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Impact of sustainable agriculture practices on farmland value

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REPORT FOR: **The Property Foundation**

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Introduction

Recent and proposed changes in legislation, policy, and regulation on carbon emissions, freshwater and biodiversity are placing stricter conditions on the way New Zealand farmers use their land and operate their farming businesses. This is leading to change in the 'highest and best'[1] use of certain areas of farm properties. Some steep hillsides, previously in pastoral use, are being planted in native and exotic tree species, or fenced off for regeneration. Riparian margins are being fenced off from stock access, and planted or left in grass. Remaining wetlands are protected, and new wetlands are being constructed (Norton and Pannell 2018, Gullery 2020).

Two key pieces of legislation driving these changes are the:

- Climate Change Response (Zero Carbon) Amendment Act 2019 (Zero Carbon Act) and the
- Climate Change Response (Emissions Trading Reform) Amendment Act 2020 (ETR Act)

The Zero Carbon Act has a target to reduce emissions of biogenic methane to 24% to 47% below 2017 levels by 2050, and to 10% below 2017 levels by 2030. On-farm strategies to achieve these reductions include changing farm systems and stock types, reducing stocking rates while increasing per animal productivity, eliminating additional feed inputs, and using forestry offsets (Journeaux and Kingi 2020).

The ETR Act incentivises afforestation with the introduction of 'averaging accounting' for new post-1989 forests and a new permanent forestry activity for post-1989 forest land. Ministry for Primary Industries (MPI) estimate there was 19,000 hectares of new planting in 2019 dominated by radiata pine (MPI 2020a). Some of the new plantings of exotic forestry will become permanent, however, some participants in permanent forestry may prefer native species due to amenity values and the potential to monetise the value of co-benefits from native forestry (Cortés-Acosta et al. 2020).

The Essential Freshwater policies and regulations that came into force on 3 September 2020 are also having an impact on the highest and best use of farmland. These regulations require; stock exclusion from natural wetlands, lakes, and rivers; controls for intensive winter grazing and feedlots; restricted agricultural intensification and management of excessive nitrogen discharge (Ministry for the Environment [MfE] 2020). The draft National Policy Statement for Indigenous Biodiversity is an additional signal of likely change in land use in specific areas. Local Councils will be required to map all significant natural areas (SNAs), which are described in the Resource Management Act 1991 as '*areas of significant indigenous vegetation and significant habitats of indigenous fauna*', against yet to be defined standard criteria. Farming activities are likely to be restricted on land within, or adjacent to, a significant natural area (MfE 2019).

There have also been incentives to change land use. The One Billion Trees Programme aims to increase tree planting across New Zealand with a focus on "the right tree, in the right place, for the right purpose", and a stated intent to integrate trees into the landscape to complement and diversify existing land uses. Outcomes of this programme include protection and improvement of soil, water quality and other natural resources, increased

1 The definition of highest and best use used by the NZ valuation profession is '*The highest and best use must be physically possible (where applicable), financially feasible, legally allowed and result in the highest value. If different from the current use, the costs to convert an asset to its highest and best use would impact the value.' (International Valuation Standards Council [IVSC], 2019).*

biodiversity, and enhanced natural landscapes. In the first 18 months of the programme, landowner grants were paid for indigenous planting and reversion of 11,157 hectares (MPI 2020b).

At the same time, farmers are required or encouraged by local authorities and/or industry to keep a more detailed inventory of their farm using some form of farm plan. Freshwater Farm Plans will soon be mandatory, most likely for all arable and pastoral farms over 20 hectares and horticultural blocks of over five hectares. Requirements for Freshwater Farm Plans will be confirmed in mid-2021, and are likely to include; identification of farm features such as waterways, effluent discharge and erosion prone areas; risk assessment across specific activities including application of fertiliser and effluent; and a schedule of actions to manage the identified features and address environmental risks (MfE 2020).

There is also an emerging trend in sustainable finance. The Sustainable Agriculture Finance Initiative is developing a classification system for sustainable agriculture for the finance sector to use in considering farm finance and investment in New Zealand (The Aotearoa Circle 2020). Environmental management is currently factored into the finance cost for all farm finance with farmer attitudinal data on environmental, social and governance (ESG) criteria and environmental management included in bank's rating system for setting interest rates. This is likely to be taken further in the future with funding linked to the sustainability performance of the farm business as measured by key performance indicators. A farm business with high sustainability performance will secure asset value, whereas one with poor performance may risk a reduction in value.

These changes and initiatives are designed to improve environmental outcomes and enhance the state and value of New Zealand's natural capital[2], providing benefits to the landowner and the public. Given increased interest in, and understanding of, the importance of natural capital and ecosystem services[3], it is timely to reconsider the relationship between total economic value and market value of different classes of farmland. These concepts are defined as follows.

> Total Economic Value (TEV) is *'the sum of all benefits obtained from a resource. TEV = Use Value + Option Value + Bequest Value + Existence Value'* (Sharp B & Kerr G 2005).
>
> Current market value (CMV) is *'the estimated amount for which an asset or liability should exchange on the valuation date between a willing buyer and a willing seller in an arm's length transaction, after proper marketing and where the parties had each acted knowledgeably, prudently and without compulsion'* (IVSC 2019).

This report focuses on the valuation of non-timber plantings on farmland to improve the provision of ecosystem services at a farm scale, including areas of native forest, shrublands, wetlands, riparian margins, space planted trees for erosion control and shelterbelts. These plantings aid in regulating the flow of water into rivers and streams, storing carbon, purifying water, and providing shade for livestock and habitats for native

2 Natural capital refers to "all" aspects of the natural environment. It includes individual assets such as minerals, energy resources, land, soil, water, trees, plants, and wildlife. And, also includes broader ecosystems and their services – i.e., the joint functioning of, or interactions among, different environmental assets, as seen in forests, soil, aquatic environments and the atmosphere. (van Zyl and Au, 2018)

3 Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth. (Millennium Ecosystem Assessment, 2005)

species. The annual value of the provision of ecosystem services from land in non-productive plantings is significant (Patterson and Cole 2013; Cameron et al. 2020), however this may not be reflected in the current market value of the land.

Research into the market value of non-productive plantations on farmland is limited. A small number of farmer respondents to a survey investigating attitudes to biodiversity expressed a belief that the value of their farm would be increased due to improved biodiversity (Maseyk et al. 2021). Similarly, a group of Taranaki farmers believed that property value would be increased by riparian planting since a fully fenced and planted farm would be more attractive to buyers due to cost savings on fencing and planting (Maseyk et al. 2017). It has also been argued that there are significant benefits in integrating indigenous biodiversity on farm, enabling famers to receive a premium for products (Norton et al. 2020) and increasing sustainability and farm resilience to climatic extremes (Maseyk et al. 2019). These benefits could be recognised by the market and factored into the land value.

Non-productive planting could also decrease total farm value if areas of indigenous vegetation are designated by the Local Council as SNAs. This is of concern to farmers with recent protest action in Northland over large areas of land designated as SNA. Landowners are concerned that the designation of these areas will interfere with their ability to farm, increase operating costs, and erode the value of land (Botting 2021).

Rural valuers assess the current market value of farmland using the sales, cost and/or income approaches to valuation in accordance with industry standards. These approaches are unlikely to reflect the total economic value of non-productive land in the valuation. However, as farmers act to lower greenhouse gas emissions, improve freshwater quality and promote biodiversity, we may see a changed attitude in the market to the added value of non-productive land. '*…there's a possibility that the gulf between what the markets value and what people value will close…*' (Carney 2020). To accurately assess the property value rural valuers should consider all the economic and environmental costs and benefits of non-productive plantings, including the non-farmed areas.

Internationally the valuation profession is recognising the importance of ESG factors. The International Valuation Standards Council (IVSC) is now developing a more systematic approach to the incorporation of ESG into business valuation and practice (IVSC 2021) and the Royal Institute of Chartered Surveyors (RICS) has released two papers on the valuer's role in the valuation of ecosystem services (RICS 2017, 2012). They make the point that consideration of ESG factors and total economic value will become more important and foresee new opportunities for valuers to move into this area given their skill base in commercial valuation, land management and client engagement.

This research will investigate valuation methods used to assess the CMV and TEV of New Zealand farmland that does not maximise potential income to the landowner, but does provide valuable ecosystem services to society. The importance of those services provided by non-productive areas is well recognised and supported by recent and proposed regulation changes, is now being recognised by the finance sector, and should be considered carefully by rural valuers in valuing farmland.

Objectives

The purpose of this research is to investigate current market and total economic valuation methods used to value New Zealand farmland in non-productive use.

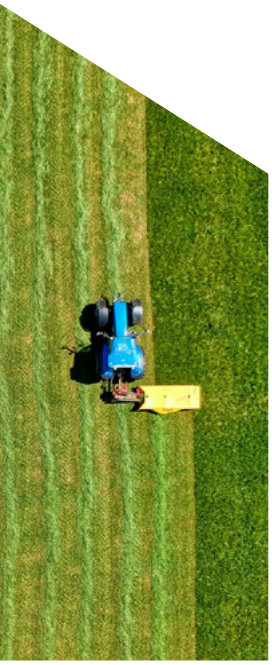
In addition, consideration is given to the relationship between sustainable indicators in agricultural lending decisions and farmland value.

To meet this aim, the following objectives were framed:

1. Current practice to assess total economic value of ecosystem services provided by farmland in non-productive use will be identified
2. Methods used in New Zealand for assessing current market value of non-productive farmland will be identified
3. The incorporation of sustainable indicators in farm finance will be examined

To explore the first objective, the New Zealand literature on valuation of natural capital was reviewed. Practicing rural valuers were surveyed to investigate the second objective. A rural banker was interviewed to gather information on the third objective.

The next section covers the review of relevant academic and grey literature, followed by the survey and interview methods and results.



Literature

This literature review focuses on current practice used in New Zealand to assess the total economic value of natural capital with an emphasis on the methods used to value ecosystem services provided by non-productive farmland.

The state and value of New Zealand's natural capital

Two new indicators, the Genuine Progress Indicator (GPI) and the Living Standards Framework (LSF), have been developed to assist Government decision making and overcome the shortcomings of using Gross Domestic Product as a measure of well-being (Patterson et al. 2019, The Treasury 2019). GPI and LSF both include consideration of environmental, as well as social and economic, indicators and go some way towards highlighting changes in the state of New Zealand's natural capital.

The GPI is widely used globally as a metric to measure economic growth (Kubiszewski et al. 2013) and involves a macro-scale analysis of the costs and benefits of a range of aspects of economic activity, including measurement of environmental costs. Ten of the twenty-one components that make up the New Zealand GPI are environmental components, three of which provide ecosystem services relevant to farmland use: deforestation of indigenous forests, loss of wetland ecosystem services and loss of soil ecosystem services (Patterson et al. 2019).

New Zealand Treasury developed the LSF and associated LSF Dashboard to consider the collective impact of policies on intergenerational wellbeing. The LSF includes natural capital as one of the 'Four Capitals' (human, financial-physical, social and natural) that provide the basis for the assessment of intergenerational well-being. The LSF Dashboard is a structured database of indicators that provide an integrated system for measuring wellbeing outcomes. The current environmental indicators used are air quality, access to the natural environment, water quality and perceived environmental quality (The Treasury 2019).

This Government recognition of the importance of understanding the quantity, state, and value of natural capital in New Zealand should mean that comprehensive information is available to better inform decision making. However, there are shortcomings with the current environmental reporting system and further work is needed to identify elements of natural capital for measurement and the appropriate methods for measurement, storage, analysis, and access to this data (Upton 2019, StatsNZ and MfE 2015 to 2021).

High-quality environmental data is needed to ensure confidence in assessments of natural capital value and value change. Patterson et al. (2019) found some appropriate time series data (e.g. volumes of indigenous timber harvested annually in the Land Cover Databases) to use in the GPI calculations, but in many cases relevant time series data was not available (e.g. time series data on loss of wetlands, cost of all ecosystem services lost with soil erosion from farmland). van Zyl and Au (2018) investigated ways of measuring the overall value of New Zealand's natural capital but found they did not have the data necessary to calculate overall value. They recommended that Treasury adopt the widely used Total Economic Value framework (Pagiola et al. 2004, OECD 2006) to categorise all the constituents of use

and non-use[4] value of natural capital. This requires correctly identifying and quantifying future income streams of ecosystem services to determine a net present value. They concluded that significant work is required to define the appropriate measures and gather accurate data for each type of natural resource.

Total economic valuation methods and their application in New Zealand

Total economic valuation (TEV) requires assessment of both use and non-use values gained or lost from marginal changes in ecosystem services. Many ecosystem services do not have a market price and value has to be derived using non-market methods. The choice of method will depend on the nature of the ecosystem services and the quality of data available to complete the valuation. 'Use values' are derived from the direct use of an environmental resource (e.g. timber harvest, forest use for recreational activity), the indirect benefit of the ecosystem services supported by a resource (e.g. carbon sequestration, water filtration) and/or from the option to use the resource in the future. 'Non-use' values are derived from having an environmental resource maintained for future generations, for those in the current generation, and/or from the existence of the resource.

Commonly used methods of to assess the TEV of ecosystem services are summarised in Table 1 below. Combinations of these methods have been applied to the valuation of different ecosystem services in New Zealand.

4 Use values comprise provisioning services value (e.g. food, fibre), regulating services value (e.g. flood control, climate regulation), cultural services value (e.g. aesthetics, cultural well-being), and supporting services value (e.g. nutrient cycling, soil formation). Non-use values comprise option value, existence value and bequest value (Patterson and Cole, 2013).

TABLE 1: **Summary of TEV methods used to assess the value of ecosystem services.**

Valuation Approach	Method	Example of application
Market valuation		
Market price	Value based on what market is willing to pay	Income generated from timber harvest
Cost		
- cost avoidance	Value based on costs avoided	The value of a flood control service based on the estimated cost of damage if flooding occurs
- replacement cost	Value based on costs incurred by replacing ecosystem services with artificial technologies	Cost of groundwater recharge estimated from the cost of obtaining water from another source
- restoration or mitigation cost	Value based on cost of mitigating or restoring services	Cost of preventative expenditure, say to avoid flooding in absence of wetland service
Production	Value based on the contribution of an ecosystem service to increased income or productivity	Value of increased agricultural production due to soil fertility
Revealed preference		
Travel cost	Value of a site is estimated by the cost people incur to enjoy it	Value of a National park based on the time and money people spend to travel there
Hedonic pricing	Value is estimated through willingness to pay through purchase in a related market	Property sales data analysed to estimate the premium paid for proximity to a park
Stated preference		
Contingent valuation	Willingness to pay or accept a loss is estimated by direct questioning	Price respondents would pay for improved water quality in a local stream
Choice modelling	Respondents choose between options that have different costs	Preference of respondents to a choice of several alternative, differently costed, effluent disposal options
Benefit transfer		
	Economic values that have been assessed for a study site are applied to a different site	Value of a standing forest based on values derived from research concerning different forests in different locations with adjustments made for the differences

Market valuation methods

Market valuation methods are based on three valuation approaches that are familiar to valuers; market price, cost, and production methods, however, the application of these methods for valuation of ecosystem services differs from a current market valuation approach as TEV is also concerned with capturing and measuring the value of externalities, i.e. the factors, costs and impacts that are not represented in prices paid (RICS 2017). Market value methods focus on use value and may not reflect the non-use value of a resource.

Market price methods use price and quantity information to estimate value of a natural resource. Cost methods assess the value of a natural resource based on either the avoidance, replacement, or mitigation cost to ensure maintenance of the benefits provided by the resource. Productivity methods relate the incremental output of a marketed good or service to a measurable change in the quality and quantity of the natural resource requiring accurate scientific data on biophysical relationships (Bann 2002).

Two New Zealand studies (Dominati et al. 2014a, b) used a range of the market valuation methods to quantify and value natural capital. Their process involved six guiding principles; differentiate ecosystem services from supporting processes, identify and quantify the properties and processes behind each service, differentiate natural capital from added and built capital, identify how external drivers affect natural capital stocks, analyse the impact of degradation processes on natural capital stocks and estimate the economic valuation on measured proxies. This process was used to assess the multiple benefits of soil conservation practices at a paddock scale (Dominati et al. 2014b) and to quantify and value the ecosystem services provided by the volcanic soils on a dairy farm (Dominati et al. 2014a).

Market valuation methods used in these studies included market price (e.g. wood market price for wood fibre service), productivity change, defensive expenditure (e.g. soil nitrogen filtering service by mitigation cost of nitrogen leaching using standoff pad), replacement cost (e.g. soil support for human infrastructure by cost of farm track foundations) and provision cost (e.g. soil filtering of contaminants by cost of constructed wetland). The limitations of the methods used to value some ecosystem services and the need to make assumptions where data was unavailable was noted.

Patterson et al. (2019) used cost methods to value environmental components that did not have a market price in their calculation of GPI. For example, loss of water quality was measured using the avoidance cost of planting riparian strips, and loss of soil ecosystem services was valued by costing the losses from change to urban land use and from accelerated erosion. They also noted limitations of some estimates due to lack of data.

Revealed preference methods

Revealed preference methods (travel cost and hedonic pricing) value an environmental asset by analysing market behaviour associated with its use (van Zyl and Au 2018). Travel cost methods commonly use information about how much people would be prepared to pay to visit a site with specific environmental attributes to infer how much they value changes in quality of those attributes. Hedonic pricing methods often use property sales data to estimate the value of environmental amenities, assuming the

value of environmental amenities will be reflected in the sale price. Hedonic pricing has greater relevance than travel cost to assessing the total economic value of environmental amenities on farmland, however the low volume of farm sales limits the reliability and applicability of hedonic models.

Very few international studies use hedonic analysis to estimate the value of ecosystem services generated by non-productive plantations on privately owned rural land. There are no known New Zealand studies. International studies indicate that ecosystem services that support direct use values, such as services provided by non-productive plantings, are likely to be capitalised into land value while regulating services may only be partially reflected in property price (Ma and Swinton 2011, Polyakov and Pannell 2016).

Hedonic analysis has been used in New Zealand to value soil natural capital, (Samarasinghe and Greenhalgh 2009) and to examine the determinants of rural land value (Stillman 2005). These two studies used rating valuations rather than sale prices to overcome the limitation of low volume of sales data. This decreases the accuracy of results as the rating valuation may not reflect the current market value of the property.

Stated preference methods

Stated preference methods rely on surveys, on stakeholder answers to carefully worded questions. The two main approaches are contingent valuation, where respondents are asked direct questions about willingness to pay for a change in ecosystem services, and choice modelling, where respondents are asked about trade-off between costs and changes in quality of an ecosystem service. These methods are often used to estimate non-use values such as bequest and existence values.

There is growing interest in the value of biodiversity in New Zealand at national and farm level (Maseyk et al. 2019, 2021, Pannell 2020, Norton et al. 2020). Yao (2019) used choice modelling to assess non-market value of biodiversity enhancement by asking survey respondents about their willingness to pay for a proposed biodiversity enhancement programme in New Zealand's planted forests. However, the results were limited by the small response size, highlighting one of the issues of using this approach.

To provide reliable value estimates, stated preference methods require carefully designed survey and sampling methods and sound econometric modelling (Bann 2002). Reliable information has to be provided to ensure reliable values are derived.

Benefit transfer method

Benefit transfer methods adjust the research results from primary studies at a study site to another unstudied site. To have validity the primary study must be accurate, and the study sites should be very similar to the primary study site.

Benefit transfer has been used to value some ecosystem services at farm, catchment, and national scale. Patterson and Cole (2013) quantified the total value of New Zealand's land-based ecosystems and their services using a benefit transfer method to estimate non-market values. They derived values for New Zealand from international studies that had applied a wide range of valuation methods including willingness to pay, replacement cost, willingness to accept compensation, avoided cost, factor income, travel costs, hedonic pricing, conjoint analysis, and choice modelling.

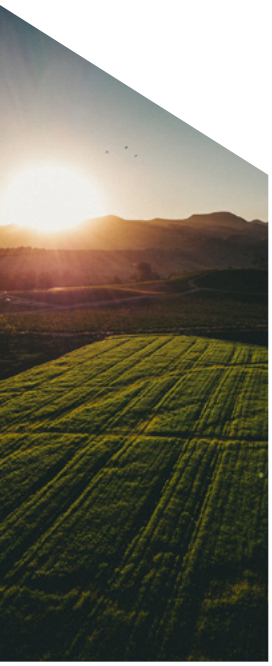
Walsh et al. (2017) used benefit transfer to monetise improvements to water quality and changes in carbon sequestration in research that explored the benefits of permanent forests compared with plantation forests and other land uses on a national and catchment scale. Cameron et al. (2020) quantified the value of ecosystem services provided by Pamu Landcorp farms with a benefit transfer approach using the framework developed for New Zealand by Patterson and Cole (2013). These three studies acknowledged the limitations of the benefit transfer approach but note that it was useful to give indicative results and a broad indication of the importance of different ecosystems and their services.

Annual value of non-productive land classes

An assessment of the annual use value of ecosystem services provided by a range of different non-productive land classes has been derived from academic literature and is presented in Table 2 below.

TABLE 2: **Annual TEV/ha and TEV/ha of ecosystem services for a range of land classes, derived from New Zealand studies (converted to 2021 dollars using Reserve Bank inflation calculator)**

Land class	Regulating value (2021 $NZ / ha/yr)	Provisioning and cultural value (2021 $NZ / ha/yr)	Net annual value (2021 $NZ / ha/yr)	Value/ha (3% cap rate)	Value/ha (10% cap rate)
Forest[5]	3,438	8,584	12,022	400,733	120,220
Established and Regenerating Scrub[5]	690	145	835	27,833	8,350
Established Native Shrublands[5]	596	6	602	20,067	6,020
Wetlands[6]	10,025	4,718	14,743	491,433	147,430
Spaced Planting[7]			492	16,400	4,920



Practicing rural valuers with knowledge of sales of each of these land classes will see a wide difference between TEV and CMV per hectare, most obvious for wetlands and forests. The differences between TEV and CMV indicate that many ecosystem services provided by non-productive plantings are not reflected in the price the market is prepared to pay, and highlight the important role of non-productive land in providing benefits to society.

5 Patterson and Cole, (2013)
6 Patterson et al., (2019)
7 Dominati et al., (2014b) The increase in economic value of ecosystem services due to conservation trees after 10 years

Method

The research approach involved the use of primary data. Firstly an online survey of practicing rural valuers (Appendix I), was used to determine current New Zealand valuation practice for assessing CMV of non-productive farmland. The questionnaire included open and closed-ended questions and covered; classes of non-productive farmland valued, the CMV method used, the application and confidence in each CMV method, the challenges faced when valuing non-productive land and the data/information needed to make an informed valuation assessment. Finally, a definition of TEV was provided (as stated on page 4) and respondents were asked if they had considered assessing the TEV of ecosystem services provided by a farm property, and if they had, the TEV methods used.

Practicing rural valuers were identified from the Property Institute of New Zealand's website and the websites of New Zealand valuation firms. An email with a link to the online questionnaire was sent to 65 practicing rural valuers on 17th February 2021, with a follow-up email a week later. The questionnaire was closed at the end of February and responses collated and analysed.

Secondly a semi-structured interview was used to gather information on incorporation of sustainable indicators in agricultural lending decisions and to investigate the impact such indicators could have on farmland value. As at March 2021 the BNZ was the only New Zealand bank to offer a farm sustainability linked loan. The Head of Natural Capital for BNZ was interviewed on 24th March 2021 to gather information on the loans, the uptake and possible value impacts.

Results

Valuer survey results

Twenty-two rural valuers provided valid responses to the questionnaire. All the respondents had had experience in valuing at least one of the ten classes of land described as non-productive (Table 3).

TABLE 3: **Land classes valued**

Land class valued	No. and % of Respondents
Established native bush	21 (95%)
Regenerating native bush	18 (82%)
Wetlands	18 (82%)
Planted riparian strips	16 (73%)
Fenced, unplanted riparian strips	16 (73%)
Shelterbelts	14 (64%)
Established native shrublands	13 (59%)
Plantation exotic and/or native trees, not intended for harvest	13 (59%)
Plantation manuka	11 (50%)
Spaced planting for erosion control	6 (27%)

CMV approach used

Thirteen valuers only used the sales approach to value non-productive land classes, eight have used the sales and either the cost or income approach and only two valuers used all three valuation approaches.

TABLE 4: **CMV approaches**

Valuation approaches used	No. and % of Respondents
Sales approach	22 (100%)
Income approach	9 (41%)
Cost approach	3 (14%)

The sales approach was the most widely applied approach for valuation of non-productive farmland (all respondents). All the respondents provided comments on how they apply the sales approach. Nine respondents (41%) commented that they analyse sales in detail to derive the value of each land class and land cover. *'Generally, sales can be analysed down to component parts for bush, Manuka, pines etc. over time your confidence in these figures grows with more data.'*

Respondents use two different sales analysis methods to derive values for each non-productive land class. Two respondents (9%) described how they treat non-productive areas as a residual where they have confidence in the value of the productive land areas. *'If analysing a sale that has native bush in it, I have confidence in what the productive land value is worth and productive forestry land is worth based on other sales, then after taking account of improvements and anything else, the residual is taken to be the value of the ineffective bush areas.'*

Nine respondents (41%) described the use of sales of bush blocks or wetland to support their values. *'For specific wetlands, we have researched other wetland sales and also looked for farm properties that have sold with significant wetland components and considered the value allocated (to the wetland component) in our sales analysis.'*

Five respondents (23%) commented on the current value of non-productive land, noting that value was generally observed to be very low/nominal. *'Simply put when valuing economic farms, up till now purchasers only pay nominal sums for non-effective areas that have no income generation capacity or reduce costs.'* The reason for these low values was explained by one respondent *'Though the environment is more front and centre than it has ever been in a farming sense environment compliance tends to be reflected in the productive part of the property rather than the non-productive attributes.'*

The income approach was used by nine respondents (41%). Respondents commented that the income approach has application when there is a known income stream attached to the land. They used the income approach to value; plantations that are registered in the ETS, manuka plantations where there is a known income stream from honey and/or carbon credits, and in situations where there is an income stream from eco-tourism. The income approach is more likely to be used as a check method, as stated by one respondent *'Our income approach is more low level (more support for the sales approach) over the whole property.'*

Only three respondents (14%) used the cost approach, noting that it is only relevant when valuing areas that had been replanted or where work had been done to meet an environmental standard. Two respondents commented that they have less confidence in the cost approach, and it is more likely to be used as a check method *'whether reliance is placed on this approach is dependent on the availability of other information (sales and income).'* One respondent noted that the cost approach may give an inaccurate estimate of value *'as environmental works can greatly differ from property to property, and manuka plantations are expensive often with low returns so cost doesn't equal value.'*

Data and information

Twenty respondents commented on information/data needed to make a more informed valuation assessment of non-productive land. Five respondents (23%) noted the need for detailed sales data and property information.

Three respondents (14%) commented that they would like more information on the environmental benefits of non-productive plantings, stating *'More detail as to the physical cover composition combined with the additional non property specific benefits that the cover may contribute to community. environment and interested parties.'* And *'...a better economic model to reflect their Community and/or National worth in terms of sequestering Co2, filtering nitrogenous and sulphate run-off etc.'*

Three respondents (14%) noted that it would be beneficial to have information on how purchasers view non-productive land areas. One respondent commented *'Survey information from farmers as to how they view non-productive areas when making purchasing decisions would be good, would allow valuers to have an insight into what they are thinking and how that translates through to sales analysis.'* One respondent observed that *'Some buyers may see value in wetlands and non-productive areas and others not. We interpret the buyer/seller relationship and therefore it is extremely important to understand their motivation.'*

Four respondents (18%) would like to see more cost information, including details on cost of riparian fencing and cost of establishing non-productive plantations.

Challenges in valuing non-productive areas

Twenty respondents commented on the challenges they face in valuing non-productive areas. Seven respondents (32%) mentioned that a lack of comparable sales evidence (e.g. sales of native bush blocks) made it difficult to value these land areas.

When sales evidence is available it can be difficult to analyse and apply to farmland as noted by one respondent *'Sales of bush blocks/hunting estates/farms with large ineffective areas often attract a recreational premium so it is hard to analyse these sales then justifying applying similar per hectare rates to pockets of native bush within farms.'* One respondent noted the wide variation in sales data *'...data varies by over 100% typically - partly because the values are quite low in some cases - say $500/ha but can be up to $2,000/ha .'* One respondent noted that values of non-productive plantings, derived from analysis of lifestyle sales, cannot be reliably applied to non-productive planting on economic farms.

Three respondents commented on a changing market attitude to non-productive land. *'Historically such non-productive areas have little to no value whereas on today's market it is becoming abundantly clear these areas may be worth at least as much as pastoral land - if not more!!'* One respondent thought there could be a delay in seeing this change *'...however, in my view in the future these areas will become more desirable in order to offset carbon liabilities, and/or nutrient requirements. The market is slow to pick up so I would imagine this will take some time'*

TEV and methods used

Only two respondents had considered assessing the total economic value of the ecosystem services provided by the farm property, although five said they may be interested in this. As one respondent explained *'It has been considered but not undertaken due lack of detail and information as to the component parts. Often it is dismissed as the current need for the assessment would not recognise this and the market is not assessing it. Therefore, while valuers are to be cognisant of these concepts, they are not to lead the market. So, it is a chicken and egg. If the market pushed for this approach and concept, then information would be made available, and reports would need to address it.'*

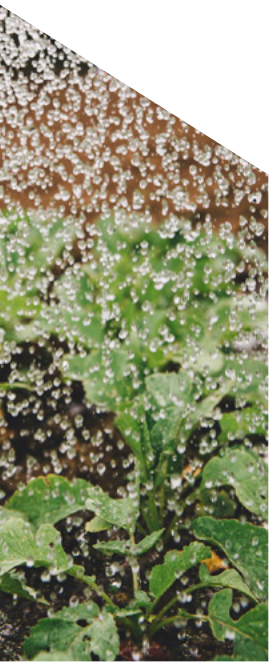
Interview results

BNZ is the first New Zealand bank to develop a concessional loan for farm finance linked to sustainability targets. Dana Muir, the Head of Natural Capital – BNZ, was interviewed on 24th March 2021 to gather information about the sustainability linked loans, introduced in February 2021.

BNZ have explored forms of finance, used predominantly in Europe, and considered how this may be beneficial to NZ farming systems, with a focus on how financing could contribute to ecosystem service health and quality and quantity of biodiversity.

The loans are for a three-year minimum term with an annual audit, by independent assessor AsureQuality, that must show continuous improvement in environmental indicators from a measured baseline. Dana stated that *'For a farmer to be eligible for a sustainability linked loan, we would expect a level of maturity in terms of their thinking and planning toward sustainability and show a determination to achieve ambitious KPIs. Pricing of the loan is linked to achievement of pre-agreed targets, with savings to costs of lending available for achievement and penalties incurred for failure.*

Dana explained that one of the potential benefits of this type of lending is allowing BNZ to consider the impact of Environmental management on the risks associated with agribusinesses which they hold the debt for. It is hoped that by incentivising sustainable improvements to the farms that they have security over, this will in turn decrease risks. Dana noted that *'natural capital and ecosystem services are complicated and at this stage the bank does not monitor farms ecosystem health on an individual basis.'* However, the BNZ is very aware of the importance of ecosystem services and is looking for ways to recognise farm businesses that are making sustainable on farm improvements.



Commenting on uptake and interest in the new loans Dana explained that the bank has spent time introducing the loans to farmers. At this stage only one farming business has a sustainability linked loan. However, Dana has found that leading farmers understand the concept and that farming leaders are interested in these loans.

Dana stated that these loans will help to ensure future farm productivity, by way of better natural capital management but she was not sure of the impact of concessional loans on farmland value. It is possible that if productivity is ensured this will have a positive effect on the value of the farm, while a farm that is highly invested in unsustainable practices may see a significant reduction in capital value (Flaws 2021).

Discussion

My research shows that rural valuer's value non-productive areas in their daily work with stands of native bush, wetlands and riparian strips that cover larger land areas and/or are fenced off from productive farmland commonly valued separately. While we hear commentary on plantation manuka and it is suggested that there is strong interest in plantation manuka (Boffa Miskell Ltd. 2017), the findings suggest that new plantations of native trees and manuka are less common than might be expected with few valuers valuing these classes of land. Very few valuers value space planting for erosion control separately, possibly accounting for the added value of these trees in the land value.

Best valuation practice recommends consideration of multiple approaches and methods (IVSC 2019). The rural valuers surveyed put most emphasis on the sales approach when valuing non-productive land. The sales approach methods they used for assessing the value of non-productive land are the analysis of sales of non-productive blocks, and the analysis of productive areas to derive a residual value for the non-productive land. To have confidence in values derived by the sales approach the valuers believed it is important to have comprehensive data on each sale and ideally have information on purchaser motivation.

The income approach can be used where cash flow or cost savings are generated (IVSC 2019). Such as income generated by carbon credits from non-productive plantations registered in the ETS. Valuers need to be cautious using the income approach where future income is uncertain e.g., the potential income from a manuka plantation. Valuers could also consider capitalising cost savings, such as savings from concessional finance, to estimate the value of non-productive land. In the future it is possible that properties demonstrating superior environmental practices, such as enhanced biodiversity, increased carbon sequestration and/or improved nitrogen filtration, will be able to maximise production from the balance of the productive land area. The question will then be whether the increased value lies in the productive land, generating the income or non-productive land, enabling additional income to be generated.

The cost approach can be applied to non-productive areas that have been recently developed, where accurate cost information is known. However, in general this approach is often limited by lack of cost data and should only be used to check values derived by other approaches since cost may not equate to value. For example, the cost to establish a manuka plantation may exceed the price that could be realised in the market.

Non-productive farmland has value beyond that recognised in the market, related to the provision of ecosystem services. Many of the ecosystem services provided by non-productive plantings have a small benefit to the private landowner and a much greater benefit to society which can lead to a significant difference between CMV and TEV of these wetland, scrubland, and native bush areas on private farms (refer Table 2, page 11).

At present there is little incentive for individual farmers to ask for an assessment of the TEV of their farm and rural valuers are not currently involved in the estimation of TEV. Calculation of TEV includes assessing both use and non-use values gained or lost from marginal changes in ecosystem services. While a range of environmental valuation techniques are available, these methods are complex and require accurate data to provide reliable values. Often complete and accurate data is not available or is expensive to obtain.

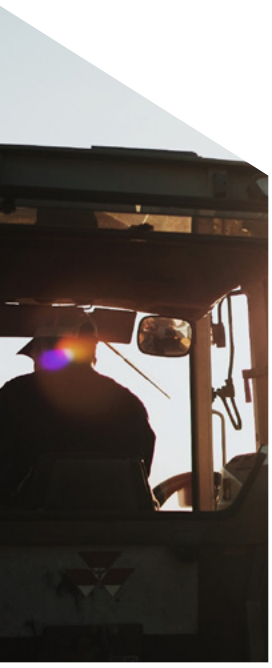
In future, there could be opportunities for rural valuers to upskill and provide the TEV of a property, as identified by RICS (2017). In the meantime, valuers need to be aware of all the

ecosystem services provided by non-productive plantings and determine how this service provision impacts the CMV of the farm. They need to be aware of polices that incentivise provision of ecosystem services, as payments to change land use are likely to be capitalised into land value. They also need to consider how changing regulations will impact farm productivity and the highest and best use of different classes of farmland.

Further research

Further research in the following areas would be useful to enable practicing rural valuers to firstly calculate CMV of non-productive land classes with greater confidence and secondly to understand application of methods used to assess TEV of privately owned land in non-productive use.

- Research on purchaser motivation and seller expectations
- A database or shared source of cost information for the establishment of different non-productive plantings
- Case studies to demonstrate the assessment of TEV and CMV of non-productive plantings



References

Bann, C. (2002), An Overview of Valuation Techniques: Advantages and Limitations, ASEAN Biodiversity. https://www.researchgate.net/publication/228583882_An_overview_of_valuation_techniques_advantages_and_limitations

Boffa Miskell Ltd. (2017). THE MĀNUKA & KĀNUKA PLANTATION GUIDE: PREPARED BY: LOUISE SAUNDERS, BOFFA MISKELL LIMITED. https://www.gw.govt.nz/assets/Manuka-plantation-guide-landcare-April2017.pdf

Botting, S. (2021, June 11). Significant Natural Areas (SNAs) in the Far North: What you need to know. *Stuff NZ*. https://www.stuff.co.nz/national/politics/local-democracy-reporting/300330331/significant-natural-areas-snas-in-the-far-north-what-you-need-to-know

Cameron, C., McQueen-Watton, J., & Shaw, W. (2020). Economic valuation of the ecosystem services provided by Pāmu Landcorp farms. *New Zealand Journal of Ecology*, *44*(2), 1-8. Retrieved July 18, 2021, from https://www.jstor.org/stable/26931306

Carney, M. (2020). Mark Carney on how the economy must yield to human values. *The Economist*. https://www.economist.com/by-invitation/2020/04/16/mark-carney-on-how-the-economy-must-yield-to-human-values

Cortés Acosta, S., Grimes A., Leining C. (2020). *Decision trees: Forestry in the New Zealand Emissions Trading Scheme post-2020*. Motu Working Paper 20-11. Motu Economic and Public Policy Research. Wellington, New Zealand.

Dominati, E., Mackay, A., Green, S. & Patterson, M. (2014a). A soil change-based methodology for the quantification and valuation of ecosystem services from agro-ecosystems: a case study of pastoral agriculture in New Zealand. *Ecological Economics*, 100, 119–129.

Dominati, E., Mackay, A., Lynch, B., Heath, N., Millner, I. (2014b). An ecosystem services approach to the quantification of shallow mass movement erosion and the value of soil conservation practices. *Ecosystem Services*, 9 (2014), pp. 204-215, 10.1016/j.ecoser.2014.06.006

Flaws, B. (2021, March 1). Dairy business gets loan discount if hits environmental targets. *Wellington, Stuff NZ*. https://www.stuff.co.nz/business/farming/124320169/dairy-business-gets-loan-discount-if-hits-environmental-targets

Gullery, L. (2020, April 18). Wetland construction project brings North Waikato rural community together. *Wellington, Stuff NZ*. https://www.stuff.co.nz/environment/climate-news/120960649/wetland-construction-project-brings-north-waikato-rural-community-together

International Valuation Standards Council (2019). International Valuation Standards (IVS), Effective 31 January 2020. IVSC, London, UK.

International Valuation Standards Council (2021). Perspectives Paper: ESG and Business Valuation. International Valuation Standards Council. https://www.ivsc.org/files/file/view/id/1928

Journeaux, P.R., Kingi, T., (2020). Mitigation of On-Farm Greenhouse Gas Emissions. *In: Nutrient Management in Farmed Landscapes*. (Ed. C.L. Christensen). http://flrc.massey.ac.nz/publications.html. Occasional Report No. 33. Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand. 9 pages

Kubiszewski, I., Costanza, R., Franco, C., Lawn, P., Talberth, J., Jackson, T., Aylmer, C. (2013). Beyond GDP: Measuring and achieving global genuine progress. *Ecological Economics*, Vol93, 57-68, ISSN 0921-8009, https://doi.org/10.1016/j.ecolecon.2013.04.019.

Ma, S., & Swinton, S. (2011). Valuation of ecosystem services from rural landscapes using agricultural land prices. *Ecological Economics, 70*, 1649-1659.

Maseyk F.J.F., Dominati, E.J., White, T., Mackay, A.D. (2017). Farmer perspectives of the on-farm and off-farm pros and cons of planted multifunctional riparian margins. *Land Use Policy*, Volume 61, 160-170. https://www.sciencedirect.com/science/article/pii/S0264837715302477

Maseyk, F.J.F., Dominati, E.J., Mackay, A.D. (2019). More than a 'nice to have': integrating indigenous biodiversity into agroecosystems in New Zealand. *New Zealand Journal of Ecology* 43(2): 3372. https://dx.doi.org/10.20417/nzjecol.43.20

Maseyk, F.J.F., Small, B., Henwood, R.J.T., Pannell, J., Buckley, H.L., Norton, D.A. (2021). Managing and protecting native biodiversity on-farm – what do sheep and beef farmers think? *New Zealand Journal of Ecology*, 45 (1) (2021), p. 3420

Millennium Ecosystem Assessment (2005). *Ecosystems and Human Well-being A Framework for Assessment*. Washington, D.C. Island Press. https://www.millenniumassessment.org/en/Framework.html

Ministry for the Environment (2020). *Factsheets on polices and regulations in the Essential Freshwater package*. Wellington, Ministry for the Environment. https://environment.govt.nz/what-government-is-doing/areas-of-work/freshwater/e/freshwater-reform/factsheets-on-policies-and-regulations-in-the-essential-freshwater-package/

Ministry for the Environment (2019). *Draft National Policy Statement for Indigenous Biodiversity*. Wellington, Ministry for the Environment.

Ministry for Primary Industries (2020a). *New Zealand's forests statistics*. Wellington, Ministry for Primary Industries. https://www.mpi.govt.nz/forestry/new-zealand-forests-forest-industry/forestry/new-zealands-forests-statistics/

Ministry for Primary Industries (2020b). *One Billion Trees Fund 18 Month Monitoring and Evaluation Report*. Wellington, Ministry for Primary Industries. https://www.mpi.govt.nz/dmsdocument/41848-One-Billion-Trees-Fund-18-month-monitoring-and-evaluation-report

Norton, D and Pannell J, (2018). *Desk-top assessment of native vegetation on New Zealand sheep and beef farms*. Report prepared for Beef+Lamb New Zealand. https://beeflambnz.com/sites/default/files/Norton_report_shortform.pdf

Norton, D., Suryaningrum, F., Buckley, H., Case, B., Cochrane, C., Forbes, A., & Harcombe, M. (2020). Achieving win-win outcomes for pastoral farming and biodiversity conservation in New Zealand. *New Zealand Journal of Ecology, 44*(2), 1-9. Retrieved July 18, 2021, from https://www.jstor.org/stable/26931309

OECD (2006). *Cost-Benefit Analysis and the Environment RECENT DEVELOPMENTS*. Paris, Organisation for Economic Co-operation and Development. https://doi.org/10.1787/9789264010055-7-en

Pagiola, S., von Ritter, K., Bishop, J. (2004). *Assessing the Economic Value of Ecosystem Conservation*. Environment Department Papers. Environmental Economics; no. 101. World Bank, Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/18391 License: CC BY 3.0 IGO.

Pannell, J.L., Buckley, H.L., Case, B.S., Norton, D.A. 2021. The significance of sheep and beef farms to conservation of native vegetation in New Zealand. New Zealand Journal of Ecology, 45 (1).

Patterson, M.G., Cole, A.O. (2013). 'Total economic value' of New Zealand's land-based ecosystems and their services. In: J.R. Dymond (Ed.), *Ecosystem Services in New Zealand — Conditions and Trends*, Manaaki Whenua Press, Lincoln, New Zealand.

Patterson, M.G., McDonald, G., Forgie, V., Kim, J., Hardy, D., Smith, N., Zhang, Y. (2019). *Beyond Gross Domestic Product: The New Zealand Genuine Progress Indicator to Measure the Economic, Social and Environmental Dimensions of Well-being from 1970 to 2016*. Massey University, Palmerston North.

Polyakov, M., & Pannell, D. J. (2016). Accounting for private benefits in ecological restoration planning. In D. Ansell, F. Gibson, & D. Salt (Eds.), *Learning from agri-environment schemes in Australia. Investing in biodiversity and other ecosystem services on farms* (pp. 181– 190). Canberra, Australia: ANU Press.

RICS Thought Leadership. (2012). *Challenges for international professional practice: From market value to natural value*. Great Britain: Direct Approach.

Royal Institute of Chartered Surveyors (2017). Value of natural capital – the need for chartered surveyors. RICS, Parliament Square, London. https://www.rics.org/globalassets/rics-website/media/knowledge/research/insights/value-of-natural-capital-the-need-for-chartered-surveyors-rics.pdf

Samarasinghe, O., Greenhalgh, S. 2009. The value of inherent soil characteristics: a hedonic analysis. Paper presented at the 2009 NZARES Conference, Tahuna Conference Centre, Nelson, New Zealand. August 27-29, 2009.

Stats NZ and the Ministry for the Environment (2015-2021). *New Zealand's environmental reporting series*. https://environment.govt.nz/facts-and-science/science-and-data/environmental-reporting/

Stillman, S. 2005. *Examining Changes in the Value of Rural Land in New Zealand between 1989 and 2003*. Motu Working Paper 05-07. Motu Working Paper Series. Wellington: Motu Economic and Public Policy Research.

Sharp, B., Kerr, G. (2005). *Option and existence values for the Waitaki catchment*. Report to Ministry for the Environment. https://www.mfe.govt.nz/sites/default/files/media/Fresh%20water/Option%20and%20existence%20values%20for%20the%20Waitaki%20Catchment.pdf

The Aotearoa Circle (2020). *Sustainable Finance Forum, Roadmap for Action, Final Report – November 2020*. Aotearoa New Zealand's Sustainable Finance Forum (SFF). https://static1.squarespace.com/static/5bb6cb19c2ff61422a0d7b17/t/5f9f7a83aa6e763a1b0f6759/1604287127400/20207-000234_Sustainable+Finance+Forum+Final.pdf

The Treasury (2019). *Living Standards Framework Dashboard Update*. Wellington, New Zealand Treasury.

Upton, S. 2019. Focusing Aotearoa New Zealand's environmental reporting system. Parliamentary Commissioner for the Environment. https://www.pce.parliament.nz/media/196940/focusing-aotearoa-new-zealand-s-environmental-reporting-system.pdf

Walsh, P.J., Soliman, T., Greenhalgh, S., Mason, N.W.H., Palmer, D. (2017). *Valuing the benefits of forests*. Landcare Research Contract Report LC2788 prepared for the Ministry for Primary Industries. Pp. 57.

Yao, R.T., R. Scarpa, R., Turner, J.A., Barnard, T.D., Rose, J.M., Palma, P.H.N., Harrison, D.R. 2014. Valuing biodiversity enhancement in New Zealand's planted forests: socioeconomic and spatial determinants of willingness-to-pay. *Ecological Economics*, 98 (2014), pp. 90-101, 10.1016/j.ecolecon.2013.12.009

van Zyl, S., Au, J. 2018. *The start of a conversation on the value of New Zealand's natural capital*. New Zealand Treasury Discussion Paper No. 18/03, The Treasury, New Zealand Government. http://hdl.handle.net/10419/205376

APPENDIX I

Rural valuer questionnaire

Valuation methods

Thank you for being willing to help me investigate valuation methods appropriate for assessing the current market value of non-timber tree plantings, regenerating native shrublands and forests and wetlands that provide ecosystem services such as flood control, prevention of soil loss and detoxification.

This short survey will give insight into valuation methods that are currently being used and highlight where further information is needed.

1. Which classes of land have you valued separately in your rural valuation work? *(Tick as many as apply)*

Established native bush
Regenerating native bush
Established native shrublands
Plantation manuka
Plantation exotic and/or native trees, not intended for harvest
Planted riparian strips
Fenced, unplanted riparian strips
Wetlands
Spaced planting for erosion control
Shelterbelts
None of the above

2. Do you use the **sales approach** to assess the current market value per hectare of 'non-productive' areas such as native bush, shrublands, wetlands?

Yes
No

3. Please give details of how you apply the sales approach and situations where you have confidence in applying this approach.

4. Do you use the **cost approach** to assess current market value per hectare of 'non-productive' areas such as native bush, shrublands, wetlands?

Yes
No

6. Do you use the **income approach** to assess current market value per hectare of 'non-productive' areas such as native bush, shrublands, wetlands?

Yes
No

7. Please give details of how you apply the income approach and situations where you have confidence in applying this approach.

8. What challenges do you face in valuing 'non-productive' areas such as native bush, shrublands, wetlands?

9. What information/data do you need to make a more informed valuation assessment of 'non-productive' areas such as native bush, shrublands, wetlands?

Total economic value

Total Economic Value (TEV) is the sum of all benefits obtained from a resource. TEV = Use Value + Option Value + Bequest Value + Existence Value (Sharpe & Kerr 2005)

10. Have you considered assessing the **total economic value** of ecosystem services provided by a farm property?

Yes
No
Maybe

11. What method/s would you use to assess total economic value?

12. I'm very keen to hear about how you value 'non-productive' land and/or your interest in economic valuation. If you would be willing to discuss this at a time that suits you, could you please provide your contact details.

Name
Email Address
Phone Number

Thanks for your time, I will send out a link to the report when it's completed

The Property Foundation

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