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Item 5.3 of the provisional agenda

BEST POLICY GUIDANCE FOR THE INTEGRATION OF BIODIVERSITY AND ECOSYSTEM SERVICES IN STANDARDS

Note by the Executive Secretary

INTRODUCTION

1. The attached document on policy guidance for the integration of biodiversity and ecosystem services in standards has been prepared by the UNEP World Conservation Monitoring Centre (UNEP-WCMC). The paper responds to paragraph 3 (b) of decision X/21 of the Conference of the Parties, which calls upon the Secretariat to "*...analyse the effectiveness of ...tools in relevant economic sectors, and to make this ...available to national focal points and all relevant stakeholders, through the clearing-house mechanism of the Convention and through other means"*, as well as paragraph 3 (c) of decision X/21, which calls upon the Secretariat "*To encourage the development and application of tools and mechanisms that can further facilitate the engagement of businesses in integrating biodiversity concerns into their work..."*. This analysis of standards also builds upon the work presented in CBD Technical Series No. 63, "Review of the Biodiversity Requirements of Standards and Certification Schemes", available from the Secretariat of the Convention on Biological Diversity.

2. In addition, this paper is also in line with the recommendations of the fourth meeting of the Ad Hoc Open-ended Working Group on Review of Implementation of the Convention to the eleventh meeting of the Conference of the Parties, requesting Parties "*To take into account according to priorities and national circumstances other policies that halt biodiversity loss, such as...Encouraging consideration of best practices for voluntary standards and certification schemes that respect the goals and objectives of the Convention and the Aichi Biodiversity Targets that will help incentivize the sustainable management of landscapes and seascapes, and will help companies (particularly small and medium-sized enterprises) assess and effectively address their impact upon biodiversity and on indigenous and local communities*" (see UNEP/CBD/COP/11/4, annex, paragraph 3 (d) of recommendation 4/7).

3. The paper is being circulated in the form and language in which it was submitted to the Secretariat.

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United Nations Environment Programme
World Conservation Monitoring Centre

Best policy guidance for the integration of biodiversity and ecosystem services in standards

October 2012

This document has been prepared by the UNEP-World Conservation Monitoring Centre (UNEP-WCMC) in partnership with the Secretariat of the Convention on Biological Diversity (SCBD)

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Executive summary

There is growing recognition of the importance of biodiversity and ecosystem services to sustainable development, whereby unsustainable activities that cause a loss of biodiversity and degradation of natural ecosystems and the services that they provide are expected to have severe consequences for human well-being and economic development. In response, biodiversity and, to some extent, ecosystem service safeguards are becoming a common feature of standards systems that aim to achieve social, economic and environmental sustainability of economic activities.

Biodiversity and ecosystem services are integrated in to the policy requirements of standards systems in a number of ways. This largely depends on the overarching intent of the standard whereby biodiversity and/or ecosystem services can either be central to the mission, or form one of a number of principles that help achieve the central mission of the standard. Based on current practice of a selected number of international standard systems, the common inclusion of biodiversity safeguards such as habitat and threatened species protection are encouraging. Equally there are a number of safeguards in place that address the key pressures on biodiversity and ecosystem services such as habitat loss and pollution. There are however a number of potential ways that standard's policies relating to biodiversity and ecosystem services can be improved. These include the use of clear and consistently understood terms, definitions, and approaches, and the overall inclusivity of safeguards that address the key pressures on biodiversity and ecosystem services.

This best policy guidance document aims to facilitate further improvements in standards systems with regard to the biodiversity and ecosystem service safeguards, through providing an overview of some of the key approaches that could be adopted and some of the major considerations for the formulation of appropriate policy requirements. This document is therefore structured in two parts as detailed below.

The first section of this document focuses on high level considerations to be made by the standard setting organisation. These include the identification of high level principles or commitments that fit with the intent of the standard and support the Aichi targets set by the Convention on Biological Diversity. These principles will guide the appropriate selection of more specific criteria with which operators need to comply. Other overarching approaches that are discussed are an integrated ecosystem services approach to help ensure that the benefits that natural ecosystems and processes

provide to people are maintained, and a landscape approach to help ensure that operations support the wider sustainability objectives of a landscape.

The second section of the document is structured around the five pressures that economic activities pose to biodiversity and ecosystem services and provides specific guidance on how each pressure can be addressed. These pressures are habitat and land cover change; harvest and resource consumption; pollution and external inputs; climate change; and invasive species and genes:

- Habitat and land cover change is of particular relevance to operations that are land intensive such as agriculture and many of the recommended strategies for mitigating this pressure relate to site selection and the identification of no-go situations. Reducing and avoiding habitat degradation is also highlighted as an important component to tackle this pressure, along with opportunities to provide benefits to biodiversity and ecosystem services through restoration.
- Harvest and resource consumption is highly relevant to operations that cause direct exploitation of species but also relates to all operations that use natural water supplies in their operations. Recommended strategies that tackle species exploitation focus on sustainable use that can be based on a number of factors related to the species biology, location and method of harvest. Also highlighted in this section are the indirect impacts of operations, for example species exploitation activities of hired labour forces, as well as the potential for species exploitation activities to provide local or national conservation incentives.
- Pollution and external inputs is relevant for almost every type of operation and requirements to reduce pollution levels are arguably those with the longest history in the evolution of environmental standards systems. Recommended strategies are largely focused on those to limit or control the release of pollutants into the environment, which need to be coupled with monitoring requirements to ensure that controls are effective. Of particular relevance to the impacts of pollution on biodiversity and ecosystem services is the protection of priority areas through vegetated buffer zones or distance barriers.
- Climate change is particularly relevant for operations that are energy intensive or cause conversion of natural ecosystems. Recommended mitigation strategies therefore focus on factors such as energy efficiency, land-use practices, and restoration. Ecosystem based adaptation is also highlighted in this section whereby promoting resilience and

diversity of natural ecosystems can convey additional benefits in terms of adaptation to inevitable changes in the global climate system.

- Invasive species and genes is relevant to operations that lead to accidental or deliberate introduction of species outside of their natural distribution, as well as those that use Genetically Modified Organisms (GMOs). While this section encompasses two very different types of pressure, recommended mitigation strategies are along similar lines with a focus on controlling the use of non-native species and GMOs, and controlling their spread into natural ecosystems.

The effectiveness of the suggested strategies given in this document will depend on the implementation and regulation processes of the standard system, as well as the interpretation of such policy guidance to the sector and scale appropriate to the standard. This document is therefore envisaged to form part of an evolving process whereby performance evaluation of standards systems combined with feedback on feasibility aspects of implementation will inform the development of future policy guidance materials.

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1. Introduction

Biodiversity provides a fundamental basis for human development and well-being. The earth's diverse species are crucial for the functioning of ecosystems, which in turn provide essential goods and services on which people, business, and global economies rely. However, biodiversity is currently disappearing at an alarming rate. Over the past 50 years ecosystems have been extensively modified to meet demands for natural resources from a rapidly growing global population. As a result, it is estimated that around 60% of examined ecosystem services are now degraded or being used unsustainably (MA, 2005). Moreover, human induced climate change, as well as a growing human population and economic expansion will continue to exacerbate ecosystem degradation and biodiversity loss unless a more sustainable approach to global development is adopted.

Over the past two decades there have been a number of concerted efforts to establish the importance of biodiversity and ecosystem services, and to identify, quantify, and manage detrimental impacts on them. Much of the momentum behind this movement began in 1992 when the United Nations Conference on Environment and Development in Rio de Janeiro called upon all governments and stakeholders to integrate sustainable development considerations and goals into their consumption and production decisions. In the intervening years since this landmark summit, the crucial role of business as stakeholders in global efforts to curb biodiversity and ecosystem services loss has become increasingly clear and business engagement has consistently been included in subsequent international environmental conventions and symposia agreements (Figure 1).

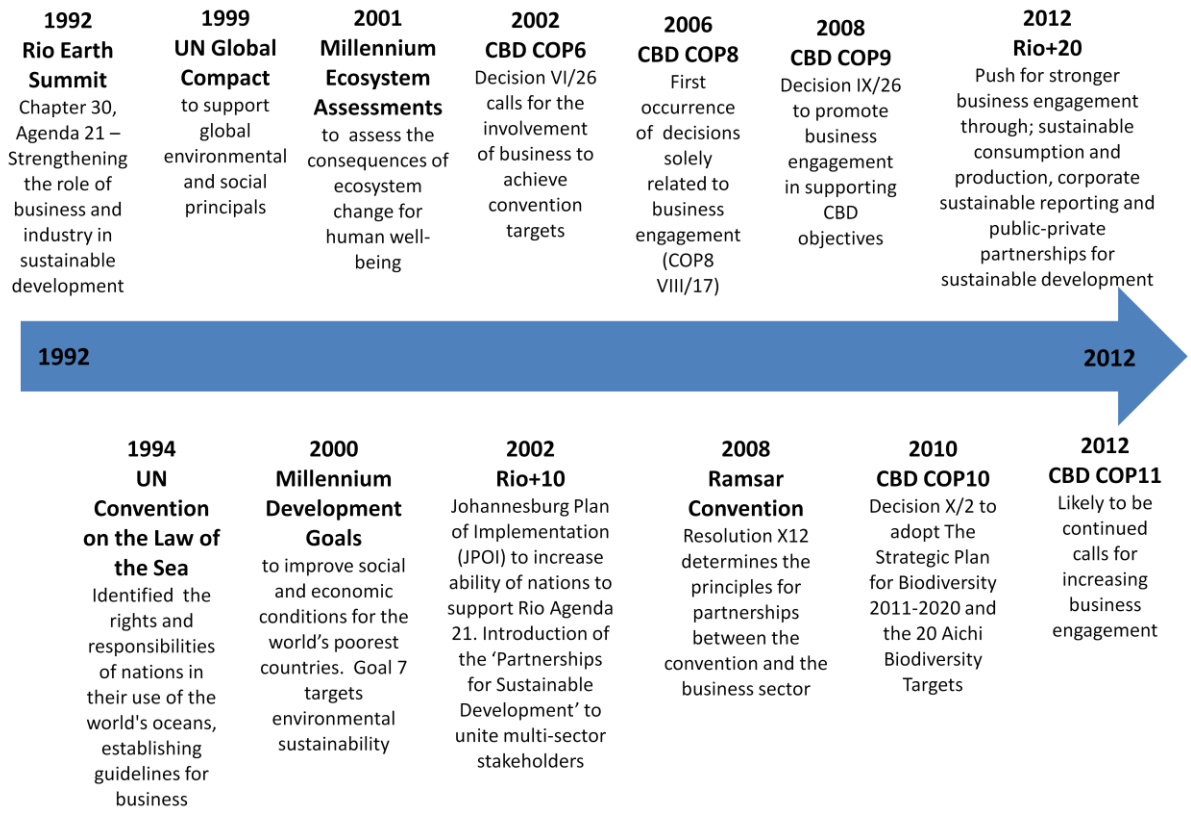

Figure 1. Time line of international events and multilateral agreements related to biodiversity in which business engagement has been specifically recognised

Over recent years, numerous initiatives and activities have been developed to support the business community in their understanding and engagement with biodiversity issues (UNEP & UNEP-WCMC , 2010). Voluntary standards have become one of the key tools used to direct improved social and environmental performance by companies. Broadly speaking, standards can be described as a set of explicit requirements with which companies must comply, and against which they can be audited. Most business sectors have adopted a range of standards, often associated with finance initiatives or certification schemes. The prevalence of standards and certification schemes has increased significantly over the past 20 years (Figure 2), and their importance is now clearly recognised as a mechanism for positive change by the Convention on Biological Diversity (most recently in CBD COP 10 Decision X/21, paragraph 2f[1]). There is therefore a clear need to understand better exactly how standards are articulating their safeguards for biodiversity and ecosystem services, and work towards establishing best policy practices.

[1] The Conference of the Parties encourages businesses and the private sector "*To participate in voluntary certification schemes that promote the three objectives of the Convention*"

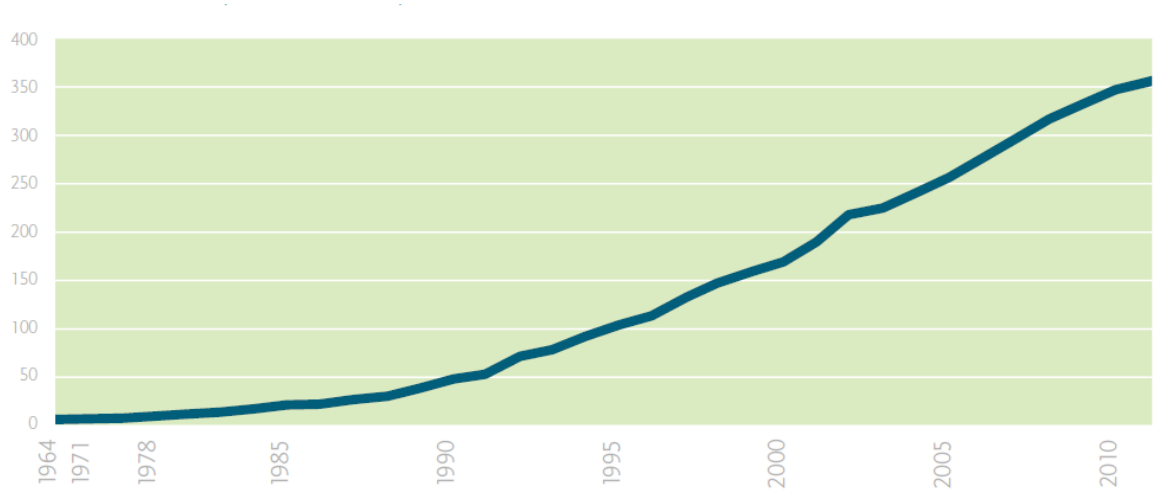

Figure 2. Graph showing the increasing number of ecolabels sampled from 246 countries and 25 business sectors between 1964 and 2011. Data are generated by www.ecolabelindex.com

Purpose of this report

In partnership with the Secretariat of the Convention on Biological Diversity, UNEP World Conservation Monitoring Centre (UNEP-WCMC) has been working on biodiversity and ecosystem services safeguards contained in voluntary standards for the private sector since 2010. This document has been developed for standard setting bodies such as certification schemes and financial institutions, as well as individual companies that set internal sustainability requirements. It aims to provide clear and structured policy advice for the integration of biodiversity and ecosystem service safeguards within voluntary standards for the private sector. The ability of a standard to achieve social and environmental sustainability depends on a feedback loop linking the development of strong policy to the implementation and regulation of policy at the site and project scale (Figure 3). Here, we focus on the first part of this process; defining and strengthening the policy content of standards systems and ensuring the clarity of terms and definitions used to facilitate effective implementation. The ultimate effectiveness of this report therefore relies on relating the recommendations it makes to guidance on implementation and regulation, for which we would recommend referring to the ISEAL codes of good practice[2]. In addition, findings from the State-of-Knowledge Assessment of Standards and Certification (RESOLVE, 2012) have shown that although there is some evidence for the positive effect of standards systems, the development of appropriate indicators or reporting processes for evaluating and monitoring standards and certification schemes is an area that is still in need of further attention. As reporting and evaluation processes are

[2] ISEAL Alliance is the global association for sustainability standards, working to develop guidance and deliver programmes that strengthen standards' social and environmental impacts (http://www.isealalliance.org/)

developed, it will be important to maintain a strong feedback loop between policy requirements and their impacts on-site.

This guidance document builds on policy reviews conducted by UNEP-WCMC, in which biodiversity and ecosystem service safeguards contained in standards from across eight business sectors[3] were assessed. Through this work, which has involved a series of external consultations with stakeholders from the business, standards and NGO communities, we have generated high level guidance for standard setting bodies from all business sectors to assist with the identification of key biodiversity and ecosystem services issues for consideration in their policies. Our intention is that this will be a first step for policy development that standards bodies can use to define tailored sector- and scale-specific biodiversity and ecosystem services safeguards. Following the introduction that provides some background on current practice, this guidance is structured into two sections: Section two focuses on high level considerations to be made in setting the scope and intent of the standard; and section three provides guidance on the formulation of specific policy requirements structured around the five core pressures on biodiversity and ecosystem services, as recognised by the Convention on Biological Diversity and the Millennium Ecosystem Assessment (Habitat and land cover change, harvest and resource consumption, pollution and external inputs, climate change, and invasive species and genes). The guidance outlined in this report is suitable for all business sectors, subject to an assessment of the relevance of each pressure to the type of economic activity the standard governs, and the defined purpose of the standard itself.

[3] The eight business sectors reviewed are; fisheries, forestry, carbon, finance, tourism, bio-trade, mining, and agriculture

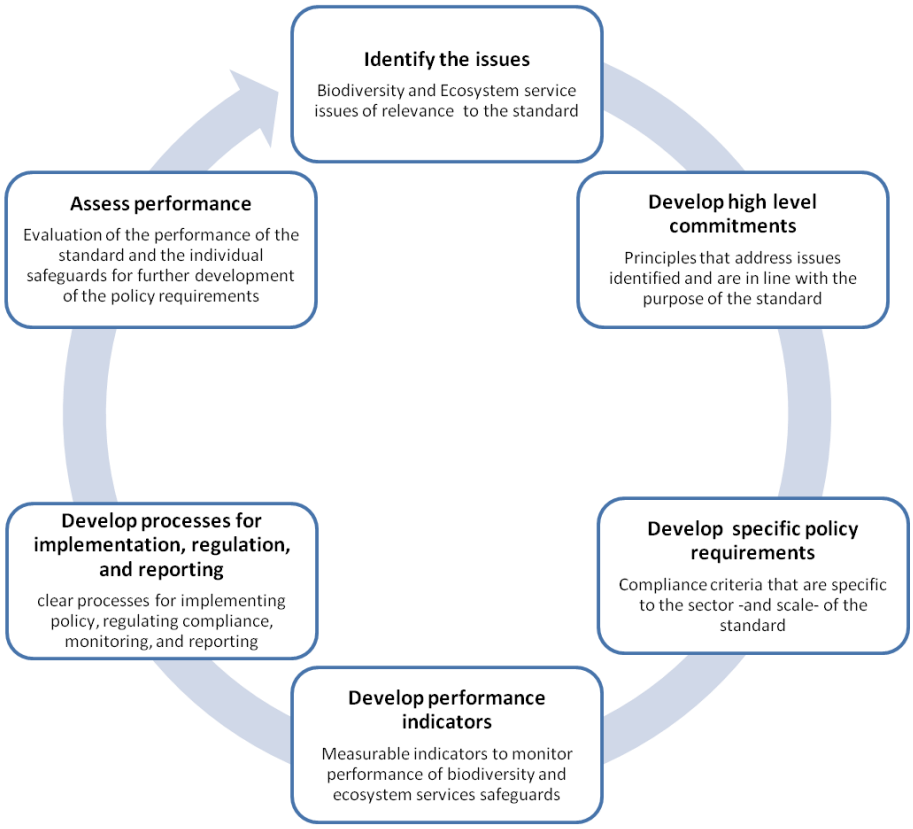

Figure 3 - Feedback loop linking the performance evaluation of a standard to the development of policy

1.1. An introduction to Biodiversity and Ecosystem Services

Defined by the Convention on Biological Diversity (CBD) (Article 2), 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"*. Biodiversity is the provider of all the genetic material, species and ecosystems on which life relies, and its importance for human wellbeing has been recognised for several decades. This was formalised in 1992 when the CBD was first adopted. From that time biodiversity has been a strong element of international environmental discussions, triggering innumerable national and regional scale conservation efforts.

More recently, there has been consideration of how biodiversity and the ecosystems it comprises drive economic and social development, leading to the concept of ecosystem services. In 2000, the United Nations Secretary-General, Kofi Annan, initiated a global programme of study, The Millennium Ecosystem Assessment (MA), which appraised the condition and trends in the world's ecosystems and the services they provide humanity, and explored options to restore, conserve or enhance the sustainable use of ecosystems. This milestone report provided the first formal and

globally recognised definition of ecosystem services as the *"...benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other nonmaterial benefits"* (Figure 4.). Ecosystem services can have local, regional, and global benefits, and any efforts to maintain their provision should consider their geographical extent and the equitable sharing of benefits. Biodiversity and ecosystem services are inextricably linked in that ecosystems, and the services they provide, are dependent on the functional and structural variability of the species and habitats they are comprised of, and for this reason the management of biodiversity and ecosystem services should be considered in tandem. Since the MA, there has been growing interest in the quantification of biodiversity loss and ecosystem services deterioration. One influential study, The Economics of Ecosystems and Biodiversity (TEEB), has estimated the cost of losing biodiversity and ecosystem services at around US$2-4.5 trillion over 50 years (TEEB, 2008).

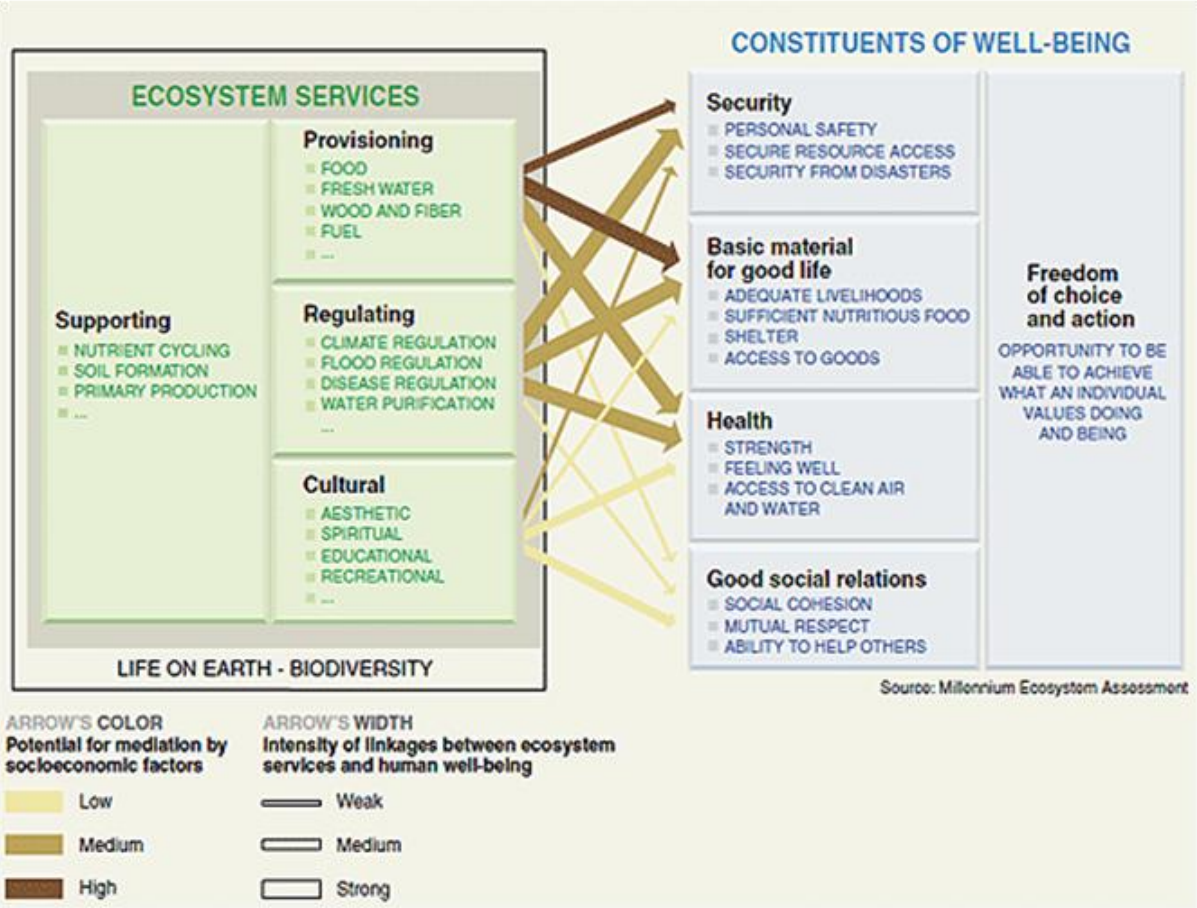

Figure 4 - Ecosystem Services and their links to human well being (source: Millennium Ecosystem Assessment, 2005)

Business has a two-way interaction with the natural environment. On the one hand, all business activities rely to some extent on ecosystem services for their products and processes, and on the other hand, these activities drive changes to ecosystems and their service provision. As a result of the need to address their dependencies and impacts, several leading businesses have invested considerable time and money in finding ways to manage and mitigate their negative impacts and maximise positive impacts in order to assure the social, environmental and economic sustainability of their operations into the future (WBCSD, 2012).

1.2. Current state of biodiversity and ecosystem services in standards systems

In partnership with the Secretariat of the Convention on Biological Diversity (SCBD), UNEP-WCMC has conducted two reviews of standards policy; the first examining language and approaches taken to define biodiversity safeguards in 36 standards from across 8 business sectors (UNEP-WCMC & SCBD, 2011) (Table 1); and the second providing a broad overview of the range of different approaches to incorporating ecosystem services safeguards in a small sample of standards from across the same eight business sectors. This work has culminated in the development of a list of high level recommendations, appropriate for all business sectors, on how biodiversity and ecosystem services safeguards might be strengthened, and forms the basis for the generation of best policy guidance.

Table 1 - List of standards included in UNEP-WCMC reviews of biodiversity and ecosystem services safeguards

Sector	Name of Standard	Biodiversity review	Ecosystem Services	
			Survey	Review
Agriculture	Sustainable Agriculture Network	✓	✓	✓
	International Federation for the Organic Agricultural Movement	✓		
	Roundtable on Sustainable Palm Oil	✓		
	Roundtable on Sustainable Biofuels	✓	✓	
	Bonsucro	✓		
	The Round Table on Responsible Soy Association	✓		
	4C Association	✓	✓	
	Fairtrade Labelling Organisations International	✓	✓	
	UTZ Certified	✓	✓	
	The Better Cotton Initiative	✓		
	The Smithsonian Migratory Bird Centre	✓	✓	
	GLOBAL Good Agricultural Practices	✓		
Finance	International Finance Corporation	✓	✓	✓
	Asian Development Bank	✓		
	Inter-American Development Bank	✓	✓	
	European Bank for Reconstruction and Development	✓		
	European Investment Bank	✓		
Forestry	Sustainable Forestry Initiative	✓		

	Forest Stewardship Council	✓	✓	
	International Tropical Timber Organisation	✓		
	Global Forest Alliance	✓		
	Programme for the Endorsement of Forest Certification		✓	✓
Carbon	The Climate, Community, and Biodiversity Alliance	✓		
Offset	PlanVivo	✓	✓	✓
	CarbonFix	✓		
Mining	Responsible Jewellery Council	✓	✓	✓
	Alliance for Responsible Mining	✓	✓	
Biotrade	Union for Ethical BioTrade	✓	✓	
	FairWild Foundation	✓	✓	✓
Fisheries and	Marine Stewardship Council	✓	✓	✓
Aquaculture	Marine Aquarium Council	✓		
	Global Aquaculture Alliance	✓		
	Aquaculture Dialogue	✓	✓	
	Global Good Aquaculture Practices	✓	✓	
Tourism	Global Sustainable Tourism Council	✓		
	World Tourism Organisation	✓	✓	
	Eco-Destinet	✓	✓	✓

1.2.1. Biodiversity review

In 2011, the UNEP-WCMC and the SCBD published a snapshot review of biodiversity safeguards contained within 36 standards and certification schemes drawn from eight business sectors (UNEP-WCMC & SCBD, 2011). While there is a concerted move to integrate specific biodiversity requirements better within private sector standards in general, as evidenced by the recently revised International Finance Corporation Performance Standard 6 (IFC, 2012), our review demonstrated that there is a great deal of variation between standards with regard to the coverage of biodiversity, definitions used, and the measures adopted for biodiversity protection.

To assess biodiversity coverage of the standards selected for the study, policy documents were carefully reviewed, recording any information relating to:

1. A number of key components of biodiversity (species, habitats, protected areas, and priority conservation areas).
2. A selection of core threats to biodiversity and a number of possible responses to the threats (habitat loss, over-exploitation, invasive alien species, habitat restoration, mitigation hierarchy, and no net loss/net positive impact).
3. A set of crucial biodiversity-related Multilateral Environmental Agreements (Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Convention on Wetlands of International Importance (Ramsar Convention), UNESCO World Heritage Convention, Convention on Migratory Species (CMS)).

Results

A brief outline of some of the key results is provided below and a full set of results and the discussion and conclusions of the study can be found in the report (UNEP-WCMC & SCBD, 2011).

Terms and definitions - One of the fundamental findings of the review was the disparity in the use of terms and definitions among the standards studied, both within and across sectors. For instance, while most standards contained safeguards for threatened species, only 64% of the standards referred to the internationally recognised IUCN definition and categories of threatened species. Similarly, for habitat safeguards the terms 'natural', 'modified' and 'critical' habitat were commonly used, but often had limited or absent guidance or definition. For example, 'natural' habitat was referred to in 86% of standards, although the term was only defined by 30% of standards.

The use of inconsistent or unreferenced terminology is problematic for operators and can lead to confusion when attempting to implement a safeguard and ultimately can reduce the likelihood of safeguard effectiveness. Ideally, standards are advised to use internationally recognised definitions where available, citing the source authority and providing any necessary guidance on interpretation. If it is necessary to develop independent definitions for any component of biodiversity, it is crucial to provide operators with comprehensive guidance on interpretation.

Habitat protection - Habitat protection was a common feature in the biodiversity approach of standards, with all 36 standards studied including it to some extent. Of these, 44% include a no conversion policy for specific habitat types, of which forests were afforded the greatest level of protection. For example, both GlobalG.A.P and the Fairtrade International standards require proof that production has not taken place on previously forested land. Although this focus on forests may be justified given that certain forest types are of very high value for both the biodiversity they support and their carbon sequestration properties, standards setting bodies are cautioned to avoid neglecting protection measures for other habitats of biodiversity value.

Protected Areas – Protected areas have long been, and remain, one of the key strategies behind biodiversity conservation, and the vast majority (86%) of standards reviewed recognise their importance. Some, including the Roundtable on Sustainable Biofuels (RSB) and Bonsucro, even declare legally protected areas as ‘no-go’ areas. While this is encouraging, many standards rely on national law and regulation and the existence of an effective management plan for the area to guide operations, neither of which may be present for all protected areas. Furthermore, given that the role of voluntary performance standards is often to go beyond what is required by law, it is advisable that complying companies operating in or near such areas, be required to avoid negative impacts in

these areas and, if needed, support the development of management plans to ensure protected area objectives are stated and met.

Priority Conservation Areas - As much of the world's biodiversity does not fall within legally protected areas, there is a great need to identify and safeguard areas of biodiversity importance, irrespective of legal status. Encouragingly, many standards do include stringent measures for the protection of such areas. However, the effectiveness of these measures is likely to be impeded by a lack of clarity over how important areas for biodiversity should be identified. A large number of terms were adopted including '*areas of conservation value'*, '*high value ecosystems*' and '*land with high biodiversity value*'. Without sufficient definitions and the provision of assessment criteria, the identification of such areas becomes an arduous task and allows for a flexible interpretation which can be manipulated to the detriment of biodiversity. Great advances have been made in conservation science to identify areas of biodiversity importance using established criteria in order to direct sustainable development. These priority areas include, but are not limited to, the High Conservation Value (HCV) approach, and the set of Key Biodiversity Area (KBA) types. HCVs and KBAs appeared in only 28% and 11% of standards respectively. While the adoption of these existing approaches to prioritise areas for stricter protection may not always be appropriate, the ability to identify areas highlighted for protection by a standard is crucial for its ultimate effectiveness.

Mitigation Hierarchy and No Net Loss - Conservation science is a constantly evolving field and new approaches and strategies are constantly emerging to support 'green' development. These include the mitigation hierarchy, as well as strategies for offsetting residual biodiversity impacts as a way to achieve no net loss, or even a net positive impact, on biodiversity. In general, standards are not yet embracing these approaches to any major extent, although the finance sector, including IFC, the European Investment Bank (EIB), the European Bank for Reconstruction and Development (EBRD), and the Asian Development Bank (ADB), has made the most progress in this area with specific mention of the no net loss concept and the inclusion of positive gain requirements. The overall lack of uptake is likely to be due to the infancy of such approaches, a lack of defined, cost effective methods for quantifying biodiversity impacts, and the availability of offsetting options.

Conclusions and Recommendations

These findings, among others in the review, imply a growing need for better guidance for standard setting bodies on how biodiversity could be better incorporated within standards with respect to the terms and definitions required for identification of biodiversity on the ground, and what safeguard measures are likely to provide discernible benefits. Through consultation with a workshop of experts

convened at the end of 2011, a set of recommendations has been proposed to guide standard setting bodies in the development and strengthening of their biodiversity safeguards (Box 1).

Box 1 - Recommendations for Strengthening Biodiversity Safeguards

1. Adopt internationally recognized definitions. Guidance on selecting credible definitions and language should be made available.
2. Avoid the leakage of threats and provide guidance on indirect effects through adopting the ecosystem approach and spatial planning methods.
3. Include and define modified habitats. Alternatively, use a biodiversity 'value' and require ecosystem assessment of all operation zones.
4. Provide guidance on operation inside protected areas, using existing management plans where possible. Where no management plans exist, support the development of management plans in consultation with local, national and international stakeholders.
5. Adopt a more inclusive definition of protected areas that includes internationally recognised protected areas and areas of customary use such as Indigenous and Community Conserved Areas.
6. Safeguard priority conservation areas by the use of an approach such as HCV that is based on a range of biodiversity values.
7. Work towards adopting the mitigation hierarchy and consider incorporating 'no net loss' in business plans.
8. Apply a checklist of the five key threats to biodiversity (habitat loss, over-exploitation, invasive species, pollution, and climate change) to ensure the criteria cover those of relevance to the standard.

1.2.2. Ecosystem service review

With the increasing global awareness of the importance of conserving not only biodiversity and the ecosystems it comprises, but also the ecosystem services that are provided, understanding how standards address ecosystem services has never been more timely. UNEP-WCMC has therefore undertaken an initial investigation to understand how ecosystem services are being provided for in the existing environmental and social safeguards of standard's policies. This involved a survey of standards setting bodies followed by a review of a small sample of standards.

Survey

Prior to commencing the review of standards policy documents, UNEP-WCMC conducted an online survey of 20 standards (Table 1) in order to determine how standards setting bodies viewed the issue of ecosystem services so that key issues could be identified and considered in the subsequent phase of the study (Figure 5).

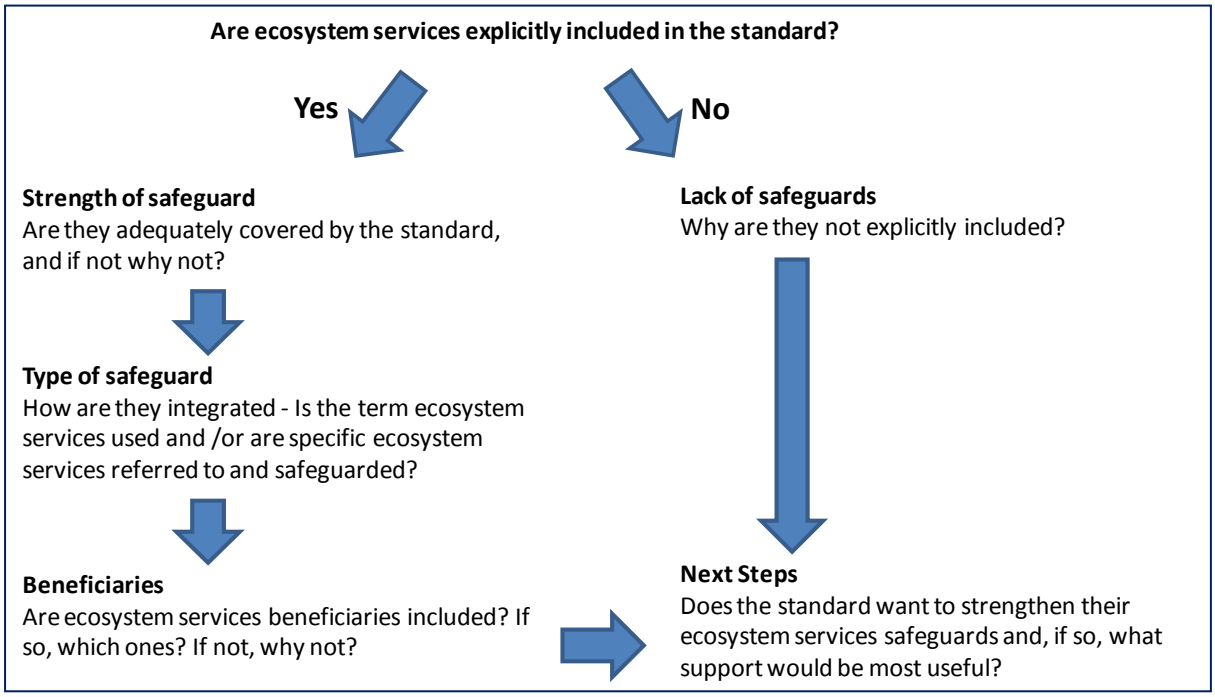

Figure 5 - Schematic of the survey circulated among 20 standards from 8 sectors in order to identify how standards perceive and integrate ecosystem services safeguards

Overall, the survey indicated a high degree of coverage for ecosystem services in standards, though different approaches are being employed. Specifically, of the 20 standards which responded to the survey, 14 stated that ecosystem services were explicitly mentioned in their policies although only nine of these were confident that the coverage in place was adequate. The most common reason for inadequate coverage was the recent evolution of the concept of ecosystem services, followed by financial constraints and difficulty with defining, assessing and regulating ecosystem services. Similar reasons were given by those standards that did not include ecosystem services in their policies at all, although one further common justification was that ecosystem services were implicitly incorporated into broader biodiversity safeguards.

While the approach to incorporating ecosystem services in those 14 standards that did include them varied, the majority of standards adopted a prescriptive approach in which safeguards were in place

for specific services, with fewer standards applying only high level ecosystem service requirements. A closer examination of which ecosystem services were being named showed a wide coverage of ecosystem services across the standards. Water provision, erosion prevention, and health benefits were most commonly referred to, while noise regulation, tourism, and the provision of medicinal resources were only identified in a few standards. Some of the ecosystem service types can be easily confused with artificial management procedures, for example the treatment of waste water can be carried out by ecosystems as well as through water treatment facilities. This has potentially led to some confusion around what ecosystem service safeguards are present in standards and what management procedures are present that perform similar functions.

Within the 14 standards that had ecosystem services safeguards, all made provisions for beneficiaries, with most reference being made to local communities. Other beneficiary groups included the operating companies, consumers, wider society, and employees. Some misidentification of beneficiaries indicated that there is a need for some guidance on the anthropocentric nature of ecosystem services whereby human beneficiaries need to be present.

To conclude the survey, all standards surveyed were asked whether support was needed to strengthen ecosystem services safeguards and all but one standard agreed on the need for further assistance, suggesting a wide range of activities including the development of guidance and teaching materials for standards setting bodies and their clients, financial support, case studies on the implementation of ecosystem services safeguards, and cost effective solutions for implementing and regulating ecosystem services safeguards.

Policy Review

Following the survey, a more detailed review of a small number of standards (one from each of the eight sectors, Table 1) allowed us to investigate the specifics of how ecosystem services are being articulated and integrated into standards across a wide range of business sectors. Standards were selected for review based on how recently their current version was launched, on the assumption that they would be more likely to include ecosystem services if they were revised in recent years. Importantly, due to the small sample size in this study, the multi-sector cross section, as well as the highly divergent approach to ecosystem services, this work was intended to provide a qualitative assessment of how standards could integrate ecosystem services and did not compare or rate the individual standards assessed. To accommodate all approaches to ecosystem services existing within the sample of standards, any policy requirement which could directly or indirectly impact on one or

more ecosystem service drawn from the TEEB list of ecosystem services (TEEB, 2010) (Box 2) was identified, catalogued and assessed.

Five core questions for the review were identified:

1. Is the term 'ecosystem service' used across standards?
2. Are specific ecosystem services named and safeguarded in standards documents and if so, which ones?
3. Are ecosystem services implicitly provided for through general environmental and social policy requirements?
4. Are ecosystem services beneficiaries identified in standards?
5. How do sectors differ in their approach to ecosystem services?

In general, of the 186 separate policy requirements that were reviewed, there was a large variety of approaches and language used. While the term 'ecosystem service' was used in a number of the standards studied, there was also a range of alternative language which could imply a similar meaning including *"ecosystem diversity, processes and functions"* and *"economic, ecological, cultural and social values of ecosystems"*. Importantly, even where the term 'ecosystem service' is used, specific guidance on managing ecosystem services is rarely given and few refer to any accepted authority or framework for ecosystem services.

In many of the standards, policy requirements existed that referred directly to specific ecosystem services, though they were largely not associated with the specific language of ecosystem services. For example, direct reference was often made to soil, water, habitats, and biodiversity although these were seldom categorised as ecosystem service types. In these instances, some obvious commonalities and gaps in the potential coverage of ecosystem services was identified. Table 2 shows the number of policy requirements (called “safeguards”) that directly referred to each of the ecosystem services listed, indicating those that are most and least commonly referred to.

Box 2 - List of ecosystem services identified by The Economics of Ecosystems and Biodiversity (TEEB, 2010)

Provisioning Services

- **Food:** Ecosystems provide the conditions for growing food – in wild habitats and in managed agro-ecosystems
- **Raw materials:** Ecosystems provide a great diversity of materials for construction and fuel
- **Fresh water:** Ecosystems provide surface and groundwater
- **Medicinal resources:** Many plants are used as traditional medicines and as input for the pharmaceutical industry

Regulating Services

- **Local climate and air quality regulation:** Trees provide shade and remove pollutants from the atmosphere. Forests influence rainfall
- **Carbon sequestration and storage:** As trees and plants grow, they remove carbon dioxide from the atmosphere and effectively lock it away in their tissues
- **Moderation of extreme events:** Ecosystems and living organisms create buffers against natural hazards such as floods, storms, and landslides
- **Waste-water treatment:** Micro-organisms in soil and in wetlands decompose human and animal waste, as well as many pollutants
- **Erosion prevention and maintenance of soil fertility:** Soil erosion is a key factor in the process of land degradation and desertification
- **Pollination:** Some 87 out of the 115 leading global food crops depend upon animal pollination including important cash crops such as cocoa and coffee
- **Biological control:** Ecosystems are important for regulating pests and vector borne diseases.

Habitat or Supporting Services

- **Habitats for species:** Habitats provide everything that an individual plant or animal needs to survive. Migratory species need habitats along their migrating routes
- **Maintenance of genetic diversity:** Genetic diversity distinguishes different breeds or races, providing the basis for locally well-adapted cultivars and a gene pool for further developing commercial crops and livestock.

Cultural Services

- **Recreation and mental and physical health:** The role of natural landscapes and urban green space for maintaining mental and physical health is increasingly being recognized
- **Tourism:** Nature tourism provides considerable economic benefits and is a vital source of income for many countries
- **Aesthetic appreciation and inspiration for culture, art and design:** Language, knowledge and appreciation of the natural environment have been intimately related throughout human history
- **Spiritual experience and sense of place:** Nature is a common element of all major religions; natural landscapes also form local identity and sense of belonging

Table 2 - The coverage of ecosystem services in standards based on the number of direct references made to each ecosystem service type (taken from the TEEB list in Box 2) from the sample of 186 ecosystem service relevant policy requirements (safeguards) taken from eight standards. Entries listed in green denote ecosystem services that are most commonly referred to, those in red denote those that are least commonly referred to.

Category	Ecosystem Service	Number of Safeguards
Provisioning Services	Food	3
	Raw materials	4
	Freshwater	**31**
	Medicinal resources	3
Regulating Services	Local climate and air quality regulation	4
	Carbon sequestration and storage	3
	Moderation of extreme events	**1**
	Waste-water treatment	**0**
	Erosion prevention and maintenance of soil fertility	**14**
	Pollination	**0**
	Biological control	**0**
Supporting Services	**Habitats for species**	**25**
	Maintenance of genetic diversity	**29**
Cultural Services	Recreation and mental and physical health	7
	Tourism	3
	Aesthetic appreciation and inspiration for culture, art and design	4
	Spiritual experience and sense of place	4

Based on the results of the survey, and feedback from standard setting bodies, one of the most prevalent reasons for not adopting an explicit ecosystem services approach is that ecosystem services are implicitly conserved through the use of broader environmental policy requirements. Assessing the ways in which ecosystem services may be indirectly safeguarded, without being named, is extremely subjective as it largely depends on the interpretation of the policy, the sector, the on-site understanding of the ecosystem and its functions, and the type and scale of operation being undertaken. For example, the protection of natural or priority habitats can convey benefits to a whole suite of ecosystem services that may be provided by those habitats such as water regulation, provision of wild foods, pollination, flood defence etc. depending on the specific traits of the protected habitat and the existence of human beneficiaries. Nonetheless, while it is possible to speculate as to the various ways that different policy requirements could be indirectly providing for one or a number of ecosystem services, the lack of an integrated approach to ecosystem services may risk omitting important ecosystem services or may fail to safeguard all phases of the provision of ecosystem services from stock to flow to beneficiaries (Figure 6.).

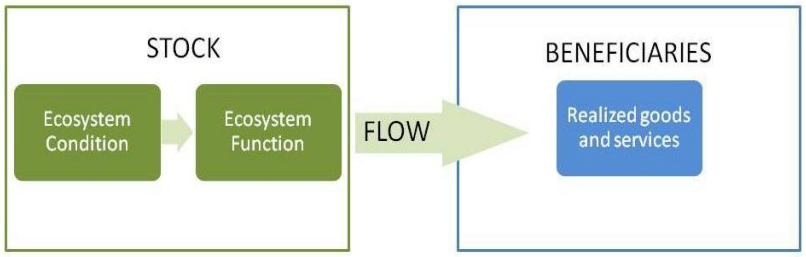

Figure 6 - Schematic of the fundamental process of ecosystem service provision, from stock to the flow of the service to beneficiaries

Safeguards for ecosystem services require the inclusion of measures to ensure that services are delivered and the benefits received by identified beneficiaries. The review demonstrated that ecosystem services beneficiaries were incorporated in different ways depending on the structure and purpose of the standard. In the few standards where an over-arching ecosystem services approach was adopted, there was a clear requirement to protect access, rights and values of natural resources for local communities and other beneficiary groups. In most standards in which ecosystem services occur in policy without any high level ecosystem services approach, beneficiaries are occasionally attached to some of the policy requirements for provisioning and cultural services but rarely for either supporting or regulating services.

The impacts and dependencies of operations on ecosystem services differ between sectors and, as a result, standards are likely to target and prioritise different ecosystem services. To begin to understand the high level differences between sectors, the 186 different policy requirements reviewed were collapsed into a set of broader categories (Table 3). Three of these categories are included in the policies of sectors:

- Biodiversity - including requirements relating to genetic diversity, genetically modified organisms, and native species.
- Local people - including requirements relating to access to natural resources, the rights of local people, and community development.
- Natural, critical and protected areas – including requirements that identify priority areas for protection or sustainable management.

The remaining categories are dependent on the sector, for instance carbon trading standards are largely based on policy requirements relating to carbon sequestration and greenhouse gases, while any standard for the harvesting of a natural resource is likely to focus on policy requirements to ensure the sustainable exploitation of species.

Table 3 - Relationship between sectors and the type of safeguards that were included in their standards

	Category of Safeguards											
Sector	**Biodiversity - genetic diversity, GMO, native**	**Carbon and GHG - sequestration, consumption, emissions**	**Consumption natural resources (water, raw materials)**	**Ecosystem services/functions**	**Local people - access, rights and development**	**Natural, critical and protected areas**	**Soil conservation and erosion control**	**Species - sustainable exploitation**	**Sustainable land management**	**Sustainable sourcing**	**Waste and pollution**	**Waterbody protection**
Agriculture	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓
Biotrade	✓			✓	✓	✓		✓	✓		✓	
Carbon	✓	✓		✓	✓	✓	✓		✓			✓
Finance	✓	✓	✓	✓	✓	✓			✓	✓	✓	
Fishery	✓			✓	✓	✓		✓				
Forestry	✓			✓	✓	✓	✓	✓	✓		✓	✓
Mining	✓	✓	✓		✓	✓			✓		✓	
Tourism	✓	✓	✓		✓	✓	✓	✓		✓	✓	

Based on these results, the conclusion of this piece of work has been that while different aspects of ecosystem services are potentially safeguarded through a wide variety of social and environmental policy requirements, in general, there is a lack of an integrated approach to ensure that ecosystem stock, flow and delivery is accounted for. This may mean there is limited assurance that ecosystem services benefits are sustainably and equitably delivered.

2. High level commitments and approaches

2.1. Biodiversity and ecosystem service commitments

Standards systems typically define an overarching mission that the standard sets out to achieve, and then sets a number of high level commitments or principles that elaborate on the overall objective of the standard. These principles, which are fundamental statements against which compliance would be difficult to measure, are important for guiding the more prescriptive criteria that set out the conditions which need to be met. Biodiversity and ecosystem services can be the central theme of the overarching mission of a standard, or can form one of the principles that help achieve this mission. Principles based on biodiversity and ecosystem services typically define the level of commitment to biodiversity conservation and the maintenance or enhancement of ecosystem

services, and can highlight specific elements, such as protecting natural habitats, enhancing the provision of ecosystem services to local communities, restoring degraded ecosystems, sustainable use of species. The nature of these commitments clearly depends on the purpose and mission of each standard but ideally they should reflect the key pressures on biodiversity and ecosystem services that are presented by the types of economic activity that they govern. Due consideration therefore needs to be given to the nature of these commitments in order to guide the appropriate selection of specific criteria against which compliance can be measured.

Commitments aligned with the Aichi targets

The Convention on Biological Diversity (CBD) entered into force in 1993 in response to the global community's growing commitment to sustainable development, with the three objectives of conservation of biological diversity, sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. The Aichi Biodiversity Targets were adopted at the 10th Conference of the Parties to the CBD in Nagoya, Japan and form part of the Strategic Plan for Biodiversity 2011-2020. The CBD calls on all stakeholders – governments, business, and individuals - to implement the strategic plan and voluntary standards for the private sector can play a large role in directing businesses and helping to achieve the Aichi targets. There are 20 targets in total, comprising the five strategic goals of the Strategic Plan, and a number of these targets are directly relevant to business and those standards that direct business behaviour (Table 4).

The missions of many standards systems are often already aligned with one or a number of the Aichi targets. For example the sustainable harvest of aquatic species (target 6) is the key intent of many fisheries based standards, and the sustainable management of agriculture, aquaculture, and forestry areas (target 7) is key to standards within those sectors. Nonetheless, standards can contribute to the achievement of these targets in multiple ways that can be reflected in the high level principles defined by each standard system. These targets can therefore be used to identify those aspects of biodiversity and ecosystem services to which they can reasonably contribute and to maximise the potential of their standard in helping achieve the objectives of the CBD and other related international conventions. For example, while the role of a forestry standard in preventing habitat loss may be commonly identified, their potential to contribute to landscape connectivity or the importance of respecting the knowledge and practices of indigenous and local peoples may be less well recognised.

Table 4. Summary of the 20 Aichi targets of the CBD, indicating those of relevance for business and standards systems (in bold)

Aichi Target
Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society
Target 1 - Awareness of the values of biodiversity and the steps to conserve and use it sustainably.
Target 2 - The integration of biodiversity values into national and local development
Target 3 – Removal of harmful incentives to biodiversity and development of positive incentives for the conservation and sustainable use of biodiversity
Target 4 - Implemented plans for sustainable production and consumption and keep the impacts of use of natural resources well within safe ecological limits.
Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use
Target 5 – Habitat loss and degradation
Target 6 – Sustainable harvests of aquatic species (fish, invertebrate, plant)
Target 7 – Sustainable management of agriculture, aquaculture and forestry areas
Target 8 – Non detrimental levels of pollution
Target 9 – Prevent introduction and establishment of IAS
Target 10 – Reduce pressure on coral reefs and other climate vulnerable ecosystems
Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity
Target 11 – Increased extent and connectivity of effectively and equitably managed protected areas and other area-based conservation measures
Target 12 – Prevent extinction of known threatened species
Target 13 – Maintain genetic diversity of cultivated plants and farmed animals and their wild relatives
Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services
Target 14 – Restoration and safeguarding of ecosystems that provide essential services
Target 15 – Restoration of degraded ecosystems for climate change mitigation and adaptation
Target 16 – Support national policies on Access and Benefit Sharing (ABS)
Strategic Goal E: Enhance implementation through participatory planning, knowledge

management and capacity building
Target 17 – Development of an effective, participatory and updated national biodiversity strategy and action plan
Target 18 - Respect traditional knowledge and practices of indigenous and local communities and their customary use of biological resources
Target 19 – Improved, shared and applied knowledge, science base and technologies relating to biodiversity and the consequences of its loss
Target 20 - Mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020

2.2. The mitigation hierarchy

In order for standards to address the impacts on biodiversity and ecosystem services that are presented by the economic activities that they govern, there is often the need to incorporate a process for identifying and mitigating those impacts. The mitigation hierarchy is a stepwise process for managing biodiversity impacts and averting risk. It is widely recognised as best practice for private sector management of biodiversity and is required by law in some jurisdictions. Through this mitigation process an emphasis is placed on avoidance of impact, and where this is not possible impacts need to be reduced or minimised and then restored or repaired, and where any residual impact remains, offset or compensated for.

According to the recent review of biodiversity in standards and certification schemes (Section 1.2.1), few standards refer to the mitigation hierarchy leading to recommendations for greater uptake. While it may not always be possible to implement the full mitigation hierarchy as this relies on quantification of impacts and often the availability of offsetting options, it is possible for all operators to adopt it as a logical sequence of events to ensure all avoidance strategies are exhausted before minimisation, repair and offsetting are instigated.

The mitigation hierarchy and no net loss

The mitigation hierarchy can be used to support commitments made towards a no net loss of biodiversity and ecosystem services, or even a net positive impact. These are target driven commitments to biodiversity and/or ecosystem services that are increasingly common for certified carbon projects as well as project finance requirements of large financial institutions. These require operators to quantify their impacts on biodiversity and/or ecosystem services in order to ensure that

no net loss or a net positive impact is achieved. The implementation of the mitigation hierarchy in these circumstances is important to prevent the commitments being achieved solely through offsetting and compensation rather than avoidance or impact minimisation strategies.

No net loss and net positive impact commitments have largely been made towards biodiversity in the past, although they are now beginning to incorporate ecosystem services. This is due to the fact that many advances have been made in developing biodiversity offsets, whereas tools and methodologies for quantifying impacts and developing offsets for ecosystem services remains in its infancy. Such commitments set ambitious targets for biodiversity conservation and the maintenance of ecosystem services and encourage the full identification and quantification of impacts. Therefore while promoted as admirable goals, it is recognised that uptake will be limited by the current lack of well understood methods to quantify impact, the limited availability of offset options, and the associated costs.

2.3. An ecosystem services approach

The incorporation of ecosystem services into traditionally biodiversity agendas has in part been driven by their increasing attention in environmental policy. For example, Strategic Goal D of the Strategic Plan for Biodiversity 2011-2020 - *'Enhance the benefits to all from biodiversity and ecosystem services*' - calls for the restoration and safeguarding of areas which provide essential ecosystem services (CBD, 2010). Equally, the European Union's biodiversity strategy to 2020 calls on Member States to '*halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020*' (European Commission, 2011). Such policy developments have been encouraged by the publication of the TEEB review that highlights the economic value of ecosystems and the services they provide to humanity (TEEB, 2010).

While biodiversity has largely been regarded as an important component of ecosystem services, whereby a healthy and diverse ecosystem can support sustainable production of goods and services, there is increased recognition of the ability of semi-natural areas and areas of low biodiversity to generate ecosystem services. Therefore, while the emphasis for biodiversity conservation is often placed on protected and priority areas of biodiversity significance, those areas important for the production and/or delivery of ecosystem services to beneficiaries often include cultivated and semi-developed areas. The incorporation of an ecosystem services approach therefore extends the capacity of standards systems to maintain not only the underlying natural systems that produce services but the delivery of those benefits to human beneficiaries.

An ecosystem services approach requires standards systems to acknowledge the importance of areas for ecosystem service provision and delivery and to set requirements that maintain or maximise those services. As the identification of these areas and services relies entirely on local context and the existence of human beneficiaries, an ecosystem services approach requires on-site assessments. As a result, the capacity for implementation will vary considerably based on the scale of operations that the standard system governs. For example, large scale operators that are complying with the performance standards of multilateral finance institutions are likely to have much greater capacity to implement a full assessment of ecosystem services than small scale operators seeking certification of products.

There are two approaches that can be adopted to incorporate an ecosystem services approach in standards. The first is non-prescriptive whereby high level commitments are sought towards ecosystem services and external experts required in order for those commitments to be met. This can require a full quantitative analysis, which will incur considerable costs and may be beyond the scope of even larger operators, as well as a more qualitative approach that requires operators to identify and prioritise ecosystem service impacts and dependencies. In such cases it is recommended that detailed guidance on how such an assessment should be carried out be given or referred to (e.g. The Corporate Ecosystem Services Review (Hanson et al., 2012) and the ESR for Impact Assessment (WRI, 2011)) in order to achieve consistent results across operations. Such guidance should include a full list of ecosystem services in order that the full scope of service types is considered (Box 3).

The second approach is the incorporation of ecosystem service values in more prescriptive measures. For example, through specific requirements for key ecosystem services that are likely to be impacted such as freshwater production or carbon sequestration. The identification of key ecosystem services in this case would need to be carried out by the standard setting organisation removing the need to build ecosystem service terminology and assessment into the compliance criteria. Another potential way of integrating ecosystem services into the specific criteria of standards systems is through the inclusion of ecosystem service values in the identification of areas prioritised for avoidance of impacts. In such cases the full list of ecosystem services to be considered should be provided in order that operators understand the full extent of ecosystem services (Box 3).

When considering the ecosystem services of relevance to a business sector or type of economic activity, it is important to consider both the impact and dependence of the activity on each ecosystem service. For example, while the maintenance of pollination services is very relevant to the agricultural sector due to their dependence on those services, it may be equally relevant to other

sectors such as extractives and construction that have no obvious reliance on pollination services but may impact these services through degradation of pollinator habitats.

Box 3. Lists of Ecosystem Services

There are a variety of ecosystem service lists available to refer to which include those of the influential and policy relevant Millennium Ecosystem Assessment and The Economics of Ecosystems and Biodiversity (TEEB). While there are slight variations in the ecosystem service lists provided by these project documents, as shown below, they both provide comprehensive coverage of the different ecosystem services that have been classified under the four types of service (provisioning, regulating, supporting and cultural).

Millennium ecosystem assessment	TEEB synthesis report 2010
Provisioning Services	
Food	Food
Fiber	Raw materials
Fresh water	Fresh water
Biochemicals, natural, medicines, pharmaceuticals	Medicinal resources
Genetic resources	
Regulating Services	
Climate regulation	Local climate
Air quality regulation	Carbon sequestration and storage
Natural hazard regulation	Air quality regulation
Water purification and waste treatment	Moderation of extreme events
Erosion regulation	Waste-water treatment
Pollination	Erosion prevention and maintenance of soil fertility
Disease regulation	Pollination
Pest regulation	Biological control
Water regulation	
Supporting Services	
Nutrient cycling	Habitats for species
Soil formation	Maintenance of genetic diversity
Primary production	
Cultural Services	
Recreation and ecotourism	Recreation and mental and physical health
Aesthetic values	Tourism
Spiritual and religious values	Aesthetic appreciation and inspiration for culture, art and design
	Spiritual experience and sense of place

Trade-offs and beneficiaries

The maintenance or maximisation of ecosystem services requires a focus on the long term sustainability of provision and the equity of access to those services rather than on the amount of service generated by an ecosystem. Economic operators will often show a strong dependence on ecosystem services and may increase the production of ecosystem services such as food or biofuel for the global community. Ecosystem services are however subject to trade-offs whereby increasing the production of one can lead to the detriment of another. For example, the provision of food through intensive agriculture can lead to degradation of ecosystems that provide a host of other ecosystem services such as wild foods, water, flood defence etc. Therefore, the identification of ecosystem service impacts requires an assessment of all ecosystem services within the area of influence of the operating company, and the identification of all beneficiaries that are depending on those services. This is necessary to ensure that any impacts on the range of services and benefits received by all are addressed. While ecosystem safeguards are important to ensure the ability of ecosystems to provide services is maintained, an ecosystem services approach equally requires that those services are effectively and equitably delivered to the range of users. Such safeguards therefore need to include maintenance of access to services by users, such as access to water sources and raw materials, as well as maintenance of the flows of services, such as pollination delivery through connected habitats.

Recommendations for an ecosystem services approach

There are a number of high level recommendations that can be made to support the strengthening of ecosystem services in standards. These include:

- High level or sectoral level assessment of relevant ecosystem services to be carried out by the standard setting body
- Where possible, set requirements for the identification and assessment of all ecosystem services, and their beneficiaries, that may be impacted by operations.
- Include ecosystem service values in the prioritisation of areas for protection from development impacts
- Address equitable access to ecosystem services within the area of influence of the operator, particularly for provisioning and cultural services
- Consider aspects of ecosystem service delivery to beneficiaries through measures including maintaining connectivity of habitats and natural water courses
- Provide a full list of ecosystem services with explanatory material to illustrate their full scope

2.4. A landscape approach

While standards typically operate at the site level and influence decisions of individual operators in isolation, sustainability ultimately needs to take place at the landscape level to ensure long-term viability of natural ecosystems and the delivery of ecosystem services from areas of production to areas of consumption. This requires an understanding by operators of the entire landscape in which they are operating and for their decisions to be in line with the wider conservation and development objectives of the area. The biodiversity and ecosystem service requirements of sustainability standards therefore need to consider these wider landscape objectives and help to identify suitable locations for economic activity and areas that require protection or restoration in order to maintain or enhance biodiversity and ecosystem service values.

Standards systems typically set a number of land-use and habitat protection requirements that can support a sustainable landscape approach. However, in order that these requirements achieve sustainability on the landscape scale, a number of factors need to be taken into consideration. These include how well they are maintaining the connectivity of natural ecosystems and whether they prevent the redirection of negative impacts to other important areas. Land use planning exercises can be carried out prior to development in order to identify the most appropriate project sites as well as areas where restoration activities could be carried out to maintain optimal function and connectivity of natural ecosystems. It is therefore advisable that operators refer to any existing land-use maps that are available in the region in order for development to be in line with local and regional conservation and development objectives. Standards that promote best practice generally require higher environmental performance than that being proposed by local authorities, and therefore the use of such maps needs to be integrated with other measures in place to maintain sustainable landscapes. Section 3.1.1 of this report examines the process a business might take to determine where to operate, identifying no-go areas and tailoring activities in all other areas to local biodiversity and ecosystem services values.

2.5. Defining Biodiversity and Ecosystem Terms

One of the key findings of the biodiversity and ecosystem services reviews outlined in section 1.2 is the need for agreement and consistency in the use of terms and definitions to define biodiversity and ecosystem services, and their component parts. Based on this work, there are a number of important considerations when developing appropriate language for effective biodiversity and ecosystem services policy requirements:

1. ***Refer to globally recognised terms and definitions when possible***. This will improve the ability of operators to identify and comply with policy requirements. When referring to recognised biodiversity terms, it is important to provide a citation to avoid confusion with alternative definitions or undefined terms, and to reference any available resources to support implementation. For example, in reference to internationally threatened species, the IUCN Red List (IUCN, 2012) is considered the most authoritative guide[4], and in reference to priority areas for conservation there are a number of internationally recognised systems (for further information see the website; A-Z of Areas of Biodiversity Importance (UNEP-WCMC, 2010)).
2. ***Share lessons among other standard setting bodies operating within your sector***. This will increase the effectiveness of the sustainability safeguards by ensuring key issues are managed in a complementary way across the sector. Moreover, where relevant, improving the compatibility of standards' policies may also pave the way to collaboration between standard setting bodies and their compliant parties.
3. ***Where new terms are being defined, provide guidance to aid the understanding and identification of the element of biodiversity referred to.*** If terms are referred to which are unique to a standard, or for which there is no internationally accepted definition, it is imperative that comprehensive guidance on interpretation, identification and management is provided to aid understanding and effective implementation.

3. Address pressures on biodiversity and ecosystem services

In order for business to help achieve the conservation and sustainable use of biodiversity and ecosystem services, the drivers of change that are within the control of economic operators needs to be addressed. The Millennium Ecosystem Assessment (MA) considers a driver to be any factor that changes an aspect of an ecosystem and these include both direct and indirect drivers of change. Indirect drivers have been categorised as demographic, economic, socio-political, scientific and technological, and cultural and religious, and largely are beyond the control of individual operators. Direct drivers are primarily physical, chemical, and biological and include land cover change, climate change, external inputs (air and water pollution, irrigation, use of fertilizers), harvesting and natural resource use, and the introduction of species (MA, 2005). These direct drivers are often within the control of individual operators and therefore the role of standards systems is to identify relevant

[4] The IUCN Red List classifies threatened species as Critically Endangered (CR), Endangered (CR), and Vulnerable (VU), but also includes species classified as Near Threatened (NT) and Least Concern (LC) which are not considered threatened at present, as well as Data Deficient (DD) whereby insufficient data are available for assessment.

drivers and influence them in order to minimise negative impacts and maximise positive outputs for biodiversity and ecosystem services. It must be noted that these drivers do not occur in isolation and are interconnected. For example, the release of external inputs such as fertilizers into the natural environment can lead to the degradation of aquatic ecosystems and an impact on land cover. Equally climate change can have a direct influence on habitats land cover and vice versa.

The drivers of change, as defined by the MA, are synonymous with the five threats to biodiversity that have been identified by the CBD. These are habitat loss, over-exploitation, pollution, climate change and invasive alien species, each of which has been shown to have varying impacts on different ecosystem types as illustrated in figure 7. For example, habitat loss is considered to have most severe impacts in tropical forests, temperate grasslands, and inland and coastal aquatic ecosystems, whereas overexploitation is considered to be most severe in tropical grasslands and savannas and marine ecosystems. For the purposes of this report we have combined these categories of threats and drivers of change in order to be inclusive of both biodiversity and ecosystem services and have termed these "pressures". These categories are listed in table 5 with a short description.

Table 5. Categories of pressures based on the definitions provided by the MA and the identified threats to biodiversity as recognised by the CBD

Pressures	Description
Habitat and land cover change	Changes in land use and the conversion and degradation of natural ecosystems. Refers to both terrestrial and marine ecosystems
Harvest and resource consumption	The harvest and consumption of natural renewable resources, both living in terms of species, and non-living in terms of water
Pollution	Air, water and land pollution from external inputs into the natural environment such as fertilizers, air emissions, waste
Climate Change	Human induced climate change resulting from increased emissions of greenhouse gases and reductions in natural carbon sinks
Invasive species and genes	The introduction of non-native species with invasive properties and genetically modified organisms into the natural environment

It is advisable for standards to consider these five key pressures that economic operations contribute to, through assessing the relevance of each to the types of operations that they govern and putting in place measures to address them. Such a process can inform the selection of appropriate policy requirements by the standards setting organisation. When assessing the relevance of each type of pressure it is important to consider both the direct activities of a complying operator as well as how they indirectly influence activities through sourcing raw materials and causing in-migration of people to an area. This section of the document provides further guidance on the relevance of each pressure to different operations and details a number of considerations to be made when developing policy requirements to address them.

Figure 7. The severity and trends in direct drivers of change on different ecosystem types. Millennium Ecosystem Assessment, 2005

3.1. Habitat and land cover change

Habitat and land cover change alters the mix of ecosystem services provided by an area and often results in the loss of natural ecosystems and biodiversity. While this may allow for the increased delivery of some ecosystem services, such as food from agricultural production, there is often a reduction or loss in the delivery of a number of other ecosystem services. Different ecosystems are more or less affected by habitat and land cover change, as illustrated in figure 7 from the Millennium Ecosystem Assessment (2005) in which tropical forests, temperate grasslands, coastal and inland waters are shown as most affected.

There are a number of key sectors that are most likely to cause habitat and land cover change, including agriculture, mining, and aquaculture, all of which typically involve land conversion activities. Importantly, the extent and severity of this pressure is strongly dependent on the interaction of multiple pressures. Perhaps most striking of these interactions is the combined effect of habitat and land cover change and climate change that results in increased risk of desertification and a reduced capacity to withstand extreme events such as flooding, land-slides and high winds.

Aquatic ecosystems hold significant ecosystem service value due to the high human dependence on these systems for water, food, flood defence etc., but are also of high importance to the broader landscape due to the ecosystem functions they perform such as nutrient cycling. They are however extremely vulnerable to alteration from land development, which can lead to wide ranging ecosystem impacts including habitat loss and degradation and land cover change. They therefore deserve explicit mention to prevent or limit activities that pollute or alter these systems.

Broadly following the mitigation hierarchy, there are a number of ways in which habitat and land cover change resulting from business operations can be managed:

1. Avoid: Site selection and the identification of no-go situations
2. Minimise: Minimise habitat disturbance and degradation
3. Minimise: Indirect effects of operations
4. Restore: Restore habitat and maintain connectivity

3.1.1. Site selection and the identification of no - go situations

For economic activities that are likely to result in habitat conversion, there is a need to identify those areas or situations where such impacts would lead to an unacceptable loss of biodiversity and/or

ecosystem services where no-go commitments could be made, and areas that are most appropriate for operations to occur. This involves adopting a system of prioritisation of land based on relevant biodiversity and ecosystem service values. Such prioritisation systems can be applied equally to identifying no-go areas as well as to inform the types of economic operations that are appropriate outside of no-go areas. Equally it is important to consider the correct identification of areas that are of low biodiversity and ecosystem service value where it may be more appropriate for development to occur.

No-go situations

No-go policies are clear and decisive requirements that can be highly effective in conserving those areas considered important for biodiversity and ecosystem services and mitigating the threat of habitat loss, if consistently adhered to by multiple land-users or industry members. These can be used in conjunction with site selection strategies that optimize the biodiversity and ecosystem service values of an area and make optimal use of areas of low value. There are therefore a number of considerations for the effective development and implementation of no-go policies that include the need for:

- **Clear and appropriate definitions of no-go areas** based on the relevant biodiversity and ecosystem service values and specific pressures presented by the operation in question.
- **Appropriate assessment procedures and safeguards for operations outside of no-go areas**, given that development will be redirected to other areas. When prioritising land on the basis of natural or specified habitats, provisions need to be made for semi-natural and unnamed habitats that may contain significant biodiversity and ecosystem service values.
- **Buffer zones around no-go areas** to prevent degradation of habitat around the periphery. Buffer zones will vary in the level of economic development permitted within them, but their purpose is to enhance the protection of those areas identified as no-go based on their biodiversity and ecosystem service values.[5]
- **Adherence by multiple land-users** to ensure the area is excluded from development. This can be achieved through coordination of efforts with local authorities.
- **Associated requirements to prevent habitat clearance taking place prior to assessment**. This is most commonly achieved through the inclusion of a cut-off date for no habitat clearance that occurs well before the assessment date.

[5] . See the A-Z of Areas of Biodiversity Importance website (UNEP-WCMC, 2010) for further information regarding buffer zones.

- **Clear unambiguous language with appropriate guidance** that can be easily and consistently understood by operators and auditors. For example, when using terms such as 'no significant conversion permitted', clear guidance on what is considered to be 'significant' must be provided. If there are conditions under which conversion of such areas are permitted, very clear guidance on what those conditions are needs to be provided.

Prioritisation approaches

There are a number of prioritisation approaches that can be used to identify areas of high importance for biodiversity and ecosystem services and for which a no-go policy could be considered. These include all natural habitats, specific habitat types (e.g. forest, mangrove etc.), protected areas, and priority areas or habitats of specified values as discussed below.

Natural and specified habitat types - Prioritisation of areas can, and often is, based on how 'natural' a habitat is. However problems can arise in identifying 'natural' habitat, particularly in places with long histories of human habitation and development or land utilisation. Semi-natural habitats, sometimes referred to as modified habitats, are areas that have undergone some level of anthropogenic modification, and in certain parts of the world such as Europe, such habitats may dominate. These areas are still likely to hold significant biodiversity and ecosystem service value and any measures which focus on the conservation of natural habitats need to make provisions for those habitats that have undergone some level of change. This is particularly important when considering the provision or delivery of ecosystem services which are often found in partially developed and occupied landscapes.

The use of specified habitat types, such as forests or mangroves, may be appropriate when there is a specific threat for such habitats. For example, there is a need to stipulate protection of coastal habitats such as mangroves for aquaculture operations due to the threat posed by this activity. Equally, forests often deserve specific mention due to the threat of deforestation from a range of land intensive activities. While the importance of these habitats may need to be emphasised, implementation of measures that focus on individual habitat types could redirect threats to other equally important, but unspecified habitat types also affected by operations and for which less protection is given.

Protected areas - Depending on the activity in question, no-go commitments in protected areas can be a minimum requirement to safeguard areas identified as important by national governments (e.g. national parks and reserves) and, in some cases, by international conventions (e.g. World Heritage

and Ramsar Sites). While some small scale, low impact operations may be compatible with the objectives of some types of protected areas, a no-go commitment for protected areas is strongly recommended for high impact operations, such as intensive agriculture and mining that can result in significant land cover change. There has been some uptake of this type of policy across the international conservation and business community. In 2000, the IUCN World Conservation Congress adopted a no-go position on mining in protected area categories I to IV (IUCN, 2001), illustrating the perceived impact of this industry on protected areas, and this was followed in 2003 with a commitment by the International Council on Mining and Metals not to explore or mine in World Heritage properties (ICMM, 2003). UNEP-WCMC's review of biodiversity safeguards in standards and certification schemes demonstrated that there are already a number of agricultural and forestry standards which include a no clearance policy for protected areas (See section 1.2.1). However, rather than implementing a no-go policy, many standards rely on the existence of protected area regulation and management plans, stating the need to respect all applicable laws and follow stated objectives for such areas. There are considerable shortfalls with this approach given that management plans and appropriate regulatory frameworks are often absent, lacking in specific guidance for operators, or insufficient to maintain the values for which the area is protected.

An important consideration when defining operations in protected areas, and developing effective safeguards, is the appropriate definition of protected areas and the inclusivity of areas that may lack legal recognition. For example, areas that are under customary use, sometimes termed Indigenous and Community Conserved Areas (ICCAs), may not be legally protected but are important for the provision of a suite of ecosystem services to local communities, and can fit the IUCN protected area definition because they are managed by “other effective means” (Dudley et al., 2008).

Priority areas - There are a number of existing and internationally accepted approaches to identifying priority areas on the basis of biodiversity and ecosystem service values. These are highlighted in Box 4 (UNEP-WCMC, 2010). These areas are largely based on biodiversity values such as vulnerability (threatened species or habitats), irreplaceability (endemic species or rare habitats) and intactness (large wilderness areas). Priority areas such as the High Conservation Value (HCV) approach can however include a number of ecosystem service values such as the provision of services including pollination, water supply, and raw materials. Setting no-go policies for these often unprotected areas alongside protected area networks can be very important for maintaining or enhancing the connectivity of landscapes.

While maps exists for many of these areas where they have been identified or designated, the full identification of areas of biodiversity and ecosystem service value requires on-ground assessments. Depending on the scale of these existing priority area types, there may be more or less difficulty in using them as no-go areas. For example the regional scale areas such as Biodiversity Hotspots cover large expanses of land and would not be appropriate as no-go areas, whereas site scale such as the Key Biodiversity Areas (KBAs) are more feasible and a highly recommended option for no-go areas. Alliance for Zero Extinction (AZE) sites (a subset of KBAs) are the last refuges for endangered and critically endangered species and therefore no-go commitments for these areas can be considered as a minimum requirement.

Box 4. Existing prioritisation systems

- **Site scale priority areas**. These are typically based on the level of irreplaceability and/or vulnerability either of the species or habitat type present in the areas, but some also include ecosystem service values. These include Key Biodiversity Areas (KBAs), and their subsets such as the Alliance for Zero Extinction (AZE) sites, as well as the High Conservation Value (HCV) areas that are based on both social and biodiversity values
- **Regional scale priority areas**. These are large expanses of land that have been prioritised to direct conservation effort and resources to the most important regions of the world and are based on values of vulnerability, irreplaceability and intactness. They include Biodiversity Hotspots, Centres of Plant Diversity, Crisis Ecoregions among others

See www.biodiversitya-z.org for further detail about these areas

Appropriate sites for development

In addition to prioritising areas for protection and no-go commitments, site selection strategies can involve identifying land with low biodiversity and ecosystem service value that is more appropriate for development. This supports the protection of high value areas and increases the ecosystem service provision from the landscape as a whole. In theory, optimal land use planning maximises the use of degraded land, however, no clear definition exists for how to identify such land. This has been a point of criticism for many operators claiming sustainability through the use of degraded land despite having had significant impacts on biodiversity and ecosystem service values. Ideally, therefore, classification of degraded land should consider the value of biodiversity and ecosystem

services in that area, rather than simply representing historical activities. For instance, some definitions of 'degraded' have included previously logged forests that can maintain significant levels of biodiversity as well as areas of local importance for cultivation. The World Resources Institute has provided guidance on the identification of appropriate sites for development in the context of oil palm production to overcome the issues surrounding the definition of degraded land (Gingold et al., 2012). This involves assessing potential development sites on the basis of environmental factors (carbon, soil and water protection and biodiversity), social factors (land-use and local interests), economic factors (crop productivity and financial viability), and legal factors (zoning and rights). Therefore in the definition of degraded land, it follows that such land would be of low value from an environmental and social perspective, and the appropriate use of that land would then be based on legal and economic constraints.

3.1.2. Minimisation of habitat disturbance and degradation

Operations can cause degradation or disturbance to habitats in a variety of ways depending on the type of activities they involve. Examples include: habitat degradation associated with destructive methods for harvesting fish, plants or other wildlife; fragmentation of habitats from infrastructure development; pollution, sedimentation and alteration of natural water bodies; and the spread of fire, pollutants or invasive species from operation sites to neighbouring ecosystems.

The degree of anticipated impact will depend on the type of operation, the sensitivity of the local habitats to the operation, and the existing biodiversity and ecosystem service values of the local area. Therefore, in efforts to minimise habitat disturbance and degradation in areas of operation the following need to be considered and integrated into the requirements of standards systems:

- Carry out an assessment of the biodiversity and ecosystem services values that may be impacted by the proposed operation. This process can be supported by the prioritisation approaches detailed in section 3.1.1.
- Deploy impact mitigation techniques specific to the operation in question (e.g. non-destructive collection methods, water treatment protocols, buffer zones and distance barriers).

3.1.3. Habitat restoration and connectivity

In order to influence trends in habitat and land cover change positively and mitigate negative impacts, an emphasis needs to be placed on the restoration. Optimal sites for restoration include degraded lands of low biodiversity and ecosystem service value (see section 3.1.1 for further

discussion on the definition of degraded land within the context of appropriate sites for development), areas with past biodiversity values which may have been lost due to human activities, and areas with nearby biodiversity values indicating high restoration potential. These areas provide opportunities for operators to provide biodiversity and ecosystem service benefits through restoration that can lead to a no net loss or net positive impact (see section 2.2 on the mitigation hierarchy for further details). Restoration options include restoring natural vegetation and features such as lakes, creating natural recreation areas, and creating wildlife breeding habitats. In order for restoration to provide maximum benefits to biodiversity and ecosystem services, there is a need to assess the values of previous and alternative land types, and to require the use of native species in planting. Clear guidance on accepted restoration activities therefore need to be provided.

Restoration of natural ecosystems can also provide significant benefits to the wider landscape through improving connectivity of habitats. Therefore, in the selection of areas for the restoration of degraded lands, consideration needs to be given to the connectivity of that habitat across the landscape. For instance, through identifying corridors for species of particular interest and restoring and maintaining landscape features that connect the landscape including waterways, hedgerows and other habitats that provide shelter and food for migrating species. This helps to ensure the long term viability of the restored and connected habitat patches and promotes the movement of species and the delivery of associated ecosystem services (e.g. pollination, nutrient cycling, water regulation) across the landscape.

3.1.4. Indirect impacts of operators

Aside from the direct biodiversity impacts of any economic operation, it is important to consider how an operator might influence the behaviour of local communities, employees and others associated with the operator towards the natural environment. Economic development in any area is often associated with increases in local population sizes as people move to the area for employment or to benefit from other services and amenities that build up around areas of economic activity. This puts an increased pressure on local resources and land availability, driving increased rates of habitat loss and land cover change.

Operators can help to support sustainable growth of local communities through careful land planning, engagement with local governments and stakeholders, and promotion of environmental education and outreach schemes to encourage sustainable economic development. In addition, they have the opportunity to ensure that employees and contractors are engaged with their environmental policies and understand key issues around biodiversity and ecosystem services. It is

therefore advisable for standards systems to set requirements for companywide procedures to encourage appropriate behaviour of people associated with the operation to prevent their activities leading to habitat loss and degradation (e.g. preventing agricultural encroachment of land, destructive resource collection activities etc.)

3.2. Harvest and resource consumption

Harvest and resource consumption refers to the harvesting of a renewable natural resource and the over-exploitation or over-consumption of that resource is where it is used beyond sustainable limits. This equally refers to the consumption of natural resources such as water beyond the rate that any particular source is replenished, as well as the exploitation of species beyond their renewable capacity, determined by their natural mortality rates and reproductive capacity. Harvest and resource consumption is relevant to different types of operations in different ways as discussed below.

3.2.1. Species exploitation

Species exploitation is particularly relevant to operations that rely on the wild capture of species as raw materials and tradable commodities as a core part of their business. These sectors will include fisheries and marine ornamentals, forestry, pet trade, leather/fashion industry, cosmetics and pharmaceuticals. It is, however, also relevant to other sectors such as tourism and the associated trade in wildlife souvenirs. While of most relevance to those responsible for harvesting and supplying species based commodities and materials, it is also of importance to those operators responsible for sourcing such commodities within their supply chains, whereby procurement of an over-exploited resource can present business risks in terms of supply and reputation.

3.2.1.1. Sustainable use of harvested species

The principle objective of any policy to prevent over-exploitation of a species is to ensure the long term viability and productivity of the target species. Overexploitation can lead to decreases in population sizes and/or the size of the territory occupied by those populations. It can also lead to reductions in genetic diversity and to local and/or global species extinctions. There are a number of complementary strategies that can be detailed in the policy requirements to help ensure that the aim of sustainable use is met.

Management plan for target species

An overarching management plan sets out the overall strategy for how the exploitation of a species needs to be managed within sustainable limits. This would include information on harvest limits, strategies and locations, monitoring and assessment of target populations, harvest and trade reviews and response mechanisms to indications of over-exploitation as detailed in the following sections.

Controlled harvest

Controlling the harvest of a species to within sustainable limits is the foremost strategy to ensuring sustainable off-take. This can be based on the number of individuals as well the size of individuals removed from a population. Typically a combination of the two is adopted. The levels and type of harvest should be based on sound biological data collected from target populations that ideally would include:

- The population size and distribution of the species being harvested and trends in these (with consideration of the quality of the datasets involved)
- Biological data on the species, such as reproductive strategy, population dynamics, size distributions, habitat adaptability, and migratory characteristics
- Level of off-take by multiple users to understand the cumulative impact of exploitation
- Risk assessment of species vulnerability to exploitation (see below)

Risk assessment of species vulnerability and the precautionary approach

Some species are more sensitive than others to over-harvesting and a risk assessment needs to be carried out to assess vulnerability to exploitation. This may include species that are threatened (consider IUCN Red List categorisations (IUCN, 2012), but also regional and national lists of threatened species), endemic (to single countries and/or to small geographical units), naturally rare in occurrence, or particularly vulnerable to over-exploitation due to life history traits (e.g. low fecundity). A precautionary approach that reduces the level of off-take permitted to well below estimated sustainable levels is recommended for such species, as well as those for which there is insufficient information.

Location of harvest

As part of the harvest strategy consideration needs to be given to where individuals should be harvested from in order to maintain the reproductive potential of the target species population. This can be based on the following information:

- conservation status of specific populations
- occurrence of subspecies of conservation concern
- prevalence of poaching/illegal harvesting of species in particular locations
- local and national management regimes and legislation, including the occurrence of protected and no-take areas
- The occurrence of source populations (seed trees, fish spawning grounds etc.) in potentially unprotected or poorly protected areas

Specific reference to customary, local, national and international laws

Laws and regulations can be regarded as minimum requirements for species harvests that can support sustainable use and help ensure that harvests do not conflict with local or national management strategies for those species. They include the following:

- Ensure that international trade complies with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and with any national or regional measures that may be stricter than CITES (e.g. EU Wildlife Trade Regulations)
- Ensure that harvest, domestic use and export complies with national legislation
- Ensure that harvest complies with local management regimes and customary law, including that related to land tenure

In some instances local or national laws and management regimes may not be based on the best data or may be insufficient to govern sustainability. It is therefore important that operators, in addition to respecting local and national restrictions, make their own assessments of species vulnerability to over-exploitation and develop appropriate sustainable harvest strategies.

Monitoring, assessment and harvest reviews

An important element of any harvest strategy is a programme to regularly monitor and assess harvest levels and the status of the target species populations and review the harvest strategy. Such a programme needs to include the following:

- Established frequency based on the level of risk to over-exploitation of the target species
- Fast response mechanism to trends indicating over-exploitation (e.g. amend harvest levels, removal of certificate)
- Sharing of collected information with the relevant wildlife management authorities and if possible with the wider conservation/scientific community

3.2.1.2. Impacts on non-target species and habitats

Species exploitation activities can have negative impacts on non-target species as well as the habitats in which exploitation takes place. This is dependent on the harvest strategy adopted, which can range from highly destructive collection methods to those that lead to minimal disturbance to other species and the surrounding habitat. Measures to tackle these impacts overlap considerably with those related to minimisation of habitat degradation and disturbance detailed in section 3.1.2. In terms of their relevance to pressure - harvest and resource consumption – such activities can cause unsustainable exploitation of non-target species and, through a loss of ecosystem functions, can lower the reproductive potential and associated sustainability limits of target and non-target species. These ecosystem changes can lead to a reduction in the provision of ecosystem services to other beneficiaries in terms of wild foods, raw materials and medicinal resources and therefore require careful consideration. Measures that address these impacts include:

- **Prevention of the incidental harvest of non-target species** (e.g. by-catch, non-target timber species). This can be achieved through use of appropriate harvest techniques and technologies. This can also be assisted through conducting a risk assessment based on the occurrence of rare, endemic, protected or threatened species that may be exploited indirectly and the deployment of specific techniques to prevent their inclusion in the harvest.
- **Prevention of damage to natural habitats by harvest and collection activities**. This can be achieved through avoiding the use of techniques that damage natural habitats (e.g. blast or cyanide fishing, bottom trawling, clear-felling) as well as avoidance of, or stricter controls on harvest techniques within areas considered of high biodiversity value that are important for retaining the renewable capacity of populations of target and non-target species. These may include areas important for maintaining the connectivity of habitats that support harvested species, areas with known threatened species, or areas important for maintaining the reproductive potential of exploited species such as spawning grounds.
- **Consider impacts on non-target species that occur through the interactions between target and non-target species**. Species exist in a complex web of interactions whereby

reductions in the population of one can impact on the population of another. For example, species can depend on the existence of another through mutualistic interactions or predator-prey relationships. Therefore the impacts of exploitation of a single species can lead to a cascading effect whereby other species that depend upon the exploited species for food, shelter, defence etc. will also be impacted. Such relationships are often difficult to determine due to the complexity of species interactions but highlight the need to achieve sustainable harvests and maintain population sizes of exploited species.

3.2.1.3. Indirect impacts of operators

For many operators the direct exploitation of species does not form part of their core business. These include those in the extractive (oil and gas, and mining), agriculture, and tourism sectors. Nonetheless, operations of these types can influence species exploitation indirectly through the activities of hired labour forces and consumers such as tourists. This is particularly apparent for large mining operations in remote areas that can be responsible for the development of whole communities who may wish to hunt and fish in nearby habitats. Therefore standards that govern operations that influence the migration of people need to consider the inclusion of specific requirements that mitigate indirect threats on species exploitation. These include the following:

- Companywide policy and organisational measures for sustainable hunting and sourcing that include controlling activities and encouraging good behaviour by staff and/or consumers. These measures can include compliance with hunting regulations and customary laws and prohibiting the exploitation of threatened, endemic and otherwise vulnerable species, as well as more incentive driven measures such as providing subsidised alternative food sources. Establishing and implementing sustainable limits for exploitation activities that the operator is only indirectly linked to may be difficult due to the data and resource requirements of this approach. However, it may be more possible to establish and monitor no-take zones based on the occurrence of threatened, endemic and otherwise vulnerable or protected species
- For some types of operations, such as tourism ventures, it may be possible to exclude all types of wild species exploitation (hunting, flower picking, and purchasing specified souvenirs). This, however, may be problematic in many other circumstances where people who are hired on operations rely on species exploitation for livelihood support.

3.2.1.4. Conservation incentives

Species exploitation can act as a positive driver of change for biodiversity and ecosystem services through providing local people, business and governments with economic incentives to conserve species and protect habitats where valuable species reside. This approach not only helps conserve biodiversity and the provision of ecosystem services, but also enhances the benefits that people gain from the exploitation of resources.

Some harvesting operations can contribute to species conservation directly, e.g. ranching programmes that remove specimens at high natural mortality life stages, such as eggs, to rear in captivity for trade, with a proportion of individuals being released to the wild as less vulnerable adult specimens. Many conservation incentives are, however, less direct whereby local people and national authorities gain benefits through revenue and employment as a result of wild species trade. This can incentivise controls on illegal harvest and habitat degradation that can positively impact the population sizes and tradable quantities of target species.

Conservation incentives are of relevance to operators for which species exploitation is a core part of their business and for which there is potential to convey some benefit to local and national environmental stewards. It is therefore of relevance for community based operations as well as those involved in bio-trade for cosmetics, pharmaceuticals etc.

The importance of benefit sharing to the conservation and sustainable use of biodiversity is illustrated by the CBD's Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising From Their Utilization, which was adopted in 2010 to provide a legal framework for the fair and equitable sharing of benefits arising out of the utilization of genetic resources. This protocol operationalises one of the three objectives of the CBD and sets core obligations for Parties regarding access and fair and equitable benefit sharing.

This requires mutually agreed terms between Parties and prior and informed consent with indigenous and local communities regarding the access that is to be granted and the nature of the benefits to be received by all parties, which may be monetary or non-monetary. These obligations will come into force through national legislation and it is therefore important that standards require compliance with regulations related to access and benefit sharing. It is also important that the measures stated in the protocol are reflected in the standards own criteria as national legislation will not always be present or enforced. The Nagoya Protocol is largely applicable to companies that use

biodiversity as ingredients for food and personal care and medical products, as well as in research and development for the identification of new products.

For those operations for which there is potential to provide conservation incentives through species exploitation, the inclusion of specific measures is recommended. These can include:

- Compliance with the Nagoya Protocol on Access and Benefit Sharing (ABS) and all related national legislation
- In the absence of national legislation related to ABS - The need for prior and informed consent and a sharing of benefits with local and indigenous communities that govern access to resources, and the need for mutually agreed terms with local and national authorities (e.g. payment of royalties)
- Measures that provide benefits to the livelihoods of local people by operators harvesting species (e.g. local employment policies)
- Requirements to financially support the conservation of the harvested species, including sustainability studies, illegal harvest controls, and protection of no-take zones

3.2.2. Sustainable water consumption

The non-living natural resources that are considered exhaustible include water, metal ores, minerals, and oil and gas. While sustainable consumption of oil, gas, minerals and metals is an important component of global sustainability in terms of the continued provision of energy and resources to mankind, this does not negatively impact biodiversity and ecosystem services directly and therefore is not covered here. Issues that relate to sustainable energy production are covered under section 3.4 on climate change due to the benefits that they concurrently provide to biodiversity through climate change mitigation.

Water is the most widely used natural resource by economic operations as it is essential to all types of business, from its use in processes such as oil refining, mineral processing, irrigation, hydropower generation, and production of raw materials. It is, however, an increasingly scarce resource in many parts of the world and unsustainable consumption of water can lead to severe impacts on both biodiversity and local communities that depend on freshwater.

Sustainable consumption of water should therefore be considered a minimum requirement for sustainability standards systems. In order to achieve the desired sustainability results, water consumption requirements should include the following:

- An understanding of water requirements of the operation as well as other water users in the local area in order to assess cumulative impacts of consumption
- Knowledge of the water availability of the area, including seasonal and annual trends
- Assessment of the impact of the operation's water consumption based on the water source and other water users in the local area. This should include an ongoing monitoring scheme of water availability and reporting processes on any water based conflicts that arise with other water users

3.3. Pollution and external inputs

Pollution refers to the contamination of the air, water or soil by substances that are harmful to living organisms as a result of human activities. 'External inputs', the term used by the Millennium Ecosystem Assessment, is a largely agricultural term that refers to chemical, physical, biological and mechanical inputs that are provided artificially, and therefore includes activities such as irrigation that alter the state of an ecosystem and the mix of ecosystem services provided. The impacts of pollution have been shown to be rapidly increasing and are currently most severe in coastal and inland aquatic ecosystems and temperate grasslands (MA, 2005). Pollution includes air emissions from burning biomass and fossil fuels; nutrient loading through the artificial application of nitrogen and phosphorus fertilizers; the release of novel and organic compounds, salinization; and waste and contamination with hazardous substances. Each of these can have dramatic effects on biodiversity and ecosystem services in very different ways and such impacts typically traverse spatial boundaries. For example, agrochemical use can impact not only the on-farm biodiversity but natural water courses and neighbouring ecosystems, and air emissions can impact local as well as global climate systems. Table 6 provides examples of the different types of pollution released from different industry sectors and the extent of their impact.

Table 6. Examples of the wastes and contaminants released by different industrial sources (adapted from the MA, 2005)

Category	Types of Wastes	Extent of Impact
Energy production	Metals, Polycyclic aromatic, hydrocarbons (PAH), fixed nitrogen, waste heat, fly ash, spent fuel, CO_2	Local to regional to global
Manufacturing	Wide variety of types; often synthetic chemicals, solvents, and/or metals	Local to regional
Mining	Metal-contaminated water and soils, acidified water	Local to regional
Transportation	Oil spills and chemical spills, PAH, reactive nitrogen, lubricating oils, coolants, lead	Local to regional
Livestock production systems	Pathogens, including species-jumping bacteria/viruses, organics, nutrients, salts; pharmaceuticals, including antibiotics	Local to regional
Cropping systems	Herbicides, fungicides, and insecticides; non-usable plant materials, nitrogen, phosphorus	Local

Pollution can impact biodiversity by directly harming organisms that become exposed to pollutants through direct contact, through the food chain, or through changes in environmental conditions. Such impacts can then have a number of indirect effects due to the complex nature of species interactions and dependencies. Pollution can also lead to a drastic loss of ecosystem services, for example through its impacts on harvested species and water quality. Nutrient loading is one of the key documented drivers of change for ecosystem services. It occurs when excessive nutrients (nitrogen and phosphorus) are released into the environment causing eutrophication of aquatic ecosystems that depletes oxygen in the water and leads to a loss of aquatic life. This can impact a whole range of ecosystem services including fisheries, waste water treatment, recreation, and freshwater supply (MA, 2005). Many of the documented impacts however, focus on those related to human health and a number of standards for chemical exposure have been set on this basis. However, due to the different sensitivities of different species, such standards may not be sufficient to protect biodiversity more broadly (MA, 2005).

Ecosystems also play a key role in detoxifying or assimilating wastes and reducing their concentrations in the environment through processes such as microbial degradation and sequestration of metals and toxic substances. The rates that certain ecosystems can perform these functions are, however, dependent on local conditions such as oxygen availability, moisture and

temperature. The loss and degradation of ecosystems will therefore exacerbate the impacts of pollution by reducing the ability of natural processes to reduce the harmful effects of pollutants released into the environment. Wetlands represent one of the major mechanisms to treat and detoxify a variety of waste products and are one of the most threatened ecosystem types from land conversion as well as from pollution (Figure 7, MA, 2005).

The impact of any operation's pollution will therefore depend on local conditions, background levels of pollution, and the vulnerability of local ecosystems and their services to the expected level of pollution. As a result, any pollution prevention strategy needs to take into account local context and require some level of on-ground assessment. There are essentially two strategies that can be jointly adopted to minimise the impact of pollution on biodiversity and ecosystem services. These are to control and reduce the release of harmful pollutants into the environment, and to protect important ecosystems from the impact of pollution.

3.3.1. Control the release of pollutants

Many standards systems already include a number of controls that limit the release of pollutants and prohibit the use of specific substances that are considered to be of high concern. Such requirements include:

- Comply with national legislation regarding emission levels, substance use and disposal.
- Comply with international conventions related to substance use and transportation (see Box 5)
- Avoid the use of harmful substances that are considered high risk to biodiversity and ecosystem services. There are a number of lists that can be referred to depending on the operation in question including the list of hazardous active ingredients classified by the World Health Organization
- Where hazardous substances are used, implement protocols for correct use, storage and disposal (including recovery and re-use) to prevent their release into the natural environment
- Minimise the use, extent of application, and release of harmful substances to the natural environment. These include pesticides and herbicides used in agriculture that can be reduced through a range of agricultural practices including organic production methods, precision agriculture and integrated pest management.

- Minimise the use and release of organic substances into the natural environment. This refers largely to nutrient loading that is relevant to the agriculture sector and can be achieved through improved efficiency in nitrogen and phosphorus use.
- Implement waste management controls to prevent the release of production by-products and waste into the natural environment. These will vary depending on the type of waste and include; controls on the release of riverine tailings in mining processes; waste water treatment requirements; prevention of dumping of solid waste; and prevention of the release of solid or liquid waste into natural water bodies.
- Monitoring of air, water, and soil quality to ensure that levels of pollutants remain below specified thresholds and take account of the cumulative impacts of multiple operations.

Efforts to reduce pollution of an operation can also apply to activities further up or down the supply chain. These can include the pollution arising from the production of raw material inputs and transportation, as well as the consumption and disposal of products. Requirements to control pollution that results from supply chain activities can include those to reduce consumption of raw material inputs and energy (through increases in efficiency, reusing and recycling) and those to minimise transportation (e.g. identifying and using local sources of inputs).

Box 5. International regulatory mechanisms on pollution

There are a number of international regulatory mechanisms to control the release of certain emission and contaminants. These include:

- the 1979 Geneva Convention on Long-Range Transboundary Air Pollution and its eight protocols;
- the 1985 Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances that Deplete the Ozone Layer (plus amendments);
- the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal;
- the 1992 United Nations Framework Convention on Climate Change and its Kyoto Protocol;
- the 1998 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade;
- the 2001 Stockholm Convention on Persistent Organic Pollutants; and
- the Regional Seas Conventions and Protocols for the Mediterranean, Kuwait Region, West and Central Africa, South-East Pacific, Red Sea and Gulf of Aden, Wider Caribbean, Eastern Africa, South Pacific, Black Sea, and North-East Pacific

3.3.2. Protection of priority areas

In addition to controlling and reducing the level of pollutants being released into the environment it is necessary to protect certain ecosystems and functions from any residual impact that remains. The protection of ecosystems that perform waste detoxification and assimilation functions also further supports the mitigation of pollution impacts. It is therefore necessary to identify and protect those ecosystems which are of high biodiversity and ecosystem service value as well as those that may be particularly sensitive to the effects of pollution. Protection can be through avoiding locating operations in such sites and through the use of buffers and barriers to protect these sites from the impacts of pollution. Such strategies should therefore consider the following:

- Protection and restoration of natural aquatic ecosystems due to their importance for the provision of ecosystem services (including waste treatment) and their vulnerability to the

effects of pollution. This can be through the protection/restoration of vegetated riparian zones to prevent erosion and release of pollutants into the water body.

- Identification and protection of areas with high biodiversity and ecosystem service value, including the identification of local communities who may be impacted by pollution from the operation. For further information, see section 3.1.1 on no-go situations. These areas can be protected through avoiding operations within specified distances and the use of sustainably managed buffer zones around such areas
- Monitoring air, water and soil pollution levels in priority areas to ensure that protection measures are sufficient

3.4. Climate Change

In the past decade, there has been increasing recognition of the interconnection between climate change and biodiversity and ecosystem services in the international arena. According to the Millennium Ecosystem Assessment, climate change is likely to become one of the most significant drivers of biodiversity loss during the 21st century, with serious implications for achievement of the objectives of the CBD and the delivery of ecosystem services such as freshwater, food, and protection from extreme weather. Climate change is already forcing species to adapt, either through shifting habitat, changing life cycles, or by developing of new physical traits, and the impacts of climate change on ecosystems and people are already being strongly felt through disruptions to the water cycle.

Biodiversity and the ecosystems it comprises are also part of the solution to climate change. Conservation of natural terrestrial, freshwater and marine ecosystems and restoration of degraded ecosystems is necessary to combat climate change due to the essential role of ecosystems in providing carbon cycling and sequestration services, as well as in adapting to inevitable climate change. While a large amount of terrestrial carbon is stored in forest ecosystems, there are also significant stores in other ecosystems such as grasslands and wetlands, where much of the carbon held within these ecosystems is within the soil. Marine ecosystems also play a major role in the carbon cycle and are responsible for over 50% of the global biological uptake of CO_2 (Nellemann et al., 2009). There is therefore great potential for climate change related strategies to offer multiple benefits such as protecting and restoring natural ecosystems and the services they provide to people.

Climate change can exacerbate other pressures caused by human activities such as habitat loss and degradation, loss of biodiversity, and introduction of invasive alien species. These combined

pressures are a significant risk to business itself in terms of reduced productivity and resilience of agricultural, forestry and fisheries systems, increased water scarcity, and increased frequency of natural disasters, among other effects. While the effects will vary for each business sector, they are particularly severe in agriculture. For example, changes in species ranges can lead to a loss of local pollinator species, the invasion of new pests and diseases, and a change in local environmental conditions causing extensive crop failure. It is therefore important to build climate change strategies into biodiversity and ecosystem service safeguards.

Human induced climate change is driven by increased emissions of greenhouse gases (GHGs) to the atmosphere, as well as loss and degradation of natural ecosystems that remove GHGs from the atmosphere through natural processes. Strategies to address climate change include both mitigation strategies that work to reduce GHG emissions and increase the carbon sequestration potential of natural ecosystems, and adaptation strategies that aim to increase the adaptability of people and harness the inherent capacity of ecosystems to adapt to climate change.

3.4.1. Climate change mitigation

Strategies for mitigating human induced climate change consist of a wide range of measures that ultimately work to reduce the overall level of GHGs in the atmosphere that result from human activities. They include those that reduce sources of GHGs, as well as those that increase sinks for GHGs. GHG sources include emissions from energy consumption, principally fossil fuel based energy, and those that result from land-use and marine management practices that release stored carbon and other GHGs into the atmosphere. Sinks refer to natural ecosystems, such as forests, grasslands, wetlands and oceans that remove carbon and other GHGs from the atmosphere. The capacity of these ecosystems to capture and store carbon is heavily influenced by land use practices as well as management of the oceans vegetated habitats. Climate change mitigation strategies can therefore be incorporated in the policy requirements of relevant standards systems and include:

GHG emission disclosure and reduction strategy: The first step in encouraging GHG emission reductions is to require monitoring and disclosure on GHG emissions that involves the identification and quantification of all sources. One tool that can be applied to this process is carbon footprinting, which requires a methodology for calculating and validating emissions. Once all significant sources have been identified, there are a number of strategies for reducing GHG emissions that vary depending on the sector and constantly evolve due to technical advances.

GHG emission strategies related to energy consumption: Due to the global use of fossil fuel based energy, strategies to reduce GHG emissions from energy consumption are the most common. Sectors for which this is most relevant include energy, transport, construction, and the production and manufacturing of metals and materials such as cement and petroleum. GHGs may be generated directly from the activities of an operator, or indirectly through the production of power used by the operator. Strategies include:

- Compliance with national legislation regarding GHG emissions
- Increases in energy efficiency to reduce overall consumption by operations (including investment in, and uptake of, clean technology, building insulation, and energy saving devices), as well as throughout the supply chain (including re-using and recycling, sourcing less energy intensive inputs, and re-use of waste products)
- Promotion and uptake of renewable or low carbon energy sources (see Box 6 for information on potential tradeoffs and the need to consider to consider biodiversity benefits)
- Promoting and using carbon capture and storage technologies

GHG emission strategies related to land-use: Significant GHG emissions are released through land-use practices that convert stored compounds into atmospheric GHGs. This is largely relevant for sectors with land intensive and land clearing operations such as agriculture, forestry, and mining that can lead to conversion of natural ecosystems. Land-based climate change mitigation measures are wide ranging and vary depending on the type of operation. However those that are expected to have considerable potential are those to increase soil carbon storage potential, and activities to protect and restore natural ecosystems such as forests. Some examples of land-use based mitigation measures are:

- Restoration and protection of organic soils (e.g. soil erosion prevention, protection and restoration of peatlands)
- Agriculture specific measures such as improved crop and grazing land management (e.g. efficient nutrient usage, reduced soil disturbance from tillage, residue management, livestock and manure management)
- Protection and enhancement of natural terrestrial ecosystems (e.g. preventing loss and degradation of forests and other natural ecosystems
- Restoration of degraded land, afforestation and reforestation (see section 3.1.1 for further guidance on the definition of degraded land, and Box 6 for information on tradeoffs associated with these strategies)

GHG emission strategies related to the marine environment: Due to their role in the carbon cycle, mitigation strategies that maintain or restore marine ecosystems can offer considerable benefit. This is particularly relevant for sectors that cause the conversion or degradation of vegetated marine ecosystems such as shipping, aquaculture, coastal based agriculture and construction, and fishing. These strategies therefore include:

- Protection of marine vegetated ecosystems, including mangroves, seagrasses and salt marshes, from loss and degradation (e.g. preventing clearance for the development of aquaculture, structural sea defences and marine wind farms, and preventing degradation from destructive and unsustainable fishing techniques, shipping traffic, and pollution and siltation from land-use practices)
- Restoration of marine vegetated ecosystems on a large scale (this is currently most feasible for mangroves and salt marshes where large scale restoration projects have already taken place (Nellemann et al., 2009))

Carbon offsetting

While avoidance and minimisation of CO_2 released into the atmosphere is the preferred strategy, most economic operations will continue to have remaining CO_2 emissions into the foreseeable future. These emissions can be offset through a variety of offset schemes. In the compliance market, companies are required to buy carbon offsets in order to comply with the total amount of CO_2 they are allowed to emit. These include those set by national, regional and international carbon reduction regimes such as the Kyoto Protocol and the European Union's Emissions Trading Scheme. There are also voluntary offsets markets where companies or individuals purchase carbon offsets to compensate for their emissions on their own initiative. There are a number of voluntary carbon offset schemes with varying standards on the types of offsets accepted. Finance from these offset schemes is then used to reduce emissions in other areas through a variety of means, including renewable energy, reforestation etc. In general, when considering carbon offsetting it is advisable to adopt voluntary offset schemes that integrate biodiversity benefits through the protection or restoration of natural ecosystems, and avoid adverse social and environmental impacts (see Box 6).

Box 6. Climate change mitigation and biodiversity

To date, many climate change mitigation measures have been planned without consideration of their impacts on biodiversity and the integral role that biodiversity needs to play in sustainable mitigation of climate change. For example, initial efforts to produce renewable biofuels in significant quantities have led to problems in terms of competition with other land uses, and even losses of natural ecosystems that could otherwise contribute greatly to climate change mitigation. Equally some large hydro and marine wind farm renewable energy projects have been shown to have detrimental impacts on natural ecosystems and carbon storage potential (Campbell et al., 2009).

Reforestation and afforestation strategies are other mitigation measures that present complications, since trade-offs among biodiversity, local livelihoods, mitigation benefits, and ecosystem services are complex and dependent upon the type of previous land use and other local circumstances. In some cases such efforts have had negative impacts, including loss of natural ecosystems by conversion of natural forests, grasslands, peatlands or wetlands (Campbell et al., 2009). The resilience of natural forests to the impacts of climate change is generally greater than for plantations due to their higher diversity and adaptive capacity (CBD, 2010). Protection and sustainable utilization of these natural ecosystems therefore present a more viable long term mitigation strategy.

Due to the importance of biodiversity for maintaining natural processes and ecosystem services, and consequently balancing the carbon cycle, strategies that are beneficial for both climate change mitigation and biodiversity need to be thoroughly investigated and broadly considered. This can include the following:

- Integrating biodiversity benefits in carbon finance schemes
- Supporting the existing mitigation potential of natural ecosystems by focusing on avoiding loss and degradation of natural GHG sinks (e.g. forests, mangroves, wetlands, and grasslands)
- Careful consideration of afforestation and reforestation strategies to ensure that they deliver considerable carbon benefits compared to existing land-use types, and that trade-offs are taken into account.
- The application of strong sustainability criteria related to biofuel production and use to prevent undesirable impacts on natural ecosystems

3.4.2. Climate change adaptation

Even with the most optimistic outlook for climate change mitigation efforts, anthropogenic GHG emissions will continue to cause inevitable changes to the global climate system. The impacts of climate change are already being felt across the globe, especially by vulnerable people in developing countries, and impacts are likely to intensify in the future with important implications for biodiversity and the capacity of ecosystems to continue to deliver services to people. As these services continue to decline, businesses and economies in developed countries also will be increasingly affected. Adaptation strategies to climate change will become more and more important for countries, businesses, and individuals. While the focus of climate change adaptation tends to focus on technological, structural, social, and economic developments, biodiversity can play a key role through what is termed ecosystem based adaptation (CBD, 2010). As such measures to conserve biodiversity and maintain ecosystem services can offer additional benefits in terms of climate change adaptation.

Ecosystem based adaptation is defined by UNEP as "*The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change at local, national, regional and global levels*". It aims to protect ecosystems so that they maintain enough biodiversity to be able to reorganize and adapt to climate change. In this way, they can continue to deliver the ecosystem services that society depends upon, such as production of food, fuel and fibre, protection from natural disasters, climate and water regulation. Ecosystem based adaptation is particularly important for poorer societies of the world due to the high dependence of the poor on ecosystem services for their livelihoods, and their low adaptive capacity and vulnerability to climate change. Nonetheless such strategies can also convey substantial benefits to business operations, for example by protecting natural and human made infrastructure, maintaining yields, and sustaining water supplies.

Requirements can therefore be set by standards systems to promote diversity and resilience of ecosystems and maintain specific ecosystem services in order to convey climate change adaptation benefits. These include:

- Protection of coastal ecosystems such as salt marshes and mangroves from conversion or degradation (particularly relevant for aquaculture, fisheries, agriculture and shipping)
- Landscape planning that maintains or enhances heterogeneity and spatial diversification to promote biodiversity and enhance adaptive capacity to climate change. This can for example include measures that protect high elevation ecosystems to conserve water resources for entire subcontinents

- Diversification of agricultural and forestry systems (both crop/timber species, varieties and land cover classes) to spread risk in terms of loss of productivity, pests and diseases etc.
- Sustainable land use management practices, such as sustainable forest management and eco-agriculture to protect on site biodiversity and natural ecosystem processes.
- Protection or sustainable management of land important for waterways to prevent soil erosion and maintain water regulation services
- Protection or sustainable management of ecosystems and biodiversity that provide food and raw materials to local communities
- Conservation of wild varieties of food crops, livestock and timber species through maintaining areas of high biodiversity value
- Maintaining connectivity of habitats to allow species to migrate in response to climate change
- Sustainable off-take rates and harvest locations for exploited species to take account of predicted changes in species ranges and population sizes resulting from climate change

3.5. Invasive species and genes

While the movement of organisms into new areas is a naturally occurring global phenomenon, human activities have accelerated this process causing massive alterations to species ranges with sometimes devastating impacts on the populations of native species. The deliberate or accidental movement of species is therefore considered one of the key pressures on biodiversity and ecosystem services. While the focus of the threat of biological invasions is primarily at the species level, the CBD also consider the introduction of Living Modified Organisms into natural environments as a significant threat to biodiversity and the provision of ecosystem services, and as such this is included in this section.

3.5.1. Invasive Alien Species (IAS)

The CBD defines an “alien species” as a species, subspecies or lower taxon, introduced outside its natural past or present distribution, and an “Invasive Alien Species” (IAS) as an alien species whose introduction and/or spread constitutes an ecological threat to indigenous wild species. Alien species, often known as ‘non-native’ species, differ in their tendency to become invasive and impact native species in areas they are introduced. It is widely accepted in the conservation community that species distributions are constantly changing, and categorising a species as either native or non-

native is somewhat dependent on timescale. There are indeed species that are termed 'naturalised exotic' whereby non-native species have become established as a harmless or even integral part of a native ecosystem. Nonetheless, it is also recognised that while many non-native species may be harmless and not of conservation concern, some species when introduced to areas outside their native range can cause substantial harm to biodiversity and impact upon human livelihoods (Lambertini et al., 2011).

Invasive species have been implicated in a large number of known extinctions; have contributed to the spread of human diseases; and have impacted water sources and a host of other ecosystem services. The severity of impacts of invasive species is most extreme in island biomes due to the evolutionary distinctness of species within such ecosystems, but impacts have also been found to be rapidly increasing in a number of other ecosystem types (inland waters, tropical and temperate forests and some drylands) (Figure 7., MA, 2005). There are a number of existing lists of identified invasive species, including the Global Invasive Species Database (GISD), which features the world's worst 100 invasive species based partially on their serious impact on biological diversity and/or human activities. The GISD is managed by the Invasive Species Specialist Group of the Species Survival Commission of the IUCN. Other databases on invasive species include those of the Global Invasive Species Information Network (GISIN), and the Delivering Alien Invasive Species Inventories for Europe (DAISIE) project. National lists are also available for many countries.

It must be recognised, however, that many species that have not been identified formally as invasive may become invasive in certain environments and that the severity of threats posed by invasive species will vary in different locations depending on local conditions. It is therefore necessary to adopt a precautionary approach towards the introduction of non-native species, and where they are necessary to the operation in question, to carry out individual assessments of the risks posed by that species.

A number of standards systems identify invasive species as issues of concern and a wide range of requirements exist across the different business sectors. The necessity of measures to safeguard against the threat of invasive species clearly depends on the nature of operations being governed by a standard. For example, invasive alien species are of relevance to agricultural standards in terms of biological control, to aquaculture standards in terms of farm escapes, and to shipping in terms of ballast water management. Specific guidance on management related to invasive species can be

found for some sectors such as shipping related to ballast water management[6]. It is, however, worth noting that there are many ways in which companies from all sectors could be contributing to the threat of invasive species and a full risk assessment is required to identify particular areas of concern. These can include:

- **Transportation**: This is particularly an issue for shipping due to the movement of species in the ship's ballast water, but is also relevant to the transportation of a number of raw materials (food, timber etc.) through a variety of means (road and aviation), and to tourist operations
- **Cultivation and domestic breeding**: This is relevant for a wide range of sectors including agriculture, aquaculture, breeding of exotic species, pet trade, and horticulture.
- **Biological control**: This is largely relevant to the agriculture sector
- **Water transfer schemes**: This is relevant to large scale infrastructure projects that divert natural water courses

There are a wide range of measures that can be integrated into standards systems to safeguard against impacts related to spreading invasive species through these means. These include:

- Compliance with all national legislation and relevant international conventions regarding species introductions including the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM), and The International Plant Protection Convention that has set international standards to prevent and control the introduction and spread of pests of plants and plant products
- Assessment of potential invasiveness of non-native species being used/cultivated/traded by an operation and adoption of a precautionary approach towards the use of non-native species with unknown levels of invasiveness
- Preferences for use of native species where possible and justification for the use of non-natives in operations
- No use or deliberate introduction of known invasive species
- Controls to prevent escapes and spread on non-native species – e.g. use of effective barriers or buffers between cultivation/breeding and natural ecosystems

[6] A number of guidelines relating to the uniform implementation of the Ballast Water Management Convention (BWM) have been developed by the International Maritime Organisation (IMO) - http://www.imo.org/OurWork/Environment/BallastWaterManagement/Pages/BWMGuidelines.aspx

- Appropriate response mechanisms to the spread/release of invasive species into natural ecosystems and immediate reporting to key stakeholders
- Measures to prevent contamination of transported products with 'hitchhiker' organisms, including quarantine and export/import controls

More comprehensive guidance materials on prevention and management measures for invasive alien species are available, such as that prepared by the Global Invasive Species programme (Wittenberg & Cock, 2001).

3.5.2. Living Modified Organisms (LMOs)/Genetically Modified Organisms (GMOs)

Living modified organisms have been defined by the CBD as "*any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology*". Such organisms are more commonly termed Genetically Modified Organisms (GMOs), but LMOs refer specifically to those that are capable of transferring or replicating genetic material. They are created using genetic engineering whereby an organism's genome is directly manipulated using DNA technology. GMOs are used in biological and medical research, production of pharmaceutical drugs, experimental medicine, and agriculture.

The engineering and use of modified organisms remains largely contentious due to the potential benefit they hold for mankind through increased agricultural productivity combined with the potential risks that they present to the environment and human health. Much of the controversy over GMOs involves their application in food production where they are used to create crops with desirable traits such as resistance to pests, herbicides, or harsh environmental conditions, improved product shelf life, and increased nutritional value, as well as to create transgenic farm animals (including fish) to increase yields and reduce susceptibility to disease. While the benefits from such technologies are very promising and could convey benefits to the environment in terms of reducing the land required for food production and reducing the application of insecticides, a number of concerns have been raised. In addition to food safety concerns, these include an increased use of herbicides with the development of herbicide resistant crops, effects on non-target species, and the transfer of genetic material to unmodified relatives and the associated ecosystem impacts.

It is due to such risks that they have been highlighted as an issue of concern by the CBD, which calls on contracting parties to "*establish or maintain means to regulate, manage or control the risks associated with the use and release of living modified organisms resulting from biotechnology which are likely to have adverse environmental impacts that could affect the conservation and sustainable*

use of biological diversity, taking also into account the risks to human health;..." (Article 8(g), CBD). While a number of countries have developed stringent legislative mechanisms to regulate the industry through assessment and management of the risks, there are many countries for which no such regulation exists and most of these regulations focus primarily on issues of food safety and labelling rather than environmental impacts (WHO).

In response to the need for an environmental international mechanism to regulate transboundary movements of LMOs, the CBD adopted the *Cartagena Protocol on Biosafety* to the *Convention on Biological Diversity* in 2000, which entered into force in 2003. A key feature of this protocol is the requirement for an informed agreement to control international trade whereby exporters must seek consent from the importing country before any transboundary movement is made (SCBD, 2000). LMOs are also referred to in the International Standards for Phytosanitary Measures (ISPM) which are set by the International Plant Protection Convention (IPPC) and are to be applied by members of the WTO under the Sanitary and Phytosanitary measures agreement (IPPC, 2011). ISPM 11 provides guidance on evaluating potential phytosanitary risks to plants and plant products posed by LMOs.

The approach of standards systems to GMOs will ultimately depend on their purpose and scope. In line with a precautionary approach many standards set stringent requirements to exclude the use of GMOs from operations, in both their direct use in operations and in the supply chain. Due to the various applications of GM technology, and its potential benefits, it may not always be advisable to exclude its use entirely. Nonetheless, as a number of potentially severe impacts are associated with such technology, any permitted use needs to be accompanied with strict regulations to assess and manage those risks. These can be built into the policy requirements of relevant standards systems and include:

- Compliance with national legislation on the development, transport, handing and use of GMOs
- Compliance with international conventions related to LMOs or GMOs, including the CBD and supplementary Cartagena Protocol on Bio safety (SCBD, 2012), and the ISPMs set by the International Plant Protection Convention (IPPC)
- Risk assessment of proposed GMO use to be carried out in a scientifically sound and transparent manner and to assess the range of environmental impacts including both direct impacts, such as gene transfer to unmodified organisms, and indirect impacts, such as increased agrochemical use.
- Avoidance of high risk GM applications

- Assessment of the benefits provided by the use of GMOs in relation to the risks, and restriction on the use of non-essential or low benefit applications
- Adoption of a precautionary approach whereby a lack of scientific evidence on the potential for gene transfer to unmodified organisms is treated as high risk
- Containment of GMO areas – production, transport, storage and processing (e.g. physical and distance barriers)
- Methods to prevent the spread of derivatives of transgenic plants such as pollen (e.g. cleaning machinery etc.)

Conclusion

The integration of biodiversity and ecosystem services into the policy requirements of standards systems requires an understanding of the ways in which business interacts with, and creates pressures on, biodiversity, natural ecosystems and the goods and services that they provide to humanity. Each standard system differs in its overall mission and the types of pressures that the operations they govern pose, and this guidance document provides an overview of different strategies that can be adopted, depending on the sector and scope of the standard.

The first section focused on high level approaches that can be adopted and commitments that can be set that will inform the selection of specific policy requirements with which operators need to comply. The second part, which has been structured around the five key pressures that economic operations pose to biodiversity and ecosystem services (habitat and land cover change; harvest and resource consumption; pollution and external inputs; climate change; and invasive species and genes) has provided the rationale for each pressure, examples of different conservation or mitigation strategies across different sectors, and a number of important considerations to be made in developing policy requirements that address these pressures. The overall effectiveness of recommended strategies for policy development depends on effective processes for implementation and regulation on-site. It is hoped that future revisions of such policy guidance will be made based on the feedback from monitoring and evaluation programmes of standards systems to ensure that policies are achieving their purpose, as well as future advances in conservation science that will provide us with new tools and conservation approaches.

The development of clear and effective policies on biodiversity and ecosystem services can assist companies in mitigating operational risks such as those associated with increased costs of material

inputs, as well as other forms of risk such as reputational losses associated with environmental and social impacts. The ability of standards systems to support risk mitigation is becoming widely recognised and has led to their proliferation. Although the scope and purpose varies between the different systems, there is increasing convergence around the incorporation of biodiversity and ecosystem service values within the policy requirements. This document aims to raise awareness and further the understanding of standard setting organisations and businesses across all sectors of the range of effective and widely understood terms and conservation approaches. This in turn is hoped to facilitate an increased level of coordination between standards systems, thereby supporting their ability to generate wider benefits to biodiversity and society.

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