will be necessary (Bos, Pressey and Stoeckl, 2014).

Conclusions

The application of biodiversity offsets in New Zealand is at present generally sub-optimal and thus likely to be contributing to the degradation of natural capital. However, without provision for them, reparation will be largely absent for approved activities (unless voluntary impact reduction occurs). Improved outcomes could be achieved by:

- improving biological information that informs decision-making on the need for avoidance through enhanced planning and impact assessment;
- investing in sound prioritisation strategies to inform decisions on appropriate destinations for trade-off investments;
- developing a clear national policy to provide a consistent framework for decision-making on biodiversity offsets of all forms, including exchange restrictions;
- bolstering attention to and investment in ensuring that gains are realised, using the suite of tools available and policy innovations that enhance agency accountability and, in turn, the quality and reliability of compliance monitoring;
- investigating alternative modes of delivery of conservation gains that are more secure and strategic than present, ad hoc projects.

Biodiversity offsets, whatever their risks, are likely to be here to stay for at least the near future. Their imperfections and risks are broad and significant, but their use must be considered, against a backdrop of continued (and potentially increasing) development pressures on nature. Offsets can be viewed as an early attempt to internalise the ecological cost of economic development projects that

The application of biodiversity offsets in New Zealand is at present generally sub-optimal and thus likely to be contributing to the degradation of natural capital.

developers and public interest advocates. Providing resources and support to conservation and resource management agencies to improve knowledge of their biological resources would be an important first step, and potentially reduce the baseline information that applicants must acquire and provide.

However, if biodiversity offsets are going to realise their potential benefits, far more strategic coordination is likely required. A more robust strategic context for offsets could potentially be achieved through more visible and transparent conservation planning at national, regional and local levels. Systematic conservation planning promises much, and the Department of Conservation's implementation of the fledgling Natural Heritage Management System has helped to kickstart New Zealand's foray into evidence-based conservation. Incorporating offsets into landscape-scale conservation planning and integrating it with other similar activities is likely to yield much-improved outcomes over present ad hoc implementation. A potential solution would be regional biodiversity plans which both set out existing conservation efforts

law, but largely in the implementation gap. There are many tools available that can be used to support improved compliance. These include ensuring that enforceable consent conditions are in place, registering covenants, increased agency accountability, and more robust enforcement. Agency capture, however, can significantly constrain monitoring effort (Brown, Stephens et al., 2015). Nationalising compliance and monitoring functions, such as by vesting them in the Environmental Protection Authority, could provide a fix by altering lines of reporting and reducing the potential for political interference.

Part of the compliance issue may well also be to do with how gains are delivered. Developers are often uninterested or ill-equipped proponents of conservation, and agencies are often inadequate coordinators of requirements. A third-party model, as is common overseas (in most states of the United States, permittee-responsible requirements are relatively rare), could well assist. This may involve providing for dedicated entities to undertake offsets on behalf of the proponent of development, who may be unwilling or unable to

result in harm to the environment. In the future, novel economic institutions may well supersede biodiversity offsets in full or in part. In the meantime, there are substantial policy options to improve the way risks are managed, ensure impacts on vulnerable and irreplaceable biodiversity are avoided, and deliver more effective and rewarding exchanges when offsets are occur. The time is now to take these steps and improve the outcomes New Zealand's offsets are capable of delivering. In the absence of these fixes, biodiversity offsets are likely to further lock in decline of our natural heritage.

References

- Bos, M., R.L. Pressey and N. Stoeckl (2014) 'Effective marine offsets for the Great Barrier Reef world heritage area', *Environmental Science and Policy*, 42, pp.1-15
- Brown M.A., B.D. Clarkson, J.B. Barton and C. Joshi (2013) 'Ecological compensation: an evaluation of regulatory compliance in New Zealand', *Impact Assessment and Project Appraisal*, 31, pp.34-44
- Brown, M.A., R.T.T. Stephens, R. Peart and B. Fedder (2015) *Vanishing Nature: facing New Zealand's biodiversity crisis*, Auckland: Environmental Defence Society
- Burgin, S. (2008) 'BioBanking: an environmental scientist's view of the role of biodiversity banking offsets in conservation', *Biodiversity and Conservation*, 17 (4), pp.807-16
- Business and Biodiversity Offsets Programme (2010) *The Risks of Biodiversity Offsets*, Washington, DC: Business and Biodiversity Offsets Programme
- Business and Biodiversity Offsets Programme (2012) *Glossary*, 2nd edn, Washington, DC: Business and Biodiversity Offsets Programme
- Ceballos, G., P.R. Erlich, A.D. Barnosky, A. Garcia, R.M. Pringle and T.M. Palmer (2015) 'Accelerated modern human-induced species losses: entering the sixth mass extinction', *Science Advances*, 1 (5), e1400253
- Christensen, M.C. and M. Baker-Galloway (2013) 'Biodiversity offsets: the latest on the law', Anderson Lloyd, <http://www.andersonlloyd.co.nz/wp-content/uploads/2013/10/Biodiversity-offsets-the-latest-on-the-law.pdf>
- Clare, S. and N. Krogman (2013) 'Bureaucratic slippage and environmental offset policies: the case of wetland management in Alberta', *Society and Natural Resources*, 26, pp.672-87
- Ecosystem Markets Task Force (2013) *Realising Nature's Value: the final report of the Ecosystem Markets Task Force*, Forest Trends, http://www.forest-trends.org/publication_details.php?publicationID=3963
- Ekstrom, J. and J. Rabenantoandro (2012) 'Net positive impact forecasting: the case of Rio Tinto Madagascar', presentation, http://bbop.forest-trends.org/documents/files/forecasting_npi_at_qmm.pdf, accessed 19 October 2015
- Gardner, T.A. et al. (2013) 'Biodiversity offsets and the challenges of achieving no net loss', *Conservation Biology*, 27 (6), pp.1254-64, doi: 10.1111/cobi.12118
- Gibbons, P. and D.B. Lindenmayer (2008) 'Offsets for land-clearing: no net loss or the tail wagging the dog?', *Ecological Management and Restoration*, 8 (1): pp.26-31
- Gillespie, A. (2012) 'A missing piece of the conservation puzzle: biodiversity offsets', report prepared for the Department of Conservation
- Gordon, A., J. Bull, C. Wilcox and M. Maron (2015) 'Forum: Perverse incentives risk undermining biodiversity offset policies', *Journal of Applied Ecology*, 52 (2), pp.532-7
- Heijs, L. (2015) Master's thesis (draft)
- Linterman, A. (2014) 'Apples for oranges? Biodiversity offsetting in New Zealand', *Canterbury Law Review*, 19, pp.130-63
- Madsen, B., N. Carroll and K. Moore Brands (2010) *State of Biodiversity Markets Report: offset and compensation programs worldwide*, Forest Trends, <http://www.ecosystemmarketplace.com/documents/acrobat/sbdmr.pdf>
- Margules, C.R. and R.L. Pressey (2000) 'Systematic conservation planning', *Nature*, 405 (6783), pp.243-53
- Maron, M., A. Gordon, B.G. Mackey, H.P. Possingham, and J.E.M. Watson (2015) 'Conservation: stop misuse of biodiversity offsets', *Nature*, 523 (7561), pp.401-3
- Maron M., R. Hobbs, A. Moilanen, J. Matthews, K. Christie, T. Gardner, D. Keith, D. Lindenmayer and C. McApline (2012) 'Faustian bargains? Restoration realities in the context of biodiversity offset policies', *Biological Conservation*, 155, pp.141-8
- New Zealand Government (2014) *Guidance on Good Practice Biodiversity Offsetting*, <http://www.doc.govt.nz/Documents/our-work/biodiversity-offsets/the-guidance.pdf>
- Norton, D.A. and B. Warburton (2015) 'The potential for biodiversity offsetting to fund effective invasive species control', *Conservation Biology*, 29, pp.5-11
- Overton, J.M. and R.T.T. Stephens (2015) *Out-of-kind Biodiversity Offsets and their Application to New Zealand*, report prepared for the Department of Conservation, Landcare Research
- Parliamentary Commissioner for the Environment (2013) *Investigating the Future of Conservation: the case of stewardship land*, Wellington: Parliamentary Commissioner for the Environment
- Pilgrim J.D., S. Brownlie, J. Ekstrom, T. Gardner, A. von Hase, K. ten Kate, C. Savy, T. Stephens, H. Temple, J. Treweek, G. Ussher and G. Ward (2013) 'A process for assessing the offsetability of biodiversity impacts', *Conservation Letters*, 6 (5), pp.376-84
- Pilgrim, J.D. and L. Bennum (2014) 'Will biodiversity offsets save or sink protected areas?', *Conservation Letters*, 7 (5), pp.423-4
- PricewaterhouseCoopers (2010) *Biodiversity Offsets and the Mitigation Hierarchy: a review of current application in the banking sector*, Business and Biodiversity Offsets Programme and UNEDP Finance Initiative, http://www.unepfi.org/fileadmin/documents/biodiversity_offsets.pdf
- Salzman, J. and J.B. Ruhl (2002) 'Currencies and the commodification of environmental law', *Stanford Law Review*, 53, pp.607-94
- ten Kate, K. and M.L.A. Crowe (2014) *Biodiversity Offsets: policy options for governments. An input paper for the IUCN Technical Study Group on Biodiversity Offsets*, Gland: IUCN
- ten Kate, K., J. Bishop and R. Bayon (2004) *Biodiversity Offsets: views, experience, and the business case*, London: IUCN
- Walker, S., A.L. Brower, B.D. Clarkson, W.G. Lee, S.C. Myers, W.B. Shaw and R.T.T. Stephens (2008) 'Halting indigenous biodiversity decline: ambiguity, equity, and outcomes in RMA assessment of significance', *New Zealand Journal of Ecology*, 32 (2), pp.1-13
- Walker, S., A.L. Brower, R.T.T. Stephens and W.G. Lee (2009) 'Why bartering biodiversity fails', *Conservation Letters*, 2 (4), pp.149-57