BANKING ON BIODIVERSITY

The feasibility of biodiversity
banking in New Zealand

Marie A Brown

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Kea, *Bernard Spragg*

CHAPTER ONE: EXECUTIVE SUMMARY

Biodiversity banking ('biobanking') is a systematised means of delivering conservation gains required to address the ecological impact of a development. Biobanking may have the potential to resolve some key issues facing ecological exchanges in New Zealand, primarily by reducing transaction costs and improving the security of delivery of required gains. Examples around the world demonstrate, however, that the efficacy of a biobanking regime is intrinsically linked to the robustness of the underlying regime controlling those exchanges.

The purpose of this project is to investigate the feasibility of biobanking in a New Zealand context, having regard to:

- Our current law and policy on biodiversity management, particularly biodiversity offsetting (referred to generally as 'ecological exchanges')
- The international experience of biobanking
- The potential risks and benefits of biobanking to New Zealand, including the risks to biodiversity

Finally, the research considers whether a pilot biobanking scheme should be considered for the New Zealand context and, if so, on what terms. We conclude that there is merit in the concept. However, a pilot study would likely be more successful if prior work was done to improve the regulatory underpinnings of ecological exchanges. In addition, a range of research and liaison work needs to be undertaken to better understand how biobanking might play out in a New Zealand setting, and how to maximise its benefits while avoiding or limiting its potential negative impacts.

Key areas of further enquiry include:

- **The statutory context** for ecological exchanges in New Zealand – where are we at and where do we need to be?
- Social research into **stakeholder perspectives** on key issues in ecological exchanges and the prospect of biobanking
- **Iwi/hapū rights and interests** and their interplay with ecological exchanges and the prospect of biobanking
- **Policy development** issues and options
- **Modelling scenarios** to unpack real world barriers and opportunities, using a combination of past and presently proposed exchanges

Biobanking may serve as a more robust delivery mechanism for biodiversity impact management in New Zealand, providing a solid foundation for it is built. If it is applied more generally, than just to impact management, it may incentivise investment in biodiversity maintenance. Such a system would need to be expressly tailored to the New Zealand context, inclusive of recognising the unique and fragile nature of our biota and the unique relationship between Māori and the natural environment.

CHAPTER TWO: INTRODUCTION

Biodiversity protection ambitions often clash with development aspirations, resulting in loss of habitat, degradation of connectivity and ecological function, and direct harm to species. While in the past such collateral damage of development processes was accepted (and even directly subsidised), in modern times this is becoming less socially palatable. To enable development and protection aspirations to be met, the concept of compensating for ecological harm has been evolving since the late 1960s.

Managing the harm to biodiversity caused through development in this way involves offsetting the loss of biodiversity at one site with the restoration, enhancement or outright replacement (through habitat creation) at another. This may occur in numerous ways, from ad hoc to system-based. We use the term **ecological exchanges** within a wider context of **impact management** to capture all the various strategies to exchange biodiversity for this purpose. This report focuses on the latter: systems that administer biodiversity exchanges at scale: biobanking.

Environmental regulation exists primarily to correct market failure: where public goods are consumed beyond reasonable limits by private interests, with the costs being socialised (as economic systems fail to take them fully into account). Market mechanisms can attempt to address this market failure, and in the case of biobanking, they do this by creating an entirely new market.[1] Typically a 'biobank' (also called a conservation bank or habitat bank) consists of a system or scheme with a range of operating rules for the trading of biodiversity values and delivery of impact management requirements.

Biobanking is accelerating in its use as a policy instrument globally, in both voluntary and regulatory contexts. To date it has not made a formal entrance into New Zealand but there is interest in its potential to effect better outcomes at the interface of policy and development. Biobanking, however, carries significant risks and has a history of failure or poor outcomes for biodiversity depending on design and implementation. Any proposal to entertain it as a tool should

be carefully researched and evaluated. This report initiates that conversation.

2.1   Overview of the project's aims

The purpose of this project is to investigate the feasibility of biobanking in a New Zealand context, having regard to:

- Our current law and policy on biodiversity management, particularly biodiversity offsetting (referred to generally as 'ecological exchanges') and how biobanking may interact

- The international experience of biobanking

- The potential risks and benefits of biobanking to New Zealand, including the risks to biodiversity

Finally, the report considers whether a pilot biobanking scheme should be considered for the New Zealand context and, if so, on what terms.

2.2   New Zealand's unique biodiversity

New Zealand is a biodiversity hotspot with a world renowned biota: famous for both the level of endemism (proportion of species found here and nowhere else) and the level of threat that biota faces. Much remaining habitat is very proximal to human habitation, particularly in the lowland areas. As a result, development activities very often affect biodiversity that is rare, endangered or becoming so. Development impacts also affect biodiversity that is presently common, putting it on a trajectory towards becoming rare.

On the vast protected estate on land (managed by the Department of Conservation), key threats are the impacts of invasive species (plant and animal), climate change, mining and direct harm through poaching and harvest. On private land, economic drivers render conservation the exception and degradation the rule. Limited incentives for private land conservation, coupled with often poorly developed and implemented regulatory protection regimes, mean intensive land uses with high environmental impacts are logical fiscal

undertakings. Widespread loss of terrestrial, freshwater and marine species and ecosystems is the result.[2]

Key outcomes of these drivers are evident in our denuded dryland areas such as the Mackenzie Basin and the degraded state of our freshwater ecosystems. Marine areas are the ultimate receiving environment, and bear the cost of poor land use and freshwater management, in addition to macro scale issues such as ocean acidification.[3] More stringent and effective management of the biodiversity impacts of development is one way to address these negative drivers on our environment.

2.3 Compensating for ecological harm as a concept

Compensating for ecological harm appears – on the face of it – relatively straightforward. An area of habitat is removed to make way for a new piece of infrastructure or other activity, and nature is bolstered in some alternate way to at least 'break even' or achieve a balancing of losses and gains. The concept enables flexibility in managing development patterns and demands commensurate gains for losses that affect society as a whole.

Around the world, the use of impact management tools has increased significantly in recent decades due to a range of drivers, including:

- Increased stringency of environmental regulation and explicit requirements for compensatory actions for significant environmental damage

- Investment institutions requiring impact management as a condition to access credit

- Increased emphasis on corporate social responsibility, particularly in jurisdictions devoid of the environmental rule of law, giving rise to voluntary frameworks such as the Business and Biodiversity Offsets Programme, administered by Forest Trends

Biodiversity is non-fungible so cannot be easily traded or exchanged across time, space or type.[4] However, this recognition has not seen the practice cease but merely tighten over time, in an attempt to better recognise the limits of what can be exchanged. The rise of impact management has contributed to a growing need to deliver the promised gains in a consistent and quality assured manner, at a scale not required in the past. Biobanking has emerged as one such delivery mechanism.

Biobanking's key driver is exchanges of biodiversity to address biodiversity loss from development projects, although there can be other reasons it occurs (e.g. impact investment). Thus, it is impossible to discuss biobanking without frequent and detailed reference to impact management tools (including biodiversity offsets). The quality of the exchanges is an essential underlying determination of the quality of the biobank scheme itself. A 'good' scheme from an operational perspective will

still have bad outcomes for nature if the underlying limits on exchanges are not fit for purpose.
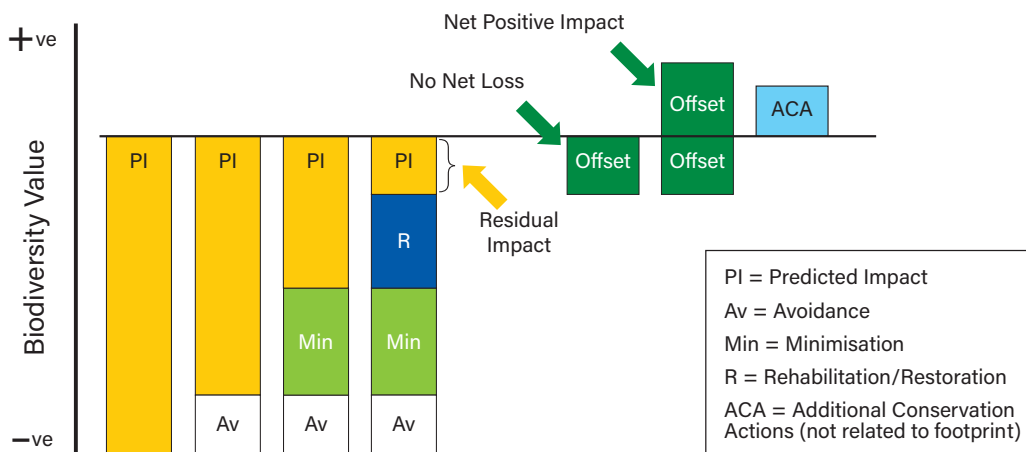
Impact management

Impact management strategies enable development to proceed where ecological gains match ecological losses on the same site or elsewhere. Such strategies can theoretically occur in all environment types: in terrestrial ecosystems, freshwater ecosystems and in the coastal and marine environments when management for gain is possible. They may occur as habitat creation projects on bare soil through to complex ecological restoration initiatives in late stage successional forest ecosystems. They may consist of planting, predator control, habitat enhancement, science research initiatives and other management approaches that make up for effects on wildlife and ecosystems.

Of all the possible interfaces, marine impact management is least understood and least often implemented, especially biodiversity offsetting and requirements for outcomes such as no net loss. The Biodiversity Consultancy posited that marine offsets were likely to become more common as sustainable development of marine areas progressed, and that there were potentially strong 'social and economic synergies' with them, such as the bolstering of fish breeding grounds by setting aside marine protected areas.[5] There are also potential further opportunities for permanent protection of marine areas with high degrees of additionality.

Of pivotal importance in impact management of any type is the concept of the **mitigation hierarchy**. The mitigation hierarchy is characterised in a number of different ways, but the underlying motive for it is to reduce impacts on the subject site as far as possible, before considering more disparate means of addressing the harm. The mitigation hierarchy includes a series of steps, starting from avoiding impacts as far as possible through to undertaking conservation activities at a distance to address the impacts on biodiversity, with diminishing preference for each stage (see Figure 1).

A combination of developing policy and jurisprudence in New Zealand has brought us increasingly in line with international conventions on the usage of these terms and implementation of the technique, although there are some important remaining differences.

1. New Zealand has no statutory definitions for any of the relevant terms at a national scale

2. Definitions do exist at a regional scale in some areas but may not be the same as other regions, nor be applied the same way in practice

3. Jurisprudence is relatively limited and often yields subtly different outcomes and is, as always, evolving

4. The lexicon is underdeveloped in New Zealand, meaning that terms explicitly defined in other jurisdictions are used informally here and are sometimes intended to mean different things

Adapted from Rio Tinto and Government of Australia[6]

Figure 1: The mitigation hierarchy

Despite the opaque context, the use of impact management strategies such as biodiversity offsets is increasing in New Zealand and becoming slowly more codified over time.

A key recent case was the granting, in the Environment Court, of consent for Bathurst Resources to mine the Denniston Plateau across a 157ha area. All parties acknowledged the extent of adverse effects to be significant, and much of the discussion related to the nature of the impact management that would be required before the mine was approved.[7] Forest & Bird then appealed the decision, noting that 'mitigation' should be seen as preferable to 'offsetting' conducted offsite. However, the Court stopped short of accepting that argument. The decision did distinguish the two practices, however, confirming earlier jurisprudence from the Board of Inquiry that heard the Transmission Gully Plan Change (in that 'mitigation' directly addresses impacts, while an 'offset' may be less similar and conducted elsewhere).[8]

2.4 Compensating within a biobanking system

Biobanking can be viewed as a means of delivering impact management outcomes within a system that operates above a site-specific scale. On one side, the scheme may attract offers of conservation values that can be used as part of a strategy to manage development impacts (e.g. landowners may be able to 'sell' their privately owned conservation projects to developers, and maintain and enhance them in perpetuity at the developer's cost). This could be of benefit to the proportion of landowners (whatever that is) that would be happy to leave all or part of their land in a natural state and undertake active management, providing some return could be gained from doing so.

On the other side, the scheme will ensure that promised gains are delivered by putting in place assurance mechanisms and other guarantees that give confidence to stakeholders and reduce uncertainty to an acceptable level. A scheme may

also have associated interfaces, such as providing a route for impact investment and other voluntary conservation measures. The biobank may or may not have a regulatory linkage and can be administered by a range of entities. Later in this report we will canvass some examples to demonstrate the breadth of practice.

Generally speaking, wherever compensating for ecological harm occurs (or could occur), so too could biobanking. New Zealand has no genuine national-scale experience with bio-banking, so the experience of mitigation, compensation and biodiversity offsetting both on and offsite is drawn upon for guidance. New Zealand does have good experience of the challenges facing private land conservation, in maximising the strategic value of conservation initiatives and in coordinating multiple and disparate mitigation approaches at a landscape scale. Where these challenges have been encountered, or solutions promulgated, they are canvassed here.

2.5 Limitations

This research exercise was primarily designed to scope the issues surrounding biobanking in New Zealand. A deliberate decision was made not to contact persons outside of the parties already involved, and as a result several key perspectives were missing. However, it is proposed that the second stage research project would entail a significant degree of social research, which would help to build understanding about other aspects.

Specific matters that were not canvassed in any detail include the legal prospects of addressing present gaps in instruments (i.e. securing exchanges in advance); iwi perspectives on ecological exchanges and the prospect of biobanking; and detailed policy analysis of regional and district policy instruments. The next stage should also incorporate strong engagement with New Zealand's community of ecological experts and industry.

CHAPTER THREE: HOW DOES NEW ZEALAND MANAGE BIODIVERSITY EXCHANGES?

New Zealand has an ad hoc approach to the management of biodiversity exchanges at a national scale. This is in part a result of an immature policy framework and is also due to a high level of devolution in biodiversity decision-making. There is a lack of generally accepted definitions of the key concepts behind biodiversity exchanges, and thus biobanking. The developing policy framework is likely to have significant implications for the feasibility of biobanking in the near term. This section sets out the current state of play for managing compensation for ecological harm and how it is delivered.

A matter somewhat unique to New Zealand is the interplay of indigenous landholdings and biodiversity management (including protection in development). Māori own a growing proportion of New Zealand's land area, comprising roughly half of all remaining indigenous habitat on private land (possibly more). Māori have unique land ownership structures, usually involving multiple owners that may or may not have an umbrella land management agent such as a trust board operating. This ownership model, and the more complex cultural relationships with land, will be a crucial consideration in evaluating the potential of biobanking in New Zealand. If the scheme does not work for Māori, then it is unlikely to gain broad social acceptance.

3.1 National level law and policy

There is no national policy on ecological exchanges. While a National Policy Statement (NPS) on Indigenous Biodiversity that included reference to biodiversity offsetting was proposed under the Resource Management Act 1991 (RMA) in 2011, it did not proceed. In 2010, the Department of Conservation embarked upon a research programme that was to investigate the technical aspects of biodiversity offsetting and help to establish a New Zealand approach. A multitude of reports were released within this project, primarily policy-based. The programme concluded in 2014 with the release of a guidance document on behalf of the New Zealand Government. The guidance document has yet to receive widespread uptake by industry. Another process is now under way to develop an NPS on biodiversity matters, and it is anticipated that it will address ecological exchanges in some form.

Impact management (including mitigation, compensation and biodiversity offsetting) mechanisms are used primarily under the RMA, but have some application under the Conservation Act 1987 and Crown Minerals Act 1991. Under the RMA, there is no national policy on ecological exchanges and it is not specifically enabled by the Act, although case law confirms its application under section 104. The Resource Legislation Amendment Act 2017 also makes general reference to 'offsets', which demands that greater effort be placed on provision of appropriate guidance to give the tool context.

A core principle of the RMA is that adverse effects on the environment must be avoided, remedied or mitigated. The policy that guides ecological exchanges is found at a subsidiary governance level (in district and regional plans and policy statements) and is highly variable nationally. Where no explicit policy exists, it has not constrained the use of the mechanism, but has simply meant that it occurs on a very inconsistent and non-repeatable basis.

Under the Conservation and Crown Minerals Acts, for activities conducted on conservation land the context is rather more complex. However, accepting compensatory actions in exchange for development approval regularly occurs.[9] Department of Conservation permissions staff negotiate directly with the user of conservation land for appropriate compensatory works. Occasionally such decision-making transcends jurisdictional boundaries (i.e. RMA and Conservation Act matters are relevant in a single case such as mining the Denniston Plateau).

Across the Acts, each agreement is generally unique, negotiated in a different setting according to often disparate standards and based on very different degrees of information

and expertise. The rules applied differ substantially and the pathways to implementation are rarely sufficiently secure. The regimes have a history of the objectives of the schema not being met. This demonstrates that present practices for negotiating impact mitigation of development impacts are unlikely to adequately and reliably safeguard biodiversity and likely to be quite inefficient.

3.2   Councils under the RMA

Decision-making regarding development impacts on biodiversity is primarily devolved to regional and local councils in New Zealand. At present the policy context for ecological exchanges is still patchy, but rather less patchy than it was. The majority of regional councils and some territorial local authorities make specific mention of the practice in their relevant plans. A couple have implemented early versions of biobanking at an organisational level (see Auckland Council case study). Although a regional policy context is important, it does not necessarily mean that the approach is reliably implemented in practice and present policy approaches could generally be described as 'malleable'.

The commonalities between different regional council provisions are that no net loss is often mentioned, but is never mandatory, and that the mitigation hierarchy is often present but never codified in such a way as to be obligatory to follow. This sustained ambiguity has much to do with the breadth of flexibility under the relevant legislation for agencies and the Courts to 'negotiate deals' outside of best practice provisions. Agencies typically prefer to reserve discretion on such matters, and during Schedule 1 processes resource users tend to put pressure on them to do so, eschewing codification where it puts in place strict limits (e.g. 'no go' areas where losses to begin with are simply not allowed etc.).

No council mandates a metric or currency system that must be used for ecological exchanges. In most cases, there is a series of principles that articulate key concerns about managing any exchanges. The exception to this approach is the Auckland Council, in which the Stream Ecological Valuation method is generally used in relation to inland freshwater impacts. This is not necessarily a bad thing: taking a holistic view of the situation (rather than relying on a purely numerical approach) can result in a better overall outcome that is more accepted by the community and is better for nature, although the converse can also be true.

Most jurisdictions increase their expectations of impact management where it may impact or improve areas considered 'significant' (an important statutory threshold under the RMA in particular). Policy may dictate that a biodiversity offset may not be contemplated (or alternatively must be contemplated) where the impact is on a significant ecosystem. However, such limits are rarely meaningful in practice because the more flexible compensation pathway is always left open and usually selected by developers.

3.3   Relevant findings of case law

The earliest significant discussion of ecological exchanges in New Zealand was in 2008 in an Environment Court development case (JF Investments v QLDC). Since then case law has developed rapidly. The most recent legal analysis of the law of biodiversity is by Christensen and Baker-Galloway (2013), a summary that yielded the following key observations:

- Court and other decisions to date have shown little appetite for black and white decisions on total avoidance in the case of highly significant ecosystems being impacted by development, resisting 'no-go' approaches at the outset in favour of more nuanced consideration.

- The definitions of the various aspects of the mitigation hierarchy remain somewhat murky compared with accepted frameworks such as that developed by the Business and Biodiversity Offsets Programme (BBOP), but are slowly being clarified via case law (see discussion of Denniston decision later).

- The court generally acknowledges the importance of a sequential approach to determining offsets and compensation (i.e. adhering to the mitigation hierarchy) but the progression through the hierarchy is not expressly codified.

- New Zealand is much in need of a national statutory framework for ecological exchanges to resolve the region-by-region debates presently underway in the context of planning reviews.

- The establishment of a market-based system is desirable to support the delivery of those gains by third parties in a way that is efficient and predictable.[10]

To date there is no explicit jurisprudence on biobanking, although many decisions that relate to ecological exchanges also include concerns raised by submitters, counsel and the judiciary over the reliability of delivery of promised gains once negotiated. Enhancing the security of delivery is perhaps the most obvious area in which a codified biobanking system would contribute, while the intractability of comparing different types of biodiversity, and technical challenges of creating and maintaining new biodiversity, remain unchanged.

3.4   Summary of the New Zealand context

Key issues facing the use of impact management mechanisms in New Zealand are:

- The variation in decision-making processes to determine what an acceptable exchange is are problematic, and mechanisms to improve consistency in decision-making are likely needed

- The challenges in ensuring that gains are additional to the status quo require careful analysis at a decision level, but also a robust policy framework to refer to

- The absence of a robust legal mechanism to secure arrangements in advance of development is a key present

failing, but unlikely to be insurmountable given the range of existing legal tools available

- The number of agencies involved in negotiating agreements means an overarching decision-making framework may well be needed to maintain fairness and equity for resource users

- The absence of a third party mechanism, meaning developers are responsible for delivering conservation gains, would need to be rectified potentially through legislative change

- The lack of sufficient expertise and knowledge to address complex tasks that impact management requirements may demand (e.g. restoration of poorly understood ecosystems) would require enhanced resourcing in decision-making bodies

- The lack of security of exchanges, given that empirical independent research has demonstrated that requirements often go unmet, and that this is particularly the case where they are practical ecological undertakings.[11] This demands enhanced compliance and enforcement processes for monitoring bodies

- Much of New Zealand's biodiversity is vulnerable and/or irreplaceable, which limits the opportunities to create gain, where there is loss and replacement, with a different type of biodiversity. This issue demands stringent frameworks that limit exchanges where biodiversity is particularly valued.

These concerns affect mainly the demand side of impact management, the side on which developers sit, where they need conservation gains to address proposed losses. Further work is needed to develop solutions to these key issues, and other parallel processes (e.g. NPS Biodiversity development) may well have insights and outputs to offer.

The supply side of a biobanking system also warrants attention. Approximately 70% of land in New Zealand is privately held, including Māori land. Few incentives are provided by local authorities and central government to carry out conservation activities on private land, and the opportunity costs tend to deter most landowners. Schemes around the world demonstrate the lure of biobanking arrangements for landowners, and given the long-known dearth of incentives in New Zealand, it is unlikely that landowners would not be keen to participate. However, in some circumstances, they may be reluctant. Their perspectives should be more keenly surveyed.

In conclusion, the New Zealand context is remarkably opaque, despite progress in recent years achieving some measure of clarity on some aspects. This observation is material to whether a biobanking system is a logical endeavour given the lack of clear guidance, lack of consistency and what is at stake if a scheme should fail. Notwithstanding that, there is also clear merit in the concept, particularly in improving security of delivery and engaging private landowners in provision of conservation gains. In the next chapter, we look to international examples that reflect this journey of consideration.

CHAPTER FOUR: THE INTERNATIONAL EXPERIENCE OF BIOBANKING

4.1 Overview

Biobanking can be implemented in a range of different ways, and draws on a wide variety of different knowledge areas, including ecological science, economics, finance, restoration ecology and law. In the absence of a clearly accepted definition, this chapter will showcase the range of ways biobanking has been implemented to date and what the outcomes and lessons are for New Zealand that arise from them. The issues with biodiversity exchanges do not go away within a biobank, and the ability of weak underlying exchanges to undermine scheme success is well acknowledged. It is noted that the ecological outcomes of these schemes are of key interest; however information on them is generally sparse.

We set out below some international case studies that review different models and give an indication of their risks and benefits based on the experience of implementation, including applicability of lessons learnt to the New Zealand context. The case studies are:

1. NSW Biobanking

2. Victoria BushBroker

3. US wetland mitigation banking

4. US Endangered Species Act example

5. Germany land development offset policy

All market-based regimes have some basic characteristics in common, such as addressing the information and metrics underlying exchanges. But they also vary considerably, being managed in different ways and with different stakeholder types participating. This report briefly canvasses those dimensions and then considers the outcomes of the scheme where they are known. Overall, there is limited systematic analysis of outcomes and analyses often do not link back to how the policy settings have influenced implementation. These international case studies are summarised in the Appendix.

4.2 NSW Biobanking

In 2007 the Threatened Species Amendment (Biobanking) Act was introduced in New South Wales and in 2008 'The Biobanking and Offset Scheme of New South Wales' was initiated. It had already been piloted in the Hunter Region and the Far North Coast Region.[12] The aim of the scheme was to send market signals about the value of biodiversity conservation, to discourage impacts on biodiversity and to aim for no net loss of biodiversity.[13] The scheme came into force in 2010 when the 'Biobanking Assessment Methodology' was developed.[14] It is still operational.

Measurement

The NSW Biobanking scheme drew on the comprehensive (comparatively) biodiversity information available for the state, including a database holding detailed information on 1600 vegetation types and on locations and ranges of listed threatened species.[15] The scheme then implemented the Biobanking Assessment Methodology that included a 'Biobanking Credit Calculator' and which could only be carried out by an accredited Assessor. Some developers chose to use the methodology but not formally participate in the scheme. While demonstrating that the method itself had utility beyond that specific programme, it does lead to questions over what the barriers were for the development community to participate.[16]

Who manages it?

The NSW Biobanking scheme is a regulatory scheme entirely administered by the state government; that is, the Office of Environment and Heritage based in Sydney. Regulatory offset requirements arise from consideration under the Environmental Planning and Assessment Act 1979. When the scheme was launched, it was staffed by 10 people. A 'Biobanking Trust Fund' was launched to hold the proceeds of exchanges and manage the distribution of ongoing

management funding. Over time this resource eroded due to changes in government and limited uptake.

Who participates?

Landowners are able to approach the scheme managers with potential exchange sites on their own land, and negotiate 'biobank agreements' with the Minister for the Environment. Landowners are recognised for the opportunity cost of vesting their land in conservation via a capital upfront payment, and are then paid to administer management actions in the long term via regular ongoing payments. Consultant ecologists play a key intermediary role between developers, regulators and landholders wishing to offer credits.[17] Biobanking Assessor training was provided to 80 persons up to 2012 – the same number of people as landowners expressing interest in participating.[18] However, interest from the development community was demonstrably more muted.

Implementation and outcomes

By 2012, nine agreements had been struck under the scheme, covering 450 hectares of habitat to be protected in perpetuity.[19] A 2014 government review of the roll-out of the NSW model was somewhat damming. Of principal concern was fact that just 10 agreements had been struck. The low participation was attributed to a number of factors, including the complexity of the scheme, the failure to properly consider indigenous rights and interests, as well as the instability of the government-based secretariat making it difficult to build social capital with would-be participants.

The ecological outcomes of the scheme have not been well studied to date, likely due to low participation. A 2014 statutory review of the scheme made a large range of recommendations, including the addition of more robust methods for assessing biodiversity values in exchanges. The review noted that the scheme had protected 5000 hectares of native vegetation, comprising 15 endangered and critically endangered ecological communities. Site level outcomes were poorly understood, however, due to the absence of a scheme-wide monitoring and evaluation programme to assess whether management actions were achieving predicted gains.[20]

Summary

On balance, the NSW scheme initially had a promising suite of metrics, but appears thus far to have been viewed as largely impractical for most potential participants. However, the incomplete understanding of ecological outcomes makes it difficult to assess how factual this perception is. This example illustrates:

- The importance of practical metrics to ensure a workable scheme that attracts participation (while also obviously not generating additional risk for biodiversity)

- The importance of a robust information basis on biodiversity

- The importance of fully considering the indigenous world view in respect of biobanking

- The need to establish robust monitoring and evaluation of ecological outcomes at the outset

A key point of difference, which enabled this scheme to be established, was the relative wealth of biodiversity information at a state scale (something New Zealand does not have). Overall, the NSW scheme was developed with significant upfront investment, seeming to reflect an expectation that it would be large in scale. That has not transpired and perhaps suggests that a scheme may be better to 'start small' and build social capital from there. It is unclear why, having done a pilot, the scheme has been subject to such limited uptake.

4.3 Victoria BushBroker

The BushBroker scheme was initiated in 2006 under the 2002 'Native Vegetation Management Framework: A Framework for Action' policy. The policy constrained habitat clearance (by making consents necessary) and then implemented a mandatory offsets framework with a net gain objective. While the main objective of the scheme was to address biodiversity exchanges, much of the practical effort appears to have been expended on engaging landowners on the supply side of the equation.

Measurement

Victoria has a well-developed spatial dataset that divides the state into 28 bio-regions and 300 'ecological vegetation classes' (EVCs). EVCs are further ranked by conservation significance into low, medium, high or very high.[21] 'Habitat Hectares' was selected as the methodological framework for comparing the losses and gains and underlying restrictions on the conservation significance of subject habitat were put in place. For example, clearing in areas of very high conservation significance was only to be allowed in 'exceptional circumstances'. Guidelines exist for many aspects of the scheme that help reduce the subjectivity of the assessment process.[22] In 2014, the metric was altered to introduce more sophisticated metrics that added in the value of the native vegetation at the landscape level and recognised the value of the habitat in question for rare and threatened species. Both of these were significant improvements.

Who manages it?

BushBroker is compliance driven as the underlying offsets regime is mandatory. The regulatory nature of the scheme results in vulnerability to political shifts, and the 'regulatory pendulum', but eliminates the poor uptake common to voluntary schemes. BushBroker was modified in 2013 in order to 'free up the market'. These changes included a change from a 'net gain' objective to one of 'no net loss' and rendering some formerly strict requirements non-mandatory.[23]

Whether this represents an intentional weakening of the scheme to broaden participation and enable inappropriate development, or is merely targeted tweaking to improve functionality, is not yet clear from any systematic analysis. However, when considering the weakening of the scheme in the overall context of the political situation in Victoria at that

time, it seems likely that politics was a factor in the shifting of the goal posts. A scheme based in government might have the power of legislation but may also enable inappropriate weakening. This is a cautionary tale for New Zealand where industry pressure has been material in weakening impact mitigation requirements in several regional planning instruments already.

Who participates?

The BushBroker scheme involves several different parties: proponents of development with offset obligations to meet, agencies that impose those offset obligations, landowners that offer up areas of conservation value as offsets, and brokers that try to pair up proponents and landowners. The scheme focused heavily on engaging landowners to provide credits rather than engaging with the development community to foster interest in purchasing them.[24] Vegetation credits trading has attracted landowners who have more than around 10 hectares of land to sell as credits, as it enables them to earn a steady income stream in exchange for protecting the land legally from threatening impacts, implementing positive conservation actions and carrying out necessary reporting.[25]

Implementation and outcomes

Overall, the BushBroker scheme is well codified and more transparent than most. More than 1100 trades have been administered through the BushBroker scheme, making it the largest scheme in the Southern Hemisphere. The demand has arisen primarily from large-scale public infrastructure (roads) and major subdivisions. Most supply side agreements have come from the agricultural sector where farmers have retired land or restored existing fragments alongside their ordinary operations. Landscape scale or site level assessment of ecological outcomes appears sparse and much is not available to the public.[26]

Summary

The BushBroker scheme illustrates the following:

- An underlying regulatory requirement for ecological exchanges provides market stability

- Regulatory schemes, however, are vulnerable to incoming political ideology

- A strong information basis for biodiversity is essential to scheme functionality

- The scale of a scheme does not necessarily reflect the degree of attention paid to the monitoring of ecological outcomes

There are strong hints from this case study that a biobanking scheme operating at scale can only do so if there is a powerful regulatory driver for ecological exchanges to occur (compared with a counterfactual of them being largely voluntary). This reflects international experience that voluntary schemes alone do not work. Given New Zealand's opaque regulatory treatment of impact management (and most particularly biodiversity offsetting), this begs consideration.

4.4   US wetland mitigation banking

Overview

The US wetland mitigation banking programme is the oldest and most well-established habitat offsetting and biobanking regime in the world. It has been active since the advent of the Clean Water Act 1972. The United States is also the epicentre of evaluative research on biodiversity offsetting more generally (57% of studies on offsets have originated there[27]). Many such studies demonstrate mixed outcomes, and particularly poor outcomes with respect to compliance. The goal of no net loss (of 'area or functional capacity') was not in place from the start; it was introduced in 1990 in an amendment to the Clean Water Act.

Measurement

Compensatory mitigation credits are the currency of choice in wetland mitigation banking. The number of credits is based on the natural values subject to restoration, creation, enhancement or preservation.[28] Methodologies vary between banks and bank sponsors and administrators must approve the generation of any credits. While methods across banks may differ, each bank must use only one method. The most common and the default methodology is the use of ratios.

Mitigation ratios are relatively simplistic, whereby for example one hectare of wetland damage through development will need to be addressed via one, two or more hectares of restoration. Recognition of site level biodiversity values is very limited, as trades are enabled on the basis of wetland type only. The number of credits generated by different activities (i.e. re-establishment versus enhancement) is also linked to certainty of success. New methods that incorporate a more robust means of estimating the increase in function are emerging slowly using simple multipliers. Overall, given the longevity of the US schemes, it is surprising that the metrics underlying wetland mitigation banking are still so unsophisticated.

Who manages it?

Mitigation banking occurs in the United States in a variety of ways. Mitigation banking schemes operate under section 404 of the Clean Water Act, or a state or local regulation requiring mitigation for certain impacts. Anyone wishing to establish a bank must meet a variety of tests, including putting in place a conservation easement and gaining approval for the relevant number of credits. Following approval, credits can be released for sale. Credits cannot be traded until they exist, which is pivotal: gains must be created in advance of them being used to address new impacts. This is the reverse of the norm in New Zealand, where in the absence of legal mechanisms to secure advance mitigation development is generally allowed to occur ahead of mitigation. This creates a serious lack of security for exchanges and the need for the application of complex and often contentious discount rates.

The value of credits is determined by the market. Credits cannot be generated from areas restored with public funding for conservation purposes, an important parameter to

ensure additionality. The Mitigation Banking Review Team hosted by the US Army Corps of Engineers undertakes all approval process under the Clean Water Act provisions. In the mid-1990s, banks proliferated across the United States, coordinated variously by government departments and the private sector. Guidance was issued for how to establish, use and operate mitigation banks. This reflected, among other things, a preference for onsite mitigation over offsite and other assurance requirements banks should aim to meet.[29] So while it is regulatory in nature, wetland mitigation banking is flexible on participation.

Who participates?

Mitigation banking is one of three primary methods for managing impacts on habitat in the United States. The other two are 'in-lieu fee mitigation' (financial payments in lieu of physical exchanges) and 'permittee-responsible mitigation' (where developers do their own restoration or habitat creation in accordance with agreed conditions). The New Zealand model closely resembles permittee-responsible mitigation. The scope of the regime has since expanded to include other habitats besides wetlands, and similar requirements have been introduced for endangered species. The wetland mitigation banking programme is the largest ecosystem market in operation in the United States.

Implementation and outcomes

A series of reviews of the effectiveness of mitigation banks have yielded some interesting observations over the years. For example, in 1999 research showed that of the 68 wetland mitigation banks then operating in the United States, 74% were achieving no net loss in area. But overall the approach was causing more than 20,000 hectares in net loss.[30] The simplified metrics are likely in part responsible for these concealed losses. In a report to the Convention on Biological Diversity in 1999, the US Environmental Defense Fund noted that the ecological outcomes at that time of wetland banking had been 'dismal' with high failure rates, high rates of non-compliance and weak oversight from regulators.[31] Further and more recent critique has noted the lack of transparency and efficiency of the schemes and poor understanding of their operation by investors.[32]

However, despite implementation concerns the preferred model is mitigation banking over the other two options as a result of improved outcomes and greater security, among other advantages. That view was endorsed in 2004 by the Society of Wetland Scientists. This preference is reflected in legislation such as the Water Development Act 2007.[33] Owing to known deficiencies, in 2002 the National Wetlands Mitigation Action Plan was released which applies to exchanges under the Clean Water Act 1972. This plan contained 17 actions to improve the ecological performance of schemes.[34] In 2013, there were 1800 bank sites loaded on the national database, up dramatically from a total of just 46 in 1992.[35] Uptake has been rapid in recent years and it can be expected that ecological outcomes have improved over time as scheme parameters have been tightened following review.

Summary

The US wetland mitigation banking programme illustrates the following:

- Biodiversity trades based on simple metrics may increase participation, but may also conceal significant losses

- Who administers a bank under a scheme may well be flexible and open to participation of many different parties (government, NGOs, private sector firms)

- Biobanking can become the preferred method of offset delivery due to enhanced security of exchanges and the existence of a well-understood framework to consider them

The final lesson is perhaps the most significant for New Zealand: that mitigation banking may have its shortcomings, but when compared with more ad hoc and opaque approaches, it has still become the preferred method for managing biodiversity impacts in the United States.

4.5   US Endangered Species Act example

Broad participation in wetland mitigation banking in the United States eventually led to the development of similar requirements for endangered species. The Endangered Species Act 1973 scheme enables people to generate income from providing permanent habitat for species that are threatened or at risk. Unlike in New Zealand, the United States has a strong legal protection system for endangered species, with conservation status recognised in law.

Measurement

Establishing credits related to the extent to which any conservation action will lead to improved survivorship for the species in question, and the method applied to determine the size of the offset, should be the same as that used to determine the impact – to enable easy comparison.[36] The US Fish and Wildlife Service is charged with undertaking the credit assessment to determine the amount the owner can 'sell'. A range of factors are considered in determining how much a site is 'worth', such as the quality and quantity of habitat, contribution to regional conservation efforts and the nature of the species affected. Implementation reviews generally note that an acre is a typical unit which is traded (i.e. an acre of appropriate habitat for the species in question).[37]

Who manages it?

The US Fish and Wildlife Service manages the scheme in accordance with the 'Interim Guidance on Implementing the Final Endangered Species Act Compensatory Mitigation Policy', released in January 2017.[38] Prior to this, the schemes had operated under the 2003 Guidance issued by the Fish and Wildlife Service,[39] although some commentators noted that banks did not always obviously conform to the Guidance.[40] The new Guidance shifts focus from a site-by-site approach in the regime to one more focused on landscape-scale outcomes. The Guidance applies to methods beyond banking, such as permittee-responsible mitigation.

Who participates?

Like wetland mitigation banking, anyone can establish a bank for endangered species habitat, and land of most tenure types is permissible (private, tribal, state, etc). Where companies (such as limited liability companies) wish to establish banks, they are subject to slightly stricter vetting, including assessments of their board members. Sites that can make a measurable difference for some species can be very small, so there is no minimum, making it well suited to private landowners. Requirements are set down in a management plan that is intended to be a living document, updated over time to reflect species' needs and changes in ecological condition. An eligible third party must be granted easement over the subject land and an endowment fund must be established. There is a range of tax incentives that also help to propel landowners to participate.

Implementation and outcomes

The use of endangered species mitigation banking has a much shorter history in the United States than its wetland cousins and systematic analysis of outcomes seems lacking to date. However, the merits of wetland banking (in terms of increased security of delivery) form an important basis for the Endangered Species Act usage of the approach. However, the Environemtnal Defense Fund report referred to above also drew important distinctions between wetlands banking (permanent fixtures on a landscape) and endangered species (often transient and subject to population fluxes and wiping out by invasive species), noting that endangered species require very much more management and monitoring than habitats themselves.[41] This suggests that success in Endangered Species Act-based banking may well be harder to achieve than in wetland banking. However, it is early days and information is thus far sparse.

Summary

The outcomes of the Endangered Species Act-based banking are unclear, but two important lessons are relevant. The first is that common to all enduring schemes is a strong regulatory basis that demands impact management, and the second is that financial drivers to engage credit providers are highly effective. Besides those lessons, it is evident that the well-established framework of endangered species listing is an important underpinning to this scheme and this is an area of law in which New Zealand is particularly lacking.[42]

4.6 Germany

Germany has operated one of the most formalised ecological exchange contexts in the world since the 1970s, known as the Eco-accounts programme. The policy approach has gradually altered from one of strict regulatory interpretation to one which is more market-based in nature. Germany is in the European Union, and thus subject to its Directives. A relevant one is the Environmental Impact Assessment Directive, an overarching instrument requiring avoidance, reduction and remediation to be carried out prior to a project being considered on its individual merits.[43] Germany operates the most formalised of all the schemes in the European Union.[44]

In the 1970s German land development policy began to formally recognise the concept of ecological exchanges, but generally only in respect of greenfield development. Requirements to offset arise from the Nature Conservation Act 1976, within the Impact Mitigation Regulations, which have a goal of 'no net loss' of biodiversity. The Nature Conservation Act is a piece of landscape planning legislation providing for a hierarchy of landscape plans at different scales (state, district groupings, municipal and sub-municipal). The lower level instruments typically contain quite prescriptive measures for compensation, including changes in land use management from intensive to extensive to reduce impacts.[45]

There are three main aspects to the Eco-accounts programme: a pool of possible destinations for conservation effort; a medium of exchange (the 'eco-point' which functions as a credit in recognition of conservation gain); and the account within which points and effort are managed (the 'eco-account'). Any measures must be incorporated into comprehensive spatial plans, and many of these requirements are reflected in the German Federal Building Code. The Building Code requirements were introduced mainly in respect of urban planning, introducing spatial and temporal flexibility for development occurring in city areas. These requirements and the federal scheme requirements coexist in many areas (e.g. Baden-Wurttemberg).[46]

Measurement

Eco-points are allocated based on the change in ecological condition and can be accrued in advance – local authorities usually supervise this. Implementation varies between states and, as such, transfer of credits interstate is not possible. At the time of development, proponents can buy equivalent credits already stored, so long as they are in the same 'impact category'. Where it is not possible to substitute for ecological harm in the same functional context, substitution is allowed in some circumstances.

The measurement approaches to weighing up losses and gains are not consistent. In fact, no law at a national level controls the balancing* and evaluation methods, of which approximately 40 exist nationally.[47,48] They range from wholly qualitative (the 'verbal argumentative method' based on expert negotiation case by case) through to highly quantitative methods – with no obvious preference nationally.

Despite the variable nature of implementation, reduced costs are still enabled for projects of a larger scale than would otherwise be feasible. The implementation of this approach sits over an existing biotope mapping system and a comprehensive suite of underlying biological data at national and

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* It is important to note the distinction between the German interpretation of 'balance' and the one commonly considered in consenting in New Zealand (i.e. the 'overall balance'). In New Zealand it provides for economic, social or cultural considerations to theoretically 'trump' environmental concerns in certain circumstances. By contrast, in Germany a 'balance' includes the concept of 'no net loss' – meaning that no development project is permitted to allow a net reduction in biodiversity value.

smaller scales, which is a significant strength. New Zealand's national-scale biodiversity information systems could not presently perform such a role reliably.

Who manages it?

The Eco-account programme in Germany is federal in theory, but state level in practice, with a wide variety of organisational modes in operation. The German system is federally based and codified to some extent in national legislation. However, like New Zealand, Germany has a subsidiary governance model that gives great flexibility to the regions/states. The flexibility granted to states, such as the ability to formulate their own criteria for biodiversity offsetting and other practices, has led to very diverse implementation nationwide. However, it does apply to all land, not just special areas.

Who participates?

The German system is a mix of regulatory and market-based mechanisms with a very strong mandatory element. Those delivering ecological exchanges long term take on the legal liability to do so, and are subject to the relevant sanction in the case of non-compliance. Even within the Eco-account system, a wide range of potential actors can participate and there is no one fixed arrangement. Local government, private investors, statutory bodies and third party mitigation agents can all administer pools of requirements to be addressed. Different tenure arrangements exist depending on the nature of the administrator and programmes can also be conducted cooperatively (i.e. involving two or more actors). Those delivering gains, however, do assume the legal liability for long-term management and maintenance.[49]

There are more novel means by which organisations such as NGOs can participate in this programme. For example, the Foundation for Nature Conservation was established by Parliament in 1978. The organisation manages 32,000 hectares for nature conservation and since 2008 has acted as a provider for offsets/habitat banking.[50] The Foundation operates a company alongside its operations (a 'compensation agency') for trading purposes and trading biodiversity is an important source of revenue and driver of conservation outcomes. This is perhaps a point of interest in a New Zealand context, in which it is not uncommon for community groups to be the recipients of mitigation funding to meet ecological outcomes.

Implementation and outcomes

Amendments to the principal legislation in 2002 and 2009 weakened the link between the nature of the impact and the corresponding gain. As a result, a different mode of impact management emerged, that of 'advanced' and 'aggregated' offsetting. These approaches took a more landscape-oriented view of exchanges and sought to maximise the collective impact of compensation through an Eco-accounts programme, the costs of which are – due to a 'polluter pays' principle – primarily borne by developers. The amendments also broadened the terms of an exchange, from not simply like for like only, to the ability to purchase an equivalent number of eco-points to the value of the original site.[51]

Even within a comprehensive and long-running regime, familiar issues emerge in managing biodiversity trading. For example, in Germany a development on the Mühlenburger Loch was examined by the European Commission (they have intervention powers on planning decisions) when the developer applied for permission along with offering compensation on the grounds that there were no 'alternative sites'. The Commission disagreed.[52]

Compliance appears to be a weakness of the German system. In 2010, Tischew published data demonstrating that of 326 restoration projects related to roading, just one-third were properly maintained following restoration. Some authors attribute this to a lack of enforcement capability of smaller compensation measures in the legislation.[53]

In 2014 a review of the effectiveness of the scheme was published.[54] The review tested the following hypotheses as to whether the scheme/s:

a. Internalise the costs of biodiversity loss and thus, by implementing the polluter-pays principle, encourage a reduction in impacts on biodiversity;

b. Do not lead to a weakening of adherence to the mitigation hierarchy through a tendency to compensate for impacts where this has a lower cost than avoiding or reducing them (i.e. becoming a 'license to trash');

c. Are a transparent and fair tool for compensating for unavoidable residual impacts through measures that provide measurable additional long-term benefits;

d. Are a more cost-efficient way to compensate for biodiversity/habitat loss (and comply with no net loss requirements) than the traditional approaches developers could take to meet the requirements under the Impact Mitigation Regulation[55]

The review found that Germany's approach (and in particular the highly codified and transparent Eco-accounts scheme itself) performed relatively well, having designed practical solutions to a wide range of concerning elements of habitat banking and biodiversity offsetting. Key issues include poor compliance and lack of long-term monitoring, in addition to potentially eroding incentives for strict adherence to the mitigation hierarchy by reducing compensation costs.

The German system is typical of continental systems, demonstrating a high degree of integration with other land use issues often treated individually in a New Zealand context (such as agricultural productivity). The scheme is also heavily reliant on spatial planning instruments under nature legislation and is thus very comprehensive when compared with the ad hoc New Zealand context. However, it retains a high degree of variability and has a number of predictable weaknesses.

Summary

The German land development policy is less well known than others, but appears at least as comprehensive. It demonstrates:

- The importance of detailed and agreed underlying bio-diversity information at an appropriate scale that has sufficient depth of information and sufficiently consistent taxonomy

- That flexibility in approach does not necessarily undermine positive outcomes

- That a single measurement approach is not necessary providing basic principles are adhered to

However, like the United States, Germany's impact manage-ment strategies often apply to highly modified continental systems, which are very different to New Zealand's rich and vulnerable biota which is comprised of many rare and ancient species and ecosystems. As such, its comparative value may be limited on some fronts.

4.7 Summary of international learnings

The use of biobanking mechanisms has had mixed outcomes globally. The range of experience and outcomes has generated some useful learning for New Zealand. These lessons are grouped under several headings below.

The importance of prescription

Opaque, voluntary schemes are unlikely to safeguard biodi-versity, particularly when it is being traded across time and space. Prescription would appear from experience to be pivotal to whether the scheme reliably maintains quality outcomes, or indeed persists at all. This has important implications for New Zealand, most particularly because of our highly devolved and highly discretionary regulatory regime for the protection of land, freshwater and marine areas, and the lack of national standardisation for even the most fundamental aspects of compensating for environmental harm.

Simple metrics conceal losses

The use of simple measurements to enable biodiversity exchanges is common (e.g. ratios in US wetland mitigation banking). Exchanging biodiversity is not simple, and metrics that assume this tend to enable poor exchanges, conceal losses and generally exacerbate the risk of harm from development on biodiversity. Where metrics or any other decision-support tools are used, they must fairly capture the values that are of concern and ensure that silent trades do not occur.

Thick markets discourage participation

An overly restrictive framework for biodiversity exchanges will inevitably reduce participation of both those offering up conservation gains and those seeking to acquire them. However, most of the thickening of a market relates to appropriately safeguarding the biodiversity at risk from development. An appropriate balance must be struck between workability and the need to recognise and maintain environmental bottom lines.

Expect to make changes in the early stages

No scheme has been launched and remained unchanged in the early years. The workability of a scheme is rarely entirely predictable on paper. As such, the launching of the scheme should anticipate shifts in operations, particularly in the early years. Care should be taken to not unfairly disadvantage early or later adopters of the scheme and to maintain transparency and accountability over time. There are several strategies that could be employed to limit the degree of 'shifting' once operationalised, including pilot projects, starting small and keeping arrangements as simple as possible. Overall, a good outcome monitoring programme at project, bank and landscape levels would seem a critical feature of any new scheme so that significant failures can be averted and good practice replicated.

Compliance is an enduring challenge

All schemes appear to suffer from weak implementation and poor compliance in some form or another. However, banking schemes appear to suffer from this less than a slew of smaller ad hoc arrangements, so it may well be that a codified banking arrangement is still 'better'. Powerful assurance mechanisms, preferably with regulatory and financial implications, are necessary to maintain compliance, particularly in the long term.

Regulatory drivers are the most secure basis

Voluntary involvement in conservation characterises New Zealand, however the drivers for people to participate can be limited. The foregoing schemes all reflect a strong statu-tory basis that drives the need for impact management and secure frameworks for landowners to be able to participate in providing gains to address development losses.

Biobanking demands advance gains

All biobanking schemes canvassed require that the credits are produced (or at least part of their value is demonstrated) at the time of exchange. This reduces the risk to biodiversity of non-delivery of any gains after the development impacts have already occurred. At present, there is no accepted mechanism in New Zealand to quantify gains in advance of development, and to secure them for the purpose of managing those impacts down the track. Gains undertaken in advance of losses have been commonly challenged as being 'non-ad-ditional' at the time of decision-making, thus forming part of the permitted baseline (existing environment). Regulators are generally reluctant to even informally recognise the advance gains, in case it compromises their later discretion during the consenting phase.

Biobanking necessitates transfer of liability

In New Zealand, requirements set down in consents run with the land and the consent holder. This means liability (i.e. the responsibility to deliver requisite gains set down in decisions) cannot be fully transferred to another entity to deliver. Even if private contractual arrangements are struck between a consent holder and an external provider of resto-ration requirements, liability for achieving outcomes remains

shared. This legal 'missing link' is likely to have significant implications for the workability of biobanking here in the short term. It is possible it could be addressed by more creative usage of resource consent conditions, but is more likely to necessitate legislative change. Further work is needed to unpack the options.

Red billed gull chicks, *Bernard Spragg*

CHAPTER FIVE: THE PROSPECT OF BIOBANKING IN NEW ZEALAND

International examples demonstrate that biobanking can potentially improve the security of agreed gains and reduce transaction costs, among other benefits. However, in all foregoing examples, a stronger regulatory framework was already in place to underpin the practice, compared with what presently exists in New Zealand. This research has identified a range of key issues that should form the basis of a second-stage research project that is able to engage openly with stakeholders, develop proposals to address the issues outlined and conduct more detailed analysis of how such a scheme might work.

5.1   Who will participate?

In determining whether or not a pilot of biobanking is worthwhile in New Zealand, it is important to consider where the demand for such a scheme might lie, and where biobanking as a concept may best contribute. By 'best' we refer to the manner in which biobanking can contribute and add value, rather than introduce significant new risks to an already contentious context. There are two key dimensions to consider in addition to the technical concerns set out in Table 1 in Chapter 6: participation and the interface with the regulatory context. Both are pivotal to the design of the system and the relevance of any pilot. Biodiversity exchanges appear to fall presently into three main categories in New Zealand:

a. Single one-off exchanges that are quite large and long-term in nature, applying to significant projects with well-resourced applicants. They are individually negotiated according to the relevant policy framework and are subject to wildly different requirements. They are costly as each discussion appears to start from a blank page.

b. Single one-off exchanges that are medium to small in scale and apply to more localised areas of impact. They too are individually negotiated, but are generally subject to far less rigour and expert involvement and less oversight going forward. They are characterised by small scale exchanges often with limited landscape context and ecological value.

c. The third category of exchanges is much rarer overall, and tends to apply to projects with long-term, multi-faceted and diffuse impacts on the environment. They are characterised by bespoke entities and financial contributions. For example, Mighty River Power established the Waikato Catchment Ecological Enhancement Trust as a condition of the renewal of the hydropower consent on the Waikato River. They are characterised by high establishment costs, highly variable reporting and transparency requirements, and usually very opaque ecological outcomes.

These categories are based on current practice and are not formally recognised, nor are they necessarily all that different in practice. There is a potential fourth category. Where there is no regulatory protection of the values (i.e. permitted activities) there is no ability to require mitigation at this point. However, there is potentially an option of requiring, within permitted activity standards, some mitigation requirements but this would rely on far more effective enforcement of permitted activity standards than is presently evident in practice.

5.2   Retrospective case studies

To provide a more 'real' sense of where biobanking might contribute, we now turn to some real life case studies where biobanking was or could have been used. In Auckland, the council has been implementing a form of biobanking in the stormwater department for a number of years. We consider the technical and regulatory challenges of that approach. We then turn to an example of an organisation that has carried out substantial restoration work as part of impact mitigation over the long term on its own, and consider what might compel it to participate in a biodiversity bank over its own approach. And finally we consider an organisation that has established

a mitigation trust and consider whether a biobanking scheme has advantages or disadvantages compared to bespoke organisations like that.

5.2.1 Auckland stream loss through residential development

The rise of the ecological exchange concept for stream impacts under the RMA created issues for New Zealand's largest council. The impact management packages being proposed by developers were often weak and poorly located, and unlikely to deliver strategically for the region's ecology. Each negotiation was also time-consuming and many projects were costing much more than the benefits they would likely deliver. Internal policy was developed to guide the technical consideration of stream impact management, and to ensure that decision-making was relatively consistent across different consents, including detailed consideration of principles such as 'like for like'.

The council opted to take a more proactive approach to identifying potential restoration sites in certain catchments, compiling a list of projects that developers could be directed towards, saving them the legwork. The metrics used were a combination of the council's Stream Ecological Valuation method (SEV), a tool that has been in place for a number of years, along with an existing formula called the Environmental Compensation Ratio (ECR). The programme enabled the pooling of funding from different projects together to achieve greater scale gains.

There have been no outcome studies to date on the scheme, so it is unclear whether the ecological outcomes and transaction costs were superior to the usual methods. Anecdotal information from the development community suggested that some projects had very different financial costs from others (e.g. daylighting versus riparian restoration through planting) and that these differences meant some developers were paying quite different costs to fulfil their impact management requirements than others. This highlights (whether the perception is founded or not) the importance of equity.

Ensuring equity in a biobanking scheme means that parties undertaking similar development activities with similar requirements incur similar costs and impositions. Otherwise, the developer paying the lesser fee gains an advantage over the other. The exception to this is where a developer carries out a similar activity in an area in which the limits to offsetting are being approached (e.g. there is only one site left that meets exchange criteria).

Part of the cost concern may have arisen from the fact that Auckland Council was also progressively shifting to a preference for stream naturalisation over the traditional and lower cost restoration strategies of riparian planting (to increase the amount of habitat on a landscape scale, not simply the quality). The other key driver for this was that planting of an existing stream was not viewed as a 'like for like' exchange where the impact was total stream loss. Auckland Council's approach – although likely very costly in the eyes of some

– would likely serve to improve the landscape scale outcomes of the scheme over time.

What would make a developer or other resource user opt to use a biobanking scheme such as this one over investigating and putting forward its own proposal? First, it could be assumed that the projects are already costed and there is a clear notion of their purpose and how long it would take to complete them. This would lower the consenting costs for the developer in the first instance. The second key reason would be that the money would change hands and there would be no ongoing liability for the developer: this would be particularly attractive to certain development types such as subdivision. The third advantage would be a perception that in opting to do a pre-arranged project, the original proposal may have a greater likelihood of being accepted by the regulator (who is also the broker and executor of the restoration in this case).

This highlights a key issue about regulator-managed biobanking schemes. From a public interest perspective, this could be touted as a conflict, and potentially put the regulator in a weaker position to decline an inappropriate proposal once it is seen to endorse the mitigation option. Careful and very transparent policy and separation of decision-making may not be sufficient to manage this.

5.2.2. Winstone Aggregates quarry development

One of the pioneering companies undertaking biodiversity mitigation at scale in New Zealand is Winstone's Aggregates. The restoration programme at the Hunua Quarry, a 240 hectare site just outside Auckland, was required due to an expansion of the quarry area into significant habitat and comprised planting and predator control over a long period. If a biobanking system had been available at the time the consent was being processed, would Winstone's have opted to participate in that over its own bespoke negotiation, which led it to manage its own restoration project?

The advantages of contributing to an existing scheme would be the lowering of the long-term administrative burden of the work and to potentially take advantage of any standards the scheme can offer that would satisfy the relevant regulator. The disadvantages might be that the company is not able to control its investment and that the long-term control over that investment would also be gone, meaning that conditions would not be able to be varied over time to enable the restored area to be quarried (as has occurred elsewhere in New Zealand and the world from time to time).

The company may also not be able to reap any ancillary benefits of the scheme. For example, many companies gain additional social capital from their impact management requirements, particularly where they extend the investment beyond compliance. This is unlikely to be possible, or at least easy, when another entity has assumed responsibility. One way to mitigate this may be for the biobanking scheme to invite further investment and make clear the quantum of those 'additional conservation gains'. This case study suggests that it may be difficult to engage some companies in participating

in the biobank, in lieu of doing it themselves, if the choice is made available to them.

5.2.3. Energy generation company (Mercury Waikato)

In 2000, Mercury Energy (then named Mighty River Power) applied for resource consents for the hydropower scheme on the Waikato River. The scheme had been in place for nearly a century at that stage and had a relatively good track record of environmental compliance. However, at no time had environmental compensation of any form been obligatory for its permitting requirements. The re-consenting provided an opportunity for the community to receive some form of redress for the environmental impact of the scheme. This was achieved in two ways: first by negotiating side agreements with more than 100 individuals and groups of stakeholders; and second through the establishment of a mitigation fund.

The mitigation fund was established to provide financial support for environmentally focused community projects in the Waikato region and is called the Waikato Catchment Ecological Enhancement Trust. Mercury Energy contributes a given amount every year as agreed with the council, and manages all of the promotion and administration concerned in running such an entity. The establishment of the Trust was costly and time-consuming, although it has been very successful in funding a wide range of community activities.

The presence of a biobanking system already in operation may have enabled the establishment costs of a bespoke trust to be avoided. On the other hand, the positive coverage and control of the outcomes of the Trust would have been removed from the company, and potentially eroded its enthusiasm to meet requirements. It is likely that the corporate social responsibility drivers for companies carrying out required conservation activities will differ, and some may be more enthused than others about participating. It is also possible that a middle ground would be able to be struck with the delivery entity, where the day to day work was carried out under the guidance of ecological experts, but the company remains intimately involved in the overall project.

CHAPTER SIX: NEXT STEPS

6.1 Should a pilot proceed?

Biobanking in some forms would likely have the potential to ameliorate some common risk areas. However, it seems somewhat premature to embark on a pilot when such a lack of clarity exists in the underlying context, when compared with other jurisdictions that have initiated biobanking. The key issues are how such a system might respond to the ecologically proper constraints of exchanging ecological values and how the regulatory context will support or detract from adhering to those.

6.1.1. Technical considerations

The following table sets out the interplay between the key issues facing ecological exchanges, and the way in which biobanking may frame the solutions. It provides a sense of the issues underlying biobanking that need addressing. Clarifying how these matters will be addressed will be essential to developing a comprehensive pilot scheme.

6.1.1.1. Information basis

The availability of good quality biodiversity data in New Zealand is generally lower than the other jurisdictions reviewed in Chapter 4. This is due to a combination of the current absence of centralised data management for biodiversity information, a lack of general access to what information is available, data often being out of date due to underinvestment, and the distributed structure of many of our environmental agencies.[57] In practice this deficiency means two things:

1. It can be hard to access information that would be useful to inform decision-making, particularly for applicants and others outside of regulatory agencies

2. There are commonly significant information gaps, particularly in species occupancy data and the like, which applicants must address through assessments of environmental effects

Addressing the information gaps in (2) long term is also unlikely, because the information collected through consenting processes is only occasionally added to any publicly available database or other information source. The implication for the establishment of biobanking long term, however, is that much thought must go in to the minimum information requirements each exchange would need to meet. This consideration may result in the bank establishing its own records over time and also contributing outwardly to existing sources of information.

6.1.1.2 Metrics

The choice of currency or metric for biodiversity is very important and underpins the reliability of exchanges. Different biodiversity values are hard to measure in both absolute and relative terms, and trading across them can represent grave risk to nature.[58] In the early days, area was the usual metric by which exchanges were determined – but this was simplistic and could help conceal significant net loss each time.[59] Since these humble beginnings, a plethora of different approaches have been put into practice worldwide. Most modern metrics are compound and take into account a wide range of features while adding complexity to the nature of the exchange.

There are a number of possible frameworks that are employed currently, including:

- The Habitat Hectares model[60]

- A custom system developed for the Department of Conservation by Maseyk et al[61]

- RobOff (conservation planning software that acts as a decision support tool for offsetting)[62]

For the purpose of a pilot study it would not be sensible to design a bespoke metric and it is suggested that one of the above is used if one is initiated. The only one specifically designed for the New Zealand context is the custom system from Maseyk et al. However, more detailed research into experience of metrics to date is likely to reveal more useful information about these options.

It is further suggested that the metric should not be the 'be all and end all' and should not isolate the analysis to mere

numbers if a wider contextual view would generate a better ecological outcome. If the pilot progresses to a full system, development of an accounting model or series thereof may well be necessary, depending on the regulatory context at the time.

Issue	Meaning	Biobanking	Questions to consider for pilot
Choice of metric	Examples of metrics include those relating to ecosystem structure and function, species traits, community composition, habitat area, fragmentation, etc.	Biobanking regimes can be built around a single set of standard metrics (Victoria BushBroker) or have no particular metric so long as scheme goals are met (Germany). In the case of the former, they can provide a framework for consistency in approach. Where the metric is inadequate, the biobanking system may act to legitimise and expedite inappropriate exchanges.	*Information basis* – how comprehensive is the information available on biodiversity values in New Zealand (at the appropriate scale)? *Measuring losses and gains* – what process should be used to measure relative losses and gains? How might these approaches translate in different environments – is it better to have one metric system or several and why? What might a bespoke system look like and is it worth designing in place of options already available?
Limits to offsetting	Ecological exchanges, if carried out when it is not appropriate, can lead to significant and irreversible losses. They are not appropriate or possible to achieve in all environment types.	Biobanking schemes can limit their geographic application to take into account very vulnerable areas, and/or to particularly focus on protecting them (in advance of any related impacts).	*Restrictions on exchanges* – biodiversity is not particularly interchangeable: some degree of quality control and restrictions on exchanges will be necessary to avoid the biobank contributing to net degradation. However, political drivers tend to weaken these exchanges.[56] What should these restrictions be, should no-go-areas/biodiversity be prescribed, and what impact will that have on participation? A key example is 'like for like' where the ecological values damaged are required to be offset by the same or similar values, a restriction that acts as a natural limiting factor in any context for impact management (if it is adhered to). How might political drivers be mitigated, and can they be?
Spatial delivery	Small ad hoc exchanges scattered over the landscape rarely represent the most strategic and cost-effective biodiversity gains. Offset and biobanking schemes operated in a landscape context in which gains are aggregated generally deliver improved outcomes for nature.	Biobanking schemes may provide a basis to aggregate funding for conservation gains and an administrative platform to coordinate them over larger areas. Biobanking that enables exchanges at too large a scale may generate unforeseen negative social, economic and environmental consequences.	*Types of exchanges* – in what domains should biobanking be trialled (i.e. should it begin with the best known context of terrestrial and or freshwater, or does a full assessment demand a marine option to be investigated also?) *Locations of exchanges* – at what scale should a biobank operate? National, regional or local? What are the risks and benefits of the different scales? What level of spatial proximity should be expected and how does that interact with the regulatory environment?

Issue	Meaning	Biobanking	Questions to consider for pilot
Additionality	A new loss cannot possibly be addressed by anything other than a new gain. Failing to ensure that conservation activities constitute new improvements to biodiversity values means the development impact goes unaddressed.	Biobanking can ensure additionality through observing strict policy restrictions on exchanges and having clear criteria for what 'new' means. However, if the biobank has only loose restrictions in this aspect, it may enable inappropriate exchanges.	*Additionality* – what existing (if any) contributions to conservation could be latterly absorbed by a biobank and under what circumstances? What is not admissible and on what basis?
Timing	When ecological values are eroded through development, it's important that they are 'replaced' as fast as possible. The 'lag' between impact and offset increases the adverse effects of the development and delays their alleviation.	Biobanking can enable better coordination of timing for loss and gain of ecological values. Within a biobanking system it is possible to generate and validate conservation gains prior to some impacts occurring (which are optimal) and to ensure the exchange of values occurs at the same or at an earlier time to prevent lags.	*Timing* – how can biobanking make advanced mitigation more possible in the New Zealand context? Certain long-term projects have a clear understanding of their future ecological effects and could begin much earlier to prepare for the exchange.
Security	Effective ecological exchanges generally demand securing of ecological gains a long way into the future, sometimes in perpetuity. A failure to do so means that any gains generated are lost and the original impact is unmitigated (save for any benefits derived in the interim).	Developers and resource users usually have only a temporary connection to a site compared with ecological timeframes (especially where requirements stretching over decades or in perpetuity are concerned). Equally, councils and other organisations often change significantly over even short times (e.g. election cycles) and may not manage long-term arrangements much more effectively. Biobanks may provide a relatively more secure organisational structure by comparison, and this would be strengthened by them holding liability to deliver requirements.	*Liability transfer* – biobanking will require (in some form) the transfer of liability between parties to undertake the required conservation actions. How does our law enable or form a barrier to this process? *The entities involved* – what sort of organisation is best placed to administer or participate in the scheme and on what terms, taking into account underlying drivers for institutional behaviour and any other roles that the organisation might have. Key options include government organisations at all levels, private sector companies and not for profit entities. What are the risks and benefits of each?

Table 1 Implementation issues for biodiversity offsetting (see McKenney and Kiesecker, 2010)

6.1.1.3. Limits to ecological exchanges

Exchanging biodiversity values carries significant risks to nature if the parameters for doing so are inadequate to recognise ecological limits and the inherent non-fungibility of biodiversity. For the design of a biobank long term, the ecological context in which it operates will be very important. For pilot studies, it will be important to recognise the limits to the concept having regard to both the regulatory framework and international best practice. It would likely be counterproductive to attempt to test and demonstrate the potential utility of the concept in a context that would lead to irreversible harm to rare or otherwise significant or irreplaceable biodiversity.

6.1.1.4. Spatial delivery

With distance from the subject site, ecological dissimilarities increase and the chances of a like for like exchange progressively erode. As a result, it is generally ecologically optimal to locate a compensation activity as close as possible to the site of the impact, and in the same or similar ecosystem type. Complexities with a requirement for proximity arise

with ecosystems that may be fragmented and located at some distance from one another. The second complexity with spatial proximity is the tension that exists between that and the need to strategically locate offset gains to maximise their value at a landscape scale.

Biobanking schemes encounter this tension and international practice suggests that the need for strategic gains tends to outweigh the spatial proximity requirements (that may result in a proliferation of disparate and disconnected restoration projects over one large one). These choices have cultural, economic, ecological and social consequences that must be considered, however. For the purpose of a pilot, it would be necessary to determine an appropriate scale for a given exchange that demonstrated that this tension had been considered carefully. Further research, including the modelling of scenarios, should determine the appropriate location and nature of such a pilot such that it will operate at an appropriate scale.

6.1.1.5. Additionality

If a new loss of biodiversity is addressed by already existing conservation values, a net loss results. Ensuring that gains for impact management purposes have been newly created for the purpose would be essential for a biobanking scheme. There are examples of this in New Zealand in which this requirement is not adhered to. For example, some councils have in the past accepted areas of habitat already protected as covenants as impact management for new development.

This practice is erroneous and serves to facilitate development, unless the condition of the covenant is improved significantly or its size expanded (preferably both, until such time as the exchange is at least even). A restriction not dissimilar to that imposed by the US Fish and Wildlife Service would be advantageous – that is, any area restored via public money is ineligible and further that areas already legally protected cannot be offered up. Such restrictions may pose limits in a context where like for like is mandated, particularly where relevant ecosystems are primarily located on public land.

Ensuring additionality relates primarily to the sites sought as 'credit' sites and therefore, if opened to private landowners to offer their properties for this purpose, additionality of the gains would need to be subject to strict vetting criteria. However, the exchange consideration would need to provide assurance that the gains are new and have not been already allocated for another project. For a pilot scheme, it would be sensible to ensure that no gain that existed prior to the scheme is considered as a credit, or that very strict criteria are used to vet these proposals.

Additionality is of pivotal importance in recognising advanced conservation efforts. It is ecologically preferable to reduce uncertainty through advanced restoration or habitat creation (where this is of course feasible, given the environment type). The settings to recognise additionality must explicitly ring-fence advanced works to ensure they are not rolled into the baseline environmental status. However, the settings must

also not enable old gains 'dressed up' as advanced work to be included within scope.

6.1.1.6. Timing

A delay in addressing a loss from development (which is usually, although not always, immediate) is an ecological effect in itself. The absence of those conservation values from the landscape or seascape while the 'offset' is generating is often overlooked as an impact. However, biobanking potentially offers a significant benefit in this area in particular. Conventional approaches see impacts preceding the conservation gains which replace them. In biobanking systems, it is more likely and more possible for such gains to be generated in advance of the impact.

For the purpose of a pilot, timing may be less relevant, as gains in the future are unlikely to be known outside of a model. However, if the pilot was to progress to a full scheme, the timing dimension would need to be taken into account. In New Zealand, there is presently no reliable legal mechanism to secure conservation gains in advance of impacts and this will have to be addressed for a scheme at scale to offer significant benefits over business as usual. Further research should identify how (or the ways in which) conservation gains can or could be secured in advance.

6.1.1.7. Security

The objective of a good practice exchange should be to ensure that the certainty of the gains is the same as the certainty of the losses. This means that the development impact and the corresponding gain should be equally likely to occur. Ensuring the delivery of gains is challenging, however, particularly as developers and resource users may only have a temporary connection to a site compared with the effects of the activity. Biobanking potentially offers strength compared to the usual approach of permittee-responsible mitigation. Delivery of intergenerational gains may be more certain where a more permanent entity can be charged with delivery.

In New Zealand, the complete transfer of legal responsibility for consent requirements to another party is not yet possible (if the development and resulting conservation gains are the subject of resource consent or similar). The consent holder would retain responsibility for the delivery of the gains. Therefore, if the biobank were to fail to meet a condition of the consent, both the bank and the developer would face sanction by the relevant authority. Developers may be willing to leave the risk of such action entirely to a separate entity to mitigate, and legal amendments may be required to more cleanly shift the liability.

6.1.2 How will a biobank interface with the regulatory context?

From the foregoing chapters, it is clear that at present biodiversity exchanges in New Zealand are generally ad hoc, and that quality control and consistency is virtually absent. Many regions have limited to no mandatory quality control of exchanges, and a large envelope of permitted activities

that could harm significant ecosystems. A murky context for biodiversity exchanges generates the most risk to nature. In the absence of a coherent national framework for exchanges, biobanking is unlikely to be able to contribute significantly at any great scale to improving the quality of exchanges overall.

At present, a biobank scheme in New Zealand would either need to focus merely on delivery of existing exchanges or provide its own gateway for quality control. The former is far from ideal and should not be pursued. This is because doing a bad exchange very well does not make achievement of no net loss or any other overarching goal more likely, and will fail to delimit the impact of poor decision-making (e.g. a council approves a significant loss of rare and irreplaceable habitat accompanied by an impact management proposal that does not meet good practice tests). Doing this would also undoubtedly erode the credibility of the scheme and detract from any positive outcomes it has generated in other projects.

For the purposes of a pilot, this question is relevant. Do we assume the statutory framework will remain as it is and focus on creating a biobank mechanism that will deliver exchanges well, irrespective of their base quality? This is rejected as it is unlikely to improve the context for biodiversity, other than to

do bad things well and for longer. Quality control is essential; therefore a pilot should have exchange restrictions whether or not they are provided for in the regulatory framework. It is noted that this may introduce a requirement for additional conservation actions not demanded by the regulatory framework, and thus may limit participation.

Overall, the regulatory framework is underdeveloped and likely unable to form a coherent regulatory basis for biobanking at this time. The present gaps include clear and nationally agreed terminology surrounding ecological exchanges (including express recognition of the mitigation hierarchy in legislation), the ability to secure conservation gains in advance of development impacts and the ability to transfer liability to a third party for delivery of those gains. On that basis, further work is recommended that uses the prospect of biobanking as a catalyst to address key outstanding issues with ecological exchanges. So, rather than accepting the statutory framework as read, this report proposes instead that further work develops a credible basis for such a tool. The next section details how this work might be structured.

CHAPTER SEVEN: SUGGESTED FURTHER WORK

Biobanking is a systematised means of delivering impact management, and has the potential to improve security of the exchanges and to reduce transaction costs. Despite these benefits, the introduction of a biobank concept can also serve to enable and expedite inappropriate exchanges in the absence of robust restrictions. So, if it is to be rolled out, it should be a world class scheme that reflects international best practice and New Zealand's unique biodiversity context. The likelihood that this could be achieved will depend on the design of the scheme, the nature of the administering body and the response from resource users and landowners.

Biobanking in New Zealand has merit in that it is potentially capable of addressing some of the most high-risk and pressing dimensions of ecological exchanges. However, implementing it poorly, without adequate regard to its limits, is likely to cause significant ecological harm. A further research project is proposed to better understand the key issues outlined in this document. There are five main components it should cover:

- **Statutory context** for ecological exchanges in New Zealand – where are we at and where do we need to be?

- Social research into **stakeholder perspectives** on key issues in ecological exchanges and the prospect of biobanking

- **Iwi rights and interests** and the interplay with ecological exchanges and the prospect of biobanking

- **Policy development** issues and options

- **Modelling scenarios** to unpack real world barriers and opportunities using a combination of past and presently proposed exchanges

The suggested scope of all sections is set out in more detail below. The objectives of these lines of inquiry are to both (a) develop a stronger understanding of what it would take to introduce biobanking and (b) develop a sufficiently targeted pilot project that is likely to provide a clear indication of the utility of doing so. The work may also serve as a catalyst for the improvement of the underlying regulatory context for ecological exchanges.

Statutory context

The existing statutory context, strengths and weaknesses and what needs to change should be canvassed in detail. This should occur at all present levels of policy including:

- Nationally relevant statutes/regulations and the prospect of further direction/guidance or law changes (i.e. NPS or the use of National Planning Standards in the Resource Legislation Amendment Act 2017)

- Existing and proposed plans and policy statements at regional and district levels – what are the best ones and why?

- The existing and potential ancillary legal mechanisms required to facilitate biobanking – what's available and what needs to be developed?

The objective of this part of the research should be to develop a pathway of legislative and policy amendment that would provide a robust context for ecological exchanges, including one or more proposed structures of a biodiversity bank. It should consider the various ways in which elements, such as transferring liability under the RMA, could be achieved and recommend the best and most efficient way forward.

Stakeholder perspectives

A programme of semi-structured interviews or similar should be undertaken to elicit views on the potential or otherwise of biobanking in New Zealand (from both demand and supply sides). Questions should also canvass the underlying context for ecological exchanges. Relevant stakeholders include:

- Business

- Central government

- Councils

- NGOs

- Iwi
- Industry groups
- Landowners

The purpose of this section is to elicit thoughts and experiences from those engaged in ecological exchanges more generally and those with an interest in it (i.e. NGOs). Insight from earlier work could also be drawn on, such as in the interview programme in Brown (2014).[63]

Iwi rights and interests

Due to the unique relationship between Māori and the environment, and indeed the Treaty Partnership with the Crown, the perspectives of iwi and hapū on ecological exchanges and biobanking's promises and perils require special attention. The specific methodology for this section should be developed by those with appropriate and relevant expertise, with the objectives set out below:

- To illustrate Māori perspectives on ecological exchanges and biobanking
- To consider the logistics of participation by Māori in either the supply or demand side
- To consider what elements are of greatest benefit and deepest concern and develop specific suggestions on how these may be addressed (if possible)

Policy development

Having regard to the series of key issues set out in Table 1, this section of work should develop – with appropriate technical input – the potential policy responses to the issues raised. For example, a key issue facing the New Zealand context is the high level of endemism in both our flora and fauna and a preponderance of ancient ecosystems.

As such, an important aspect of the policy development component is to consider how the policy settings may protect against inappropriate exchanges. This is also likely to require engagement with another important component: how fit for purpose is our biological information to inform such parameters and is further investment needed? When suggesting various parameters, researchers should be mindful of the implications of those restrictions on the functionality of a future system.

Modelling scenarios

As part of the above, it is suggested that real life cases are used as the basis to model what biobanking might look like in a New Zealand context. The case studies drawn upon earlier in the report demonstrate the utility of considering real life examples to ensure that any pilot or eventual system matches the realities of the New Zealand policy context.

Summary

The aim of this second research report should be to determine exactly when and how a pilot system should be trialled, and subject to what outcomes being achieved, either first or in parallel. A more detailed basis for pilot design is considered necessary to ensure that the prospect of biobanking is fully canvassed.

CHAPTER EIGHT: CONCLUSION

The purpose of this project was to investigate the feasibility of biobanking in a New Zealand context, having regard to:

- Our current law and policy on biodiversity management, particularly biodiversity offsetting (referred to generally as 'ecological exchanges') and how biobanking may interact

- The international experience of biobanking

- The potential risks and benefits of biobanking to New Zealand, including the risks to biodiversity

Finally, the report considered the viability of a biobanking pilot scheme in New Zealand and set out the matters further work should address in order to present a fair and full evaluation of potential.

This report finds that our current law and policy on biodiversity impact management is unlikely to provide an adequate basis at this time for a robust biobanking system due to a need for:

- Nationally and regionally agreed definitions and consistent policy development

- Legal mechanisms to secure biodiversity gains in advance of development

- Mechanisms that enable the transfer of liability for fulfilling consent conditions from consent holders to other parties in full

- Better biodiversity data to act as a decision-support tool in a statutory setting

International experience reflects the importance of a robust regulatory basis founded on detailed and consistent data to drive participation and help ensure positive outcomes for nature.

This report also recommends further research into the issues and options that do and could underpin biobanking in New Zealand, capturing its potential as a catalyst to strengthen the regulatory context for biodiversity exchanges and to ensure the public interest in nature is adequately safeguarded. Key aspects of further research should include:

- Social research into **stakeholder perspectives** on key issues in ecological exchanges and the prospect of biobanking

- An examination of **Iwi rights and interests** and the interplay with ecological exchanges and the prospect of biobanking

- **Modelling scenarios** to unpack real world barriers and opportunities using a combination of past and presently proposed exchanges

The production of an Issues and Options Paper that investigates in more detail the key issues highlighted by this report would be the best way to progress this concept.

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APPENDIX Summary of international examples of biobanking

Location & scheme	Description	Administrators	Users	Outcomes
NSW Biobanking, 2008	Biobanking Assessment Method, Biobanking Credit Calculator. No net loss model.	Voluntary scheme, administered by state government.	Landowners and developers through a biobank scheme.	Complex scheme with low uptake, low social and cultural licence. Ecological outcomes unknown.
Victoria BushBroker, 2006	Ecological Vegetation Classes and Habitat Hectares (vegetation credits). Began as net gain, but modified to no net loss to free up the market.	Regulatory	Landowners (vegetation credits), developers (with offset obligations to meet), agencies.	Largest scheme in Southern Hemisphere. Ecological outcomes unclear.
US wetland mitigation banking, 1972	Compensatory mitigation credits (gained through restoration, creation, enhancement or preservation). No net loss.	Voluntary	Voluntary, market based. Anyone wishing to establish a bank must meet tests, and credits can't be traded until they exist. Credit value is market driven.	74% achieving no net loss in area, but overall was causing more than 20,000 ha in net loss.
US Endangered Species, 2003, with 2017 update	Income is generated from providing permanent habitat for species that are threatened or at risk.	Voluntary, administered by US Fish and Wildlife Service	Voluntary. Anyone wishing to establish a bank requires third party easement over the land and endowment fund. Tax incentives offered.	Too early to assess.
Germany land development policy, 1970s	Eco-accounts, within which are eco-point credits based on impact categories, and spatial planning. No net loss.	Regulatory, administered by federal and state governments	Various	Good performance in encouraging reduction in impacts on biodiversity and implementing the polluter-pays principle, but poor compliance and long-term monitoring.