



Organisation: Biodiversity and Agri-Policy Group, University of Otago

Janice Lord (Associate Professor, Department of Botany)

Sara Walton (Professor, School of Management)

Viktoria Kahui (Senior Lecturer, Economics)

Joel Hjelte (Postgraduate Student, Economics)

Matthew Larcombe (Senior Lecturer, Botany)

Craig Bunt (Professor, Agricultural Innovation Programme Director)

Submission on **“Helping nature and people thrive”**

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Tēnā koutou katoa,

We are a multi-disciplinary team at the University of Otago researching the opportunities and implications for rural communities of Aotearoa New Zealand’s journey towards a net zero carbon future. Our research is rooted in farmer perceptions, responses to policy and behavioural drivers within the context of wellbeing, environmental stewardship and economic prosperity. For example, we recently conducted a study about conflicts between what it means to be a ‘good farmer’ and changes in freshwater policy (Walton et al. 2023).

An important insight from our engagement with farmers is that managing freshwater quality and native biodiversity is foremost about managing people. Farmers and other landowners are experiencing multiple pressures from changes in freshwater management (National Policy Statement for Freshwater Management 2020), biodiversity directives (National Policy Statement for Indigenous Biodiversity 2022) and the requirement to measure emissions on farms (He Waka Eke Noa 2019, 2022). This is leading to tension between biodiverse practices and productive land use on privately owned land in Aotearoa New Zealand and globally. Protecting native biodiversity on privately owned land has regional and national benefits but establishment costs, compliance costs and opportunity costs from forgone income (Clough, 2000) are borne by the landholder. These opportunity costs are often overlooked and land practices that protect and enhance biodiversity on privately owned land currently lack both financial incentives and financial establishment support for their uptake.

We are currently researching aspects of biodiversity credits as an innovative tool to provide positive, financial incentives for biodiversity uptake, and were very pleased to see the Government's consultation document 'Helping nature and people thrive'. Our research so far has focused on categorising biodiversity credit systems worldwide by system type (markets/direct payments/hybrids), evaluation method, monitoring mechanism and landholder incentive (see Appendix 1 for an overview). We are also liaising with local catchment groups Otago South River Care and Tiaki Maniototo as part of further research.

Based on our experience and knowledge so far, we would like to provide some comments on the proposed Biodiversity Credit System (BCS) as per below. A short summary of our key comments is as follows:

- We strongly support the development of a New Zealand Biodiversity Credits Scheme
- We strongly recommend that a Biodiversity Credit Scheme be **outcomes based** not activities based and be for biodiversity-positive outcomes only, to avoiding negative outcomes. An outcomes based credit scheme avoids the issue of how long a project should be eligible for credits - if outcomes continue to be positive, then credits could continue to be earned.
- The BCS must be flexible to allow for **cost-effective** creation of biodiversity credits by landowners; and should build on existing farm plans, technologies and carbon trading platforms to keep transaction costs low. This will incentivise support and uptake by the private sector.
- We therefore recommend adding the principle: "Flexible and cost-effective" as one of the most important four principles.

Please do not hesitate to contact us if you have any further questions or would like to discuss any other issues.

Questions

- 1 *Do you support the need for a biodiversity credit system (BCS) for New Zealand? Please give your reasons.*

We fully support the need for a BCS and think the Government's consultation document is timely.

Aotearoa New Zealand's journey towards a net zero carbon future has been particularly difficult for farming communities, which are experiencing multiple pressures from freshwater management, biodiversity directives and carbon measurement requirements.

Conventionally, agriculture, horticulture and forestry operations have narrowly focused on production and have been incentivised to do so, but New Zealand's future requirements will be best met by multi-dimensional farming systems that can satisfy the demands of a combination of food production, biodiversity protection and emissions reduction.

What needs to be addressed is how the transition to multi-dimensional farm systems can be effectively facilitated and incentivised. In addition to the benefits for native species and ecosystems identified in the Government's discussion document, we think a BCS will also provide the following **benefits**:

1. Landowners could have an alternative income stream to compensate for forgone income (opportunity costs) from significant natural areas. This is likely to be especially valuable for communally owned Māori land which often includes areas of high biodiversity integrity but limited economically viable income streams. Biodiversity credits could provide a source of financial income for iwi and hāpu, and may help address the Government's obligation under the Te Tiriti o Waitangi.
2. Biodiversity credits can reduce the difference in return on investment between native and exotic forests planted for carbon sequestration, thus reducing the current undesirable incentivisation of fast-growing exotic monocultures in the ETS.

The EcoAustralia credit is a good example where 'premium' carbon credits allow for a price mark-up of carbon captured by biodiverse systems. Currently, the Emission Trading System fails to differentiate between sequestration in exotic forests and indigenous forests (a tonne of carbon stored as pine forest is treated the same as a tonne of carbon in native trees). This leads to the unintended consequence that faster growing exotic forests dominate indigenous ones in afforestation despite the long term addition benefits associated with the latter. A biodiversity credit may allow for the development of a stacked credit, which will be better able to differentiate between the total benefits to New Zealand of biodiverse permanent native forest vs. an exotic monoculture.

3. Biodiversity certification can create value for farmers from the perception of customers. Few places globally are in a position to combine agricultural production and other ecosystem services, such as carbon sequestration, with the maintenance and protection of native biodiversity. Aotearoa New Zealand has the potential to gain a competitive advantage through showing evidence of biodiversity enhancement while still producing high quality primary products. Any certification label that is able to distinguish value for which customers will pay a premium can create economic gains for the label holders, i.e. those primary producers who rate highly on biodiversity-friendly land practices will be able to capture economic value from biodiversity protection.

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4. Biodiversity credits could provide a source of income for communally or publicly held land, such as community reserves, council land and National Parks, which may allow for ongoing support for nature based projects such as Jobs for Nature (p. 37) and provide an avenue to fund large-scale ongoing projects such as wilding conifer and pest control.

The **costs** of a BCS can be divided into two categories. Firstly, the **cost of creating biodiversity credits** includes:

- The opportunity cost of land used for protecting, restoring or enhancing indigenous biodiversity, against which biodiversity credits can be claimed, i.e. the opportunity cost represents the income forgone from the next best alternative use of the land.
- The costs of labour, technology, materials and other resources used for activities of protecting, restoring or enhancing biodiversity (e.g. cost of fencing; cost of buying possum traps; cost of paying someone to maintain traps, etc.).

These costs accrue to landowners. Our recent study about conflicts between what it means to be a 'good farmer' and changes in freshwater policy showed that the inflexibility of policy changes made them costly for farmers to implement, thereby reducing motivation to comply (Walton et al. 2023). It is therefore important for the BCS to allow for flexibility such that landowners can create biodiversity credits in the most cost-effective way. For example, if reducing predator densities is a biodiversity outcome, landowners can weigh up accessibility, existing predator densities, alternative use of land and other relevant factors to decide how many credits to create, and where, in the most cost-effective way.

Secondly, **transaction costs** (McCann et al. 2005) include:

- Ex ante costs (the costs of establishing the BCS policy framework) and
- Ex post costs (the costs of administering, monitoring and enforcing the new policy).

These costs are borne by both the government and landowners. For example, for farmers, administrative costs (time and resources invested in doing applications and keeping records) can be kept low if biodiversity outcomes can be measured as part of required farm plans and carbon footprints. It is also important to pilot approaches with users of existing farm-based mapping and recording apps, and platforms already used for biodiversity-focused projects, e.g. Trees that Count, TrapNZ, iNaturalist. Adapting existing technologies will greatly improve the accessibility of a BCS and reduce administrative costs to individuals.

For the government, administration costs could be reduced if biodiversity credits are awarded by outcome as this would allow for stacked credits (see p. 43). For example, a carbon credit (recognising the outcome of carbon stored) and biodiversity credit (recognising the biodiversity positive outcome from planting native trees) could be issued for the same project. Linking biodiversity credits to existing carbon credits reduces the costs of implementing a brand new system (measurement, verification, tracing etc.).

The importance of achieving biodiversity goals in the most **cost effective way** cannot be overstated. If it is straight-forward for landowners to adjust their practices to earn biodiversity credits effectively, they are more likely to adopt and support a Biodiversity Credit scheme. Widespread, streamlined adoption in turn lowers compliance and monitoring cost incurred by relevant public agencies. Overall, this allows for biodiversity outcomes to be achieved cost-effectively nationwide.

2	<p><i>Below are two options for using biodiversity credits. Which do you agree with?</i></p> <p>(a) <i>Credits should only be used to recognise positive actions to support biodiversity.</i></p> <p>(b) <i>Credits should be used to recognise positive action to support biodiversity, and actions that avoid decreases in biodiversity.</i></p> <p><i>Please answer (a) or (b) and give your reasons.</i></p> <p>We strongly agree with (a) that rewards should be for biodiversity positive actions. However, this question presupposes that biodiversity credits are awarded based on activities not outcomes. Please refer to our comments below.</p>
3	<p><i>Which scope do you prefer for a biodiversity credit system?</i></p> <p>(a) <i>Focus on terrestrial (land) environments.</i></p> <p>(b) <i>Extend from (a) to freshwater and estuaries (eg, wetland, estuarine restoration).</i></p> <p>(c) <i>Extend from (a) and (b) to coastal marine environments (eg, seagrass restoration).</i></p> <p><i>Please answer (a) or (b) or (c) and give your reasons.</i></p> <p>A BCS could eventually cover all environments, including terrestrial, freshwater and coastal, which aligns with Te Ao Māori that all ecosystems are inter-connected. However, it may be wise to trial terrestrial systems first. Wetland protection and riparian planting is already required under the new freshwater regulations. Some thought needs to be given as to what positive outcomes above those required by the regulations could be eligible for biodiversity credits.</p>
4	<p><i>Which scope do you prefer for land-based biodiversity credits?</i></p> <p>(a) <i>Cover all land types, including both public and private land including whenua Māori.</i></p> <p>(b) <i>Be limited to certain categories of land, for example, private land (including whenua Māori).</i></p> <p><i>Please answer (a) or (b) and give your reasons.</i></p> <p>(a) All land types should be covered for the reasons provided above.</p>
5	<p><i>Which approach do you prefer for a biodiversity credit system?</i></p> <ul style="list-style-type: none"> • <i>Based primarily on outcome.</i> • <i>Based primarily on activities.</i> • <i>Based primarily on projects.</i> <p><i>Please answer approach (a) or (b) or (c) and give your reasons.</i></p> <p>We recommend a BCS based on (a) outcomes and strongly caution against credits based on actions or activities alone, based on the following reasons:</p> <ul style="list-style-type: none"> • Biodiversity credits based on activities and projects themselves do not guarantee improved biodiversity. For example, installing predator traps (an action) in itself will not lower predator densities - traps must be regularly checked and baited. • Without sufficient verification of effectiveness, biodiversity credits may leave the door open for “greenwashing”. For example, the activity of planting natives may be use to claim biodiversity credits, but may not translate into actual biodiversity improvements if trees are not protected in the first few years. • Basing biodiversity credits on activities and projects may lead to the <u>perverse</u>

outcome that landowners focus on reducing costs to achieve a given activity as opposed to reducing costs to achieve an increase in biodiversity. For example, an activity or action of placing 100 traps may lead to landowners placing predator traps in the most accessible land, even if predator densities are low. An outcome of trapping 100 predators per given area, however, is likely to encourage the placing of traps in areas with higher predator densities to achieve higher catch rates.

- We disagree with the ‘disadvantage’ in Table 1 (p.15) that an outcomes based system will “generally require longer timeframes to create value”. For example: An ACTION might be installing predator traps; the corresponding SHORT-TERM OUTCOME would be catch rate and reduction of predator densities; a LONG-TERM OUTCOME would be maintenance of low predator densities and increased nesting success of predation-sensitive birds. Similarly, fencing is an ACTION: an area being cleared of domestic and feral stock is a SHORT-TERM OUTCOME, regeneration of browsing sensitive rare plants is a LONGER TERM OUTCOME.
- We also think an outcomes-based systems better allows for ongoing accrual of credits as it will, for example, recognise landholder efforts put into effectively maintaining a trap line with the outcome of maintaining low predator densities as opposed to seeing a trapping programme as a single short-term project or activity which will cease earning credits once it is successful, potentially leading to a loss of previous biodiversity gains.
- An outcomes-based system will also allow landholders who already have biodiversity projects and activities underway to still be eligible for credits. We strongly advise against creating a system that only recognises new activities or projects, and disallows existing activities and projects because of lack of additionality, as that could have the perverse outcome of disincentivising the maintenance of gains already made.

Please also note that other types of BCS categorisation, beyond action vs outcome vs project based, may be of benefit. Our research is focused on categorising biodiversity credit systems worldwide by system type (markets/direct payments/hybrids), evaluation method, monitoring mechanism and landholder incentive. Please refer to Appendix 1 for an overview.

6

Should there also be a requirement for the project or activity to apply for a specified period to generate credits?

Please answer Yes/No and give your reasons.

We cannot answer yes or no to this question as it presupposes that biodiversity credits are awarded based on activities. We caution against this approach. If credits are based on outcomes, then as long as biodiversity positive outcomes can be demonstrated then credits can be earned regardless of the timeframe.

7	<p><i>Should biodiversity credits be awarded for increasing legal protection of areas of indigenous biodiversity (eg, QEII National Trust Act 1977 covenants, Conservation Act 1987 covenants or Ngā Whenua Rāhui kawenata?</i></p> <p><i>Please answer Yes/No and give your reasons.</i></p> <p>Yes- awarding biodiversity credits to covenants that currently are unable to seek economic value creation for costs incurred (e.g. costs of fencing; trapping; etc.) would be useful and enabling for the likes of the QEII National Trust. Our previous Masters student Cullinane (2019) showed that the help QEII provides to landowners is beneficial in developing the covenants. Thus, being able to generate some income through a biodiversity credit scheme would help encourage more covenants across the motu.</p>
8	<p><i>Should biodiversity credits be able to be used to offset development impacts as part of resource management processes, provided they meet the requirements of both the BCS system and regulatory requirements?</i></p> <p>We are inclined to say no because the nature and purpose of off-sets is already well defined under the RMA. BCS would presumably involve investment in an existing outcome so there could very likely be a net spatial loss of natural areas, which opposes the aim of off-setting to result in a net gain.</p>
9	<p><i>Do you think a biodiversity credit system will attract investment to support indigenous biodiversity in New Zealand?</i></p> <p><i>Please give your reasons.</i></p> <p>Yes- as long as the scheme is transparent and trustworthy. It is our experience that there is a genuine need for more investment to incentivize biodiversity-positive outcomes especially on private land, and there is strong interest in the business and philanthropic communities to partner with genuinely beneficial outcomes.</p>
10	<p><i>What do you consider the most important outcomes a New Zealand biodiversity credit system should aim for?</i></p> <p>Incentivize and reward activities that result in ongoing biodiversity-positive outcomes, especially in private land and whenua Māori, within the context of an accessible, affordable, transparent, and trustworthy verification scheme.</p>
11	<p><i>What are the main activities or outcomes that a biodiversity credit system for New Zealand should support?</i></p> <p>It is not clear how this question differs from #10. Important biodiversity outcomes that could benefit from a BCS scheme include:</p> <ul style="list-style-type: none"> • Reduction in pest plant and animal abundance including introduced predators • Re-establishment of previously locally extinct native species • Increase in native species richness, diversity and abundance, and native ecosystem structural complexity (e.g. re-establishment of ground cover and epiphyte layers) • Restoration to increase area of native ecosystem or improve successional trajectories • Increase in landscape connectivity for native species (note this is scale dependent and will differ for invertebrates vs birds) • Improved climate change resilience (e.g. climate-adjusted provenancing, genetically diverse plant sources, management that improves survival during

	extreme events, e.g. fire - see Lord et al. 2022)
12	<p><i>Of the following principles, which do you consider should be the top four to underpin a New Zealand biodiversity credit system?</i></p> <p><i>Principle 1 – Permanent or long-term (eg, 25-year) impact</i></p> <p><i>Principle 2 – Transparent and verifiable claims</i></p> <p><i>Principle 3 – Robust, with measures to prevent abuse of the system</i></p> <p><i>Principle 4 – Reward nature-positive additional activities</i></p> <p><i>Principle 5 – Complement domestic and international action</i></p> <p><i>Principle 6 – No double-counting, and clear rules about the claims that investors can make</i></p> <p><i>Principle 7 – Maximise positive impact on biodiversity</i></p> <p>Leaning on the experience with carbon credits, we consider the first three principles as the most important for a successful BCS. The fourth principle, not listed here, should state: “Flexible and cost-effective”.</p> <p>Also note, principle 7 is more important than principle 4, as a requirement for additionality may rule out activities currently generating biodiversity-positive outcomes. Principle 6 is incorporated into Principles 2 and 3.</p>
13	<p><i>Have we missed any other important principles? Please list and provide your reasons.</i></p> <p>See above. Our proposed new Principle – Flexible and cost-effective</p>
14	<p><i>What assurance would you need to participate in a market, either as a landholder looking after biodiversity or as a potential purchaser of a biodiversity credit?</i></p> <p>For potential purchasers an independent verification agency, such as the Gold Standard in the Voluntary Carbon Market, will be important, as will longevity assurance (hence the value of rewarding legal protection). For biodiversity managers, having an understandable system for MVR, as well as an accessible platform for communicating the biodiversity values on offer and forming transparent relationships with investors. We also see a role for catchment and landcare groups and organizations such as QEII National Trust to assist smaller diversity managers to engage with a BCS and potentially be an avenue for bundling a number of biodiversity-positive offerings into a larger package in order to reduce the administration load for individual landholders.</p>
15	<p><i>What do you see as the benefits and risk for a biodiversity credit market not being regulated at all?</i></p> <p>Benefits:</p> <ul style="list-style-type: none"> • Increased Participation: A lack of regulation might encourage more entities to participate due to lower barriers to entry. • Innovation: The freedom to experiment without bureaucratic restrictions could result in novel and efficient mechanisms for biodiversity conservation and credit generation. • Rapid Market Establishment: Without regulatory hurdles, the market might develop faster, potentially leading to quicker positive impacts on biodiversity. • Flexibility: Entities would be able to adapt and change their strategies quickly in response to market signals, without the need to wait for regulatory approval.

	<ul style="list-style-type: none"> • Cost Effectiveness: With no regulatory compliance costs, the overall expense of participating in the market might be reduced. <p>Risks:</p> <ul style="list-style-type: none"> • Lack of Standards: Without regulation, there may be no consistent methodology for determining what constitutes a biodiversity credit. This could lead to a proliferation of credits of dubious value, undermining the market's credibility and effectiveness. • Fraud and Misrepresentation (“Greenwashing”): Absent oversight, unscrupulous actors might exaggerate or fabricate biodiversity gains to generate and sell more credits. • Environmental Harm: There is a risk that certain activities or projects, while producing credits, might have other environmental or social externalities that a regulatory framework would otherwise prevent. • Market Volatility: A completely unregulated market could be susceptible to bubbles, crashes, or manipulation, which could deter long-term investment and planning. • Inequity: Without regulations, there might be disparities in how benefits (or harms) from the market are distributed, potentially disadvantaging certain communities, ecosystems, or species. • Short-Term Focus: Market participants might prioritize short-term profit over long-term biodiversity conservation. • Reputational Risk: A scandal or perceived inefficacy in an unregulated market could tarnish the reputation of biodiversity credit systems more broadly, even those in regulated environments. • Perverse incentives: If the market doesn't actually lead to real biodiversity gains, resources (money, time, and attention) might be diverted from more effective conservation strategies. • Lack of Public Trust: People might distrust an unregulated market, believing it to be a guise for corporations to continue damaging practices without real accountability.
16	<p><i>A biodiversity credit system has six necessary components (see figure 5). These are: project provision, quantification of activities or outcomes, monitoring measurement and reporting, verification of claims, operation of the market and registry, investing in credits.</i></p> <p><i>To have the most impact in attracting people to the market, which component(s) should the Government be involved in? Please give your reasons.</i></p> <p>The government’s main role needs to be to establish rules and regulations to have an efficient, transparent, and trustworthy BCS system. It needs to do this through minimal intervention to not stifle innovation. Of the 6 components:</p> <ol style="list-style-type: none"> 1. <i>quantification of activities or outcomes, monitoring measurement and reporting, verification of claims, operation of the market and registry</i> <ul style="list-style-type: none"> • It's essential that each component mentioned above is governed by a structured framework, established and reviewed annually by the government. When drafting these regulations, flexible terminology should be employed to accommodate potential changes over time. An illustration of effective governance might be the creation of a certification system for third-party verification providers. Such a

	<p>system would promote innovation, as these entities vie for efficiency, yet ensures a consistent standard of quality. This approach, aiming for minimal intervention while guaranteeing a baseline quality, can be adopted for the other components as well.</p> <p>2. <i>project provision, investing in credits</i></p> <ul style="list-style-type: none"> • While government intervention can potentially lead to inefficiencies, it's crucial to recognize that BCSs aren't directly comparable to fungible assets like carbon credits. Some projects or credits might not be readily marketable due to specific factors, such as unique terrains, targeted biodiversity objectives, or timing constraints, yet they still hold significant value. It should be within the government's purview to financially back these initiatives, even if it means investing above current market rates. However, it's imperative to limit such interventions to avoid skewing the market dynamics. The government should transparently outline the circumstances under which they would support projects or credit investments at premium rates and delineate frequency constraints.
17	<p><i>In which areas of a biodiversity credit system would government involvement be most likely to stifle a market?</i></p> <p>This is a good question, and comes down to providing enough flexibility for cost-effective ways to create biodiversity credits, as well as keeping transaction costs low. For example, creating undue administrative burdens for landowners and public agencies in measuring, monitoring and enforcing of the BCS has the potential to be stifling and an administrative bottle-neck.</p>
18	<p><i>Should the Government play a role in focusing market investment towards particular activities and outcomes and if so why? For example, highlighting geographic areas, ecosystems, species most at threat and in need of protection, significant natural areas, certain categories of land.</i></p> <p>See comments in response to 16. Yes, this should be an option as not all important (biodiversity wise) opportunities will be capitalized on by an efficient market- some species and ecosystems are regarded as more charismatic than others (see RNZ Interview with Sophie Fern 2022), or the values more communicable. The government needs a lever to pull to prioritize specific projects. This should be done through the existing infrastructure and kept to a minimum.</p>
19	<p><i>On a scale of 1, not relevant, to 5, being critical, should a New Zealand biodiversity credit system seek to align with international systems and frameworks? Please give your reasons.</i></p> <p>3, New Zealand needs to design a system that works for New Zealand first. However, significant funding is required to achieve biodiversity targets for New Zealand. Aligning the BCS system, when possible, to international standards will allow international investors easier access and high value from New Zealand biodiversity credits. A BCS that does not accommodate and thrive domestically will be sure to fail internationally. Therefore, a compromise of 3 is listed - align when possible and consider international implications where not.</p>
20	<p><i>Should the Government work with private sector providers to pilot biodiversity credit system(s) in different regions, to test the concept?</i></p> <p><i>If you support this work, which regions and providers do you suggest?</i></p>

Yes, we support the government working with the public AND private sector to pilot systems, and we strongly recommend that pilots encompass a representative range of NZ situations in both islands. In the private sector, we suggest working with existing catchment groups, community groups and organisations such as QEII Trust, drawing research input for design and analysis from a wide range of Mātauranga Māori, biodiversity and social science providers.

It is also important that a wide range of research providers (tertiary, CRI, etc.) are involved in pilot studies encompassing a fully representative suite of biodiversity scenarios throughout New Zealand in order to develop market frameworks with the widest possible applicability.

References

Clough, P. (2000). Encouraging Private Biodiversity – Incentives for Biodiversity Conservation on Private Land. https://www.treasury.govt.nz/sites/default/files/2018-01/twp00-25_1.pdf

Cullinane, A. (2019). What are the drivers and constraints of QEII private land covenants? Master of Sustainable Business Project. Dunedin, University of Otago.

Lord, J.M., Schloots, C.-S., Steel, J.B. (2022). Flammability trajectories following destocking and forestation: a case study in the New Zealand high country. *Restoration Ecology* 30: e13696. <https://onlinelibrary.wiley.com/doi/pdf/10.1111/rec.13696>

McCann L., Colby B., Easter K.W., Kasterine A., Kuperan K.V. (2005). Transaction cost measurement for evaluating environmental policies. *Ecological Economics* 52:527-542

RNZ (2022) “Sophie Fern: Are New Zealand's cute and cuddly native species being favoured over those less charismatic?” Nine to Noon interview, 22 November 2022. <https://www.rnz.co.nz/national/programmes/ninetonoon/audio/2018868861/sophie-fern-are-new-zealand-s-cute-and-cuddly-native-species-being-favoured-over-those-less-charismatic>

Walton S., Lord J.M., Lord A.J. and Kahui V. (2023). Conflicts between being a ‘Good Farmer’ and freshwater policy: a New Zealand case study. *Agriculture and Human Values* <https://doi.org/10.1007/s10460-023-10471-1>

Appendix 1. Payment for Ecosystem (PES) is a conservation strategy that provides incentives to landowners to maintain or enhance ecosystem services (biodiversity), fostering a sustainable relationship between human activities and environmental preservation.

System Types:	Biodiversity Evaluation	Evaluation & Monitoring Mechanisms:	Landholder Incentive
<p>Markets:</p> <ul style="list-style-type: none"> • Voluntary Market: Fully voluntary, no restrictions. ClimateTrade(LatAm) • Regulated Market: Specific government requirements on what is considered biodiverse, usually also comes with cost guidelines. NatureRepair(AUS) • Mandatory Market (Offset): Developers must purchase offset credits based on their disruption. Always combined with regulations. VegetationLink(AUS) <p>Direct Payment:</p> <ul style="list-style-type: none"> • Government: Directly purchases PES. Can pay through direct purchase, grants, or tax abatement etc. BioConTrust(AUS), WetlandMBP(USA) • Private Company: Individual companies can purchase PES. Motives can be public image, self-interested or as part of an offset scheme. • NGO: International or local NGO's with a specific mandate. Such as QEII(NZ) <p>Hybrid Markets:</p> <ul style="list-style-type: none"> • Market + Direct Purchase: BD projects evaluated both in market and intrinsic value. Offers the best outcomes as high BD + high-cost projects can be funded outside of market forces usually by governments. • Carbon + BD Systems: Systems that bundle carbon offsets with BD offsets. EcoAustralia(AUS), C+BD Pilot(AUS) <p>NZ Proposed Programs:</p> <ul style="list-style-type: none"> • 2015: AccountingModel(NZ) • 2018: RMAOffset(NZ) 	<p>How:</p> <ul style="list-style-type: none"> • Market: Value of BD is determined by market valuation. Not scientifically. • Specific Habitat: Endangered plant/animal habit that is destroyed finds offsets habitat of equal or greater benefit to the target species. ConservationBanking(USA) • Standardised Metrics: Broad metrics such as native animals or plants/m². Equivalent to something like the current ETS in NZ. • Bespoke Metrics: Metrics created for specific eco systems can range from an area to a larger ecosystem classification. Done through targeted scientific evaluation. • Relative Ranking: Projects are compared against each other on biodiversity and feasibility measures. Usually done regionally with the basis for comparison constructed locally. BushTende(AUS), <p>Critical Concepts:</p> <ul style="list-style-type: none"> • Additionality: If BD value is not going to be lost. Then it commands less value, perpetuity contracts still command some. • Perpetuity: Mechanisms generally are placed on ensuring the preserved land stays preserved regardless of sale, transfer individual decisions. • BD Loss Avoidance: Value gained from avoiding BD destruction. • BD Uplift: Value gained from improving BD. <p>Proposed Methodologies:</p> <ul style="list-style-type: none"> • Biodiversity Basket: WallaceProject • A "Practical" Approach: Academic Input 	<p>Who:</p> <ul style="list-style-type: none"> • 3rd Party (Private): In enforced market systems companies are often setup and certified through a gov mechanism to serve as evaluators and brokers. MyNativeForest(NZ), EKOS(NZ) • 3rd Party (NGO): Either directly, or through hiring 3rd party. • Government Agencies: Existing agencies can be leveraged. NZ could be DOC, MFE, MPI and local Gov. Commonly this is certified out. • Local Committees: Assembled specifically to evaluate projects can consist of gov officials, experts, and residents. Composition depends on the focus of the system. • Landholder: common in voluntary markets. Conflict of interest precludes use in mandatory markets. • Purchaser: In mandatory markets the cost of evaluation and certification often falls on the purchaser, who generally use 3rd parties. <p>Tools:</p> <ul style="list-style-type: none"> • Scientific Study: Indicative Biodiversity impact and offset Report • Flow Charts/Point Matrices/Checklists: ALUS, Veglink (5.2), NPSIBAppendix1 • Online Tools: BAM • Computer Simulation: EnSym <p>Potential NZ Starting Points:</p> <ul style="list-style-type: none"> • Fresh Water Farm Plan • Farm Environmental Plans • QEII Covenant Policy/Org. • ETS Auction/Market • NPSIB 	<p>Direct Financial:</p> <ul style="list-style-type: none"> • Market Based Payment: Value of BD is determined via market supply + demand. Payment between purchaser and landholder. Usually market/broker take a cut. Often Auctions are used. • Direct Payment: Negotiated agreement between landholder and seller for specific projects. • Subsidies/Grants: Usually standardised amounts/process between gov and landowners. • Tax Breaks: Extension of subsidies/grants to the tax structure. Perceived publicly as lower cost. <p>Contract/Payment Structures:</p> <ul style="list-style-type: none"> • Repeat: Agreed repeating payment. Provisions for inflation/maintenance can be included. • Upfront: Lump sum payment, needs to be combined with perpetuity agreement. • Bounties: Payment delivered when specific BD metrics are met. • Performance Based: Payment made on relative improvement of BD. • Escalating: Increasing payments to a cap after X periods of preservation. <p>Non-Financial:</p> <ul style="list-style-type: none"> • Biodiversity Certification/Labeling: Official certification of BD product, idea is like organic, BD certified farms could command higher price. AFBCS(Aus) • Land Tenure/Use Rights/ such as increased land rights and increased participation in decision-making processes.