Business, Biodiversity and Ecosystem Services

Policy priorities for engaging business to improve the health of ecosystems and conserve biodiversity

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SUMMARY

Human impact on biodiversity and ecosystem services (BES) must be significantly reduced. This requires policies that can bring all stakeholders along, including businesses. Engaging business in sustainable resource use and biodiversity conservation is of particular importance given the environmental pressures that many businesses impose. They occupy the challenging position of being expected to drive economic development while at the same time reducing their environmental impacts.

For many businesses, declining ecosystem services can pose real risks to their continued profitability and, more broadly, their licence to operate. These risks, whether physical, reputational, or regulatory, have motivated some businesses to adopt innovative internal biodiversity policies and to engage in a range of activities that conserve biodiversity and improve ecosystem functioning. These actions are not sufficiently widespread, however.

If policy-makers want to leverage and scale up the kinds of actions and expertise already shown by some leading businesses, they will need to prioritise policies which incentivise businesses to manage these biodiversity risks.

The choice of policies should at the same time try to facilitate the creation of new commercial opportunities that will draw private sector resources and expertise into the BES field, much as policy in relation to climate change issues did during the 2000s.

The best policies for achieving these ends will often be those which create incentives for behaviour change and sustainable use of biodiversity: so-called economic instruments as opposed to regulations which mandate particular standards of behaviour. Within this general category of policy instruments, the ones likely to be most beneficial from a public perspective are those which mobilise finance< rather than rely on the public purse (such as subsidies).

Policies which will best engage business while delivering public benefits and reducing biodiversity loss include:

- taxes and charges on pollutants and natural resource use;
- removal of environmentally harmful subsidies;
- offset schemes which direct resources into areas of high value and incentivise effective restoration initiatives;
- tradable permit schemes (such as tradable fishing quotas); and
- systems of payments for ecosystem services, to the extent that they do not have to rely exclusively on public funds.

Regulatory prohibitions and standards will continue to play a vital role in efforts to reduce biodiversity loss, but to engage businesses, policy-makers need to be more focussed on incentives and incentivising the sustainable use of biodiversity and ecosystems than they are at present.

Other considerations will also come into play such as the need for *multiple* policy instruments to target different market and policy failures and different drivers of biodiversity loss,

although efficiency demands that these are complementary rather than substitutes for one another. There is also a need to pay careful attention to policy prerequisites or principles such as predictability, accountability, consistency, proportionality and sound property rights or secure land tenure arrangements – in other words, the institutional essentials without which no policy will work especially well.

Deploying economic instruments for BES policy will come with complications. For example, economic instruments require a reasonably good unit of account in terms of what it is that is trying to be discouraged or incentivised, but biodiversity and its relationship to ecosystem functioning is not easily measured. The science simply isn't (yet) sufficiently precise and the connection between biodiversity and ecosystem services is context-dependent.

The degree of caution that this sort of complication justifies in terms of using economic policy instruments comes down to a question of trading off risk and return. The returns on more ambitious policies including economic instruments are likely to be higher than conventional regulatory approaches. This is in part because they have a better chance of being scaled up by businesses. However, there are risks. More ambitious policy instruments require a reasonably high degree of learning-by-doing and a willingness to adjust if they don't deliver expected gains.

Those who object to economic instruments are sometimes too quick to compare practical problems with economic instruments with idealised or perfect regulatory regimes. Economic instruments which offer flexibility to regulated entities are often deemed unsatisfactory because they afford opportunities for evasion and unscrupulous behaviour – but exactly the same problems arise with regulatory approaches. Policy is only ever as effective as its accompanying compliance and enforcement and performance measures. This is the *sine qua non* of biodiversity policy (or indeed any environmental policy).

The returns on economic policy instruments are potentially large because of their greater potential for achieving widespread and scalable action by businesses to increase sustainable resource use and reduce biodiversity loss. Achieving scale requires mainstreaming; if policies are going to support this they cannot be imposed in an ad hoc fashion. Serious mainstreaming requires the creation of policy frameworks that establish the right incentives for efficient resource management and reduced environmental impact. This should include prices or similar signals and incentives.

The scale of policy impacts will be greatest if policies can have global reach. This is not a question of harmonisation but rather of having instruments and agreements that can help to connect the right business expertise to its best application in terms of biodiversity outcomes. Under the current state of affairs most national governments trade off damage to one ecosystem while aiming to conserve or restore some other nationally significant site. However, given that large biodiversity sites, often of global significance, are found in other countries, it may make sense to allow for trade-offs in a more global context. If this could be done in a way that directs business expertise and financial resources to where they can do the most good then it must surely be worth serious investigation.

Questions will rightly be raised over whether policy can leapfrog from, in some cases, limited enforcement of existing rules and regulations to policies that involve prices and pecuniary incentives – potentially on a global scale. However, while the risks associated with ambitious, globally-framed policy tools will make for nervousness, these must be set against the sheer scale of the biodiversity at risk and the economic, social and cultural losses that could be incurred. In the climate arena, an ambitious policy agenda which includes economic instruments has led to greater business engagement, workable technical solutions and a gradual improvement in institutional capability. Policy-makers must ask if they can afford to deny themselves access to these potential benefits if traditional interventions cannot do better.

INTRODUCTION

This paper sets out policy options for leveraging the abilities and financial resources of the private sector to conserve and sustainably use biodiversity and ecosystem services.

There is little agreement about how businesses should contribute to stemming biodiversity loss. But the world cannot wait long for a consensus on such matters. Biodiversity loss is continuing and could cause problems on a scale that rivals any other global environmental challenge (Hooper et al, 2012).

Population growth and rising incomes will see increased pressure on biodiversity (Figure 1). The OECD's *Environmental Outlook to 2050* projects a further 10% loss in biodiversity over the next forty years, continuing a trend of steady decline (OECD, 2012a).

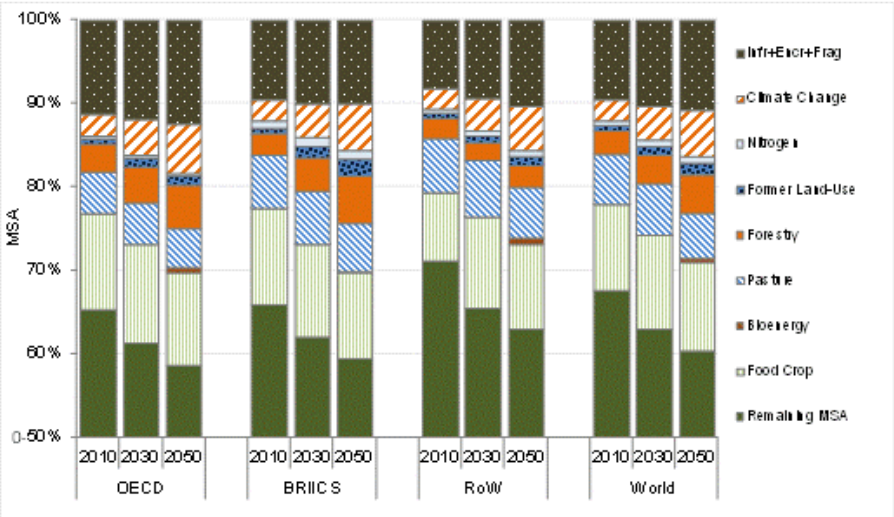
With every unit of loss the risks to both ecosystems and to economic development rise. The value lost is potentially enormous. By one estimate, the reduced biodiversity and ecosystem services from global forest loss cost in the order of $2 trillion per annum (TEEB, 2009). While good progress is being made on some fronts (Balmford, 2012), it is not being made on a sufficiently broad front to change the trend line. A large number of worthy experiments gives hope that there are solutions in sight, but for these to be worth investing in they need to be scalable.

This paper starts from two premises. First, that simply locking up nature is not a workable option. Human interventions in the biosphere have been going on for millennia and are unavoidable. We live in the anthropocene (Crutzen and Stoermer, 2000). Secondly, that the costs of that human impact on biodiversity and ecosystem services (BES) must be significantly reduced. It also assumes that any policy change must take all stakeholders along with it and this means bringing down some of the barriers that currently keep businesses at arm's length from potentially positive initiatives.

A significant share of the world's resources is in the hands of private businesses. Those same businesses are also major contributors to biodiversity loss. As such, businesses have considerable capacity either to deliver improved outcomes or to forestall change.

Figure 1. Projected pressures on biodiversity

Changes in Mean Species Abundance (MSA)



Source: OECD, 2012a

Outline

This paper begins in the next section with a survey of the nature of business connections to biodiversity loss and to ecosystem services. This includes a summary of some of the more notable actions by business to address biodiversity loss, often in the absence of coercion on the part of government.

Section 3 then outlines the policy toolkit which governments have at their disposal for encouraging business and others to stem the decline in biodiversity and bolster the health of ecosystems. This includes a summary of the essential institutional prerequisites and approaches for effective policy.

Section 4 describes a framework for matching policy options to the concerns and interests of business. This provides a way of prioritising those policies which are most likely to incentivise businesses while at the same time securing public benefits. This section includes an in-principle illustration of the kinds of policies which might deliver the most cost effective and scalable engagements by business.

Policy initiatives which seek to apply the logic of Section 4 will inevitably strike implementation difficulties. Dealing with these is likely to be more important in engaging business and meeting policy objectives than any choice of policy instrument. Section 5 discusses where these difficulties are likely to arise. The intention is not to provide a 'how to' guide for policy implementation. Policy choices will be context dependent, in terms of local institutional capability, available resources and the ecological issue at stake. Rather, the purpose of Section 5 is to provide a guide to the kinds of implementation-related trade-offs that need to be considered when making policy choices. Section 5 raises some questions that need to be addressed en route to determining priorities for building and scaling-up action on biodiversity and ecosystem services within the business sector.

The paper concludes with a discussion of whether some policies are inherently more scalable than others. The central conclusion is the claim that policies which align to private incentive are inherently scalable and that scale will therefore be achieved by focussing on private incentives.

Terminology

Throughout much of the paper biodiversity and ecosystems services are discussed as if they are synonymous. They are in fact two different things, and the connection between them is not always straightforward (as discussed in Section 5).

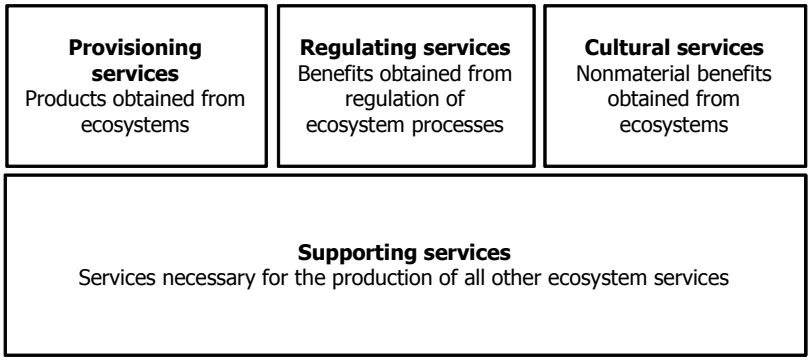
Biodiversity is "the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems" (Convention on Biological Diversity). In principle, biodiversity can be measured in objective scientific terms based on both the degree of variability in population and the extent to which this variation supports the physical functioning of ecosystems (e.g. rates of decomposition or nutrient cycling) (Hooper et al, 2012).

Ecosystem services, on the other hand, are the benefits people derive from ecosystems (which are dynamic complex systems or interdependencies amongst communities of plants, animals

and microorganisms). They are subjective in many respects, with services only counting as such when human beings deem them to contribute to wellbeing.[1]

Ecosystem services and their value to people can take a number of forms (Figure 2).

Figure 2. Natural value: types of ecosystem services



Examples of ecosystem services / Services	Ecosystem									
	Cultivated	Dryland	Forest	Urban	Inland water	Coastal	Marine	Polar	Mountain	Island
Freshwater			●		●	●		●	●	
Food	●	●	●	●	●	●	●	●	●	●
Timber, fuel and fiber	●		●			●				
Novel products	●	●	●		●		●			
Biodiversity regulation	●	●	●	●	●	●	●	●	●	●
Nutrient cycling	●	●	●		●	●	●			
Air qaulity and climate	●	●	●	●	●	●	●	●	●	●
Human health		●	●	●	●	●				
Detoxification		●	●	●	●	●	●			
Natural hazard regulation			●		●	●			●	
Cultural and amenity	●	●	●	●	●	●	●	●	●	●

Source: Millennium Ecosystem Assessment

Furthermore, these values are often not separable. The "Total Economic Value" of nature can be thought of as comprising:

- **Non-use value** (sometimes called passive-use values) reflecting enjoyment derived from an asset's existence (i.e. cultural services).
- **Use value**, from:

[1] This approach has been widely adopted following its use and publication in the Millennium Ecosystem Assessment (2003).

  - **direct use**, whether
    - commercial (e.g. timber and tourism); or
    - non-commercial (e.g. recreation, health and safety).
  - **indirect use** (functional) values, most often related to environmental services which support or protect economic production, consumption or assets (i.e. regulating services).

- **Future use values** which are**:**
  - **Option value**: the value of retaining the option of using a resource in the future, including potential increases in value due to, for instance, increasing scarcity or new technology.
  - **Quasi-option value**: the value of retaining a resource until future information reduces uncertainty over its potential value.
  - **Bequest value**: the value of retaining a resource not in anticipation of future use but for passing on to future generations.

Non-use existence values include the regret felt when landscape elements, species or their habitats are irretrievably lost, whether motivated by aesthetic, cultural or ethical concerns for other species and future generations.

1. BUSINESS AND BES

1. Businesses rely on ecosystems for a wide range of services, although these dependencies vary considerably according to the nature of the business (Table 1). This reliance motivates increasing concern about the state of biodiversity. One recent survey shows that 27% of global CEOs are 'extremely' or 'somewhat' concerned about the threat that biodiversity loss poses to business growth (PWC cited in TEEB, 2012).

Table 1. Links between business and BES

For each type of business, icons shown depict degree of (1) dependency and (2) impact

	Biodiversity dependent industries (e.g. agriculture)	Large 'footprint' industries (e.g. mining)	Manufacturing (e.g. chemicals)	'Green' enterprises (e.g. ecotourism)	Financial services (e.g. insurance)
Provisioning services					
Food					
Timber					
Freshwater					
Genetic material					
Regulating services					
Climate and air quality					
Water regulation and purification					
Pollination					
Natural hazard regulation					
Cultural services					
Recreation and tourism					
Aesthetic/non-use value					
Spiritual values					
	= Moderate to major dependency		= Minor dependency		= No relevant dependency
	= Moderate to major impact		= Minor impact		= No relevant impact

Source: WBCSD 2011

2. Successful biodiversity policy requires a scaling up of private sector engagement because, in some sectors, the private sector's ownership and control of natural resources far outweighs that of

governments. In the minerals sector, for example, only 25% of production value is managed by governments. This figure falls to 10% if China is excluded from the calculation (World Bank, 2011). [2]

3. Even in the forestry sector, where government control dominates with 80% of forests publicly owned and 80% of those forests directly managed by government, the trend in most parts of the world is towards increasing ownership or management by private interests (whether local communities, individuals or corporates) (FAO, 2010).

4. Irrespective of ownership interest or direct resource management, the private sector is also the major purchaser of products whose production significantly impacts on ecosystems. Thus, business has significant capacity to drive demand for more sustainably produced products.

5. Some businesses are already taking steps to improve environmental management as a result of increasing recognition of the risks that biodiversity loss can pose to them. These actions range from investing in projects which secure access to ecosystem services such as fresh water to restoration of forests destroyed by mining.

6. The range of initiatives undertaken by businesses to improve biodiversity varies widely. Notable examples which illustrate the range of activities that have been undertaken include[3]:

- **Syngenta's Operation Pollinator**. A five-year project aimed at boosting the number of pollinating insects on commercial farms through a mixture of habitat cultivation, improved pesticide practices and seed use.

- **Volkswagen replenishing groundwater through reforestation**. This project, in Mexico's Puebla Tlaxcala Valley, where Volkswagen has a factory, sought to improve groundwater replenishment by improving the functioning of ecosystems in upstream mountain areas. For some time it had been apparent that competition for water between industrial and household use in the nearby city of Puebla could undermine the manufacturer's access to water and therefore the sustainability of production in the area.

- **Mondi Wetlands Programme**. Launched in 1991, this programme, sponsored by commercial forestry company Mondi, actively promotes sound management and restoration of wetlands through awareness raising, research, training and on-the-ground support. Amongst other things the programme has led to a cessation of timber extraction from riparian areas to protect wetlands and associated water resource. Because Mondi's commercial activities use significant volumes of water, they rely on healthy wetlands and riparian zones.

- **Fibria's Private Natural Heritage Reserves**. The Brazilian pulp and paper company has established Private Natural Heritage Reserves on more than 2,500 hectares of land with conservation areas connected by ecological corridors to enhance biodiversity. The company plans to expand this to more than 6,000 hectares. The initiative is supported by a government scheme for recognising conservation areas on private land; there are more than 1,000 such schemes in Brazil covering a total area of 700,000 hectares (WBCSD, 2011a).

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[2] This excludes fossil fuels.

[3] Illustrative case studies on business initiatives and business and biodiversity can be found on the website of the World Business Council on Sustainable Development and the TEEB for Business library (http://teebforbusiness.earthmind.net/).

7. These examples illustrate ways in which companies have a direct incentive to arrest biodiversity loss in cases where it can undermine business growth. Even conventional conservation is not the sole preserve of governments. However, the motivation for business to engage in these kinds of initiatives is not selfless. It stems from the fact that for many businesses biodiversity loss poses fundamental risks.

8. Governments need to be mindful that while business is a potentially powerful force for the sustainable use of biodiversity, realising that potential is dependent on policies that can respond to the concerns of business.

9. These concerns, categorised according to the risks that biodiversity loss creates for businesses, are summarised in Table 2.

Table 2. Business risks from biodiversity loss

Type of risk	Examples
Operational & physical	Reduced productivity and/or higher production costs (e.g. agricultural production down and commodity prices up due to pollinator scarcity; damage to watersheds reducing access to clean water). Damage to assets (e.g. silting in hydroelectric reservoirs due to erosion; floods due to loss of wetlands).
Regulatory & legal	Prohibition on access to resources (e.g. fishing or logging moratoriums). Emergence of new environmental objectives which preclude projects. Increased fees, access restrictions, or schemes requiring compensation to offset environmental damage – damages which may not be signalled as problematic before the fact.
Reputational	Consumer boycotts or purchaser contract termination in response to poor supply chain management – reducing the value of existing assets (intangible and otherwise). Local communities oppose consents for continued operation.
Customers and markets	Shift in consumer demand towards products with "demonstrated" or certified lower impacts on biodiversity and ecosystems (e.g. . Product standards imposed by commercial clients.
Finance	Prospects of any of the above risks can undermine creditworthiness and drive up costs of capital. Conditionality of lending (or associated reporting requirements) on verification that products are sourced in conformance with environmental regulation and standards. Rising ecological risks push up costs of insurance.

Source: Adapted from WRI (2012) WBCSD (2011a)

10. Indeed, business interests are not solely about operational risk. Perhaps the most powerful motivator for business to engage in sustainable production practices is the social license to operate. Environmental irresponsibility can lead to loss of *de facto* and *de jure* license to operate.

11. This motive can be a powerful one, leading companies to take actions that can be well in excess of what is required by law. It has also led to innovations and knowledge which might otherwise not have been created if left to government initiative.

12. In Australia, the mining company Alcoa is at the forefront of forest restoration techniques. Since the 1970s the company has sought to restore forests in Western Australia – where it runs the largest bauxite mining operation in the world – to a standard well above what is required by law. The motive was an anticipated backlash of public opinion against mining.

13. According to conservationist Andrew Balmford, Alcoa's efforts in Western Australia have led to new knowledge about plant species and techniques for forest regeneration. They have even provided new gains in the restoration of biodiversity that was threatened by impacts entirely unrelated to mining, such as introduced viruses and non-native species (Balmford, 2012). This sort of initiative shows just how important the actions of business can be.

14. More generally, there are capabilities unique to business which can be used to enhance the effectiveness of policy, including:

- networks of knowledge and experience that stretch across countries,
- access to technology which can support more sustainable use, and
- incentives to innovate, which can improve both of the above.

15. The biggest potential benefit stemming from using business capabilities to meet policy priorities is less about using the abilities of any one business and more about the capacity of the commercial sector to reward high-performers and penalise under-performers – subject to governments defining appropriate conditions for success.

16. Definitions of success will be sector specific. For example, in the case of large footprint industries, especially mining, action needs to be taken to reduce the impact of the sector as opposed to reducing activity. Reducing rates of mineral extraction is not a tenable option given the central importance and value that this industry creates in terms of jobs, especially in developing countries. And...

> *"…unless society as a whole performs a collective U-turn and decides it can live without its products – from cars to drink cans from fridges to mobile phones – mineral extraction will continue".* (Balmford, 2012)

17. At the same time, the resources these industries extract are often found in biodiversity-rich places of high conservation value from a global perspective and situated near protected areas. High-performing businesses are well aware of the potential conflicts. In addition to the Alcoa initiatives described above, Rio Tinto, BHP Billiton, BP and Shell have all commited to policies of no net biodiversity loss or net biodiversity gain. This suggests an urgent need to work with the best in business to identify policies that can see an industry-wide improvement in performance around the world.

18. There are of course distinctive characteristics of business which will limit the usefulness of engaging business directly to improve biodiversity. One is that firms have a narrower focus than governments. Their operational risks and shareholders' interests will often be connected to a particular ecosystem service in a particular location, such as access to fresh water as an input to manufacturing or the sustainable use of timber. When the value of biodiversity spans multiple ecosystems and ecosystem services over a wide geographical area it is more important to rely on public initiatives.

19. In addition, businesses do not have the powers of governments for dealing with externalities or negative actions of others. In this there is an unequivocal role for government.

20. Indeed, the business of business is business. It is not the provision of public goods or environmental quality, *per se*. Governments need to set agendas and help address public concerns. Business initiatives on biodiversity do not occur in a vacuum. Essential precursors to business action include an existing or potential public interest in conservation, sustainable use, and restoration of biodiversity. The example of Fibria's private conservation initiatives shows that businesses require a supportive policy environment.

21. However, policy-makers need to be cautious about the potential for crowding out private action and voluntary action in particular. Wherever it is profitable for firms to invest in biodiversity, as Volkswagen did in the Puebla Tlaxcala Valley, policy-makers need to be supportive and selective in their actions. In such cases governments need to conduct careful project- and scheme-specific evaluation to determine whether it makes sense to introduce requirements for biodiversity conservation and sustainable use. It will be difficult at times to discern where this is the case, given that business initiatives will often bundle actions designed to try to deflect regulatory intervention along with actual operational or physical risks.

22. The opportunity for policy-makers in all of this is to leverage the capabilities of businesses. This means identifying policies which will support the conversion of commercial risks into commercial opportunities and provide incentives and institutions that help firms to mitigate remaining risks.

2. THE POLICY-SCAPE

2.1 Institutional essentials

23. Biodiversity policy does not operate in isolation from other policies. Its effectiveness will be partly determined by whether other sound policies and economic, social, and regulatory institutions are in place.

24. It may well be that, in some countries, the best way to help conserve and sustainably use biodiversity is to create sound economic and legal institutions. Without these, biodiversity policies are likely to struggle. It may be that the first step in engaging businesses to improve biodiversity is to review the economic and commercial policy environment in which they are operating.

25. Empirical evidence suggests that many of the economic, social and political institutions which assist economic development also slow rates of biodiversity loss because they "help to internalise the value of biodiversity into decision-making processes of the state and individuals" (Asafu-Adje, 2003)[4].

26. This observation is a variant on the so-called Environmental Kuznets curve – the partially empirically supported hypothesis that demand for environmental quality grows with development. In the context of businesses and biodiversity policy this is less about allowing leaving economic development to take care of environmental quality and more about the extent to which sound economic institutions provide both precursors for policy to be effective as well as increase incentives for business to engage in voluntary actions.

27. The importance of sound economic and social institutions is also supported by observations about the extent to which economic institutions which do not support private property, unbiased

[4] After controlling for the fact that the many of the most industrialised nations have severely modified much of their biodiversity.

systems of law and provision of public services retard economic growth, inhibit access to economic opportunities, and entrench inequality (Acemoglu and Robinson, 2012).

28. To the extent that poor quality economic institutions affect economic growth, they can also affect inequality. This has been shown empirically to be related to biodiversity loss (Holland et al, 2009).

29. Furthermore, there are many kinds of environmental damage that could be prevented by better social and economic institutions and protection of property rights. One example is the damage to ecosystems caused by the pilfering of oil from pipelines. Indeed, prohibition of activities with serious impacts on biodiversity is often seriously undermined by the more general institutional problem of corruption, as has been seen in the correlations between illegal logging and measures of corruption (World Bank, 2006).

30. This is not to say that the connection between sound economic institutions and sound biodiversity policy is crystal clear. A number of developing countries which rank poorly on the index of economic freedom are notable for their ambitious biodiversity policy initiatives. This casts doubt over a simple one-to-one connection.

31. That said, it is unclear if the prevalence of environmental policy initiatives in these countries is a function of domestic concern and policy initiatives, or international pressure and the priorities of development assistance agencies. It is also unclear whether these policies effectively leverage private sector expertise and resources.

32. Getting economic policy right is challenging to say the least. When it comes to economic development and institutions, there is no clear solution (Rodrik, 2007; Cohen and Easterly, 2009). However, when it comes to sensible biodiversity policy which is cost effective and amenable to business and economic development there are at least policy conditions or principles which can be used to guide policy development and have been consistently called for by business and recommended by organisations such as the OECD (WBCSD, 2011b):

- **Predictability**
  - clarity about objectives;
  - clear longer term signals (at least 5-10 years);
  - respect for and protection of property rights.
- **Accountability**
  - realistic but challenging targets;
  - clear lines of accountability for reaching targets ;
  - targeting incentives at resource managers.
- **Consistency**
  - common standards across competitors, both in markets and in terms of access to resources;
  - consistency in policy across national boundaries.

- **Proportionality**

  - actions that are proportional to ecosystem value at risk;

  - aiming to maximise net social and economic benefits;

  - international commitments which give flexibility for actions which reflect local conditions.

33. A related precondition to sound policy is sound process which ensures policy coherence and takes on board the views of a range of stakeholders. In general the steps for doing this should include:[5]

- **Taking stock of**:

  - physical state and spatial patterns of biodiversity

  - key ecosystem services (e.g. water and carbon sequestration) which are at risk and have high social or economic value and

  - existing BES-related policy.

  This should be used to identify areas where existing policy requires reform, either because it is ineffective or because it exacerbates biodiversity loss, or to identify areas of accelerating biodiversity loss or ecological risk which requires urgent action.

- **Assessing business-as-usual projections for biodiversity trends** (taking into account population growth, economic growth, and demand for agricultural production in particular). This will help to determine sites of BES that are at highest risk and identify key drivers of biodiversity loss. It will also provide a reference point against which policy progress can be measured.

- **Developing a long term vision**. To ensure coherence, this needs to be undertaken in coordination with other policy areas and initiatives, e.g. agriculture, energy and climate policy. This could involve joint high-level task forces assessing trade-offs and potential synergies. To the extent possible, this process should draw on cost-benefit analyses.

- **Identifying and implementing a suite of least cost policy options**, areas for intervention and relative policy priorities and sequencing. This should include mixtures of policies clearly connected to objectives laid out in the long term vision.

- **Monitoring and reviewing** by tracking progress towards objectives and reviewing and revising policies over time based on new information and lessons learned.

2.2 The biodiversity policy toolkit

34. Table 3 summarises the range of policies that can be used to reduce biodiversity loss and promote sustainable use of natural resources (the attributes of key policies are summarised in more detail in Appendix A). They are broken down into three broad categories:

[5] Adapted from OECD (2012) Box 4.10 "A strategy for green growth and biodiversity".

- regulatory instruments which directly set standards of behaviour;
- economic instruments which change incentives in favour of particular kinds of behaviours; and
- information and other instruments which typically aim to overcome information and coordination problems.

Table 3. Policy instruments for biodiversity conservation and sustainable use

Regulatory (command & control) approaches	Economic instruments	Information and other instruments
Restrictions or prohibitions on use (e.g. trade in endangered species and CITES).	Price based instruments: -Taxes (e.g. on groundwater, pesticide and fertiliser use). - Charges/fees (e.g. for natural resource use, access to national parks, hunting or fishing license fees) - Subsidies	Eco-labelling and certification (e.g. organic agriculture labelling schemes, labels for sustainably harvested fish or timber).
Access restrictions or prohibitions (e.g. protected areas and buffer zones).	Reform of environmentally harmful subsidies.	Green public procurement (e.g. of sustainably harvested timber).
Permits and quotas (e.g. for logging and fishing).	Payment for ecosystem services.	Voluntary agreements (e.g. negotiated between businesses and government for nature protection or voluntary offset schemes).
Quality, quantity or design standards (e.g. commercial fishing net mesh-size specifications).	Biodiversity offsets/biobanking.	Corporate environmental accounting.
Spatial planning (e.g. ecological corridors).	Tradable permits (e.g. individual transferable quotas for fisheries, tradable development credits)	
Planning tools and requirements (environmental impact assessments [EIAs] and strategic environmental assessments [SEAs]).	- Liability instruments - Non-compliance fines - Performance bonds	

Source: OECD, 2012a

2.2.1 Regulatory instruments

35. Traditionally, policy has focussed on regulatory approaches, particularly the establishment of protected areas (Figure 3) and regulatory prohibitions and standards. These sorts of policies will continue to play a central role in biodiversity policy. The Aichi target under the Convention on Biological Diversity calls, for instance, for an increase in terrestrial protected areas to 17% of land area globally.

36. Regulatory instruments can be highly effective policy instruments. If, for example, enforcement is sufficient to ensure conservation within protected areas then effectiveness is high because ecosystems can be protected in their natural state.

37. Protected areas are perhaps the most effective policy choice from a pure conservation perspective. However, establishing such areas can be divisive because it excludes resource use and even where combined with some limited resource use the reduced production possibilities for local communities can provide significant incentives to undermine the policy.

38. The presence of potentially strong incentives to use resources in protected areas means that if compliance and enforcement are absent (which is often the case) the areas are *de facto* open access. According to one assessment, approximately 14% of protected areas were considered to be lacking in basic management requirements (Leverington et al., 2008 cited in OECD, 2012a).

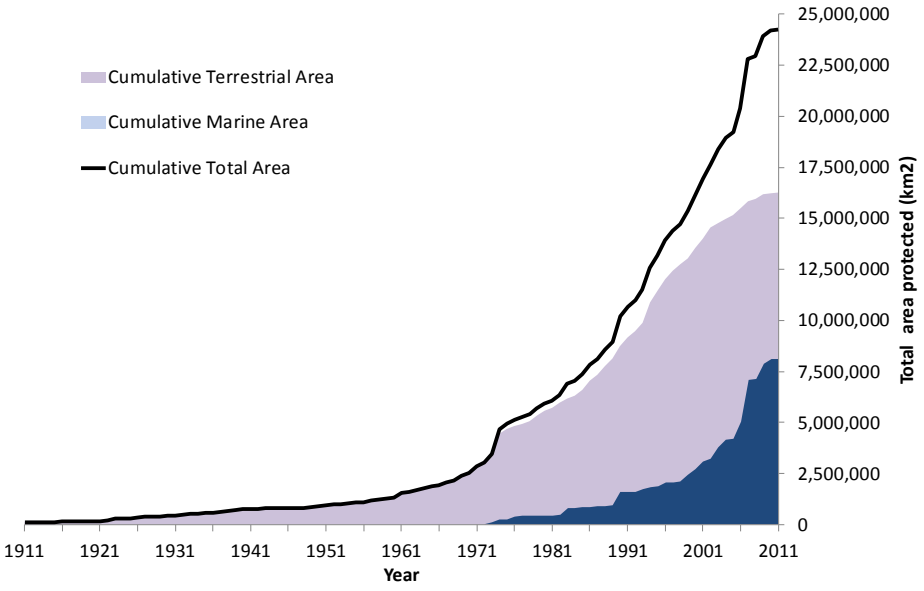
39. Funding protected areas can be difficult. Protected areas require ongoing management (e.g. measures to keep out pests and monitoring measures) and thus ongoing funding. This can be a heavy burden if there are no incentives for private funding for ongoing management.

40. Expanding protected areas entails further costs and complications, especially where land is privately owned. While the purchase of land and its subsequent management by a conservation agency or voluntary body can be an effective way of securing the conservation interest long term, the up-front costs can be very high.

41. The key to mobilizing resources for ongoing maintenance or improvement is to provide incentives which create new interests in the quantity and quality of biodiversity. This requires economic instruments rather than regulatory instruments.

42. The funding gap to achieve protection for 10-15% of global terrestrial land is estimated to be in the order of US$18-27.5 billion per annum (James et al 2001). This is a relatively modest target when compared to the Aichi target of 17% of land area and the fact that this number excludes maritime protected areas which are typically underprotected relative to terrestrial land.

Figure 3. Nationally designated protected areas



Source: IUCN and UNEP-WCMC (2012)

43. A number of regulatory policies are essentially supportive of other policy programmes and objectives, such as protected areas, rather than policies which directly target particular sites of biodiversity or sustainable resource use, e.g. prohibitions on product trade or use such as bans on trade in endangered species.

44. Regulatory policies which provide for sustainable use of resources exist within a very wide spectrum ranging from partial use or access restrictions, which approximate aspects of protected area policies, through to targeted standards for production.

45. Strict standards on the way resources are used or prohibitions on use are an often indispensable part of policy in the case of managing major hazards (e.g. from seriously toxic substances such as mercury) or preventing extinctions. They also provide a degree of certainty or safe minimum standards where impacts on biodiversity (especially long term impacts) are not well understood, as compared to incentive based policy measures. They can also be more easily set to reflect local issues (resources and production patterns) or local conditions (scope for damages and environmental thresholds) than can some kinds of incentive mechanisms.

46. Regulation for sustainable use (as opposed to access restrictions or protected areas) does come with important downsides in terms of efficiency, absence of incentives to improve performance and costs of compliance. It can also create distributional distortions and increase the welfare costs of policies. A case in point is permits and quotas: in the absence of economic instruments (which include tradability), it is very difficult to ensure their allocation on the basis of willingness to pay, in which case they may not go to the highest valued use.

47. When quotas or permits represent exclusive use rights for a limited resource, they provide holders with resource rents. This not only increases welfare costs – often borne by poorer communities who are least able to make a case for access to quotas and permits – but also increases the likelihood of non-compliance by those without access to them.

48. If quotas and permits are applied on a limited basis to activities such as non-commercial hunting and fishing they may, however, primarily serve a modest monitoring and norm-setting purpose and welfare costs may not loom large (e.g. in terms of limited hunting rights).

49. Other instruments which fall within the regulatory part of the policy toolkit include spatial planning and planning requirements (requirements to do due diligence before undertaking projects or policies with ecological impacts) which are often process-oriented. Spatial planning (in its more effective forms) provides a mechanism for stakeholders to be consulted on land designation and on the potential application of other policy instruments. It can help to determine policy objectives based on a variety of views and values.

50. As process-based mechanisms, spatial planning and planning requirements are part of good policy. However, spatial planning also creates rents by drawing lines around which properties can be used for particular purposes. Unless accompanied by economic instruments for efficient allocation of development rights, such restrictions can be divisive and will create the same kinds of welfare costs and inefficiencies as quota systems. Indeed, these inefficiencies can be worse because the results of spatial planning can be more difficult to change in response to new information about economic and ecological conditions.

51. In summary, while regulatory instruments are undeniably valuable as a policy tool they are not always effective, as they don't provide sufficient incentives for an efficient allocation of effort to conserve and sustainably use biodiversity or an efficient allocation of use rights over natural resources. The inflexibility and potential inefficiency of regulatory measures is nicely illustrated in the following example from the UK (Kate, et al, 2004 p. 17):

Great crested newts are protected under the EU Habitats Directive, although they are fairly common in many reconstructed water ecosystems. In the UK, companies could be fined up to £5000 per newt lost through development. When Northumbrian Water was upgrading its water treatment works in Darlington, it found that 10 great crested newts, which had not been present on the site before the waterworks were built, had moved into the concrete lagoons the company used to settle and drain sludge. In order to meet its legal obligations, Northumbrian Water built the newts an adjoining pond and, two years later, when this new ecosystem was ready, hired someone to collect each newt and transfer them to the new pond. The newts are now breeding happily in the new pond. The exercise cost the company £250,000. As Chris Spray, formerly Environmental Director at the company explains, "If I were to ask conservationists how they would like to spend £250,000 for biodiversity conservation, they would not say "on 10 newts". Conservationists would have had other priorities."

2.2.2 Economic instruments

52. Increasingly, governments are including incentive-based economic instruments in their biodiversity policy toolkits. These instruments aim to provide behaviour-related incentives, whether positive or negative, and to create conditions where decisions more fully reflect the costs they create (i.e. internalisation). They provide varying degrees of flexibility and, in so doing, can create new interests in biodiversity and ecosystem services as private actors seek to reduce costs or increase opportunities that can come with policies.

53. A number of economic instruments use carrots or sticks (i.e. payments or penalties) to reinforce the effectiveness of regulatory standards. Payments or penalties are made contingent on a prescribed standard of resource management or to encourage private provision of conservation on private land.

54. Examples of these kinds of ancillary measures include payments for agreed land management practices or for (voluntarily) setting aside part of private land for conservation purposes. They also include performance bonds and liability for breaching regulatory standards.

55. These incentives can markedly improve the effectiveness of regulatory measures, especially positive incentives used to reinforce initiatives where compliance is wholly or partly voluntary.

56. Positive incentives or subsidies are commonly used to facilitate or help finance the management of biodiversity and more sustainable resource use. Often, but not always, these are tied up with wider programmes of environmental fiscal reform (discussed further below). Payments are made through a variety of measures such as tax exemptions, concessionary loans, or the provision of infrastructure (e.g. irrigation) enabling more efficient resource use. The main downside with these kinds of schemes is that they can place a burden on public finances (OECD, 2012a). Furthermore, if a subsidy is linked to a given standard of performance then there is no added incentive to improve performance beyond the regulatory requirement.

57. Liability instruments (penalties for regulatory non-performance), while arguably necessary for giving regulatory standards some 'teeth', are not always successful. This is often by design because penalties are not severe enough or monitoring and enforcement is insufficient.

58. Perversely, when penalties are low and monitoring and enforcement are patchy (such that costs of non-compliance are not widely observed), the act of penalising a firm for not meeting regulatory standards can provide a signal about the weakness of penalties – which leads to more frequent violation of regulation (Faure, 2009).

59. Furthermore, firms can structure their affairs, in legal terms, to avoid ever having to pay any penalties e.g. by confining polluting activities to small subsidiary business units. Ultimately this means that while penalties may be necessary they are ineffective policy instruments on their own.[6]

60. Other types of economic instruments – which have also been referred to as 'innovative financing mechanisms' by the Convention on Biological Diversity (CBD) – include:

- **Payments for ecosystem services (PES)**
  - PES provide direct compensation from the beneficiaries of ecosystem services to individuals or communities who manage those resources for the additional costs associated with continuing to provide or to enhance those ecosystem services. More formally they are "a voluntary conditional agreement between at least one seller and one buyer over a well-defined environmental service – or a land use presumed to produce that service" (Wunder, 2005).
  - They can be applied to a range of ecosystem services, including provisioning and regulating services such as those produced by watersheds, as well as non-use or cultural services such as landscape beauty and species conservation.
- **Biodiversity offsets and bio-banking**
  - Offsets are "measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken" (BBOP, 2009).
  - They can be one-off project specific measures and requirements or can include biobanking, where obligations or desires to offset are fulfilled by paying for 'equivalent' biodiversity owned by someone else (whether a government or private owner).
- **Environmental fiscal reform**
  - Taxation, pricing and payment measures which can raise revenue or defray costs while furthering environmental goals. This includes taxes and charges on natural resource use or on pollution, on resource rents, and the reform of subsidies harmful to environment (OECD, 2005; World Bank, 2005).
  - Revenue raising examples include taxes, charges and fees on pesticides, fertilisers and other sources of NOx, SO2 and CO2 emissions, natural resource extraction (e.g. hunting; fishing; forestry; groundwater extraction), waste-water discharge, and entrance to natural parks.
  - Expenditure reform examples include subsidies that promote, without any environmental considerations, the intensification or geographic expansion of economic sectors such as agriculture, bio-energy, fishing, forestry and transport (OECD, 2012a).

[6] Evidence also suggests that regulatory standards are more effective than simple negligence based (tort) liability regimes (Dewees, 1992a; 1992b).

– Environmental taxes can also be linked to wider tax reform which can result in more efficient tax systems from both a transaction (administrative) cost and a welfare perspective.

- **Boosting markets for so-called 'green products'** (through certification, standards, labelling and public procurement). This is discussed below in the context of 'information and other instruments'.

61. The term 'innovative financing' is largely misleading because these kinds of measures are not novel. There are, for example, more than 300 PES schemes operating around the world today and the global market for offsets has mobilised an estimated US$ 2.4–4 billion per annum. That said, these instruments have often failed to mobilise wide scale private sector involvement. Although the value of PES schemes is globally in excess of US$6 billion, most of this funding has come from the public sector (OECD, 2010; IIED, 2012).

62. PES hold promise as an incentive for improving ecosystem quality because, depending on their design, they can move payment systems away from prescribed standards to measurable outcomes. They therefore lend themselves to more open-ended incentives for improved management. PES can also help to address distributional concerns by compensating resource owners (at least partially) for any lost productivity. As such they have the potential to be less divisive than other policy instruments – though this is by no means guaranteed.

63. Economic instruments like PES can provide incomes to poor and rural land users, but there are several pre-requisites before this can happen. The most important appears to be secure land tenure or property rights. In the absence of one or both of these pre-requisites the poor can be marginalised and the benefits of incentive-based mechanisms can flow to the wrong people – in particular to those without an immediate interest in the management of local land and biodiversity (Bishop et al., 2008; OECD, 2010; OECD, forthcoming).

64. PES are not suitable for all situations. High benefits from BES conservation and sustainable use or high risks from biodiversity loss may commend mandatory policies instead of voluntary measures such as PES. PES also provide additional incentives to go beyond existing regulation. Their effectiveness is therefore partly dependent on that of existing measures.

65. There are also a number of design features which need to be dealt with to produce effective PES schemes (OECD, 2010). PES can be cost effective where:

- buying a resource outright is too expensive (i.e. it is not cost effective to simply purchase land and conserve it for its ecosystem services);

- payments are less expensive than an alternative technical fix (e.g. infrastructure investment);

- transaction costs are not prohibitive (e.g. monitoring ecosystem quality and attributing changes to the individual efforts of many suppliers could be very costly); and

- there is a willing payer.

66. Offset schemes offer promise in terms of their capacity to facilitate achievement of biodiversity 'no net loss' objectives while:

- not unduly compromising economic development objectives;

- mobilising resources for ecosystem restoration or conservation;
- helping to channel conservation resource to high(er) value sites.

67. Offsetting helps to ensure that polluters pay for the cost of development and also provides a means of reducing the costs of mitigation in a way that can benefit wider biodiversity outcomes. Despite some obvious benefits, offsetting comes with some important caveats, especially where it involves exchanging mitigation and restoration actions or 'credits'. Crucially, offsetting should not be seen as a tool for justifying development on a site where development should never otherwise have occurred:

> *Where adverse impacts to biodiversity cannot be fully compensated for by an offset because the affected biodiversity is irreplaceable or vulnerable, or because there are no available offset sites or no known conservation approaches to achieve, the offset outcomes required, offsets should not be allowed and other forms of policy are more appropriate (e.g. protected areas; buffer zones).* (OECD, forthcoming)

68. To be effective and to avoid the charge that offsetting is a 'license to trash', reasonably exacting standards are required. These include how an offset is defined and measured (i.e. the equivalent unit of biodiversity that needs to be conserved or restored to offset a unit destroyed or degraded), how the quality of an offset can be assured over time (i.e. will it be permanent and additional to what would have otherwise occurred) and monitoring to confirm that a party with an offset obligation has indeed fulfilled that obligation. To do this properly requires robust institutions and exacting implementation requirements.

69. A range of policy options is available to incentivise conservation measures on private land, including paying for conservation measures, though from a fiscal perspective these incentive-based instruments can be one of the more costly options. The costs of paying for land and the difficulty of negotiating with land owners can be side-stepped by regulatory controls on how land can be used (i.e. standards).

2.2.3 Information and other instruments

70. There is a range of other instruments which do not fall precisely into the domain of either regulatory or economic instruments. These are often private initiatives, albeit often motivated by the possibility of policy intervention.

71. One example is information instruments such as labelling and certification schemes. These schemes promote sustainable resource management by cultivating consumer demand for sustainably produced products. In many cases they can be supported by policy (e.g. through standardisation or sanctioning a particular scheme) but they are also often pursued independently by industry and non-governmental organisations.

72. The environmental effectiveness of these kinds of measures is variable. While it appears that they have been effective in improving timber resource management, it is not clear how effective they have been for other products and resources (Fischer, 2010). In general, such measures are likely to be less effective in the context of biodiversity policy than for other environmental issues because the effectiveness of information measures is typically linked to whether environmental claims relate also to private benefits (such as energy efficiency) (OECD, 2008).

73. This is not to say that such schemes are not useful. They fill an important gap between producers and consumers by promoting consumer awareness of product and production attributes. However, they are by no means stand-alone policies.

74. Green public procurement is another policy instrument which can be useful in raising awareness and creating markets for goods and services based on sustainable resource use. Public procurement initiatives can operate as:

- signals to the market about policy priorities (i.e. information instruments);
- a standard setting device;
- a direct incentive (payment) to particular kinds of producers.

75. Generally, green procurement will cut across all three. Given that most governments have large procurement budgets, these initiatives have the potential for a reasonably high impact – in terms of sheer scale. They can also help markets for sustainably produced products to reach a critical mass. In many cases broader policies would commend themselves, but green public procurement can be a useful stepping stone to achieving them.

76. Voluntary agreements, within an industry or between industry and government, can also be an effective stepping stone in policy development, in part because they help to reveal information about the feasibility and costs of changes to production methods and reductions in environmental impacts.

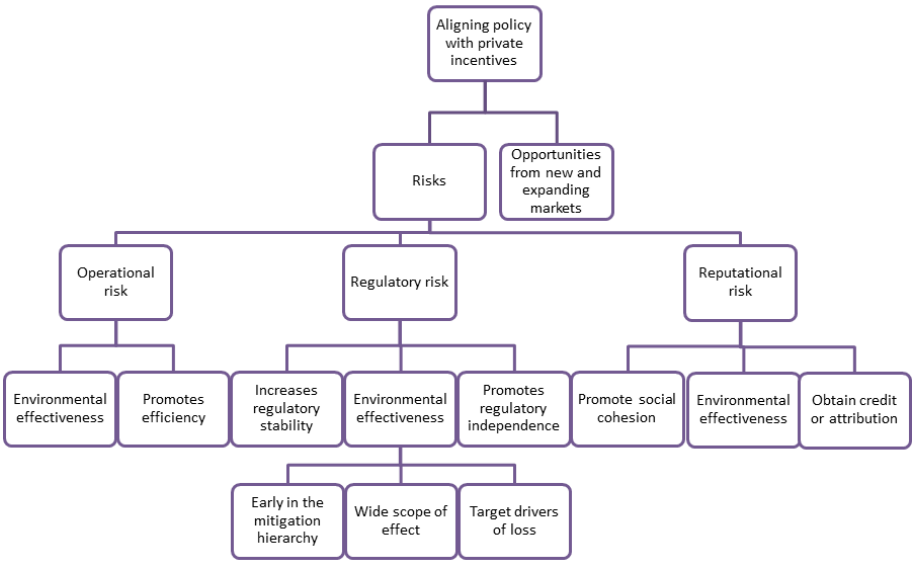
77. Voluntary agreements come with the added value that, when combined with a credible threat of regulation, they can be reasonably cost-effective because they leverage on-the-ground expertise. However, information asymmetry between firms and regulators can also reduce the effectiveness of voluntary measures.

3. ALIGNING POLICY WITH BUSINESS INCENTIVES

78. Policy which aims to engage business needs to be aligned with the incentives that drive private engagement in biodiversity conservation and sustainable use. Ideally, it will address the risks to business posed by biodiversity loss and provide commercial opportunities related to biodiversity and ecosystems services, whether in the form of new or expanding markets or price premiums.

79. The framework used here to consider these issues identifies, in respect of each business risk, policy attributes that align with the management of that risk (Figure 4). Environmental effectiveness features as a key element for managing all three kinds of business risks. To the extent that it is effective, a policy can help contain operational costs, remove regulatory uncertainty and reduce reputational risk. Characteristics which promote environmental effectiveness are listed in Figure 4. These include: whether policies target avoidance of loss rather than remedying loss after the fact (i.e. early in the so-called mitigation hierarchy); whether policy has wide scope of effect; and whether policy directly targets actions and behaviours which drive biodiversity loss. These and the other aspects of the framework are discussed further below.

Figure 4. Policy evaluation framework



Source: NZIER

3.1 Mapping policy to business risks

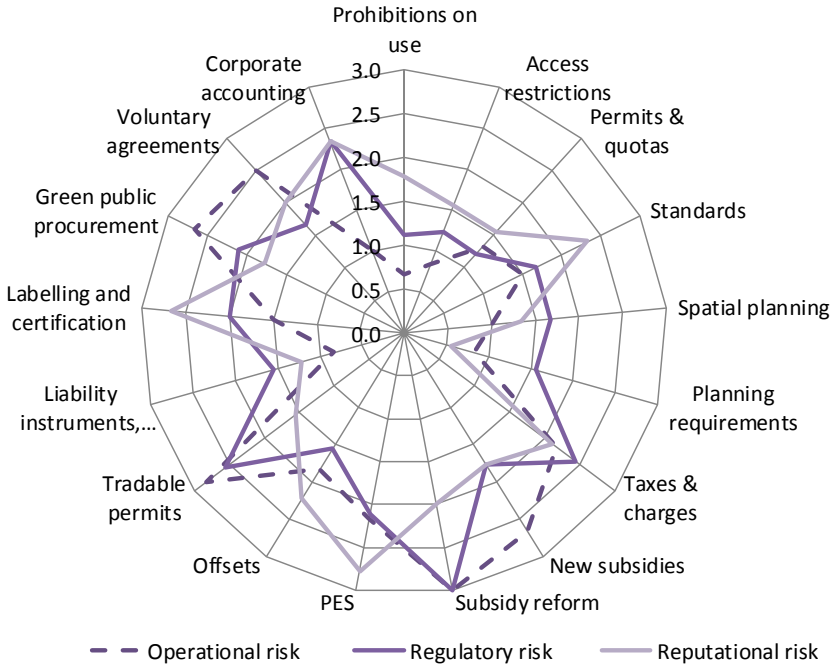
80. Prioritising policies based on risks to business means identifying policies which support businesses in managing different kinds of biodiversity related risks: whether operational, regulatory, or reputational (as outlined in Table 2).[7]

81. Using this yardstick, the relative effectiveness of policies in engaging business will vary depending on the kinds of risk that are most important to different types of businesses. Figure 5 illustrates this with an assessment of the propensity of policies to support management of these risks. A score of 0 indicates no capacity to support risk management and a score of 3 indicates high capacity (for details behind this evaluation, see Appendix B).

[7] Market and reputational risks are conflated here because the policy considerations are very similar for both risks. Financing risk is also set aside because it is a reflection of whether or not the other risks are well managed or not.

Figure 5. Policy supporting risk management

Indices of policy effectiveness in meeting biodiversity business risks



Source: NZIER

82. In many cases policy has competing effects. For example:

- There is reputational value in labelling and certification schemes, but these schemes may not support the efficient management of operational risks if they impose requirements which are not sufficiently flexible.

- Green public procurement, if conducted using competitive tendering processes, can be an efficient means of promoting sustainable resource use. But it is questionable whether, from a reputational perspective, the public will see such schemes as being associated with public or private initiatives.

- New subsidies for conservation and sustainable use would help to resolve operational risks and costs of risk mismanagement, but they do not do much for regulatory risk because subsidies may be withdrawn in hard economic times.

83. The big difference between policies and the kinds of business risks they are better at addressing is between regulatory instruments, which are reasonably effective in addressing reputational risk (and, to a lesser extent, regulatory risk) and economic instruments, which are most effective at addressing operational risk (while also reasonably effective in addressing the other risks).

3.1.1 Operational and physical risk

84. Policy which aims to support businesses in managing operational and physical risk needs to be:

- environmentally effective, in the sense that it can help reduce risks to asset value from natural hazards or loss of access to important inputs;

- efficient, in the sense that it can help keep operational risk management costs down.

85. Ideally, judgements about environmental effectiveness would be based on empirical studies, but biodiversity policy is notable for its absence of comprehensive evaluations (Albers and Ferraro, 2006). This is very gradually changing, however. In the absence of sufficient empirical evidence, three qualitative criteria are considered:

- position on the mitigation hierarchy (avoidance, mitigation, restoration and offsetting)
  - the general proposition is that policy which avoids damage has greater ecological value than policy which acts as an 'ambulance at the bottom of a cliff' (i.e. restoration) because ecological function is generally best maintained when it is completely undisturbed (see, e.g. Albers and Goldbach 2000).

- scope of effect and of applicability
  - policy instruments which affect products and processes along supply chains (e.g. raising prices of resource intensive goods) or affect ecosystem impacts across a wide spatial and functional scale have greater value than those which narrowly target a particular issue or species;
  - this is important because although narrowly applied measures can be effective, in and of themselves they can also shift environmental impact from one issue or place to another;
  - another way of describing this criterion is ad hoc versus systematic applicability.

- targeting of the immediate drivers of biodiversity loss
  - policy is more likely to be environmentally effective if it targets actors and actions which directly impact on biodiversity.

86. Efficiency demands that businesses have flexibility to respond to policies in ways that can reduce costs of compliance. This won't ring true to many businesses individually, who might rather avoid costs entirely, but it is true for businesses in general. Policy cannot address the concerns of all asset owners and businesses all of the time. Indeed, on many issues of risk management one firm's risk is another firm's opportunity. In many cases, one party's risk avoided is another party's realised.

87. This being the case, it makes no sense to search for policies that support the interests of 'business' as if it were a single entity. Someone will bear the costs of BES policy and someone will receive the benefits. We need to think instead about policies in terms of whether they minimise risks to one party while also reducing costs to another.

88. Consider, for example, a dam owner who faces operational and asset risk from erosion caused by overharvesting of forests. The dam's owners have a number of options for addressing this problem. They could, for example, pay the forest owner not to cut their trees down or buy the forest from the owner – if it maintains the profitability of the dam. In this case the exacerbator (or polluter) is a beneficiary of the avoided degradation and so too is the dam owner, but the dam owner also bears the cost.

89. The dam owner may also have recourse to remedy by litigation. Assuming that any such litigation is successful, the cost of reduced logging will fall on the forest owner, and presumably some cost of litigation will be borne by the dam owner.

90. There will also be cases where 'do nothing' is the most profitable option from the perspective of the dam owner – e.g. when the outcome of litigation is highly uncertain and the cost of erosion to the dam owner is lower than the value of the timber to the forest owner. However, this option may well be highly inefficient if a third party (say a local community) is also bearing the cost. If the total economic or social value of preventing erosion is higher than the value of the timber, then 'do nothing' is highly inefficient.

91. Under these circumstances a policy intervention can improve on the situation, but depending on its design it, too, can entail inefficiencies. Consider a situation where the dam owner lobbies the government to prohibit logging on land adjacent to the river. This is precisely the situation where one party's risk avoided becomes another party's risk realised.[8]

92. It could be argued that the business with the logging interest should bear the cost of the damage that their business creates. In general this is in keeping with the tried and tested principle of 'polluter pays'. However, an outright prohibition would leave no scope for the logging business to manage its risks. There are other policy instruments that would allow for continued logging in a more sustainable fashion (e.g. selectively).

93. It is also counterproductive from an economic development view point to prohibit an activity if it was a 'licensed' activity in the first place. While there will be cases where environmental concern mandates such a prohibition, the ex post withdrawal of the 'licence' can create uncertainty that could inhibit future investment and economic development.[9]

94. The best result for all concerned (in sum rather than individually) is one which allows for appropriate degrees of risk and cost sharing. For policy to be attractive to business, in general, it must provide scope for risk management by all parties.

95. In essence this is about recognising that helping one business to manage its operational risk will have implications for another firm trying to manage its regulatory risk. At worst, the wrong policy will exacerbate both risks for an individual or all relevant firms. Thus the ability of policy to support risk management is judged according to efficiency in terms of solution flexibility and risk sharing between parties.

3.1.2 Regulatory risk

96. Policies which support management of regulatory risk are those which:

- are environmentally effective;
- support stability in the regulatory regime; and
- are conducive to regulatory independence.

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8 In this example the parties needn't be private interests.

9 This is another reason why policy which sets out to avoid degradation before the fact (before any investment has taken place) is preferable to policy which tries to mitigate after the fact.

97. Environmental effectiveness matters because when policy is not effective the risk of regulatory intervention rises.

98. The second and third policy characteristics reflect well-established principles for regulatory quality such as the extent to which policy has, *inter alia*, clear objectives, is justified on the basis of clear cost-benefit, and is accompanied by active oversight and review (OECD, 2012b).

99. Stability in this context relates to whether, from the perspective of business, the substance of policy is likely to be conducted on an ad hoc and unpredictable basis. From this perspective, stability is synonymous with systemic policy instruments that require careful justification and clear objective setting, i.e. policies with wide scope as defined above in relation to environmental effectiveness.

100. Independence refers to whether a particular policy instrument naturally lends itself to ad hoc political interference and politicised institutions. The only policy with high capacity to improve regulatory independence is subsidy reform – which by definition reduces vested interests.

3.1.3 Reputational risk

101. Policies which support management of reputational risk are those which:

- are environmentally effective;
- typically support social cohesion;
- allow firms to obtain credit for positive outcomes.

102. The social cohesion criterion recognises that some policies are polarising in terms of public opinion. At one end of the spectrum a policy may typically worsen social cohesion by polarising debate or setting interest groups against each other. Broadly speaking, policies which do this are those which reinforce or introduce property rights in natural resources and the environment where there is no broad prior consensus in support of such changes.

103. The attribution criteria recognises that some policies provide no opportunity for improving public perception about business impacts on the environment or possibly have a negative effect, such as liability instruments and fines where policy only recognises negative actions of business. In contrast, policies to support certification and labelling clearly link businesses with positive environmental attributes.

3.2 Taking account of commercial opportunities

104. Another element we use to map policy to private incentives is the potential for policy to turn risks into new commercial opportunities. This implicitly includes the principle of efficiency in the sense that a flexible policy which admits firm response and innovation and alternative forms of compliance presents an opportunity to avoid cost. However, here opportunity is evaluated in terms of potential for entirely new markets, products or brands to form.

105. This includes opportunities for associated industries such as permit trading, investment and insurance, as well as new products from bio-prospecting and green branded or certified products.

106. Our overall assessment of the capacity for policy to engage private incentives is comprised of a combination of opportunity and ability to support the three components of biodiversity business risk. The final scoring and associated list of policy priorities is shown in Table 4. This list ranks policies by score across each of the broad assessment criteria and overall (see Appendix B).

Table 4. Ranking of policies mapped to private incentives

1 = best at promoting private incentives.

Policy	Rank – risk management	Rank - opportunities	Rank - overall
Labelling and certification	7	1	1
Green public procurement	8	1	2
PES	2	3	3
Tradable permits	3	3	4
Corporate accounting	9	3	5
Offsets	10	3	6
Taxes & charges	4	7	7
New subsidies	5	7	8
Voluntary agreements	6	7	9
Subsidy reform	1	10	10
Standards	11	10	11
Permits & quotas	12	10	12
Spatial planning	13	10	13
Access restrictions	14	10	14
Liability instruments, fines & bonds	15	10	15
Prohibitions on use	16	10	16
Planning requirements	17	10	17

Source: NZIER

3.3 Aligning private incentives and public benefit

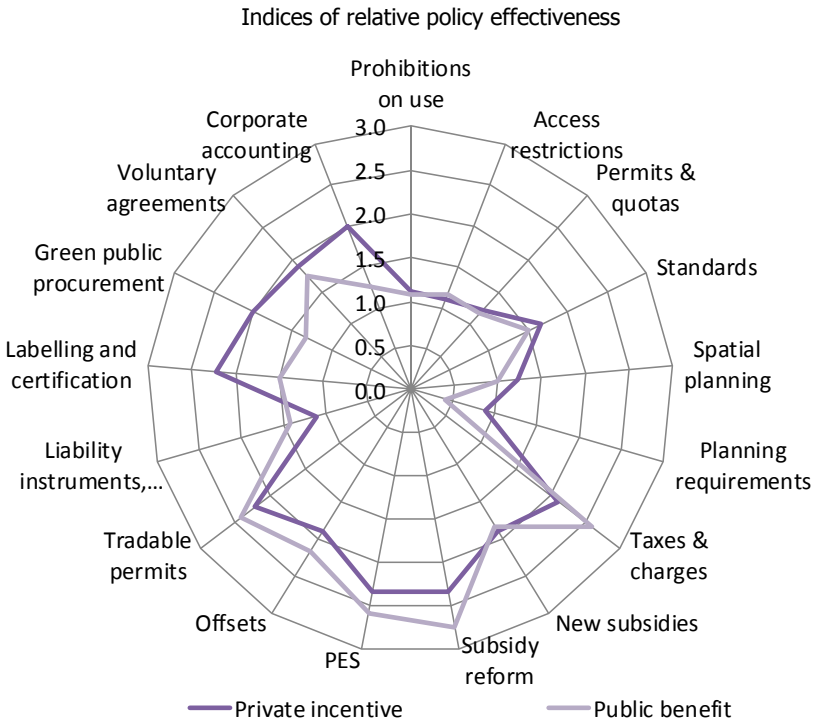
107. A final consideration is the extent to which policies can deliver public benefits as well as leverage private incentives. We define public benefit as that which is conducive to environmental effectiveness and efficiency, and also have the capacity to mobilise private sector finance. In general, policies which align with private incentives correlate reasonably well with public benefits (Figure 6).

108. The main driver of a coincidence between private incentive and public benefit is the capacity for economic instruments to mobilise financing. This is essentially why information-based policy instruments and public expenditure-based initiatives are not accorded high priority in terms of public benefit.

109. This all leads to an indicative list of policy priorities shown in Table 5. This list suggests policy should prioritise economic instruments for their capacity to leverage private incentives for public benefit. Some policies which are ostensibly similar are not accorded the same degree of priority after careful assessment. For example, new subsidies and PES do not have the same priority despite the fact that in their current form PES is a kind of subsidy scheme. PES distinguishes itself because it is a performance-based payment system and this kind of system lends itself to more efficient outcomes than subsidy schemes which are not inherently performance based (e.g. payments contingent on meeting a minimum regulatory standard of behaviour which is not connected to a measurable ecosystem outcome). Most importantly, the potential for PES to mobilise private finance makes it much more beneficial from a public perspective than subsidies. Furthermore, PES also has good potential for creating new commercial opportunities, which is much less the case for subsidies (in the sense that the term 'opportunity' is used here, which is potential for entirely new markets, products or brands to form).

110. Policies which are recorded as high priority in terms of private incentive but only medium priority in terms of public benefit are good candidates for supporting policies within policy packages that seek to engage businesses (e.g. support to labelling and certification schemes).

Figure 6. Mapping policy: public benefit & private incentive



Source: NZIER

Table 5. Indicative policy priorities[10]

Policy instrument	Private Incentive	Public benefit
Prohibitions on use	Low	Medium
Access restrictions	Low	Medium
Permits & quotas	Medium	Medium
Standards	Medium	Medium
Spatial planning	Medium	Medium
Planning requirements	Low	Low
Taxes & charges	Medium	**High**
New subsidies	Medium	Medium
Subsidy reform	**High**	**High**
PES	**High**	**High**
Offsets	Medium	**High**
Tradable permits	**High**	**High**
Liability instruments, fines & bonds	Low	Medium
Labelling and certification	**High**	Medium
Green public procurement	**High**	Medium
Voluntary agreements	Medium	Medium
Corporate accounting	Medium	Medium

Source: NZIER

[10] Low = average score<1, Medium = average score <2, High = average score>2, see scores in Appendix B Table 17.

4. ECONOMIC INSTRUMENTS: ISSUES AND OBJECTIONS

111. The claim embodied in Table 5 – that policy should utilise economic instruments because they engage private incentives and support public benefits – is not new and is often an unpopular prescription. It raises a number of questions and criticisms, the more important of which are discussed here.

4.1 Problems with prices

112. To most economists, the ultimate policy instrument is one which changes relative prices. Although BES is not naturally priced by markets policy can infer those prices – whether through taxes and charges, PES or other forms of payments. It also causes exacerbators of damage and environmental externalities to internalise the costs of their actions.

113. Instituting a pricing regime of any kind requires the definition of a unit of account to which prices or permits can be pegged. The natural unit of account here is something which reflects the economic value of nature i.e. ecosystem services (such as m3 of water).

114. Unfortunately, the connection between economically important services and underlying ecological health is not well defined. This means that while it is possible to put a price on resource use it is extremely difficult to calibrate those prices to reflect the health of underlying natural assets.

115. This difficulty usually leads to pricing policy which uses some proxy for natural asset value and use such as taxes on production outputs (e.g. timber) or inputs (fertiliser). Similarly, permit trading schemes (such as transferable fishing quota) rely on estimates of existing stocks and sustainable rates of use which are sometimes quite rough approximations.

116. In the case of offset schemes (such as wetland banking) the unit of account is often something as crude as the number of hectares scored according to whether or not that hectare is in its natural state. This overlooks the fact that there is considerable variability in ecosystem function and biodiversity even within a single hectare. Furthermore, some parts of the hectare or some organisms within it will be more essential to ecosystem functioning than others. Indeed, species traits can be as important for ecosystem function as variability (Hillebrand and Matthiessen, 2009).

117. These difficulties have seen some fairly strong resistance to price-based policies and especially trading:

> *Viable trading requires simple, measurable, and interchangeable commodities, but the currencies, restrictions, and oversight needed to protect complex, difficult-to-measure, and noninterchangeable resources like biodiversity are costly and intractable… Delivery of no net loss or net gain through biodiversity trading is thus administratively improbable and technically unrealistic. Their proliferation without credible solutions suggests biodiversity offset programs are successful "symbolic policies," potentially obscuring biodiversity loss and dissipating impetus for action.* (Walker et al. 2009)

118. These objections go to the heart of questions about whether it is appropriate to try and put a price on nature. In the affirmative is the view that if biodiversity and ecosystems are not integrated into economic systems, of which prices are a central part, then their importance will be overlooked:

"Economic valuation is needed to communicate the value of nature to decision makers in their own language, which is dominated by economic concepts and paradigms". (TEEB, 2012)

119. From this perspective, pricing is an important component of any serious policy response to biodiversity loss because it will mainstream the issue, including within the business community.

120. The contrary position, setting aside moral objections, would be that we need to wait for better science before embarking on more widespread pricing of biodiversity.

4.2 Waiting for better science

121. It is true that science can't offer simple off-the-shelf solutions when it comes to evaluating the state of ecosystems. It is also true that this does inhibit effective environmental policy and environmental management (Morton et al, 2009).

122. A recent review article in *Nature* summarised the state of the science, in terms of what is known or widely supported by evidence (Cardinale et al, 2012). The points of broad consensus that are identified are:

- Biodiversity supports healthy ecosystems
  - Biodiversity loss reduces the efficiency of ecosystems.
  - Biodiversity increases the stability of ecosystem function over time, but the exact interaction/linkages/relationship is/are still unclear.
- Effects of loss are non-linear
  - Negative effects of biodiversity loss accelerate with greater biodiversity loss, but the tipping points are not well known.
- Function matters as much as form
  - Specific species hold key roles in ecosystem functioning, so identity is important as well as variety.
  - Diversity across trophic levels has a potentially stronger effect on ecosystem function than diversity within trophic levels.
  - Functional traits have large impacts on ecosystem function.

123. The authors note that evidence of connections between biodiversity and ecosystem services are less well established. There is evidence that biodiversity is strongly correlated with provisioning and regulating services, but the contribution of biodiversity to such services is not well defined and in many cases there is insufficient data to establish relationships. For some key services, such as water, the link to biodiversity is currently tenuous. Some studies show no relationship or even a negative relationship (e.g. in the case the capacity of water bodies to support supporting pathogens).

124. The authors thus note that the marginal social value of biodiversity is not well established. This is in part because researchers focussing on ecosystem function don't always connect well to those focussing on human use of ecosystem services.

125. This raises questions about the extent to which policy should accommodate learning-by-doing and prioritise policies that recruit the efforts and expertise of the private sector – in order to leverage the kind of innovation associated with Alcoa's conservation restoration programme in Western Australia.

126. The downside of trying more innovative policies is that, without detailed knowledge of risks, we may not be able to afford the costly mistakes that can accompany learning-by-doing and trial and error. In a world in which economic pressures on biodiversity are rising and the risk of (non-linear) collapse in biodiversity is increasing, the consequences of potential policy failures need to be carefully assessed.

127. Ultimately, this comes down to a question of trading off risk and return. The returns to more ambitious policies, including economic instruments with their potential for innovation, are likely to be higher than conventional regulatory approaches, in part because they have a better chance of scaling up actions by businesses. However, the flexibility that some of these policies provide mean that the risk that policy is not as effective as intended may be larger than for conventional regulatory approaches.

4.3 Enforcement and compliance

128. Economic instruments which offer flexibility to regulated entities are often deemed unsatisfactory because they offer opportunities for evasion and unscrupulous behaviour.

129. It is true that compliance and enforcement are the *sine qua non* of biodiversity policy (or indeed any environmental policy). It is also the case that economic instruments introduce incentives that can encourage activity which may accelerate biodiversity loss if there is not sufficient monitoring or compliance (e.g. incentives to provide offsets which are not of the quality they are purported to be).

130. It is fairly simplistic to assume that poor governance of natural resources is solely a private sector phenomenon. Indeed, observed deforestation and the observation that most of the world's forests are publicly owned should give pause for thought. As the late Nobel laureate Elinor Ostrom has pointed out "What one can observe in the world... is that neither the state nor the market is uniformly successful in enabling individuals to sustain long term, productive use of natural resource systems" (Ostrom, 1990).

131. Alongside examples of incomplete or insufficient private sector initiatives there are other examples of unsuccessful, purely public initiatives. Indeed, a recent meta-evaluation of governance strategies for conservation projects has suggested that the most important ingredients for success are intellectual/knowledge leadership and adaptive management. Neither private ownership nor public land management help to explain the performance of projects in terms of their environmental outcomes (Kenward et al, 2011).

132. Nonetheless, the absence of sufficient information about ecological function and its connection to ecosystem services has seen some researchers recommend a hiatus in market based restoration initiatives:

> *"Without new science and an oversight framework to protect the ecosystem service assets on which people depend, markets could actually accelerate environmental degradation"* (Palmer and Filoso, 2009)

133. This quote shows that concerns about whether science has sufficient answers to support market-based policy are very closely associated with concerns about insufficient regulatory oversight, monitoring and compliance mechanisms.

134. A 2005 review of US Wetland Mitigation, for example, found that only 83% of fee-for-service (in-lieu) arrangements submitted required monitoring reports (GAO, 2005). In a US study of 76 wetland mitigation projects it was found that 67% of the projects had failed to create or restore their required area.

135. One international study of biodiversity conservation and ecosystem services projects has observed that "monitoring of conservation outcomes is in both cases so infrequent that it is impossible to assess the effectiveness of either ES or BD approaches" (Goldman et al, 2008).

136. This is not a problem peculiar to biodiversity. Policy evaluation and monitoring of outcomes is notoriously neglected. It does, however, raise the question of whether policy-makers should prioritise evaluation of existing programmes and policies, and improve data collection and compliance and monitoring, *before* moving to new policy agendas.

137. Simply setting standards to which business must comply is also not necessarily an effective strategy for overcoming any commercial incentives for unsustainable production methods. Firms typically need to be involved in standard setting as a matter of good regulatory practice (consultation) and because they hold information about the feasibility and impacts of standards which policy-makers often do not have. Through these processes firms have the ability and incentive to reduce the stringency of regulatory measures and to influence the contents to their advantage. Any approach that invites lobbying whose influence cannot be independently questioned risks serious policy dilution.

138. More generally, the various implementation issues and objections raised with respect to economic (and other instruments) are often valid if policy is considered in isolation from countervailing measures. What is needed are *packages of policies* which are complementary and can help to overcome or avoid potential problems. Indeed there is a theme in environmental policy theory and practice (and elsewhere) of using policy mixes to address multiple and overlapping problems and market failures (Bennear and Stavins, 2007).

4.4 Complementary policy mixes

139. No single policy instrument will be sufficient for reversing biodiversity loss because such loss is driven by a range of different factors, including multiple market and policy failures and different developmental demands. These can be found in the context of biodiversity policy directly and in associated markets and regulation such as transport, agriculture, and energy. This means that multiple policies (and policy reforms) are needed, though efficiency demands that they are complementary rather than substitutes. The presence of uncertainty about the permanence of policy initiatives also justifies the use of multiple policy instruments (Ring and Schröter-Schlaack, 2011).

140. Some policies naturally combine well with others and are mutually reinforcing. For example, government support for standard setting can combine well with voluntary certification programmes. Carrots and sticks can also work well together – e.g. access or use restrictions can be used to set a baseline for limiting biodiversity loss with PES schemes used to provide additional incentives for improved land management (OECD, 2010).

141. Some kinds of policy are inherently more capable of engaging the interests and abilities of business than others. A key opportunity for policy-makers is therefore to identify these policies and to prioritise them.

142. For some issues, mobilising private sector engagement can be achieved by prioritising a single policy instrument. This is because one of the main justifications for multiple policy instruments is varying degrees of appropriability of property rights and use values. When dealing with private incentives to conserve, for example, it makes less sense to leverage concern for non-use or cultural

values. This says nothing about the value of targeting these values, just that they are not usually business values.

143. That said, there will be cases where business has an incentive to engage in conservation for the sake of non-use values. The case in point here is private conservation initiatives undertaken to preserve social licenses to operate and to manage reputational risk or even to expand brand value. Although TEEB (2012) is quick to point out that there is little empirical evidence of returns to private conservation in terms of reputation or brand value, the fact that companies do undertake conservation initiatives is surely sufficient evidence of a benefit, even if this cannot be quantified in terms of brand value.

144. The finding that economic instruments seem to map best to private incentives does not mean that policy needs to rigidly adhere to one form of economic instrument over another. Indeed, giving companies a choice over the kind of policy they face makes sense, especially in cases where the companies' costs of environmental action and different production technologies are uncertain and not easy for a regulator to observe (Krysiak and Oberauner, 2010).

4.5 Institutional capability

145. Economic instruments require a degree of institutional sophistication that is not necessarily available everywhere. Questions are rightly raised over whether policy can leap frog from, in some cases, limited enforcement of existing rules and regulations to policies that involve pecuniary incentives and thus a greater motive to side-step and swindle the regulator.

146. It is certainly the case that there will be some jurisdictions where economic instruments are a bridge too far. However, concern over institutional capabilities should not be overblown. The number of developing countries using economic instruments to support biodiversity shows that these are certainly not OECD-only policies. There is even evidence to suggest that shifting to economic instruments, especially those where tax revenue is involved, can motivate improved institutional knowledge, enforcement and monitoring:

> *Blackman showed in a study concerning Columbia's discharge fee programme that the reason why pollution loads dropped significantly after the programme was introduced was not so much because of incentives provided by the discharge fees, but rather as a result of incentives created through the programme for regulatory authorities to improve permitting, monitoring and enforcement.* (Faure, 2009)

5. SCALE & SCALABILITY

147. A key question which remains is whether the generic priority policies identified in Table 5 are amenable to large-scale deployment and increased business engagement in most contexts. Determining which policies are more (or less) amenable to large-scale implementation is important because with scale will come better knowledge of effective policy and, at least in-principle, more rapid reversal of biodiversity loss.

5.1 Existing evidence on scale and scalability

148. Based on experiences to date, there does not appear to be any evidence that the policies identified earlier as best matching business risks are not amenable to scale although, it is the case that some seem more scalable than others (Table 6).

149. There have, for example, been cases of reasonably large-scale fiscal reform initiatives (taxes and charges) in developing countries which suggest that fiscal reform is a reasonably widely applicable and scalable policy option. In Brazil, the state of Parana introduced a method for allocating fiscal revenue to municipalities based on ecological indicators. In the past 14 years this initiative has mobilised US$170 million and seen a 158% increase in protected areas. Other states have followed this example and a number of municipalities have started supporting related private initiatives (OECD, forthcoming). A similar programme has more recently been implemented successfully in Portugal (Ring and Schröter-Schlaack, 2011).

150. Similarly, experience with certification schemes shows that there are a number which have achieved a very large scale. For example, the two largest forest certification schemes in the world now cover 33% of all forests designated for production. The Marine Stewardship Council certification scheme now covers seafood trade worth more than US$ 2.5 billion. These certification schemes and others have boomed in part because of growing support from major multinational firms such as Kraft, Nestle, and Unilever (OECD, forthcoming).

151. Market-based trading schemes are also clearly something which can be scaled up dramatically. As noted by the WBCSD (2011), the global carbon market grew out of nothing in 2004 to a US$140 billion market within five years. However, these kinds of markets will face barriers such as the problem that biodiversity doesn't have a natural common unit of account, as discussed earlier, and the technical complexity and political difficulty involved in creating new property rights.

152. Payments for ecosystems service are not necessarily scalable in any systematic way. PES are a replicable concept, but the ecosystem services themselves and the incentive to finance them are often spatially specific. This means many (but not all) PES schemes have limited economies of scale.

153. At the same time, some PES schemes do operate at the regional and national level in some countries (e.g. Mexico, Costa Rica). Depending on design these kinds of schemes can be scaled up, potentially at the international level – e.g. in terms of river systems or by adaptation of existing international initiatives for reducing emissions from deforestation and forest degradation (REDD).

154. In terms of business engagement, scale could come about if buyers have sufficient incentive to pay for ecosystem services on the basis of reputational risk or to offset regulatory risk. The willingness of businesses to pay for carbon sequestration on a voluntary basis is one example of this.

155. Projects and policies which focus on ecosystem services (rather than traditional conservation measures) have been shown to be more effective in drawing in private funding and engaging a wider range of stakeholders. This suggests scalability in the sense that it is a more appealing policy approach to a wider audience (Goldman, 2008).

Table 6. Selected ecosystem markets & growth potential

US$ millions per annum, orders of magnitude

Ecosystem market	Approximate current size	Potential size - 2050
Certified agriculture and fisheries	$26,000 in global sales	$200,000
Other certified trade (e.g. timber)	$5,000 (Forestry Stewardship Council scheme)	$50,000
Forest carbon sequestration	$100 (much of this in developing countries)	$6,000
Government payments for ecosystem services	$6,500 (China, Mexico, Costa Rica, UK, USA)	>$20,000

Private watershed management	$5	$10,000
Regulation-related ecosystem offsets	$2,400-$4,000	--
Regulation-related species offsets	$45 in the USA alone	$200
Voluntary conservation payments and biodiversity offsets	$20 (excluding money flowing through conservation organisations)	$150
Government conservation payments and biodiversity offsets	$3,000 in flora and fauna alone	$10,000
Land trusts, conservation and easements	$6,000 in USA alone	$20,000

Source: Adapted from Bishop et al., 2008; OECD, 2010; OECD, forthcoming.

156. Achieving scale requires mainstreaming. If policy is going to support this it cannot be done in an ad hoc fashion. Serious mainstreaming requires setting in place regulatory frameworks which create the right incentives for efficient resource management and reduced environmental impact. This should include prices or similar signals and incentives.

5.2 Local context and firm size

157. The extent to which policies are more or less scalable will also depend on the local context and the size, capability and concerns of firms and governments.

158. While there are a number of case studies and examples of large companies doing a good job in addressing biodiversity risks, pressures on biodiversity are only partially the result of the actions of large companies. There are many more small- and medium-sized businesses that have no strategy for addressing biodiversity and no capacity to formulate or implement a strategy.

159. Firm size is thus an important consideration because small firms have more limited resources and ability to affect the wider economic environment, including policy, than do large firms. This will dictate the sphere of their concerns and the business risks from biodiversity loss relevant to them. There will therefore be differences between policies that work well for leveraging action amongst small scale enterprises versus large corporates.

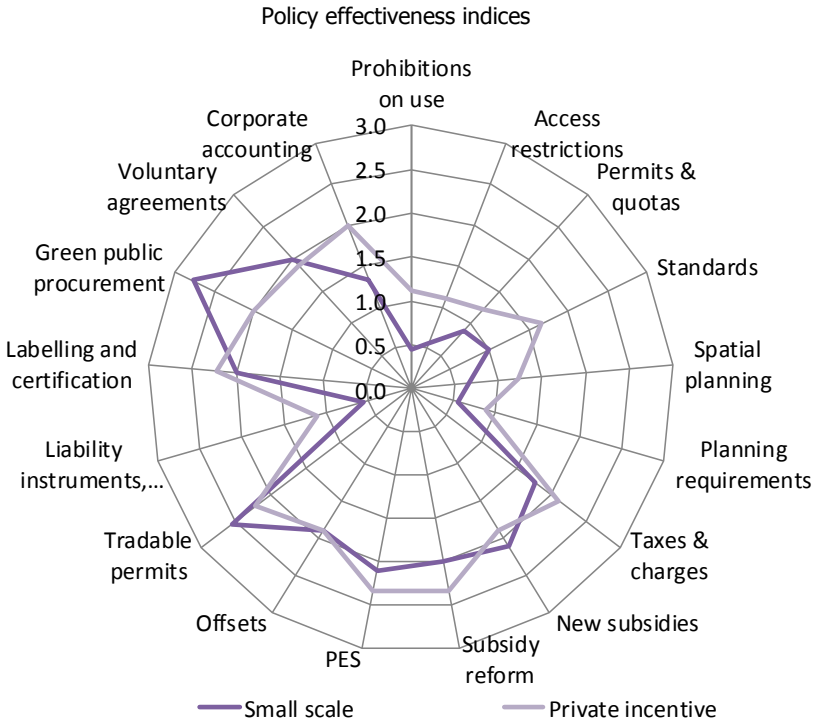
160. This can be illustrated by considering the relative importance of different business risks to different sized firms. For example, as a general proposition, policies which work to address operational risks will be of relevance to all firms, from small holder farmers (in terms of helping them safeguard their livelihoods) to multinational manufacturers.

161. At the other end of the spectrum, reputational risk is not something that is easily managed by producers who are at the bottom of supply chains. The risk may be material to their business but their capability to manage such risks is likely to be limited regardless of policy.[11] This is often reflected in concerns about labelling and certification schemes which, while a high priority for managing reputational risk, also raise concerns about small producers being locked out of markets because of the costs of certification.

[11] Similarly, although it is not an explicit component of the prioritisation framework, finance risk is more of an issue for large scale capital intensive projects and businesses than for small scale producers. This is not to say that access to finance is less important for small producers but rather that the risks of reduced creditworthiness are lower or less easily managed.

162. In the middle of the spectrum are regulatory and legal risks. These affect all producers irrespective of scale, although, compared to operational risk, their impact is likely to be less important for small scale producers.

Figure 7. Adjusting policy by business capability & scale



Source: NZIER

163. This being so, we can differentiate the usefulness of policy for addressing the interests of different kinds of firms according to the risks that they are best at addressing. A stylised description of this is shown in Figure 7. In this approach policy for small scale firms is assessed based only on its ability to address operational and physical risk.

164. This is not to diminish the extent to which producers throughout a supply chain are affected by policies and impacts in all other parts of the supply chain. It is rather to point out that different firms have different capabilities – capabilities that are often reflected in the scale of production, the length of supply chains and in their proximity to end consumers.

165. This all suggests that scalability will be a function of the kinds of firms prevalent in a country. It will also depend on the kinds of industries that are present – although this is related to firm size to the extent that large footprint companies are typically larger capital-intensive firms, as compared to biodiversity-dependent firms which are likely to be small(er)-scale.

Table 7. Policy priorities by broad sector

Priorities scored from low to high

Policy	Small & medium enterprises	Biodiversity dependent industries (e.g. agriculture)	Large 'footprint' industries (e.g. mining)	Manufacturing (e.g. chemicals)	'Green' enterprises (e.g. ecotourism)
Prohibitions on use	Low	Low	Low	Low	Low
Access restrictions	Low	Low	Low	Low	Low
Permits & quotas	Low	Medium	Medium	Medium	Medium
Standards	Low	Medium	Medium	Medium	Medium
Spatial planning	Low	Low	Low	Low	Medium
Planning requirements	Low	Low	Low	Low	Medium
Taxes & charges	Medium	**High**	**High**	**High**	**High**
New subsidies	Medium	Medium	Medium	Medium	**High**
Subsidy reform	Medium	**High**	**High**	**High**	**High**
PES	**High**	**High**	**High**	**High**	**High**
Offsets	Medium	Medium	**High**	Medium	Medium
Tradable permits	**High**	**High**	**High**	**High**	**High**
Liability instruments, fines & bonds	Low	Medium	Medium	Medium	Medium
Labelling and certification	Medium	**High**	**High**	**High**	Medium
Green public procurement	**High**	**High**	**High**	**High**	**High**
Voluntary agreements	Medium	Medium	Medium	Medium	Medium
Corporate accounting	Medium	Medium	Medium	Medium	Medium

Source: NZIER

166. At the same time, there is little difference in the relative positions of policy priorities if the frame of reference is shifted from one type or size of business to another. For example, while small enterprises have a harder time dealing with transaction costs than larger ones, it is unclear whether taking account of this alters the relative order of priorities for policy especially much. In an attempt to test the sensitivity of relative policy priorities to changes in industrial context we have adapted the policy prioritisation framework to different stylised sectors. The results are shown in Table 7. Relative policy priorities are ranked according to the same framework introduced earlier but adapted to take account of key sector differences.[12] There are some measures, such as policies supporting corporate environment accounting, that are unlikely to reach scale in a sector or economy dominated by small enterprises. However, the degree of commonality is striking.

167. In terms of scalability this means that the priority policies identified earlier may well translate into a wide variety of contexts. This doesn't indicate a precise one-size-fits-all policy prescription but does suggest that the broad messages hold in general.

[12] These are: 1) small enterprises are affected most at the operational level, so we drop the other business risks from the evaluation; 2) large footprint industries have inherently high impact, so we drop "order in mitigation hierarchy" from the evaluation criteria in terms of environmental effectiveness; 3) policy for 'green' enterprises needs to be environmentally effective; raise finance to support environmental effectiveness; and be stable and independent to give certainty around market development. Other issues do not feature in our assessment for this sector.

5.3 Leveraging the abilities of high performers

168. In many cases what policy-makers will need to do is leverage the knowledge of high-performing businesses. This will be especially so in the case of large footprint firms. One way to do this would be to scale up the use of biodiversity offsets.

169. This is not a silver bullet (recalling that, if poorly designed and implemented, "biodiversity offsets can be a license to trash"). And knowledge about how to restore ecosystems (as best they can be) is also going to location-specific. But firms that have engaged successfully in restoration projects will have project management expertise around how to engage local experts and public sector resource to best effect. The expertise may not even be held within the firms but they will have knowledge about how to access it. Often these will be global firms, though this is as much a function of the economies of scale in extractive industries as anything else.

170. Governments could create a framework which makes it viable for companies to spin their expertise off into other ventures – to earn a return from their know-how. One way to support this would be through wider use of biobanks, which provide a means of registering the supply of offsets and would reduce transaction costs for both buyers and sellers.

171. If this sort of system was put in place initially for restoration projects it would reduce many of the problems of monitoring associated with paying for ecosystem services, e.g. whether a payment is for an additional service and indeed the extent to which the service is being maintained. The benefits of restoration projects are, in principle, easier to measure because the counterfactual is more obvious.

172. An alternative method of supporting high-performing firms would be to require them to perform restoration of degraded sites to a level consistent with a best practice benchmark. This would encourage firms without sufficient expertise to seek expertise elsewhere. This benchmark could be measured in terms of species abundance or ecosystem services.

173. Some link between performance on ecological targets and the central profit motive of the firm (i.e. resource extraction) would be needed to ensure compliance. This could be done through an iterative process whereby new sites cannot be opened until progress is demonstrated on the restoration of older sites. Third party auditing would also be an essential component. That said, this would require setting some kind of standard against which to measure progress. Standards come with downsides in the sense that there is limited return to improving the process of restoration; i.e. going beyond the standard. Ideally, one wants to promote improvement at the frontier. There would be pressure to set standards too low in order to keep restoration costs down.

174. This is where external demand for offsets could prove valuable. The introduction of a third party who is interested in the quality of the offset would promote effective restoration projects. This would not be perfect, but could help to drive an increase in restoration compared to what might otherwise take place.

175. These sorts of initiatives do not necessarily need to be confined to policy in countries where biodiversity is being lost. They could, in principle, come about through offset obligations in other countries. In principle, offsetting could go global.

5.4 Going global?

176. Currently, offset schemes are local or national in nature. Governments trade off damage to one ecosystem in exchange for the conservation or restoration of some other nationally significant

site. However, given that large biodiversity sites, often of global significance, are found in other countries, it may make sense to allow for offsetting to take place globally.

177. The basis for an institutional apparatus for global offsets is already in place with a large number of non-governmental conservation finance organisations in existence and a number of governmental and multilateral funds in operation (including e.g. the Global Environment Facility).

178. Globalised systems for offsetting are not without risks. A key one is that governments which allow local biodiversity loss in exchange for conservation or restoration elsewhere in the world will have very few practical ways to ensure that those offsets are permanent and additional to what would otherwise have happened. It is also much harder for local communities affected by the loss of diversity to assess the worth of the trade that is taking place, let alone develop a sense of 'ownership' of any process advocating it. Being able to see and have some sense of shared stake in an offset is much more difficult when that offset is on another continent.

179. Scientific uncertainty and the absence of a common unit of account for biodiversity loom large in this context. The risk is that, without ecologically sound accounting and careful monitoring and verification, international offsets could lead to negative ecological arbitrage: a net loss of biodiversity as funds flow away from higher value sources of biodiversity, which may be more costly to conserve or restore, and towards less valuable sources of biodiversity.

180. At the same time, a more systematic and potentially globalised approach to offsetting could both boost incentives for conserving biodiversity and help to deploy and direct expertise, encouraging growth in the ecological services industry.

181. Another policy instrument which may be amenable to multilateral approaches is PES. International climate financing already uses PES-style approaches in the case of schemes targeting reduced emissions from deforestation and degradation (REDD).

182. From the perspective of firms as buyers of ecosystem services, whether or not PES can be used at scale depends on whether there is sufficient and sufficiently widespread incentive for commercial involvement.

183. There may be some incentive for firms to be involved if they see reputational value in paying for ecosystem services which are of global value. International PES schemes might, for instance, attract interest from firms operating in countries with rising water scarcity or reduced water quality or where river systems run across nations. Similarly, some firms will see value in ensuring that supply chains continue to function well – something that is likely to be of particular concern to firms in food and biodiversity dependent industries. There are already examples of conservation trust funds which leverage these kinds of incentives, e.g. the IDB/Nature conservancy platform for "Public-Private Funding Mechanisms for Watershed Protection" and the UNEP/Rainforest Alliance "Greening the Cocoa Industry" platform which has received contributions from firms operating upstream in the cocoa supply chain.

184. It is difficult to see what these incentives will add up to – whether they imply potential for large scale PES-style schemes. The potential for PES to be scaled in these kinds of circumstances warrants investigation, even if the underlying commercial incentives are somewhat limited and location specific.

185. It is likely that the most compelling and scalable incentives for firms to engage in paying for ecosystem services on an international scale are either the ability to claim some kind of reputational advantage or some domestic regulatory or developmental concession in return for financing public benefits i.e. the scheme needs to operate as a *de facto* offset. Firms need to be able to internalise some of the value of the ecosystem services they are paying for.

186. Alternatively, from the perspective of firms as suppliers of ecosystem services, governments engaged in spending public money on international PES-style schemes might well focus on scaling up public-private partnerships.

187. Issues and objections around the use of economic instruments tend to be raised more vocally if discussion shifts from the domestic to the global context. This is not surprising given the wide variety of perspectives and different capabilities that comes with a globally-focussed discussion. However, it may not be wise to be too cautious.

188. History suggests that an ambitious policy agenda which includes economic instruments ultimately leads to greater business engagement, workable technical solutions and a gradual improvement in institutional capability – not the other way around. Climate policy, though by no means perfect, is a case in point.

189. When the Kyoto Protocol was agreed a wide range of issues and particulars had yet to be worked through and the scale of the climate challenge was not nearly as well understood as it is today. Yet, 15 years on, climate policy is a visible part of the commercial, social and political landscape in most countries.

190. The risks associated with ambitious, globally-framed policy tools will make for nervousness, but these must be set against the sheer scale of the biodiversity at risk and the economic, social and cultural losses that could be incurred. In the climate arena, an ambitious policy agenda which includes economic instruments has led to greater business engagement, workable technical solutions and a gradual improvement in institutional capability. Policy-makers must ask if they can afford to deny themselves access to these potential benefits if traditional interventions cannot do better.

APPENDIX A
POLICY ATTRIBUTES

Table 8. Regulatory instruments

	Prohibitions on use	Protected areas	Permits and quotas	Standards
Goal	Prevent over-exploitation of species.	Safeguard important areas for species and habitat conservation	Limit over-extraction/over-use of resources	Limit damaging or resource intensive production methods.
Without policy	Species may be safeguarded in protected areas but commercial and consumer demand undermines conservation.	Protection provided by other primary instruments (e.g. management standards or permits) or existing PA network, very often no protection at all.	Some safeguards remain if protected areas or informal governance arrangements exist, otherwise yields and species decline from over-use.	Pollution degrades ecosystems and production methods create collateral damage to biodiveristy (individual species in particular).
Exacerbators	Private	Private and public	Private and public	Primarily private
Incentives	Compliance and coercion	Compliance and coercion	Compliance and coercion	Compliance and coercion, though voluntary (industry) standards exist
Governance	Public	Public with limited private involvement	Public	Primarily public but can be private
Conservation effectiveness	High in connection to policy which safeguards habitat otherwise low because it does not directly target drivers of loss.	High – increase in / conservation of biodiversity and ecosystem service provision; however, effectiveness may be at risk due to weak enforcement or may erode in the future due to changing environmental conditions (e.g. climate change)	Low to medium - depends crucially on scope, enforcement, and adequate information and monitoring for setting and revising quota limits.	Low - usually targeted fairly narrowly and aimed at prevention of particular 'event' or particular parts of ecosystems. However there are examples of very effective standards for pollution reduction.
Costs and cost effectiveness	Low to High - low where this can be integrated with other trade or market surveillance mechanisms (eg customs), otherwise High.	Medium – though PAs very often show a positive benefit cost- relationship, local opportunity costs can be substantial.	Low to medium - high uncertainty of compliance cost and welfare costs to resource users who cannot access permits, though incremental administrative cost is low if permits support informal local governance arrangements or are built upon existing monitoring regimes.	Low - generally economically costly and there is little incentive for cost-effective improvements i.e. focus is squarely on compliance.
Social impacts	Low - some risk if a resource is of high importance to the livelihoods of local people in which case countermeasures might be necessary.	Medium – ecosystem services protected by PAs may benefit (local) population; however, substantial opportunity costs and risk to revoke informal rights (e.g. access / abstraction) in area designation.	Medium - where resources are scarce and there are major competing users these policies can be very divisive.	Low - to the extent that the standards are widely applied and their effects are diffuse, although they may have important impacts through reduced productive potential and incomes.

Legal and institutional requirements	Low to medium - given established international institutions (CITES) and domestic practice, though initial establishment difficult.	Medium to High – easily introducible for a few unique spots; increasingly difficult to implement if demand for land is highly competitive.	Medium - effective schemes require ongoing information gathering for quota setting and carefully constructed allocation methods.	Medium to High - requiring sufficient information expertise and institutional architecture to establish and monitor.

Source: Adapted and augmented from Ring and Schröter-Schlaack (2011).

Table 9. Economic instruments

	PES	Taxes and charges	Payments and subsidies	Offsets and permit trading
Goal	Limit over-extraction, pollution or over-use of resources by compensating land owners for opportunity and management costs.	Change relative prices to reflect social costs of resource use and pollution.	Account for positive environmental externalities provided by land users.	Account for and mitigate inevitable impacts on biodiversity and ecosystems.
Without policy	With no policy ecosystem services decline from over-use and degradation, alternative policy measures tend to penalise owners of resource and thus do not necessarily encourage positive behaviour.	Pollution degrades ecosystems and production methods create collateral damage to biodiversity (individual species in particular).	Land users may degrade ecosystems but it may also be in their interests to improve them (i.e. ambiguous).	Damage minimisation and restoration limited to and unlikely to go beyond compliance with standards.
Exacerbators	Private	Private	Private - but can be public (e.g. fiscal transfers to municipalities based on ecological performance)	Private and public.
Incentives	Positive (beneficiary pays)	Negative (polluter pays)	Positive (beneficiary pays)	Negative (polluter pays)
Governance	Primarily public but can be private	Public	Public	Public
Conservation effectiveness	Medium - increase in / conservation of biodiversity and ecosystem service provision; risks come from non-additionality leakage, and imperfect connection between measurement and quality of biodiversity and ecosystem function	Medium to High - as a price signal it is most effective for incentivising resource efficiency and reducing pressure rather contributing to e.g. restoration but funding streams can be put this use.	Low to Medium - usually requires targeted approach and is limited to a sub set of actors in the community. May be positive if it involves reduction in production-linked subsidies.	Medium. Typically designed to allow for a no net loss goal or sustainable yields but problems arise in evaluating existing resource, ensuring equivalence of offsetting measures and with long term monitoring.
Costs and cost effectiveness	Medium to High - payment for ecosystem service may leave the resource owner to choose the most effective action.	Medium - simple charges have minimal costs (assuming functioning tax collection systems) and provide efficient incentives; detailed charging regimes can come with high transaction costs.	Medium to High - likely to be quite cost effective where it can be added on top of existing payment schemes. May be more positive if it involves reduction in production-linked subsidies.	High, in particular the option to trade mitigation measures significantly reduces opportunity costs.

Social impacts	Medium to High - provides income, promotes land tenure, improves local organisation; can lead to elite capture and eviction from land where property rights were insecure before the fact. There may also be barriers to entry for poorer land owners.	Medium to High - depends entirely on any countermeasures and the nature of the tax in question e.g. fertiliser taxes may have a disproportionate impact on small scale land owners/users.	Low to medium - depending on the differential ability of exacerbators to meet subsidy requirements (which will likely differ by e.g. site).	Medium – facilitates increased job opportunities, long term yield sustainability, and compensation for opportunity cost of resources otherwise conserved. Continued exploitation may create tensions.
Legal and institutional requirements	Medium to High - effective schemes require careful monitoring and evaluation and consideration; establishing schemes requires reasonably sound property rights frameworks and law.	Low to medium - requires sufficient monitoring of tax base and functioning tax collection administration.	Low to medium - low to the extent that the system replaces or can be layered on top of existing payment systems; medium to the extent that additional monitoring methods needed.	High. Strong public sector involvement for setting up schemes and monitoring outcomes and trading scheme architecture.

Source: Adapted and augmented from Ring and Schröter-Schlaack (2011).

Table 10. Information and other instruments

	Labelling & certification	Corporate environmental accounting	Voluntary agreements	Green public procurement
Goal	Promote demand for sustainably produced products.	Awareness of business impacts and biodiversity amongst businesses and shareholders and wider community.	Resolve coordination problems by adopting common industry standards.	Development of markets for sustainably produced products and services.
Without policy	Producers do not receive the benefit of conservation and sustainable use because consumers cannot identify their efforts.	Risks go unmeasured and problems emerge which may have otherwise been mitigated.	Firms do not adopt sustainable production practices which increase costs because they will be under-cut by competitors.	Dominance of old products and production methods because of insufficient scale in markets for alternative goods and therefore also insufficient incentive for firms to innovate.
Exacerbators	Private.	Private (and public to the extent that policy failure may create business risks).	Private	Private and public.
Incentives	Positive or negative, depending on whether a price premium can be attached to cover any additional costs.	Positive or negative. May help with risk management. May be used for compliance purposes.	Positive.	Positive.
Governance	Private or public.	Private or public.	Private.	Public.

Conservation effectiveness	Low unless scale can be achieved otherwise medium to high.	Low, in and of itself.	Low to medium. Agreed standards are often not much better than what would be expected without the agreement.	Low unless scale can be achieved otherwise medium to high.
Costs and cost effectiveness	Low to medium. Cost effective at scale but it is based on standards so there is little incentive to go beyond what is required for certification.	Low to medium. Cost effective for large firms with significant dependencies or impacts on biodiversity. Difficulties measuring or valuing impacts can make this very costly for small enterprises.	Medium, to the extent that industry is able to bring its practical expertise to bear.	Low to medium. Cost effective at scale but it is likely to be based on standards so there is little incentive to go beyond what is required for certification.
Social impacts	Can be negative for small scale producers who cannot to certify their production.	Low.	Low.	Low.
Legal and institutional requirements	Low to medium. Some oversight required to assess veracity of claims and prevent fraudulent claims.	Low.	Medium. Non trivial barriers exist in anti-trust laws.	Medium. Strong governance and oversight measures required to ensure value for public money and to minimise rent-seeking.

Source: Adapted and augmented from Ring and Schröter-Schlaack (2011).

APPENDIX B
APPLYING POLICY TO PRIVATE INCENTIVES

1. The intention behind our mapping exercise is to introduce a consistent framework for determining the relative position of policies compared to each other. In general, implementation will dictate the actual performance of policy in relation to these objectives. However, policies have inherent attributes that can be used for the purposes of prioritisation. For example, standards on production methods (such as net mesh size) are, by definition, quite narrow in application and typically target specific features of ecosystem services or specific species within an ecosystem. Taxes and charges, on the other hand, have an inherent capacity to be broadly applied to resource use and to have wider effects in terms of encouraging firms to find ways to minimise their tax burdens and reduce impacts of their activities. While it is possible for taxes to be more narrowly targeted than standards (especially when compared to performance-based standards) this is not an inherent feature of taxes and charges.

2. The judgements being made assume away the benefits that one firm might gain over another, e.g. from low cost exclusive access to a resource. That is, we don't consider what are termed 'rent-seeking' opportunities.

3. Our assessment framework has five main components:

- Private incentives
  - support risk management;
  - convert risk to opportunity.
- Public benefit
  - environmental effectiveness;
  - wider economic impact (efficiency, distributional impacts & potential for mainstreaming);
  - capacity to attract financial flows.

4. Table 16 and Table 17 summarise the entirety of the scoring regime and ranking criteria. The short summaries below provide some motivation for the overall rankings and approach.

B.1 Environmental effectiveness

5. To judge environmental effectiveness we consider policy from the perspective of formulating wide-ranging strategies for BES. This is quite different from formulating a particular policy for a particular issue in a particular context. For example, it abstracts away from the need to take strong and tightly-targeted action to address imminent extinction or ecosystems which are on the verge of collapse – necessitating moratoriums.

6. It also abstracts away from the considerable value of individual ad hoc, well targeted and executed restoration projects. One example is restoration of mining sites (which can be of enormous value and are an indispensable aspect of sound management of biodiversity).

Table 11. Components of environmental effectiveness

Rating based on average scores <1 = Low, <2 = Medium, <3 = High.

Policy instrument	Rating	Mitigation hierarchy	Scope	Precision
Prohibitions on use	Medium	2	1	1
Access restrictions	Medium	3	1	1
Permits & quotas	Medium	2	1	2
Standards	High	2	1	3
Spatial planning	High	2	2	2
Planning requirements	Medium	1	2	2
Taxes & charges	High	2	3	2
New subsidies	High	2	2	3
Subsidy reform	High	3	3	3
PES	High	2	2	3
Offsets	Medium	1	1	3
Tradable permits	High	2	3	3
Liability instruments, fines & bonds	Medium	1	1	3
Labelling and certification	High	2	2	2
Green public procurement	High	2	3	2
Voluntary agreements	High	2	1	3
Corporate accounting	High	1	3	2

Source: NZIER

7. Environmental effectiveness has been judged along three criteria:

- Position on the mitigation hierarchy
  - The general proposition is that policy which avoids damage has greater ecological value than policy which acts as an 'ambulance at the bottom of a cliff' (i.e. restoration).
  - Policies are scored (1), (2) and (3) depending on whether they typically offset or restore, or mitigate or avoid (respectively)
- Scope, of effect and of applicability
  - Policy instruments which affect products and processes along supply chains (e.g. raise prices of resource intensive goods) or affect ecosystem impacts across a wide spatial and functional scale have greater value than those which narrowly target a particular issue or species.
  - This is important because although it is the case that narrowly applied measures can be effective, in and of themselves they may simply shift environmental impact from one issue to another.
  - Another way of describing this criteria is ad hoc or systematic.
  - Policies are scored according to judgement about whether scope of applicability and scope of effects is low (1), medium (2) or high (3).
- Targeting of the immediate drivers of biodiversity loss
  - Policy is more likely to be environmentally effective if it targets actors and actions which directly impact on biodiversity.

– Policies are scored according to whether they are blunt instruments which do not directly apply to relevant actors and actions (1); tightly targeted along one dimension (e.g. targeting decision makers with direct influence or power over impacts) (2); or targeted to both relevant actors and actions (3).

B.2 Private incentives

B.2.1 Supporting risk management

8. The scale for this qualitative assessment is a scale of 1 to 3 with (1) being low propensity to support risk management; (2) being moderate propensity; and (3) being high propensity for supporting different biodiversity related business risks.

B.2.2 Operational and physical risk

Table 12. Policy & management of operational risk

Rating based on average scores <1 = Low, <2 = Medium, <3 = High.

Policy instrument	Rating	Environmental effectiveness	Efficiency
Prohibitions on use	Low	1.3	0
Access restrictions	Low	1.7	0
Permits & quotas	Low	1.7	1
Standards	Medium	2.0	1
Spatial planning	Low	2.0	0
Planning requirements	Low	1.7	0
Taxes & charges	Medium	2.3	2
New subsidies	High	2.3	3
Subsidy reform	High	3.0	3
PES	High	2.3	2
Offsets	Medium	1.7	2
Tradable permits	High	2.7	3
Liability instruments, fines & bonds	Low	1.7	0
Labelling and certification	High	2.0	1
Green public procurement	High	2.3	3
Voluntary agreements	High	2.0	3
Corporate accounting	Medium	2.0	0

Source: NZIER

9. Policy which aims to support businesses in managing operational and physical risk is assessed in terms of environmental effectiveness and efficiency. Environmental effectiveness goes to the ability of policy to help reduce risks to asset value from natural hazards or loss of access to important inputs. The requirement of efficiency goes to keeping risk management costs down.

10. Efficiency is judged from the perspective of firms in general (in sum rather than individually) and is promoted by policy which allows for appropriate degrees of risk and cost sharing. Thus, for policy to be attractive to business in general, it must provide scope for risk management by all parties. Efficiency also demands flexibility to respond to policy in ways that can reduce the costs of compliance. While this won't ring true to many businesses individually (who would rather avoid costs entirely), it is true for business in general.

11. Thus the ability of policy to support risk management is judged according to efficiency in terms of solution flexibility and risk-sharing between parties.

B.2.3 Regulatory risk

12. Policies which support management of regulatory are assumed to be:

- environmentally effective;
- support stability in the regulatory regime; and
- conducive to regulatory independence.

13. Environmental effectiveness matters because when policy is not effective the risk of regulatory intervention rises.

14. Stability in this context relates to whether, from the perspective of business, the substance of policy is likely to be conducted on an ad hoc and unpredictable basis. From this perspective, stability is synonymous with systemic policy instruments that require careful justification and clear objective-setting – i.e. policies with wide scope as defined above in relation to environmental effectiveness.

15. Independence refers to whether a particular policy instrument naturally lends itself to ad hoc political interference and politicised institutions. Policies have been rated according to whether they: (1) have low capacity for independence; (2) are neutral (either do not affect or could go either way); (3) have a high capacity for independence.

Table 13. Policy & management of regulatory risk

Rating based on average scores <1 = Low, <2 = Medium, <3 = High.

Policy instrument	Rating	Environmental effectiveness	Stability	Independence
Prohibitions on use	Medium	2	1	1
Access restrictions	Medium	3	1	1
Permits & quotas	Medium	2	1	1
Standards	Medium	2	1	2
Spatial planning	Medium	2	2	1
Planning requirements	Medium	1	2	1
Taxes & charges	High	2	3	2
New subsidies	Medium	2	2	1
Subsidy reform	High	3	3	3
PES	High	2	2	2
Offsets	Medium	1	1	2
Tradable permits	High	2	3	2
Liability instruments, fines & bonds	Medium	1	1	2
Labelling and certification	High	2	2	2
Green public procurement	High	2	3	1
Voluntary agreements	Medium	2	1	2
Corporate accounting	High	1	3	2

Source: NZIER

B.2.4 Reputational risk

16. Policies which support management of reputational risk are those which:

- are environmentally effective;
- typically support social cohesion

- facilitate business attribution i.e. allow firms to obtain credit for positive outcomes.

17. The social cohesion criterion recognises that some policies are polarising in terms of public opinion. We score policies according to whether they: (0) are largely irrelevant to public opinion; (1) typically worsen social cohesion by polarising debate or setting interest groups against each other; (2) could be positive or negative; (3) typically improve social cohesion. Broadly speaking, policies which score low are those which reinforce or introduce property rights in natural resources and the environment.

18. The attribution criteria recognises that some policies provide: (0) no opportunity for improving public perception about business impacts on the environment or possibly a negative effect; (1) very limited scope for public awareness of business actions; (2) some scope for public awareness of the actions of firms and attribution of those actions to business initiatives; (3) a clear positive connection between policy and business.

Table 14. Policy & management of reputational risk

Rating based on average scores <1 = Low, <2 = Medium, <3 = High.

Policy instrument	Rating	Environmental effectiveness	Social cohesion	Attribution
Prohibitions on use	Medium	2	3	1
Access restrictions	Medium	3	2	1
Permits & quotas	Medium	2	2	1
Standards	High	2	3	2
Spatial planning	Medium	2	2	0
Planning requirements	Low	1	0	0
Taxes & charges	High	2	3	1
New subsidies	Medium	2	2	1
Subsidy reform	High	3	2	1
PES	High	2	3	3
Offsets	High	1	2	3
Tradable permits	Medium	2	1	1
Liability instruments, fines & bonds	Medium	1	2	0
Labelling and certification	High	2	3	3
Green public procurement	Medium	2	0	1
Voluntary agreements	High	2	2	2
Corporate accounting	High	1	3	2

Source: NZIER

B.2.5 Opportunities

19. The final element we use to map policy to private incentives is the potential for policy to turn risks into new commercial opportunities. Scope for new commercial opportunities are evaluated according to whether a policy generally supports the status quo (low = 1), will enable the creation of new products and services or new markets (2 = medium), and enables both new products and new markets (3 = high).

20. This implicitly includes the principle of efficiency in the sense that a flexible policy which admits firm response and innovation and alternative forms of compliance presents an opportunity to avoid cost. However, here opportunity is evaluated in terms of potential for entirely new markets, products or brands to form. This includes opportunities for associated industries such as permit trading, investment and insurance, as well as new products from bio-prospecting and green-branded or certified products.

B.3 Public benefit

21. A key consideration in this policy mapping exercise is the extent to which policies can deliver public benefit as well as leverage private incentive. We define public benefit as policies which are conducive to environmental effectiveness and efficiency, and also have the capacity to mobilise private sector finance.

Table 15. Prioritisation of policy for public benefit

Rating based on average scores <1 = Low, <2 = Medium, <3 = High.

Policy instrument	Rating	Environmental effectiveness	Efficiency	Raise private finance
Prohibitions on use	Medium	1.3	0	0
Access restrictions	Medium	1.7	0	1
Permits & quotas	Medium	1.7	1	0
Standards	Medium	2.0	1	0
Spatial planning	Medium	2.0	0	0
Planning requirements	Low	1.7	0	0
Taxes & charges	High	2.3	2	3
New subsidies	Medium	2.3	3	0
Subsidy reform	High	3.0	3	3
PES	High	2.3	2	3
Offsets	High	1.7	2	3
Tradable permits	High	2.7	3	3
Liability instruments, fines & bonds	Medium	1.7	0	2
Labelling and certification	Medium	2.0	1	0
Green public procurement	Medium	2.3	3	0
Voluntary agreements	Medium	2.0	3	0
Corporate accounting	Medium	2.0	0	0

Source: NZIER

B.4 Components of policy indices

Table 16 and Table 17 describe the components of the policy indices constructed using our evaluation framework with the scores used to prioritise policies

Table 16. Qualitative scoring regime

Score	(A) Efficiency	(B) Opportunities	(C) Finance	(D) Order	(E) Scope	(F) Precision	(G) Stability	(H) Independence	(I) Cohesion	(J) Attribution
0	No flexibility or opportunities for cost minimisation	No opportunities	No new finance	na	na	na	na	na	Irrelevant	No (or inherently negative) attribution
1 (Low)	Low flexibility or opportunities for cost minimisation	Low or limited commercial potential	Low or limited potential for private flows	Restoration	One off and narrowly applied	Blunt	One off and narrowly applied	Low capacity for independence	Typically worsens	Very limited attribution
2 (Moderate)	Moderate flexibility or opportunities for cost minimisation	Some to moderate commercial potential	Some to moderate potential for private flows	Mitigation	Systematically applied over time and space OR across a range of risks	Target exacerbator or exacerbating action (but not both)	Systematically applied over time and space OR across a range of risks	Neutral (either does not affect or could go either way)	Neutral (or could go either way)	Some attribution
3 (High)	Highly flexible or opportunities for cost minimisation	High commercial potential	High potential	Avoidance	Systematically applied across time and space and addressing a range of risks to BES	Target both exacerbator and actual action	Systematically applied across time and space and addressing a range of risks to BES	High capacity for independence	Typically improves	Clear attribution

Source: NZIER

Table 17. Policy scores

Policy instrument	(A) Efficiency	(B) Opportunities	(C) Finance	(D) Order	(E) Scope	(F) Precision	(G) Stability	(H) Independence	(I) Cohesion	(J) Attribution
Prohibitions on use	0	0	0	2	1	1	1	1	3	1
Access restrictions	0	0	1	3	1	1	1	1	2	1
Permits & quotas	1	0	0	2	1	2	1	1	2	1
Standards	1	0	0	2	1	3	1	2	3	2
Spatial planning	0	0	0	2	2	2	2	1	2	0
Planning requirements	0	0	0	1	2	2	2	1	0	0
Taxes & charges	2	1	3	2	3	2	3	2	3	1
New subsidies	3	1	0	2	2	3	2	1	2	1
Subsidy reform	3	0	3	3	3	3	3	3	2	1
PES	2	2	3	2	2	3	2	2	3	3
Offsets	2	2	3	1	1	3	1	2	2	3
Tradable permits	3	2	3	2	3	3	3	2	1	1
Liability instruments, fines & bonds	0	0	2	1	1	3	1	2	2	0
Labelling and certification	1	3	0	2	2	2	2	2	3	3
Green public procurement	3	3	0	2	3	2	3	1	2	1
Voluntary agreements	3	1	0	2	1	3	1	2	2	2
Corporate accounting	0	2	0	1	3	2	3	2	3	2

Source: NZIER

Components of the indices are aggregated as follows:

- *environmental effectiveness* = (D) + (E) + (F)
- policy support for *managing operational risk* = (A) + (D) + (E) + (F)
- policy support for *managing regulatory risk* = (D) + (E) + (F) + (G) + (H)
- policy support for *managing reputational risk* = (D) + (E) + (F) + (I) + (J)
- *private incentive* = (A) + (B) + (D) + (E) + (F) + (G) + (H) + (I) + (J)
- *public benefit* = (A) + (C) + (D) + (E) + (F)

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