

Payments for Ecosystem Services

Purpose of the paper

In May 2017 the Biodiversity Collaborative Group (BCG) discussed the presentation on natural capital and ecosystem services from the Ministry for the Environment. The BCG has requested further information on one of the financial tools discussed; Payments for Ecosystem Services (PES).

The purpose of this paper is to provide the BCG with an overview of PES and the opportunities and risks of using it as a tool for achieving ecosystem and biodiversity protection. This has been accomplished through a desktop study of international and scientific literature.

This paper will discuss:

1. Taking an ecosystem services approach
2. Payments for Ecosystems Services as a market-based mechanism for taking an Ecosystem Services approach
3. The effectiveness of Payments for Ecosystem Services in achieving environmental outcomes
4. The effectiveness of Payments for Ecosystem Services for biodiversity protection
5. Payments for Ecosystem Services in New Zealand
6. Questions for discussion by the BCG

Limitations

The purpose of this paper is information provision. It does not provide a policy position or advice for the inclusion of PES in the draft National Policy Statement for Indigenous Biodiversity and complementary measures being developed by the BCG.

The level of detail is targeted at informing discussion about PES as a policy tool, rather than detailed analysis regarding practical development and application of the mechanism.

Taking an Ecosystem Services Approach

1. Ecosystem services (ESs), simply defined, are the benefits people and societies derive from the natural environment. These are normally divided into four areas¹:
 - Provisioning services such as food, water, timber and fibre
 - Regulatory services such as regulation of air quality, climate and flood risk
 - Cultural services such as opportunities for spirituality, cultural activities, recreation and tourism
 - Supporting services which provide underlying functions such as soil formation, genetic diversity and nutrient cycling
2. ESs underpin human wellbeing and economic growth. Maintaining existing ESs, and restoring or enhancing them where they have been lost or damaged, is increasingly recognised as essential for prosperity.
3. Despite the critical role of ESs, the 2005 Millennium Ecosystem Assessment report concluded that globally, whilst some ESs, such as food production had increased, the majority of ESs had been degraded as a result of environmental degradation, fragmentation and biodiversity decline¹. The report highlighted that

¹ Global Assessment Reports (2005) Millennium Ecosystem Assessment Working Group

increasing population and the subsequent pressure on resources is projected to put increasing stress on natural resources and ESs.

4. The ESs approach is based on the principle that deterioration in ESs reflects a historic failure by contemporary economic market systems to properly value the services derived by society from our natural environment.² While some ESs, such as food and timber, have a financial value in the marketplace, others like pollution control and flood risk regulation do not, despite the critical role they play in sustaining the economy.
5. As a result of this, un-priced ESs are rarely taken into account in decision making processes and this, in turn, has created an imbalance in the way that decisions affecting the natural environment are made. The consequence of this has been a focus on short-term financial gain at the expense of long-term provision of critical ESs, threatening the continuance of economic prosperity and human wellbeing.³
6. The ESs approach seeks to assign a value to the benefits provided by ESs, so that they can be better incorporated into decision making. This (normally) monetary value is often referred to as 'natural capital'. A number of countries (including New Zealand) have initiated the development of frameworks to support the incorporation of natural capital into decision making.
7. Ideally, an ESs approach "explicitly links ecosystems and well-being, considers all ESs and recognises that ES impacts and dependencies pose both risks and opportunities for decision making. This information can then inform trade-offs by clarifying which persons and what ESs are affected either positively or negatively by a decision".³
8. In practice, the ESs approach creates the ability to build a 'business-case' for nature. Placing a value on ESs can provide greater recognition of the range and amount of benefits that nature provides and can lead to an improved understanding that society and the economy depend on nature and the socio-economic benefits of ESs⁴. This recognition incentivises protection of ecosystems and the services provided by them.
9. The ESs approach has been criticised for excluding the intrinsic value of nature, as assigning a value based on what ESs provide for humans could be considered exploitative. Some argue that this contradicts holistic world views, including te ao Māori³.
10. Additionally, an ESs approach normally requires economic valuation, which some argue can lead to 'commodification' of nature. It has been suggested⁵ that this can have damaging effects such as transforming nature into a commodity that can be accessed only by those with purchasing power. Arguably aspects of nature have already been 'commodified' (e.g. forestry requires the valuation of timber). In taking this approach, it should be acknowledged that valuation should not be used to set a price at which to trade nature, but rather as an indication of the critical importance of ecosystems to wellbeing and prosperity.

Biodiversity and the ecosystem services approach

11. Biodiversity underpins the functioning of many ESs. For a great number of ESs there is firm evidence demonstrating the necessity of biodiversity for ecosystem functioning, which is essential for the long-

² Payments for Ecosystem Services: A Best Practice Guide (2013) Department for Environment Food and Rural Affairs (DEFRA), UK.

³ Mainstreaming Ecosystem Services into policy and decision-making: lessons from New Zealand's journey, Greenhalgh and Hart (2015).

⁴ *Payments for Ecosystem Services*, United Nations Development Programme (UNDP). Website page found here: <https://www.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html>

⁵ Ecosystem Services and the Environment, Science for Environment Policy (2015). In depth Report 11 produced for the European Commission by the Science Communication Unit, UWE, Bristol.

term, stable provisioning of multiple ESs⁵. For example, higher levels of biodiversity has been linked to increases in pollination regulation, water quality, climate regulation, and regulation of agricultural pests⁵.

12. When considering ESs provisioning in the short term, some ecosystems do not require high biodiversity to function (e.g. monoculture forestry plantations) and some ESs provisioning may be reduced by high levels of biodiversity (e.g. freshwater quality provision can be negatively affected by greater plant coverage, as it increases water retention). However, biodiversity has been shown to have an overarching role in long term stability and resilience of ecosystems and ES provision⁵. This is particularly important in adapting to climate change, as resilience will be essential for the continued provision of ecosystem services in the face of increasing pressures, such as changes in normal climate conditions and more frequent extreme weather events.
13. As such, the continued depletion of biodiversity is destabilising the functioning of ecosystems which, in turn, is putting at risk the flow of related benefits, such as the provision of food and clean water, mitigation of natural disasters, and physical, mental and spiritual wellbeing. This in turn affects the long-term viability of economic activities and human wellbeing.⁶
14. Taking an ESs approach to biodiversity protection could:
 - Promote and incentivise the ongoing conservation, restoration and sustainable use of biodiversity due to the critical role played in the provision of ESs;
 - Make trade-offs in decision making more explicit; and
 - Create an innovative source of funding for biodiversity protection.
15. However, the links between ESs and biodiversity are broad, complex and not yet fully understood by science⁶. Whilst mapping and modelling of ecosystems and ESs has improved greatly over the last twenty years, our understanding is still limited. Maximising only those aspects of ecosystems that we have identified as providing services to humans, without full knowledge of the complex interactions within and between ecosystems, could fail to halt the decline of ecosystems and biodiversity or in fact worsen the deterioration. As such, it is essential that ESs be considered as part of a wider system and the ESs approach be only part of a suite of tools for addressing biodiversity loss.
16. Additionally, valuation of biodiversity is subject to the same issues described in paragraphs 9 and 10, and is particularly controversial as it does not incorporate intrinsic values, instead focusing on the services that biodiversity performs for humans (see paragraphs 9 and 10 for further discussion).

Payments for Ecosystem Services – A market-based mechanism for taking an Ecosystem Services Approach

17. Payments for ESs (PES) can be used as an umbrella term for any economic arrangement used to reward conservation of ecosystem services². However specifically, PES refers to a type of market-based tool involving:

“A voluntary transaction where a well-defined ES (or a land-use likely to secure that service) is ‘bought’ by a (minimum of one) ES buyer from a (minimum of one) ES provider; if and only if the ES provider secures ES provision⁷”.

⁶ Innovative mechanisms for financing biodiversity conservation. A comparative summary of experiences from Mexico and Europe, Ezzine de Blas et al. (2017)

⁷ Making Policies Work for Payment for Environmental Services (PES): An Evaluation of the Experience of Formulating Conservation Policies in Districts of *Indonesia*, Prasetyo et al. (2010) *Journal of Sustainable Forestry*.

18. The fundamental idea behind PES is that those who provide ESs (e.g. land owners or other natural resource owners) should be paid for doing so. PES therefore provides an opportunity to put a price on previously un-priced ESs like climate regulation, water-quality and regulation and the provision of habitat for wildlife. In doing so, PES can bring some ESs into the wider economy by creating incentives for the continued provision of these services, or certain actions likely to enhance their provisioning over-and-above what would otherwise be provided in the absence of payment.⁴
19. PES can thus support and incentivise the conservation, restoration and expansion of ecosystems when the latter generate services that can be valued in economic and financial terms. In some circumstances, PES can create additional revenue streams for conservation.

Payments for Ecosystem Services in practice

20. PES schemes can be developed at a range of spatial scales: International, national, catchment or local. At any scale, schemes are most likely to succeed in situations where:
- specific land or resource management actions have the potential to increase the supply of a particular ES (or services);
 - there is a clear demand for the service(s), and its provision is financially valuable to potential buyers; and
 - it is clear whose actions have the capacity to increase supply.
21. For these reasons, certain ESs are more applicable to PES schemes than others. For instance, PES for improving water quality or increasing carbon sequestration are the most common and successful schemes internationally. This is because it is easy to link actions to increased supply (e.g. riparian planting by farmers reduces nutrient run off from farms OR planting more trees increases carbon sequestration). Additionally, these types of PES often have easily identified buyers that are large in scale, relatively well funded and organised (water utility companies OR national government).

22. In some cases, actions to improve ESs provision may be felt by beneficiaries over considerable geographical distance, or else not felt for years after the actions have been undertaken. PES schemes may

Buyers: Beneficiaries of ESs who are willing to pay for them to be safeguarded, enhanced or restored.

For example: individuals, national or local government, community groups, NGOs, businesses, water or energy suppliers.

Providers: Land and resource managers whose actions can potentially secure supply of the beneficial service.

For example: Farmers, forest owners, national or local government, resource managers

Example

In some catchments, restoring wetlands upstream can slow the volume and pace of water moving down the catchment, reducing the risk of flooding homes and businesses downstream. Modelling of ESs can indicate the required location and quantity of wetland restoration needed to slow flood inundation. In high risk flood areas, local government may be willing to pay upstream landowners to retire areas from production and undertake wetland restoration and/or maintenance to assist in reducing the risk of flooding in the lower catchment.

- **Voluntary transaction** – Yearly financial compensation (funds raised from rate payers)
- **Well-defined ecosystem service** – Flood risk reduction
- **Ecosystem service buyer** – Local government
- **Ecosystem service provider** – Upstream landowners
- **Ecosystem service provision** – Wetland restoration/maintenance in agreed areas

See Appendix A: PES – two international examples

be inappropriate in these situations as it will be harder to identify buyers of ESs. Additionally, it is more difficult to establish a direct causal link between the management action, the increased provision of an ES and the beneficiary of the ES. These are particular issues for PES schemes targeted at biodiversity as an ES (see paragraph 31).

23. For PES to work, a market must be created and the market conditions understood and legally recognised. In some cases (for instance international carbon trading or national water allocation systems) this requires government intervention for market establishment and regulation. In smaller-scale PES, where there only a small number of stakeholders involved, the market can be self-organised, although the requisite legal arrangements must still be in place. Regardless, there is always a risk that the market could collapse, highlighting a major risk of PES as a tool for conservation. If PES payments stop then ESs management would halt, potentially resulting in ES degradation.
24. In addition to the 'buyers' and 'sellers' of ESs, other experts are required for successful PES schemes: 'intermediaries', who can serve as agents linking buyers and sellers and can help with scheme design and implementation; and 'knowledge providers', such as resource management experts, valuation specialists, land use planners, regulators and business and legal advisors, who can provide knowledge essential to scheme development.
25. The running costs of the PES schemes include financial costs, measuring, reporting and verification and regulatory oversight. These might also include communication, negotiation, enforcement costs and provisions for legal risks. There is evidence that transaction costs are often prohibitively high for small-scale PES schemes.
26. The 2013 Department for Environment Food and Rural Affairs (DEFRA) Best Practice Guide to Payments for ESs² identifies key principles which should inform the development of any PES scheme:
 - **Voluntary:** Stakeholders enter into PES agreements on a voluntary basis
 - **Beneficiary pays:** Payments are made by the beneficiaries of ESs (individuals, communities and businesses or governments acting on behalf of various parties)
 - **Direct payment:** Payments are made directly to ES providers (in practice, often via an intermediary)
 - **Additionality:** Payments are made for actions over-and-above those which land or resource managers would generally be expected to undertake
 - **Conditionality:** Payments are dependent on the delivery of ES benefits. In practice, payments are more often based on the implementation of management practices which the contracting parties agree are likely to give rise to these benefits
 - **Ensuring permanence:** Management interventions paid for by beneficiaries should not be readily reversible, thus providing continued service provision
 - **Avoiding leakage:** PES schemes should be set up to avoid leakage, whereby securing an ES in one location leads to the loss or degradation of ESs elsewhere.
 - **Establishing the baseline position:** Establishing the likely provision of the relevant ESs in the absence of the PES scheme, will be critical since this will allow for accurate monitoring which will, in turn, indicate the level of additionality being delivered, thus reassuring buyers that the requisite services are indeed being provided
 - **Stakeholder engagement:** Consultation with those likely to be affected by the scheme will allow for better community involvement and decision making
 - **Packaging:** A PES scheme can focus on more than one ES. Those services being sold are then described as having been 'packaged' or 'bundled'. For instance, wetland restoration can provide multiple ESs (e.g. flood risk reduction, biodiversity benefits and water quality improvements).

Additionally, PES can have co-benefits outside of ESs, for instance some PES are designed to contribute to alleviating poverty in rural areas.

27. In order for PES schemes to be successfully implemented, supporting preconditions must be in place. If these preconditions are not present, there are a number of risks that can undermine the goals of taking an ESs approach. Some of these are outlined below:

	What preconditions are needed for PES to succeed?	Associated risks
1	<p>National level institutional/legal frameworks and governance structures supporting an ESs (Natural Capital) approach. This includes:</p> <ul style="list-style-type: none"> a. A framework for valuation of ESs; b. Investment in high quality mapping and expanding the scientific knowledge base for ESs. 	<ul style="list-style-type: none"> a. Commodification of nature, loss of human-nature connection, and alienation of non-monetary values from decision making. b. Poor quality mapping and inaccurate information could lead to uninformed trade-offs being made by decision makers. For instance, leakage can occur when the provision of ESs in one location increases pressure for conversion in another. If there is poor understanding over what is being brought and sold, PES schemes could fail to halt the decline of ecosystem degradation. c. As discussed in paragraph 25, establishing an adequate baseline is a critical step and is not possible without mapping and scientific knowledge of ESs.
2	<ul style="list-style-type: none"> a. The legal and institutional framework for PES transactions (including best practice/ good design principles) 	<ul style="list-style-type: none"> a. Unintended perverse incentives that negatively affect some ESs. For a PES programme to produce effective incentives, conflicting market distortions, such as environmentally harmful subsidies, should be removed. b. Without meaningful stakeholder engagement, there could be a loss of control and flexibility over local development options and directions. c. Well-designed PES can have a positive effect on inequality and alleviate poverty. However, if equity is not considered in design, elites might capture the largest income provided through PES, limiting access to resources and land for impoverished communities. d. Property rights must be clearly defined. PES cannot be implemented if there is confusion over ES rights or in situations where there are issues with defining ownership over ESs

3	a. Market conditions must be understood and legally recognised.	a. There is a risk of market failure if the market collapses. If PES payments stops, management of PES will be discontinued and could lead to degradation of the ESs in question. Ensuring the legal framework is in place can mitigate this risk, but the risk cannot be entirely eliminated.
4	b. Sufficient workforce capacity to provide the intermediary support and expert knowledge needed to develop PES schemes	b. Limited workforce capacity for expert intermediaries and knowledge providers may result in sub-standard or risky PES schemes being implemented.
6	a. Financing structure for PES is both sustainable and sufficient.	a. Funding from local communities is typically scarce and to operate successfully in the long-term, PES schemes must attract investment from global beneficiaries, national governments or the private sector. The more cost-effective a programme is, the more likely it will be able to mobilise additional funding. One approach to maximising cost-efficiency for investors is to identify and target areas where two or more important ESs are highly valued and are jointly at risk of destruction. ³

28. When successfully implemented, PES schemes can present a number of opportunities as a policy tool²:

- PES is a flexible instrument that can be highly customised to local circumstances.
- PES can incentivise ecosystem and biodiversity conservation by providing financial rewards for suppliers of ESs.
- Well-designed PES can provide opportunities for income in rural areas where poverty might be concentrated.
- The benefits of some ESs may be felt at considerable distances from their point of origin, and there may be a considerable time lag between suppliers protecting/enhancing ESs and the beneficiaries experiencing a change in ESs provisioning. PES schemes therefore have the potential to link up geographically and temporally disparate suppliers and beneficiaries of ESs.
- Communities can benefit from increased knowledge of sustainable resource use practices that are usually connected to PES through the provision of training and technical assistance.

The effectiveness of Payments for Ecosystem Services in achieving ecosystem protection

29. PES programmes have proliferated rapidly over the past two decades, with more than 550 active programmes implemented around the world and an estimated US\$36-42 billion in annual transactions (2016)⁸. Large scale successes such as the Harmony Initiative of Mondelēz International described in Appendix A, have driven interest in PES as a conservation tool. However, like many conservation programmes, PES are rarely designed with stringent monitoring of effectiveness in mind, and despite the

⁸ The global status and trends of payments for Ecosystem Services, *Nature Sustainability* v. 1, pp 136–144 (2018) Salzman, J, Bennett, G, Carroll, N, Goldstein, A. and Jenkins M

growth of these programmes, comprehensive and reliable data on their implementation and financial success have proven difficult to substantiate.

30. PES is still considered a relatively new instrument, and whilst its effectiveness may not yet firmly established, increasing use of PES can be credited with increasing awareness of the value of ecosystem services to economic prosperity and human well-being, and as such is contributing to raising the profile of ecosystem protection³.

The applicability of Payments for Ecosystem Services to biodiversity protection

31. There are four ways that PES can be applied specifically to biodiversity protection:

- I. Biodiversity underpins the provision of many ESs and is necessary for the long term resilience and stability of ecosystems. As such, creating incentives for protecting or enhancing ESs indirectly creates an incentive to protect biodiversity. However the connections between ESs and biodiversity are complex and not always well-understood, making direct causation between biodiversity, management and ESs provisioning difficult to establish and allow for quantification.
- II. PES schemes can be targeted so that the ES being supplied is biodiversity. However, the beneficiaries of biodiversity are often widespread geographically and temporally, and the specific benefits indirect, hard to measure or non-material. Internationally, PES designed specifically for biodiversity are rare and it is the least developed uses of PES.
- III. Many PES schemes, such as those developed for water or carbon sequestration, can have co-benefits for biodiversity (and other goals such as poverty reduction). Well-designed PES schemes coupled with high quality ES mapping can maximise co-benefits in such cases. This is likely to be where PES can have most benefit for biodiversity protection.
- IV. PES can generate a novel source of revenue that can be directed towards ecosystem and biodiversity conservation.

Payments for Ecosystem Services in New Zealand

32. New Zealand's economy relies on well-functioning ecosystems and the services they supply. Our large primary sector (e.g. sheep, beef, dairy, timber) is growing, yet at the same time is negatively impacting many of the ecosystem services it relies on. Urbanisation is also expanding, bringing with it its own dependencies on ESs, as well as increasing pressures. In time, the cost of restoring or substituting the flow of services from these disrupted ecosystems is likely to increase, threatening continued economic prosperity.³ As such, there is increasing interest in the protection of ecosystem services and the biodiversity that underpins them.

33. As discussed in the May 2017 presentation to the BCG by the Ministry for the Environment, there has been significant interest in developing the framework required for taking an ESs approach in New Zealand. New Zealand is still in the early stages of this development, although recent gains have been made:

- a. The Treasury have started development of the Living Standards Framework, which includes the development of the natural capital approach
- b. Statistics NZ have recently published "New Zealand Environmental-Economic Accounts" for the years 2017/2018. These are a first step in exploring how the environment and economy interact, and how natural resources contribute to national wealth.
- c. Waikato Regional Council and Auckland Waikato Regional Council has recently released guidance on "Applying an Ecosystem Services Approach".

34. Further development of New Zealand's approach to Ecosystem System Services is needed before PES schemes could be effectively designed and implemented. There would be significant risks (as discussed in

paragraph 27) to introducing PES schemes immediately, as developing the requisite legal and institutional frameworks must be considered and agreed and workforce capacity building would need to be supported.

Questions for the Biodiversity Collaborative Group

- a. Valuation of ESs and biodiversity can be problematic and many are critical of assigning a financial value to such things. Valuation of ESs is costly and can be controversial to implement into communities. Given these limitations, is the ESs approach an appropriate option for seeking to halt biodiversity loss?
- b. If New Zealand were to develop PES approaches, how would we ensure that valuation of biodiversity is not just considered financially, but incorporates intrinsic value and Mātauranga Māori?
- c. The institutional arrangements needed for successful PES schemes are not yet fully developed in New Zealand, and there are significant risks to implementing PES in an immature market. Could the work of the BCG have a role in advancing these arrangements or underlying systems needed?
- d. PES schemes that are designed primarily for biodiversity protection are uncommon and difficult to implement successfully. However, more successful PES schemes (such as those designed for achieving improved water quality or carbon sequestration) often result in co-benefits for biodiversity. Given that benefits are often indirect or secondary for biodiversity, what role could or should PES play in halting the decline of biodiversity?

Appendix A: Payment for Ecosystem Services – Two International Examples

1. Europe – Harmony Initiative of Mondelēz International (International scale)

Mondelēz International is an American multinational confectionary, food and beverages company with a revenue in 2015 of more than USD 30 billion. The company is also Europe’s largest biscuit baker with brands like Oreo, belVita and LU.

The company is reliant on the provision of raw materials (such as wheat) for production of food and beverages. As such, ecosystem services underpin their supply chain. Prompted by the decline of pollinators, which puts their supply of agricultural produce at risk through the decreased provision of pollination ecosystem services, Mondelēz launched a European initiative called “The Harmony Initiative” in 2008, which sought to decrease the environmental impacts of the company.

The Harmony initiative aims to enhance sustainable agriculture and biodiversity protection by targeting the company’s own wheat supply chain. The “Harmony Charter” was developed in collaboration with NGOs and Scientists, which details 51 sustainable farming practices designed to decrease negative influences on ecosystem service provision by farming, including the protection of biodiversity.

Wheat farmers were offered the opportunity to sign up to the “Harmony Charter” in return for a premium payment for each ton of “Harmony wheat” they produces. Farmer cooperatives also receive

Harmony Initiative of Mondelēz International

- **Voluntary transaction** – Farmers were offered financial rewards over and above their normal pay
- **Well-defined ecosystem services** – Practices likely to increase biodiversity protection
- **Ecosystem service buyer** –Mondelēz International
- **Ecosystem service provider** – Wheat farmers, farmer collectives
- **Ecosystem service provision** – Sustainable agricultural practices designed to the environmental footprint of farmers and increase biodiversity protection. Technical support for farmers in moving to sustainable practices.

a payment for the technical assistance they provide to farmers in employing sustainable farming methods.

When the initiative was established the headline target of the company was to have 75% of biscuits produced in Western Europe with Harmony wheat by 2015. By 2013, 44% of Mondelēz biscuits in Western Europe were made with Harmony wheat, which later increased to 60% and 75% in 2014 and 2015, respectively, meaning that the headline target was achieved.

2. USA - Forest Resilience Bonds (National scale)

Over the last twenty years, wildfire has increasingly worsened in the Western United States (US), threatening and destroying lives and property, and seriously damaging economic prosperity. In 2015, wildfire burned over 10 million acres of land across the United States for the first time in recorded history.

Forest density in the US has increased by 300-400% over the last one-hundred years, with excess vegetation increasing the risk of wildfire. As a result, 40 percent of the U.S. Forest Service's 193 million acres of public forest and grasslands are at "high risk" of severe wildfires.

Forest restoration—the strategic removal of brush and shrubs and selective thinning of trees lowers risk of severe wildfire, which protects water quality and watershed resilience, while avoiding devastating carbon emissions from wildfires. However, despite the financial, social, and environmental benefits that restoration would create, funding for the US Forest Service is limited and the scale of restoration needed far exceeds their capacity to undertake it.

Forest restoration can generate financial value not just for US Forest Service, but also for a wide array of beneficiaries.

Water and electric utilities save money when there are fewer severe fires because trees and vegetation hold soil that would otherwise erode, contaminating and obstructing drinking water systems and reducing hydroelectricity generation capacity. Restoration also allows state governments to protect rural communities while creating restoration-related jobs and avoiding dangerous emissions from severe wildfires.

The Forest Resilience Bond (FRB) has been developed by Blue Forest Conservation, the World Resources Institute, and Encourage Capital. The FRB brings together the beneficiaries of forest restoration with private investors in a public-private partnership that enables private capital to finance forest restoration. Investor capital is used to pay local businesses specialising in forest restoration to implement the restoration treatments, and investors earn back their money from payments by the beneficiaries

Forest Resilience Bond

- **Voluntary transaction** – Identified beneficiaries are approached by the developers of the Forest Resilience Bond and agree to pay for increased provision of ecosystem services
- **Well-defined ecosystem services** – wildfire risk reduction, hydroelectricity generation, avoided sedimentation, water quality and volume, avoided carbon emissions (and others)
- **Ecosystem service buyer** – US Forest Service, Electric and Water utilities, state and local governments
- **Ecosystem service provider** – local businesses contracted to undertake restoration work
- **Ecosystem service provision** – Forest restoration (strategic removal of brush and shrubs and selective thinning of trees)

