Biodiversity management in the cement and aggregates sector

Regulatory tools

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2. technical "on-the-ground" legal assistance in drafting and implementing legislation and treaties;
3. training and capacity building; and
4. information dissemination through publications and policy papers.

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To achieve this aim and objective, three interconnected entry points have been identified in the IUCN Business Engagement Strategy:

1. Businesses adopt policies to manage biodiversity risks, so as to avoid and minimise biodiversity impacts and seek opportunities for biodiversity conservation and benefits for natural resource-dependent people.
2. Supply chains apply sustainability standards and safeguards that positively impact biodiversity and local livelihoods.
3. Public and financial sector policies promote the integration of biodiversity and livelihood values in business decision-making.

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Foreword

Governments have an important role to play in laying the foundations for a sustainable future. As the primary stewards of natural resources, they are responsible for the protection and wise use of these resources. Public policies and regulatory tools can help ensure these "public goods" are managed carefully and safeguarded for future generations.

Creating an enabling environment for businesses to integrate biodiversity considerations into corporate policies and operations is an important driver of responsible resource stewardship. By holding all businesses to the same standards, policy makers can create a level playing field, and by rewarding businesses that operate above minimum standards, they can encourage continuous improvement.

At IUCN, we work with a wide range of economic sectors, from those with significant impacts on biodiversity, such as extraction, to biodiversity-dependent sectors, such as agriculture and biodiversity-based enterprises like ecotourism. In most cases, we have seen that business outcomes can be enhanced by good public sector interventions.

In the case of the cement and aggregates sector, we have worked with key industry players for nearly 10 years, gaining experience with individual companies and also with industry associations. The scope of our work has ranged from site-level interventions to development of broader management and reporting systems. However, the policy context was the missing link throughout this work.

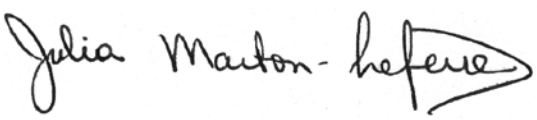
This practical guide explores the crucial relationship between policies and business actions, and how regulatory tools can best be used to improve the biodiversity performance of the cement and aggregates sector and help reduce the sector's environmental footprint.

This publication is part of a broader series addressing the risks and opportunities for biodiversity and ecosystems that result from quarrying for cement and aggregates. While this particular guide is aimed at policy makers, other guides in the series are designed for businesses, to support them in developing internal policies and systems to manage and monitor biodiversity on their landholdings. The series emphasises the distinct but complementary roles that governments and businesses have to play in the conservation and sustainable use of nature and natural resources.

The challenge ahead is in gaining momentum for implementation. IUCN stands ready to support the implementation of the recommendations, ideas and suggestions in this guide, and the rest of the series. However, success can only be achieved through collaboration. Through this guide, IUCN hopes to create a collaborative space in which governments, businesses and civil society work together to create better outcomes for biodiversity and ecosystems as well as communities who directly depend on natural resources.

Finally, this guide is a living document, and we hope that readers' experiences and perspectives will give it longevity and relevance. We would like to illustrate these recommendations with a variety

of real-life examples and warmly welcome your feedback and suggestions. We invite all interested parties to join us in a conversation to promote this collaborative interface between enabling policies and business actions for the benefit of nature and people.



Julia Marton-Lefèvre
IUCN Director General

About this guide

Like any other extractive activity, quarrying for cement and aggregates has the potential to affect biodiversity throughout the life cycle of an extraction operation, both directly and indirectly. These impacts result from land clearance, noise and vibrations, pollution and waste, as well as the alteration of hydro-geological systems.

This guide provides guidance on the principles and content of regulatory tools that can be used to identify and address impacts, risks and opportunities to biodiversity and ecosystems from quarrying for cement and aggregates. It also draws on key international laws, existing strategies and a range of relevant initiatives to develop a series of principles to support these tools and help ensure that biodiversity considerations are integrated in planning and throughout the life cycle of quarrying operations. In the context of this guide, other environmental or social issues are addressed only when they link to biodiversity.

The guide is aimed at policy makers and regulators at the national level, who are in the process of adopting, reviewing and implementing relevant regulatory tools to strengthen biodiversity standards for the extraction of construction materials. Given that the guidance provided is global and that legal systems vary extensively from country to country, this guide focuses on providing general direction for regulatory tools, rather than specifically prescribing how this content should feature in the legal framework of a certain country or system.

Chapter one explains the potential impact of quarrying operations on biodiversity and ecosystems, the need to address and manage biodiversity issues throughout the life cycle of extraction activities, and the role that policy makers and regulators can play in creating an enabling environment to do so. **Chapter two** provides a policy goal and five principles to guide regulatory tools related to biodiversity management, thus laying the foundation for developing a legal framework that is in line with global biodiversity conservation objectives. **Chapters three**, **four** and **five** then explore the range of regulatory tools that can be used to promote better biodiversity management in the cement and aggregates industry; these chapters also provide examples of how these tools have been used in different countries.

Executive summary

To function effectively, environmental policies need to involve a mix of regulatory tools. Whereas command-and-control regulatory instruments are mandatory and limit choice, market-based instruments introduce an element of choice and use price signals, either positive (financial rewards/incentives) or negative (charges and taxes) to change behaviours. The key is to achieve the right mix of tools based on a country's institutional arrangements. This mix will vary depending on the maturity of the country's environmental legal frameworks, the technical capacity of public authorities and the level of integration of sustainability practices across private and state-owned enterprises operating in-country.

The following set of five principles and list of actions for policy makers aim to support the establishment of a policy environment in line with the global biodiversity conservation agenda. Together, the principles and actions provide an overview of the key messages within this guide and have been elaborated based on the Integrated Biodiversity Management System as well as the literature and experts consulted for this guide.

Policy Principles

Principle 1 The ecosystem approach informs land-use and strategic planning, as well as biodiversity management, from project inception to beyond closure

Principle 2 Sound science forms the basis for biodiversity assessment

Principle 3 Incremental biodiversity values trigger differentiated but proportionate responses

Principle 4 Impacts on biodiversity are addressed in the context of the mitigation hierarchy

Principle 5 Open, participatory and transparent processes support biodiversity management

Actions for policy makers

Command-and-control instruments

- In drafting laws and regulations for biodiversity management, take into consideration the key terms, definitions and obligations associated with international conventions that have been ratified by your country.
- Ensure that all terms and definitions related to biodiversity and ecosystems are consistently used in all laws and regulations.
- Undertake a comprehensive assessment of the institutional and legal framework in your country, including environmental regulations and mining and planning laws, in order to assess the extent to which this framework enables or hinders biodiversity conservation.

- In countries with a federal or decentralised structure, promote cooperation between different levels of government through collaborative institutional arrangements.
- Based on an institutional and legal assessment, identify the need for adopting and/or strengthening laws and regulations for biodiversity management in quarrying operations.
- Use planning tools to reconcile environmental and development objectives at a strategic level, and to ensure that biodiversity considerations are fully integrated within land-use and strategic planning. Such tools also need to be informed by an ecosystem approach and established in an open, participative manner.
- Include a biodiversity impact assessment as a requirement in the overall Environmental Impact Assessment or Environmental and Social Impact Assessment procedures. Such an assessment provides the basis for the baseline assessment and subsequent tools, such as the biodiversity management plan or action plan, and rehabilitation and closure plans.
- Ensure that permitting procedures are transparent and provide opportunities for all stakeholders, both governmental and nongovernmental, to submit proposals and participate in the decision-making process.
- Establish an effective compliance and enforcement system, involving self-monitoring and reporting as well as administrative control/ inspections.

Market-based instruments

- Ensure that sufficient and accurate information about the environmental costs and cost differences of different activities is available and that necessary analytical studies are undertaken to define the most cost-effective instruments for targeting environmental damages.
- Help improve overall knowledge of the economic values or benefits of biodiversity, in order to know which components of biodiversity need to be protected, and to what extent, to safeguard or enhance their contributions to human welfare.
- Ensure that market-based instruments are in conformity with other policies. In general, successful market-based instruments incorporate other policy instruments to function effectively.
- Formulate trading rules and establish the regulatory or contractual underpinnings necessary to create effective property rights or implement an environmental tax.
- Establish monitoring systems and allow for adaptive management to ensure the effectiveness of market-based instruments.

Supporting instruments

- Create opportunities for capacity-building activities related to integrated biodiversity management measures, in order to enhance or strengthen compliance with environmental laws and regulations.
- Encourage sustainability reporting practices through the use of international standards or the establishment of regulatory incentives or technical support.
- Commit to sustainable public procurement procedures and promote sustainable sourcing practices in the cement and aggregates industry, to improve the management of biodiversity and ecosystems in supply chains.

1 Biodiversity and ecosystems in quarrying operations

Biodiversity and ecosystems provide essential products and services for human life, including oxygen, food, fresh water, fertile soil, medicine, shelter, protection from storms and floods, stable climate and recreation. However, biodiversity is being lost at unprecedented rates, largely due to human activities. If this rate of loss continues, it will hugely impact human well-being and the ability for future societies to sustain themselves.

Like any other extractive activity, the extraction of materials for concrete production has the potential to affect biodiversity and ecosystems both directly and indirectly, throughout the life cycle of a project. These impacts result from land clearance, noise and vibrations, pollution and waste related to extraction and production activities, and the alteration of hydro-geological systems. As demand for these resources grows and their supply becomes scarce, it is expected that there will be greater conflicts and increasing tradeoffs between business interests and biodiversity values. Given that quarrying operations are often located close to urban areas and on land with relatively low biodiversity values, there are also important opportunities for this sector to enhance biodiversity on quarrying sites through effective management and rehabilitation.

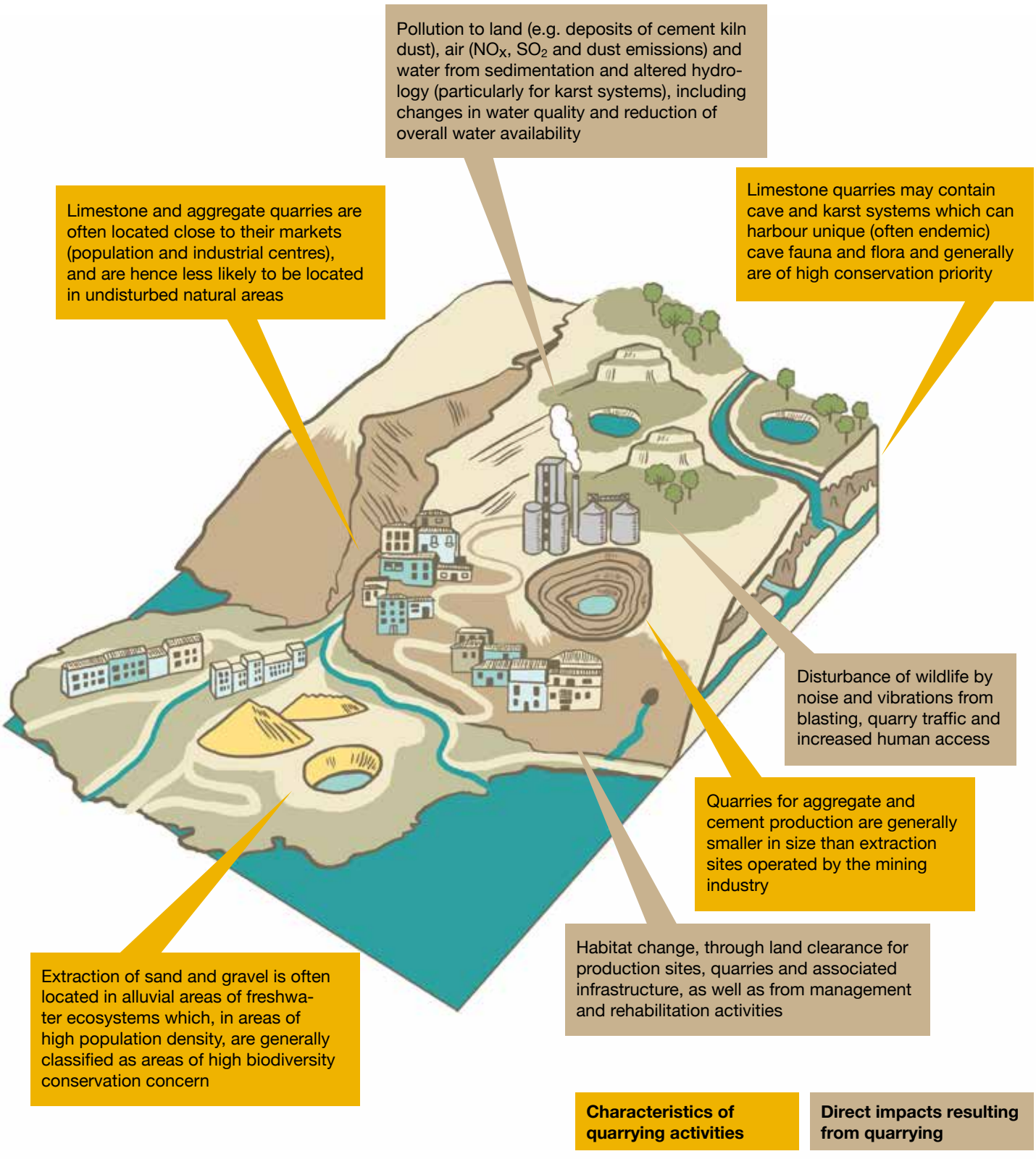
If the value of nature and the services it provides are integrated into decision making, the degradation of ecosystems can be halted. Laws and regulations have a key role to play in protecting the environment, biodiversity and ecosystems, and in promoting sustainable resource use. While site-level measures are essential in addressing biodiversity impacts, emphasis needs to be placed on safeguarding biodiversity at the national level, through strategic assessment and planning.

Quarrying and the Integrated Biodiversity Management System

Concrete is the most widely used material in the world after water. Every nation and every community requires concrete for construction and infrastructure. Consequently, its main ingredients—cement and aggregates—are in high demand. They are also relatively widespread, extremely bulky and fairly cheap, meaning that, as it is expensive to transport them over long distances, their extraction and production generally occurs locally (see Figure 1).

In order to address the potential impacts of quarrying for cement and aggregates on biodiversity, as well as to maximise the opportunities for biodiversity on quarry operations, an integrated approach to biodiversity management is needed. Such an approach should take into consideration the entire life cycle of an extraction operation, from the planning phase to closure. It should also allow for differentiated responses based on the biodiversity that exists in and around a site. IUCN's Integrated Biodiversity Management System (IBMS) for the cement and aggregates sector describes such an approach.

Figure 1 – Characteristics and impacts of quarrying



The IBMS forms the basis for the guidance and recommendations provided in this guide (See Box 1). While this guide targets policy makers and regulators, the IBMS was developed as best practice guidance for companies in the sector to integrate biodiversity considerations into corporate policy and throughout the life cycle of quarrying operations. These two documents have been designed to complement each other, with one aimed at changing business practices and the other at creating the enabling policy environment for improved biodiversity management by the sector.

Box 1 – The Integrated Biodiversity Management System (IBMS)

The IBMS provides guidance to companies in the cement and aggregates sector that want to take a systematic approach to managing biodiversity at their operations. It delineates the key elements of a system for integrated and prioritised management of biodiversity throughout the life cycle of an extraction operation and in all activities, using a risk-and-opportunity-based approach. The IBMS guidance is anchored on the business processes used by companies, as well as their interactions with policy processes at several different stages (see table below). Thus, the implementation of an IBMS relies on regulatory tools that are consistent with good biodiversity management practices.

Public authority	Stage of business operations life cycle	Biodiversity in action (IBMS)
Planning Procedural Permitting	Planning phase	Biodiversity risk and opportunity assessment Biodiversity in Environmental Impact Assessment
Permitting Compliance mechanism Market-based instruments, including taxes, offsets, etc.	Operational	Biodiversity Action Plan Rehabilitation Plan Monitoring for biodiversity management
Compliance mechanism	Closure	Rehabilitation Plan
Compliance mechanism	Post-closure	Monitoring and evaluation

Source: IUCN. 2014. Biodiversity management in the cement and aggregates sector: Integrated Biodiversity Management System (IBMS). Gland, Switzerland. Available at: www.iucn.org/cementandaggregates

The role of policy makers and regulators in creating an enabling environment

Policies, laws and regulations are an important part of a framework for public and private actions to advance the protection of the environment, resources and ecosystems. On the one hand, laws and regulations provide the basis for mainstreaming biodiversity into strategic planning processes, including land-use planning, Strategic Environmental Assessments that include cumulative and multi-source impacts, and landscape-level management processes that integrate biodiversity values based on the ecosystem approach. On the other hand, they establish the framework for an enabling environment that allows operators to integrate biodiversity protection into their business activities.

In order for voluntary action on biodiversity by leading companies to become standard practice throughout an industry or sector, policy makers and regulators need to support the establishment of an enabling policy environment, by first putting in place minimum requirements for all operators and second creating incentives for companies to go beyond the minimum standards. Governments can further enable scaling up of best practices by business by rewarding voluntary measures that support biodiversity goals.

It is very important to ensure that the minimum standards are applied equally to all operators of every size, including state and private companies and national and international operators. Provisions should also be made for rewarding first movers and best practices. Generally speaking, command-and-control measures are used to set minimum requirements, while market-based instruments may be more appropriate for incentivising better practices.

2 Policy goal and principles for improved biodiversity management

The policy goal of this guide is to promote the integration of biodiversity management into cement and aggregates extraction, in order to achieve optimal outcomes for biodiversity, ecosystems and natural-resource-dependent communities.

The following five principles for biodiversity management lay the foundations for regulatory tools designed to advance this goal.

Principle 1

The ecosystem approach informs land-use and strategic planning, as well as biodiversity management, from project inception to beyond closure

The ecosystem approach is defined by the Convention on Biological Diversity as "a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way … It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It recognises that humans, with their cultural diversity, are an integral component of ecosystems."

An ecosystem approach proposes that decisions about development activities be made based on knowledge of natural systems and how ecosystems work, taking into account the services provided by ecosystems and involving people who benefit from ecosystem services and could be affected by development projects.

By adopting the ecosystem approach in land-use and strategic planning, local authorities can help set priorities and identify possible conflicts between quarrying and biodiversity. This approach can also help prioritise areas for development that maintain ecosystem connectivity at a level which will not compromise biodiversity and ecosystems. Thus, an ecosystem approach to land-use and strategic planning requires taking into consideration legislation on protected areas, habitats and species and introducing appropriate measures, such as the creation of buffer zones.

Integrated planning for natural resource extraction and biodiversity conservation at the regional level can result in interesting and novel scenarios. Particularly in sand and gravel extraction, where life cycles of quarries are relatively short, there are good opportunities for re-establishing habitats that have been lost; these activities can be directed towards species and ecosystems that are regionally rare or under-represented.

In promoting the ecosystem approach, it is important that all players look beyond their fenceline and work together to address cumulative impacts on a larger scale. Policy makers can support such actions by setting requirements that any impacts in areas with relevant ecological connections to extraction sites be addressed in biodiversity

management activities. In addition, the sector can be encouraged to make biodiversity management decisions in light of the surrounding landscape, in order to enhance biodiversity values in the area and support conservation priorities.

Principle 2

Sound science forms the basis for biodiversity assessments

Planning and regulatory tools should require that the best available and most up-to-date scientific data informs biodiversity assessments and leads to the identification of measurable improvements in biodiversity management for planning, operation and closure at extractive sites, including through the permitting and EIA processes. Decisions should reflect the state of the art of biodiversity management. If such information is unavailable or incomplete, regulators should use appropriate incentives to encourage operators to contribute to the generation of scientific information through site-based research and assessments.

Data on biodiversity is available from multiple sources. At the national level, the repositories of such information will vary, but may include government agencies, universities and non-governmental organisations. At the global level, there are a number of web-based tools and datasets where such information can be found, including the IUCN Red List of Threatened Species (www.iucnredlist.org), Protected Planet (www.protectedplanet.net), Key Biodiversity Areas and the IUCN Red List of Threatened Ecosystems (www.iucnredlistofecosystems.org). In addition, the Integrated Biodiversity Assessment Tool (www.ibat-alliance.org/ibat-conservation) is an online tool designed to facilitate access to critical biodiversity information at the site level, in order to inform decision-making processes.

Principle 3

Incremental biodiversity values trigger differentiated but proportionate responses

Regulatory tools should require operators to assess the importance of biodiversity at proposed development sites, as well as their potential risks and impacts, and mandate management responses proportionate to the importance of biodiversity within the site. Thus, the higher the risk, the more stringent the response.

Biodiversity assessments and baseline studies should be an integral part of planning and permitting requirements and inform the development of biodiversity management measures for the inception, operation and closure of quarries for cement and aggregate operations. Regulatory tools also need to ensure that quarrying activities are managed in such a way that biodiversity concerns are systematically and effectively integrated into planning and decision making at an early stage, so that better outcomes are achieved for the conservation and sustainable use of biodiversity resources.

Differentiated requirements should be put in place depending on the level of biodiversity importance onsite. In areas where high biodiversity values have the potential to be affected, clear and measurable biodiversity targets should form an integral part of rehabilitation plans and be required through the permitting procedure.

Quarrying in protected areas should only be carried out if permitted under applicable legislation, based on the non-regression principle, which prevents governments from loosening their existing standards or regulations regarding the protection of biodiversity, and in accordance with established legal requirements and the management objectives of the respective areas.

Principle 4

Impacts on biodiversity are addressed in the context of the mitigation hierarchy

Regulators should ensure that plans for and decisions on activities that may have significant impacts on biodiversity reflect due consideration of biodiversity risks and opportunities associated with the activities planned. All opportunities to protect, restore and enhance biodiversity should be identified, conservation outcomes created and adverse biodiversity impacts adequately addressed.

Policy and legal instruments should further aim at ensuring no net loss of biodiversity and biodiversity management measures through use of the mitigation hierarchy, which states that (1) significant impacts are avoided; (2) impacts that cannot be avoided are minimised; (3) restoration measures are taken to address any unavoidable impacts; and

(4) any significant residual impacts on biodiversity that may remain are offset (see details on the mitigation hierarchy on the next page). Where avoidance of significant effects or application of the mitigation hierarchy are not reasonably practicable, the projects may be permitted only if justified by overriding public interest and after consultation of all stakeholders; in such cases impacts should be mitigated by reasonable and appropriate measures.

Principle 5

Open, participatory and transparent processes support biodiversity management

Policy and legal instruments should encourage open, participatory and transparent processes for biodiversity management at all phases of a cement and aggregates operations, from planning to closure. Legal instruments should be used to ensure that stakeholders are well-informed and that there are appropriate and effective opportunities for consultation and participation in decision making. Information about the biodiversity aspects of quarrying activities can be made available based on proactive disclosure to stakeholders and the public, in accordance with applicable legislation.

Regulators should require that the management of biodiversity in quarrying operations gives appropriate weight to biodiversity-related social aspects at the local level, in order to integrate the different perspectives and interests of stakeholders as they relate to biodiversity. It is especially important to consider the opinions of communities who see themselves as potentially or actually affected by the activities through, for example, loss of vegetation, noise, vibration, dust and other forms of pollution.

Sub-national governments should participate actively in the participatory and transparent processes, in order to contribute technical opinions and knowledge of the area. While the operator ultimately bears the responsibility for biodiversity management, where appropriate, local community members can play an important role in monitoring and measuring activities. Such community engagement can have social, environmental and economic benefits for all stakeholders, and may help build community support for the project. The limits of public information, including business confidentiality, pending procedures, etc., should be respected in this process. Such approaches may also help contribute to better enforcement of the laws and permit conditions.

Besides designing regulatory tools to ensure that participatory processes are in place, policy makers and regulators also have a broader role to play in protecting the rights and building the capacity of local stakeholders. In this sense, they need to ensure that the needs and opinions of natural-resource-dependent and indigenous communities are balanced with biodiversity conservation needs, to ensure sustainable outcomes. Furthermore, the rights of indigenous people need to be safeguarded through principles such as that of free, prior and informed consent. This principle states that a community has the right to give or withhold its consent to proposed projects that may affect the lands they customarily own, occupy or otherwise use.

The next chapters provide more detail on the regulatory tools that policy makers can use and how these tools can help encourage better management of biodiversity within the cement and aggregates sector.

The Mitigation Hierarchy

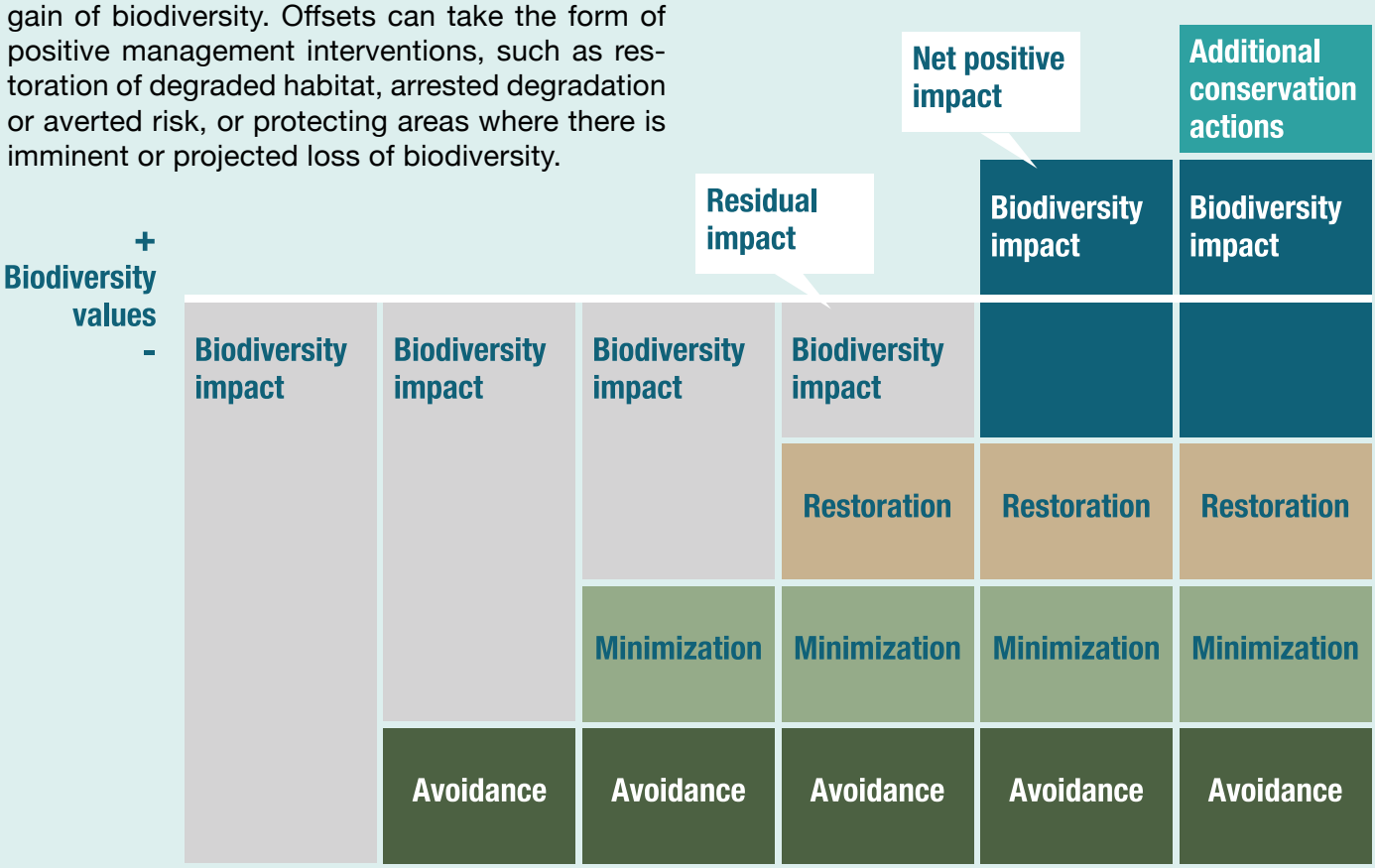
The mitigation hierarchy is defined in the BBOP Standard (2012) as follows:

Avoidance: measures taken to avoid creating impacts from the outset, such as careful spatial or temporal placement of elements of infrastructure, in order to completely avoid impacts on certain components of biodiversity.

Minimisation: measures taken to reduce the duration, intensity and/or extent of impacts (including direct, indirect and cumulative impacts, as appropriate) that cannot be completely avoided, as far as is practically feasible.

Rehabilitation/restoration: measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/or minimised.

Offset: measures taken to compensate for any residual significant, adverse impacts that cannot be avoided, minimised and/or rehabilitated or restored, in order to achieve no net loss or a net gain of biodiversity. Offsets can take the form of positive management interventions, such as restoration of degraded habitat, arrested degradation or averted risk, or protecting areas where there is imminent or projected loss of biodiversity.



Sources: Rio Tinto. 2008. Rio Tinto and Biodiversity - Achieving results on the ground. Available at: SAME LINK. And, BBOP. 2012. Mitigation Hierarchy. Available at: http://bbop.forest-trends.org/pages/mitigation_hierarchy

3 Command-and-control instruments

This chapter reviews the legal tools, mechanisms and approaches that can be used to support biodiversity management in quarrying operations, from integration into wider land-use and strategic plans to specific legislative instruments that regulate biodiversity management at the site level. It also discusses procedural mechanisms that can be used to complement laws and regulations, including access to information and public participation.

Land-use and strategic planning

One way to integrate biodiversity management into quarrying operations is to plan natural resource extraction as an element of broader land-use and strategic plans. This requires looking beyond a particular site and making decisions based on a landscape, group of sites or specific initiative.

Strategic Environmental Assessment

Proposed and existing land-use plans may be subject to a Strategic Environmental Assessment (SEA), which allows for the integration of conservation considerations into land-use planning processes.

An SEA is a formal, systematic process of analysing and addressing the environmental effects of policies, plans and programmes and other strategic initiatives. This process applies primarily to development-related initiatives that are known to have or likely to have significant environmental effects, notably those initiated individually in sectors such as transport and energy, or collectively through spatial or land-use change.

While an Environmental Impact Assessment (EIA) focuses on integrating environmental considerations into development goals and objectives at the project level, an SEA extends the aims and principles of an EIA to higher levels of decision making. It allows problems of environmental deterioration to be addressed at their source in policy and planning processes, rather than waiting to mitigate their project-level impacts.[i]

Land-use planning

The impacts of the cement and aggregates industry at a landscape level and on biodiversity can be minimised through the development and application of national, regional and local policies for the supply of minerals. The overall aim of mineral planning is to meet the justified need for minerals at the lowest social, economic and environmental cost. Wherever practicable, areas of designated landscape, nature conservation or heritage value should be protected from mineral development.

There are competing land-use interests in every society and state. These interests range from community-related issues to industrial and commercial issues to ecological issues. As far as the extractive industries are concerned, the key challenge is to find a balance among the sustainable supply of minerals for society, economic development and the social and natural environment. The objective of land-use planning within the context of mineral planning is to find sustainable solutions that take into consideration medium-to-long-term views and local, regional and national interests. Mineral extraction requires access to mineral deposits, which unlike many other resources are geographically fixed. Because of this inflexibility, land-use planning requires a long-term view to protect mineral deposits from sterilisation, which happens when other types of development are prioritised above ground that prevent access to the minerals for the long term. It should take place at a high level, since the distribution of minerals can vary significantly between regions.[ii] In the EU, the demand for minerals is being set in the context of environmental and land-use policies and the impacts of extraction at a landscape level and on biodiversity.

Land-use planning, as defined by the Food and Agriculture Organisation of the United Nations, is “the systematic assessment of land and water potential, alternatives for land use and economic and social conditions in order to select and adopt the best land-use options. Its purpose is to select and put into practice those land uses that will best meet the needs of the people while safeguarding

resources for the future."[iii] It can be considered a proactive rather than a reactive measure, in the sense that does not react to specific proposals to carry out development on specific sites. It can also help prioritise economic activities within a specific landscape, while at the same time ensuring the sustainable use of natural resources.

Land-use planning regularly takes into account nature protection; the consideration of requirements for species and habitat protection, protected areas and sustainable use of natural resources are binding obligations and an essential part of any land-use planning process. Land-use planning does not necessarily prohibit resource extraction but rather regulates where quarrying should not take place and where it may be allowed, subject to certain conditions. Use of the ecosystem approach can help establish rules to attract extractive operations in areas where negative environmental impacts are less likely to occur.

Box 2 provides examples of planning systems for mineral extraction in the EU that, depending on the jurisdiction, combine elements of land-use and mineral planning.

Box 2 – Examples of planning systems for mineral extraction in the EU

- Mineral plans elaborated by some EU member states (e.g. Austria, France, some German states) identify mineral reserves (mainly sand and gravel) and evaluate their quality and quantity (productivity), regional importance (demand, etc.) and suitability for exploitation. The plans also analyse possible conflicts with other land uses, which include Natura 2000, natural protection areas, forests, groundwater protection zones, settlement areas and traffic routes, and also identify areas that may be suitable or unsuitable for extraction.
- In England, Planning Policy Statements and guidelines for Minerals and Biodiversity and Geological Conservation provide clear rules and conditions for the extraction of aggregates, brick clay, natural building and roofing stone, oil and gas. The roles and responsibilities of the planning authority and the project developer are defined, and the competent authority for nature conservation (Natural England) must be consulted as regards the assessment of impacts when extractive activities are likely to have adverse effects on protected areas (including Natura 2000). Regional and local strategic plans set out the spatial framework within which proposals for the extraction sites will be considered. Such plans are subject to a strategic environmental impact and, where necessary, an appropriate assessment under the Habitats Directive.
- In Slovakia, in the framework of the national raw materials policy, the overlapping of protected areas (including Natura 2000 sites) and mineral reserves has been analysed in order to better understand which are the actual overlaps, how far Natura 2000 sites are "limiting" extraction of known reserves, and what are the possible solutions in sites that are subjects of interest for both mining and nature protection.
- Some mineral planning systems also consider the need to safeguard mineral resources for future exploration and/or extraction. For instance, Sweden has developed a land bank system by declaring various types of mineral reserves to be of national interest in accordance with the Environmental Code, and protecting the resources from being sterilised by other land-use development.

Source: European Comission (EC). 2011. Guidance Document "Non-energy mineral extraction and Natura 2000". Pp. 40. Luxembourg. Available at: http://ec.europa.eu/environment/nature/natura2000/management/docs/neei_n2000_guidance.pdf

Conservation and sustainable use legislation

Risks to the environment and biodiversity from natural resource extraction can also be regulated at the site level through specific legislative instruments including:

- permits;
- environmental impact assessments (EIAs);
- management plans; and
- monitoring and inspection systems.

These requirements may be included in specific biodiversity conservation legislation, as well as in more general laws and regulations on mining or industrial activities. The placement will depend on the existing legal framework and constitutional structure of the country, the national legal systems and practices, and regulations at a local level.

Permitting procedures for quarrying operations

The permitting process, overseen by competent administrative authorities in a formal administrative act, is the core legal instrument for the integration of biodiversity into mineral resource extraction. In permitting procedures, authorities either assess environmental impacts or verify the results of formal EIAs carried out by experts hired by the proposed operator of a project. These results are then fed into the overall decision-making process.

Different jurisdictions take varying approaches to addressing the interface between environmental considerations and permitting for access to mineral rights. In some jurisdictions, environmental considerations are integrated directly into the permitting process, while in others they are considered separate from the permitting process and subject to a different set of laws and regulations. In many countries, quarries are subject to the laws of landownership, i.e. they are owned by the relevant landowner, unlike most minerals, which are often owned by the state. However, even when quarries are the property of the landowner, they are still subject to the environmental permitting process before they are approved for operation.

The permitting process represents a crucial opportunity for determining and approving the biodiversity management measures necessary for the responsible operation of a given activity. Therefore, all measures that will be undertaken during the operational phase should be introduced as requirements during the permitting procedure and included in permit conditions, with statutory obligations specified.

These activities might include mitigation measures at different phases of the project; requirements for the compilation of information on biodiversity to be used for biodiversity inventories, biodiversity monitoring and continuous biodiversity improvements; mine closure measures and plans; and any plans for rehabilitation, restoration, offsets or compensation.

Although permitting is generally required for new activities or for significant changes in existing activities, it may also be required for existing activities or installations. When permitting is required for existing activities, it is important to recognise that, in most cases, the operators already have permits, and, even if authorities are entitled to require changes, additional resources and time are often needed for such changes. As a consequence, transition periods may be granted, with the condition that compliance plans for achieving the new requirements over time need to be elaborated. This may also apply to requirements for the integration of biodiversity conservation into existing extractive industry activities.

Environmental impact assessment with specific attention to biodiversity impact assessment

Nearly every country has a requirement for an environmental impact assessment (EIA) as part of the permitting process for mineral extraction activities. An EIA identifies the potential impacts of a planned activity on the environment and biodiversity and specifies mitigation measures to address those impacts. Collection and assessment of information on potential impacts on the environment, including biodiversity, is the core of the procedure.

EIA requirements are often included in specific EIA laws and regulations that need to be considered

when deciding on permit applications. To facilitate the preparation of EIAs by operators, the competent authority with responsibility for approving the EIA and granting the relevant permit can provide information on the overall legal framework in a guide or on the relevant government website.

At the European level, Article 6 of the EU Fauna and Flora Habitat Directive provides that potential impacts on biodiversity be given particular attention. Impacts on biodiversity need to be given equal weight when balanced with other aspects. Assessment procedures and their outputs should be such that the assessment of biodiversity impacts is clearly identifiable. This does not mean that two separate assessment procedures are necessary; biodiversity impact assessment can be part of the overall EIA, provided that it is identified as a specific section.

The following sections offer some points on the process, scope, content and standards of the biodiversity impact assessment that may prove helpful for law and policy makers looking to mainstream biodiversity considerations into environmental regulations.

The biodiversity impact assessment process

A comprehensive biodiversity impact assessment, which looks at potential impacts on biodiversity and ecosystem services, will lead to the creation

Box 3 – The International Finance Corporation (IFC) Sustainability Framework (2012)

The IFC's Sustainability Framework promotes sound environmental and social practices in business activities, encourages transparency and accountability, and contributes to positive development impacts. IFC's Performance Standards, which are part of the Sustainability Framework, have become globally recognised as a benchmark for environmental and social risk management in the private sector.

With regards to EIAs and biodiversity impact assessment in quarry operations, two Performance Standards (1 and 6) need to be given special consideration, as they provide specific guidance for better integration of biodiversity management into business operations:

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts – establishes the importance of (i) integrated assessment to identify the environmental and social impacts, risks and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the client's management of environmental and social performance throughout the life of the project.

Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources – recognises that protecting and conserving biodiversity, maintaining ecosystem services and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in this Performance Standard have been guided by the CBD. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. Based on this process, the requirements of this Performance Standard are applied to projects (i) located in modified, natural and critical habitats; (ii) that potentially impact on or are dependent on ecosystem services over which the client has direct management control or significant influence; or (iii) that include the production of living natural resources (e.g., agriculture, animal husbandry, fisheries, forestry).

Source: International Finance Corporation (IFC). 2012. Performance Standards and Guidance Notes available at http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/sustainability+framework/sustainability+framework+-+2012/performance+standards+and+guidance+notes+2012/performance+standards+-+2012

of a baseline assessment representing the *status quo* before operations start. A biodiversity impact assessment is conducted as part of the broader environmental impact assessment process, either as part of the overall EIA or an environmental and social impact assessment (ESIA) required by existing legislation. It may also be a separate procedure, as suggested for Natura 2000 areas in EU legislation.

The process should include an adequate inventory of the biodiversity present at the site and, based upon this inventory, a proper identification of the biodiversity importance of the site. It is important that the biodiversity impact assessment be as comprehensive as possible, with all possible impacts of a planned activity on and around a site identified, described and assessed, including residual impacts that cannot be avoided and any necessary mitigation measures (see Figure 2). The assessment should also include all aspects and phases of the proposed activity, including site preparation, development of the site, operation, rehabilitation and closure, as well as all elements of biodiversity possibly affected and all possible impacts of the proposed activity on biodiversity.

International standards specific to biodiversity impact assessment, such as the "Voluntary guidelines for biodiversity-inclusive impact assessment" developed by the CBD, the EU Natura 2000 network or the International Finance Corporation (see Box 3), are useful frames of reference.

Box 4 – Policy and legal provisions on biodiversity offsets in EIA requirements

Governments can introduce biodiversity offsetting policy and regulation in two basic ways. The first is through specific provisions on biodiversity offsets (and perhaps other aspects of biodiversity conservation) and the second is to incorporate offsetting provisions into other laws and policies that deal with EIA, land use planning, SEA, sectoral policies or broader environmental policies. The decision on which approach to take depends to some extent upon the legal customs of the jurisdiction concerned, and also upon the scope of the other laws relative to the intended scope for biodiversity offset requirements.

In many countries, EIAs provide the necessary framework for governments to negotiate biodiversity offsets with developers, particularly for larger-scale projects. In order for the EIA to act as a trigger for biodiversity offsets, the requirements of the EIA system itself need to be robust and transparent, to ensure that the full mitigation hierarchy is followed, that there is a reliable measure of residual impacts on biodiversity and their significance, that biodiversity offset negotiations take place with stakeholders, and that realistic and practicable offset proposals are prepared.

When integrating biodiversity offset provisions within EIA requirements, it is important to ensure that the EIA or its supporting policy framework:

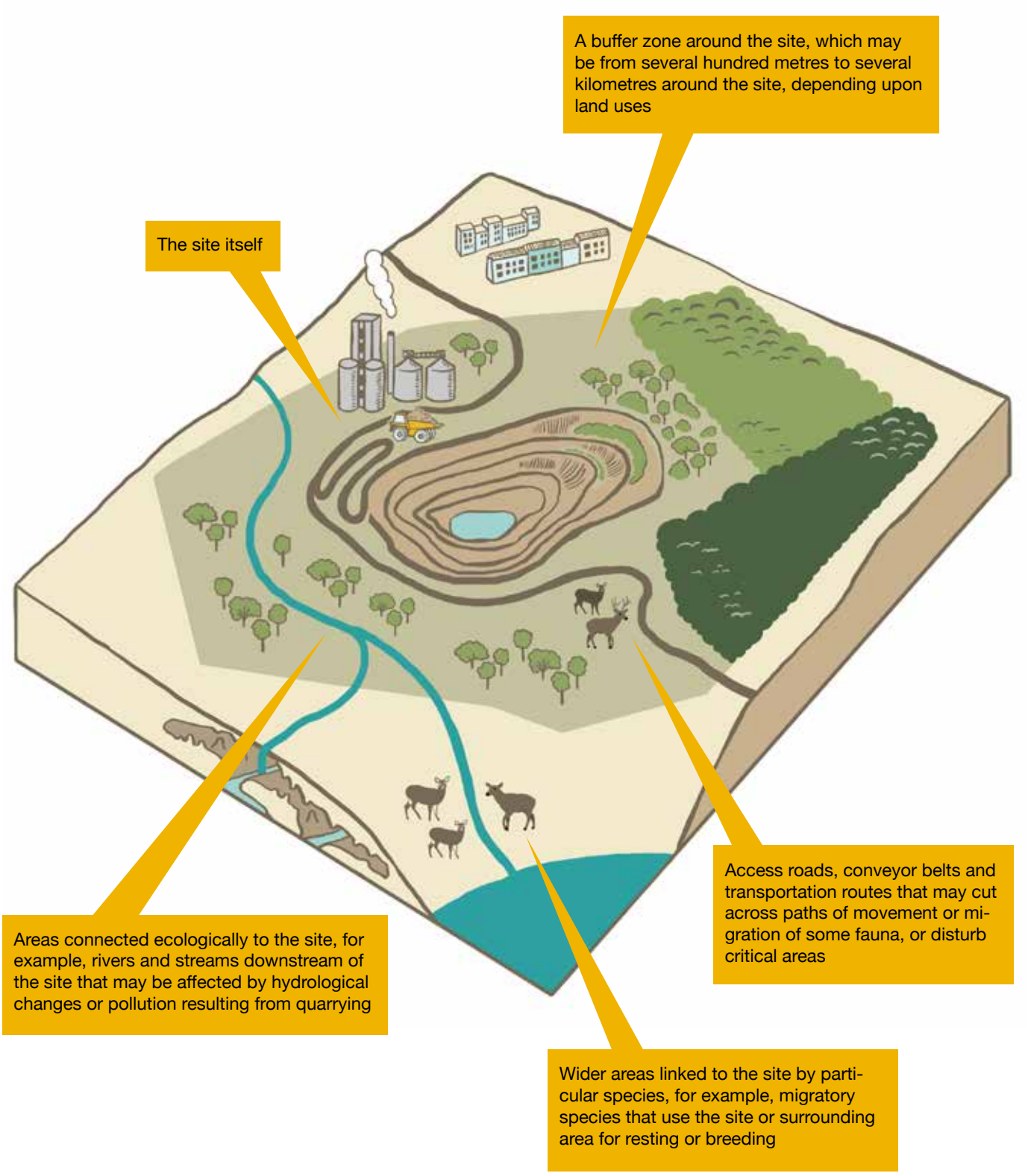
- includes targets to achieve "no net loss" of biodiversity, translated into country- and context-specific indicators;
- requires the avoidance and minimisation steps for all impacts on valued biodiversity;
- requires that significant residual impacts are offset;
- addresses all components of biodiversity affected, including ecological and evolutionary process and functional aspects;
- addresses the use of cultural values of biodiversity to affected parties;
- considers impacts beyond the site boundaries, at the landscape scale;
- addresses indirect and cumulative impacts; and
- evaluates the effectiveness and risks of proposed measures to minimise and restore/repair impacts; that is, it must provide a reliable measure of residual negative impacts on biodiversity.

Details about implementation of the proposed offset should then be incorporated in an environmental management plan (offset management plan) or Biodiversity Action Plan.

The Business and Biodiversity Offsets Programme (BBOP) has developed tools and resources related to biodiversity offsets, including principles on biodiversity offsets and guidance for designing offsets, as well as resource papers and case studies.

Source: Crowe, M. and ten Kate, K. 2010. Biodiversity offsets: Policy options for governments. Available from: http://www.forest-trends.org/publication_details.php?publicationID=3079

Figure 2 – Geographical scope of the biodiversity impact assessment



Contents of the biodiversity impact

A biodiversity impact assessment should include information on the proposed activity, the environment that may be affected, and the impacts of the proposed activity on the environment, for various stages of the operation. EIA and biodiversity assessment legislation generally prescribes the output, i.e. the information required for a sound decision. An essential part of this information is categorisation of the impacts, in order to determine the risk to biodiversity and ecosystem integrity. To determine the risk to biodiversity and ecosystems, it is necessary to classify the biodiversity importance of the site as well as understand the impacts that the operation will have on biodiversity. Within the assessment, biodiversity and potential impacts can be categorised as follows:

- *protected areas*: potential impacts on recognised areas of high conservation value that are either in or nearby the site;
- *habitats*: the presence of characteristic and high-value habitats found in the area upon which the species depend;
- *species*: rare or endangered species that are present in or near the site, characteristic species that are found in the area, and invasive alien species that might be a threat to biodiversity in the area;
- *hydrological services*: including ground and surface water balances and flows; and
- *community use*: the key uses of biodiversity by local stakeholders, including livelihood and recreational uses of biodiversity, as well as spiritual values associated with biodiversity in and around the site.

International instruments and standards, as well as national law as applies, can be useful references for identifying biodiversity that may be affected by the operation. Among the useful sources of information are:

- protected area status, including World Heritage sites, Ramsar sites, biosphere reserves, IUCN protected area management categories I-IV and other significant national protected areas;
- Key Biodiversity Areas (KBA);
- critical habitats and, in particular, limestone resource areas should be investigated for the presence of karst ecosystems and features especially caves;
- ecosystems (terrestrial and aquatic) and the services they provide;
- species on the IUCN Red List of Threatened Species;
- national priority species and national priority habitats (defined in legislation and/or National Biodiversity Strategy and Action Plan).

In addition to describing and assessing the possible impacts, the biodiversity assessment should also identify mitigation measures for all operational phases of the proposed activities and beyond closure (see Box 4). Mitigation measures include biodiversity management activities as part of the environmental management measures required by law. The development of management plan(s) will be informed by the descriptions of possible impacts and identification of mitigation measures within impact assessments. These plans should be prepared and agreed on in the overall permitting process and will be part of the permitting conditions.

Management plans incorporating biodiversity

The assessment of environmental risks and opportunities will trigger the development of management plans that address the risks identified and realise the opportunities associated with improved practices. These plans can include an environmental management plan (EMP), a biodiversity action plan (BAP) and a mining closure and site rehabilitation plan. Such plans are often a legal requirement and focus on avoiding, minimising and mitigating impacts of operations on the environment. Given the nature of quarrying activities, biodiversity considerations should be an integral component of these plans. Furthermore, regulatory tools should provide for differentiated requirements based on the level of biodiversity importance and impacts of an extraction site.

Box 5 – Levels of biodiversity input for the rehabilitation plan

Standard rehabilitation plan

- re-vegetation using non-invasive alien species or native species
- active control of invasive alien species
- no biodiversity monitoring
- ultimate land use not primarily geared at biodiversity or depending on biodiversity (e.g. residential/industrial)

Rehabilitation plan with biodiversity targets

- may include biodiversity targets (together with targets for other forms of land use)
- re-vegetation using only native species
- active control of invasive alien species
- no biodiversity monitoring (except presence/absence of invasive alien species)
- ultimate land use based on a natural resource base/biodiversity (forestry, grazing, etc.) with due cognisance of the land-use patterns in the broader landscape

Source: IUCN. 2014. Biodiversity management in the cement and aggregates sector: Integrated Biodiversity Management System (IBMS). Gland, Switzerland. Available at: www.iucn.org/cementandaggregates

Environmental Management Plan (EMP)

The EMP provides a description of the methods and procedures for mitigating and monitoring impacts and promotes the awareness and use of best environmental management practices by sites during their construction and operations phases.

Findings of the biodiversity impact assessment, especially the recommended mitigation measures could be incorporated into the EMP. The management plan should include provisions for emergency response if unforeseen biodiversity- related events occur, such as discovery of rare species, discovery of important undetected caves, accidental spillage of oil or other substances reaching water resources, or quarrying activities accidentally disturbing underground water balance. The EMP should refer to the biodiversity value of the site, the opportunities to enhance biodiversity, the landscape context and community expectations and desires.

Biodiversity Action Plan (BAP)

A BAP should be required for sites where the risk assessment determines that biodiversity values are high and impacts would be difficult to mitigate. BAPs are intimately linked to EMPs and complementary to rehabilitation plans. While both EMPs and rehabilitation plans consider other aspects of the risk assessment, such as environmental impacts and safety-related considerations, the BAP focuses exclusively on biodiversity and ecosystem risks and opportunities. The decision on the need for and preparation of a BAP should also be part of the permitting process, and the BAP, if needed, should be part of the permit conditions.

Basic elements of a BAP may be prescribed in secondary legislation (decrees, regulations) or in administrative instructions or guidelines issued by the government. BAPs should include targets for important biodiversity and monitoring procedures.

Mine closure and site rehabilitation plan

As part of the permitting process, a developer should be required to submit a mine closure, land reclamation and site rehabilitation plan to identify measures to restore the impacted parts of the site. The closure and rehabilitation plan, if agreed to by the authorities, should also be made part of the permitting conditions.

The management plan for the site should be fully integrated into the mine closure and rehabilitation plan, and vice versa. Specific biodiversity requirements for the rehabilitation plan, which are best included in secondary legislation (decree, regulation) or in administrative instructions, should include biodiversity rehabilitation targets, a minimum level of biodiversity input and opportunities for biodiversity gains (see Box 5).

It is important to stress that closure and rehabilitation measures should be implemented as early as possible and financial assurances should be provided early in the project, to ensure there are enough funds available at the time of closure. Specific characteristics of rehabilitation plans that could be helpful in drawing up specific requirements can be found in the IBMS document discussed in Box 1.

Biodiversity monitoring system and reporting requirements

During the permitting process, the monitoring and reporting requirements for the biodiversity of the site will be determined and prescribed, with conditions on how to fulfil the general monitoring obligations included in legislation or in secondary rules and regulations on biodiversity monitoring. The subjects of biodiversity monitoring at the site, the procedures and the reporting requirements should be decided on in the permitting procedure and included in permit conditions. Basic elements of a monitoring system for a site to be considered in the permitting process may be described in secondary legislation (decree, regulation) or in administrative instructions or guidelines, and should include reporting requirements.

Procedural mechanisms

As a complement to regulations and laws governing the permitting and impact assessment processes, governments should implement specific procedural mechanisms to ensure transparency, participation, consultation and compliance, with a view to enhancing the legitimacy of the entire process. It is essential that access to information is ensured and that all stakeholders, both governmental and non-governmental, have the opportunity to participate in public consultation processes (see Box 6).

Principle 10 of the 1992 Rio Declaration on Environment and Development states that environmental issues are best handled with the participation of all concerned citizens in the decision-making process. States should require public authorities – including government bodies from all sectors and at all levels, as well as bodies performing public administrative functions – to create mechanisms and adopt measures for ensuring access to information, public participation and access to justice.

Box 6 – Public access to environmental information

In the EU, the Aarhus Convention and EU Directive 2003/4/EC on public access to environmental information mandate that member countries provide access rights to guarantee that the disclosure of information is the general rule. Public authorities are permitted to refuse a request only in specific and clearly defined cases. There is also a mechanism for reviewing compliance.

In Southeast Asia, the rights of access to information and participation are expressed in article 16 of the ASEAN Agreement on the Conservation of Nature and Natural Resources, which stipulates that the contracting parties shall circulate as widely as possible information on the significance of conservation measures and their relationship to sustainable development objectives, and shall, as far as possible, organise public participation in the planning and implementation of conservation measures.

At present, member countries of the Economic Commission for Latin America and the Caribbean are also developing a regional instrument on access to environmental information, participation and justice to ensure those rights in the region.

Source: European Commission (EC). 2013. The Aarhus convention: http://ec.europa.eu/environment/aarhus/

Access to information

National legislation relating to access to information on environmental matters provides a practical tool for achieving transparency and accountability by allowing individuals and communities who are, or may be, affected to obtain government-held information about activities that can affect them or pose a risk to their lives or to the environment. In addition, access to information legislation can also provide recourse to justice when the public authority fails to provide such information through procedures for review or appeal of an agency's decision to withhold information.

Two complementary systems are necessary to effectively implement this topic. The first is a system to keep records of all decisions and processes held by public authorities, and to disseminate them and inform the public without the need for them to request the information. Relevant legislation for this system should identify specific documents to be publicly available for review, comment and information, both in draft and in final form. The legislation should also state the authorities responsible for providing access and distribution of information, the means of distribution, format, timeframe and the means by which comments will be received. Box 7 details the type of biodiversity management information that should be available, widely publicised and easily accessible.

The second system should allow the public to request and receive information, outside review or comments. This right to access information should be extended, by law, to any person, without having to prove any interest or reason for requesting information. Legislation to implement this system should outline the timeframes for delivering the information requested (minimum of one month as stated by the Aarhus Convention with possible extension if needed for a justified reason) and standards or guidelines for situations when information requests may be refused, for example where disclosure would adversely affect various interests.

In general, situations that could lead to refusal of information might include national defence, international relations, public security, the course of justice, commercial confidentiality, intellectual property rights, personal data or the confidentiality of the proceedings of public authorities; or where the information requested has been supplied voluntarily or consists of internal communications or material in the course of completion. The grounds for refusal should be interpreted narrowly, taking into account the public interest served by disclosure. The legislation should also guarantee stakeholders access to review procedures before a court of law or other independent and impartial body to challenge a decision; this would be relevant when a stakeholder considers

Box 7 – Making biodiversity management information publicly accessible

Phase		Planning	Permitting	Extraction
Instrument		**Land-use/ strategic planning**	**EIA**	
Types of materials that should be made publicly available for review, comment and information	**Government level**	National development plans Proposals of declaration of protected areas and budget Proposals of land-use planning presenting all the information collected (e.g. maps) and specifying the problem statements and the alternatives for change in terms suitable for public and executive discussion	Evaluation of the biodiversity assessment by public authorities. If final decisions override biodiversity conservation impact assessment findings, reasons must be given.	
	Operator level	Closure and rehabilitation plan	Findings of biodiversity assessment easily identifiable in the general EIA Information on methods, process and technologies used for the assessment Proposed mitigation measures	

that his request of information has been unreasonably refused, partly or fully, inadequately answered or ignored, or in any other way not handled in accordance with applicable law.

Access to information held by the authorities can be included in specific legislation. Reference to such legislation should be made in biodiversity, land-use and mining legislation, where the legal instruments such as planning, EIA/ESIA and permitting are regulated. When a single piece of legislation concerning access to information does not exist or is insufficient, provisions on access to information and the relevant procedures should be incorporated into legislation on biodiversity conservation or into laws and regulations on mining or land-use planning.

Public participation in decision-making processes

The public's right to participate in decision making on administrative and legislative measures relating to the development and exploitation of natural resources is crucial, particularly in mineral extraction. The Aarhus Convention (Annex I) lists quarries and opencast mining where the surface of the site exceeds 25 hectares as one of the activities that require public participation in decision-making processes. Legislation should specifically establish that extractive activity-related decisions should be subject to appropriate participation by affected persons and the general public. Decisions and processes where public participation is particularly important

Closure		
Permitting	**Monitoring**	**Rehabilitation**
The permitting request Comments presented by the public The decision made. If other aspects have priority over bio-diversity conservation, reasons must be provided to clearly and reasonably justify the decision they make. Review proceedings of permits and permit conditions	Government inspection reports that include the company's permit compliance information	Land use after closure
The environmental financial assurance arrangement (which includes the costs for biodiversity rehabilitation)	Biodiversity monitoring report EIA implementation reports	Biodiversity rehabilitation implementation reports Closure procedure and implementation

for integrating biodiversity conservation into quarrying activities include land-use planning, designation of protected areas and quarry sites, EIA, permitting processes and establishment of mitigation measures and management plans for biodiversity.

Some basic provisions for early and effective public participation should be incorporated into relevant legislation. The concerned people should be informed in a timely manner, and the information provided should be accurate, relevant and understandable. Once they have received all relevant information, the public and/or affected persons should be given adequate or reasonable opportunity to prepare and express their views and opinions, for both drafts and final decisions. Capacity-building resources, including environmental education and awareness raising, should also be provided to stimulate public participation in decision-making.

Government authorities should take due account of the public comments within the decision-making process, and any decisions should be promptly relayed to the public. Decisions should refer to the comments and, if the comments have not been followed, proper justification should be provided. Public citizens should have access to review procedures before a court of law or other independent and impartial body to challenge the substance and procedural legality of any decision, act or omission relating to public participation in decision making in environmental matters. Such procedures should be timely, fair, open, transparent and equitable.

Finally, the community and other affected or interested parties should have the right to monitor and oversee the project and its impact, and, whenever there is significant impact to biodiversity and/or their livelihoods, there should be a complaint mechanism procedure available to them.

Indigenous and local communities that depend on biodiversity for their livelihoods or traditional lifestyles should be given special attention to guarantee their participation in decision-making processes. If needed, mechanisms should be established for this purpose. As such, adopting the obligations on free, prior and informed consent of the International Labour Organization (ILO) Convention 169 on Indigenous and Tribal Peoples in Independent Countries and the UN Declaration on the Rights of Indigenous Peoples into national legislation is recommended (see Box 8), particularly the following aspects:

- consult the people concerned whenever consideration is being given to legislative or administrative measures that may affect them directly (ILO Convention 169, Article 6a);
- consult and cooperate in good faith with Indigenous Peoples, seeking to obtain their free, prior and informed consent (UNDRIP, Article 19, 32 (2));
- recognise the rights to participate in decision making in matters which affect Indigenous Peoples' rights (UNDRIP, Article 18);
- establish means by which these people can freely participate, to at least the same extent as other sectors of the population, at all levels of decision making in elective institutions and administrative and other bodies responsible for policies and programmes that concern them (ILO Convention 169, Article 6b); and
- safeguard the people concerned against the abuse of their rights; means should be provided to allow them to take legal proceedings, either individually or through their representative bodies, for the effective protection of these rights (ILO Convention 169, Article 12).

Compliance and enforcement-related mechanisms

Ensuring compliance is an important complement to legislation that oversees impacts on the environment and biodiversity; laws and regulations will be useless if the government is unable to ensure compliance and effective implementation. Strengthening the integration of biodiversity conservation into extractive industry activities also means making recommendations for better practices in compliance mechanisms.

The objective of compliance mechanisms is to ensure that the statutory obligations, as well as the obligations and conditions established in permits, are followed. Inspection and supervision also ensure that the mitigation measures have been implemented and thus that the environmental and biodiversity management systems are working. Inspection/supervision must cover all activities throughout all phases, including site operations, site-closure and post-closure measures. When statutory obligations imposed on an operation via a license, EIA or other regulatory process are not met, enforcement mechanisms must be put in place.

An effective compliance and enforcement programme requires governments to take a number of actions. Compliance should be considered when environmental laws and regulations are framed. Good communication with industries likely to be affected can also help improve eventual compliance. Economic instruments should be chosen carefully, in order to maximise compliance. Environmental performance can be improved by a mix of such instruments, including incentives as well as restrictions. In addition to command-and-control regulations, other approaches, such as voluntary or negotiated agreements and market-based instruments should be given consideration.

A number of issues are crucial to ensuring effective compliance:

- *Competence and expertise:* Governmental and administrative authorities responsible for compliance control must have the necessary competence and expertise in biodiversity conservation. Authorities must have sufficient personnel and appropriate equipment. Otherwise, they should have access to expert advice.

Box 8 – Law on Prior Consultation with indigenous and native peoples in Peru

The Law on Prior Consultation was adopted in Peru in 2011. It builds on commitments set out in the ILO Convention 169 concerning Indigenous and Tribal Peoples in Independent Countries.

The Peruvian law recognises the right of indigenous and native nations to be consulted before the adoption of any legal or administrative measures (e.g. mining operation permits), as well as any plans or programmes for development at national and regional levels (e.g. land-use planning) that could directly affect their rights, cultural identity, quality of life and development. Prior consultation must be conducted before adopting any decision for exploitation of natural resources located in their territories. The law aims at reaching consensus between the government and native peoples. The competent authorities (i.e. the ones responsible for the measure) are obliged to identify decisions that can potentially affect Indigenous Peoples, identify the concerned indigenous or native populations, fully inform them of the measures, evaluate the measure taking into consideration their collective rights and initiate a dialogue with the people. The consultation is developed through the Indigenous Peoples' representative organisations, which are appointed by members of indigenous communities. In addition, the peoples' representative organisation can request the initiation of the consultation, and if such petition would be rejected, legal remedies are provided.

The final decision is adopted by the competent authority. It has to be justified and refer to all points of view, suggestions and recommendations of the people implied, and must include an analysis of the implications of the decision for the people. The consensus achieved is legally binding for both parties. Even if there is no consensus, the authorities are obliged to ensure the protection of people's collective rights.

It is important to note that this procedure does not preclude the obligation of the authorities to conduct public participation procedures as part of EIA and permitting processes, which include a wider range of stakeholders.

Source: Full text of the Peruvian law on Prior Consultation with indigenous and native peoples (in Spanish): http://faolex.fao.org/docs/pdf/per128120.pdf

- *Legal means:* Authorities must have the necessary means to undertake appropriate and effective inspection/supervision, including setting aside appropriate financial resources. Legislation must provide for these.
- *Cooperation of authorities:* Inspection/supervision authorities must have the opportunity to participate in permitting procedures, both to ensure that aspects of enforcement are considered and permits are "enforceable" and to ensure that they are informed about the permits that they are expected to control afterwards. Conversely, inspection/supervision authorities should inform permitting authorities about the results of compliance controls, enabling permitting authorities to verify that permits are working or whether modifications and adaptations are required.
- *Transparency and accountability:* Compliance control needs transparency, not only for the operator but also for other affected stakeholders, including the public. Reports on inspection/supervision should, to the extent possible, respect rules about business confidentiality. There are a number of inspection standards available, for example the EU's Integrated Pollution Prevention Control system (IPPC), which applies to extractive industry activities. For instance, in the IPCC system, industries with a high pollution potential are required to have a permit which can only be issued if certain environmental conditions are met. Member States are responsible for inspecting industrial installations and ensuring they comply with the directive. At the global level, the Extractive Industries Transparency Initiative (EITI) is a recent example of

a transparency and accountability standard for better governance of natural resources that reconciles and makes public company payments and government revenues from oil, gas and mining at the country level (see Box 9).

- *Monitoring:* Compliance can also be ensured by self-monitoring and reporting by industry. A combined system is appropriate, involving both self-monitoring and reporting and administrative control. To the extent operators voluntarily establish environmental and biodiversity management systems involving monitoring and reporting, results can be taken into account when deciding about inspection/supervision. Especially where environmental auditing systems are in place and are applied by operators, inspection/supervision can be reduced, though not completely replaced, as any self-regulation requires some governmental guarantee.

Where obligations are not complied with and could cause serious damage to the environment, enforcement measures, including appropriate sanctions, are needed.

Box 9 – The Extractive Industries Transparency Initiative (EITI)

The EITI is a global standard to ensure better natural resource governance through transparency and accountability in the extractive sector. It is a voluntary initiative, supported by a coalition of companies, governments, investors and civil-society organisations.

The EITI has a robust but flexible methodology for monitoring and reconciling company payments and government revenues from oil, gas and mining at the country level. According to this methodology, each implementing country must develop its own EITI process adapted to its specific needs. The Initiative encourages greater transparency and accountability to help mitigate the potential negative impacts of mismanaged revenues.

The EITI has 12 principles that are the cornerstone of the standard. It includes several criteria detailing minimum requirements that countries must follow. At present, 23 countries worldwide have met the requirements established in the EITI Standard.

Source: EITI Standard: http://eiti.org/files/English_EITI%20STANDARD_11July_0.pdf

4 Market-based instruments

This chapter provides an introduction to market-based instruments, explaining what they are, what their function is, why they can be useful policy tools for biodiversity conservation, and the practical advantages they offer in relation to the more traditional command-and-control instruments.

Overview of market-based instruments

A challenge for biodiversity management is that, in the absence of well-defined property rights for habitats and biodiversity components, the costs and benefits to biodiversity resulting from the land-use activities of any one individual operator tend to fall on society as a whole, rather than on the individual. As such, an operator may not fully consider these costs and benefits in its decision-making.

Market-based instruments (MBIs) aim to internalise these external costs and benefits and encourage private producers and consumers to consider biodiversity or ecosystem values in their economic decisions, either through pricing tools such as taxes or subsidies or by allocating tradable property rights to "pollute" at a level below that which occurs in a non-regulated marketplace.

MBIs are broadly defined as "regulations that encourage behaviour through market signals rather than through explicit directives."[iv] These tools can harness market forces by redefining the agenda of companies and individuals so that they see improved environmental outcomes as in their own interest.

MBIs can result in the same benefits to biodiversity conservation as command-and-control mechanisms, but at a lower financial cost to government, industry and society as a whole, by:

- allowing flexibility in response to the instruments, so that each individual can choose the lowest-cost means of achieving the desired outcome;
- encouraging greater change or abatement measures amongst those who can achieve change most cheaply, as opposed to imposing equivalent change requirements on all; and
- providing positive incentives for better biodiversity outcomes, compared to the negative or punitive incentives evident in regulatory approaches.[v]

Command-and-control regulations are more prescriptive in nature than MBIs. For example, command-and-control mining regulations tend to have minimum requirements for site rehabilitation, require the use of a certain type of management process to prevent environmental damage, or specify a maximum allowable level of pollution at the firm level.

However, a challenge of command-and-control instruments is that they require all companies to reduce their pollution by the same amount, even if the companies are only able to achieve this at different costs (due to differences in processes employed, input mixes, location-specific factors, etc.). In contrast, an MBI with the same allowable level of pollution target will encourage those companies or plants that can reduce their environmental impact at a lower cost per unit of discharge to reduce more, relative to those operators who face higher abatement costs.

MBIs, therefore, allow firms to make adjustments based on their unique business structures and opportunities. Furthermore, as MBIs give companies the incentive to discover cheaper ways to achieve desired targets, they may lead to innovation in production processes and enhanced competitiveness. Other advantages include improved access to investment capital and, in some cases, reduced enforcement costs due to better alignment between private and public interests.

MBIs leverage behavioural change through a range of different mechanisms, including:

- *price-based instruments*, which alter the prices of goods and services to reflect their relative impact, for example through environmental taxes and tax rebates, subsidies, fees and fines (see Table 1);
- *quantity-control instruments*, which alter the rights associated with the use of natural resources and make these rights tradable, for example through tradable permits and biodiversity offsets schemes (see Table 1); and
- *Market-based facilitation approaches*, which make existing markets work better by enhancing information, lowering the costs of transactions and increasing market confidence, for example through information disclosure (see Chapter 5).

The choice of the most appropriate MBI will depend on a range of factors, including environmental effectiveness, costs of contracting, monitoring and enforcement, distributional effects, conformity with other policies and political preferences. For example, if there is concern about the compliance costs of achieving pollution reduction, then a price-based mechanism should be favoured, as the cost of reducing one unit of pollution is known beforehand (although such instruments may need to be adjusted several times until the required change is achieved). However, it is important to recognise that measures such as subsidies or payments for environmental services are only effective as long as budgets remain available. For this reason, the environmental outcome of price-based instruments is sometimes considered less certain than quantity-based approaches, such as cap-and-trade schemes. In general, successful MBIs usually incorporate other policy instruments to function effectively, for example quantity-based instruments tend to require complementary regulations to create effective property rights or entitlements.

While there are many benefits to using market-based instruments, some caution also needs to be exercised. Before using an MBI, it is important to define and understand the relevant market failure and policy objective that is being addressed. If environmental goals are not well-defined, it may be difficult to set appropriate tax, subsidy or pollution levels to effectively address the specific challenges at hand. Economic valuation of the benefits and costs of pollution control or habitat preservation can help governments make the case for MBIs by ensuring that there is enough information available to determine what levels of taxes, subsidies or pollution caps will contribute to increasing social well-being. Such valuation studies can also be used to support policy and decision-making about alternative land uses for a given site or alternative locations for a given quarry.

In considering which instrument is most appropriate for addressing biodiversity concerns, it is worth recalling two basic principles of the market-based approach:

- the beneficiary pays principle states that an instrument should be designed to reward good environmental performance by compensating those who deliver biodiversity benefits; and
- the polluter pays principle, states that an instrument should be designed to ensure that those who damage biological resources pay the costs either to those directly affected or to the state, acting on their behalf.

Since the extraction of aggregates and limestone tends to be associated with pollution and damages to biodiversity, most instruments used in these sectors adhere to the polluter pays principle. However, when a single landholder is able to provide substantial environmental benefits, e.g. through the restoration of a wetland or by undertaking environmentally friendly, multi-functional agriculture

Table 1

Examples of particular instruments

Category	Examples of particular instruments	
Price-based instruments	Environmental taxes (charges and levies)	An environmental tax is a tax whose tax base is a physical unit (or a proxy of it) that has a proven specific negative impact on the environment. The objective is to encourage more environmentally friendly practices by increasing the price of environmentally related products and activities.
	Payments, subsidies	A subsidy is a payment to an industry or operator that is intended to maintain prices below the prevailing market prices, to encourage a certain environmentally beneficial activity.
	Conservation tenders	Conservation tenders or "auctions" are used to fund conservation work on private land. Land managers are invited to submit bids to undertake conservation work, such as better vegetation management, erosion control, salinity control and carbon sequestration on their property.
	Performance bonds, insurance premium taxes	A performance bond (for example a mine site rehabilitation performance bond) is an instrument that requires payments by operators to the respective authority before a potentially environmentally damaging activity is undertaken, mostly in the course of the official licensing procedure. The payment is only returned if the environmental damage of the activity does not exceed certain thresholds (or stays within the legal thresholds). Performance bonds are sometimes classified as "insurance premium taxes." Performance bonds are similar to a deposit-refund system, since "the amounts deposited with a performance bond can be refunded only when the affected firm fulfils particular obligations."[vi]
	Deposit-refund systems	A deposit-refund system is a surcharge on the price of potentially polluting products. When pollution is avoided by returning the products or their residuals, a refund of the surcharge is granted.
Quantity-control instruments	Tradable permits (also called cap-and-trade), biodiversity offsets	A quantity-control instrument is an economic policy tool under which rights to discharge pollution or exploit resources can be exchanged through either a free or a controlled-permit market. Examples include Individual transferable quotas in fisheries, CO_2 emissions trading schemes, tradable depletion rights to mineral concessions and marketable discharge permits for water-borne effluents.

or forestry, other instruments, such as public subsidies, conservation tenders or auctions, conservation easements, or payments for environmental services may be appropriate. These instruments follow the beneficiary pays principle.

The following section offers examples of instances where MBIs have been used to lessen the environmental impacts associated with the extraction of limestone, sand, gravel, rock or coal. The examples focus on instruments most commonly used in the cement and aggregate sector, namely tradable permits, biodiversity offsets and taxes.

Price-based instruments[vii]

Price-based approaches include conservation tenders, environmental taxes, user fees, bonds, tax rebates and subsidies, all of which aim to influence the behaviour of producers and/or consumers by altering prices, and therefore costs or profits. The most commonly used price-based instrument in the natural resources extraction sector is environmental taxes. Tax rebates, or subsidies in combination with taxes or tax rebates, are also used. Some schemes, for example, allow for relief from taxes on natural resource extraction in exchange for a formal and monitored commitment to implement and maintain environmental improvements. In some cases, policy makers may also combine taxes and subsidies to minimise the overall extraction of virgin material.

Environmental taxes are commonly levied to correct market prices that do not reflect the negative externalities imposed on society as a result of an environmentally harmful activity. In the EU, an environmental tax is defined as one whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific negative impact on the environment. European statistics distinguish four different types of environmental taxes, relating to energy, transport, pollution and resources.[viii] The revenue from environmental taxes usually goes into the central budget of ministries of finance, although a percentage may be earmarked for specific environmental objectives. However, despite the potential environmental and fiscal benefits associated with environmental taxes, they have been relatively scarcely applied.

Boxes 10–12 provide some country-based examples of environmental taxes used in Europe to curb pollution and minimise impacts from extraction for cement and aggregates. These examples show that most of the environmental taxes used in the aggregates industry are applied to natural resource extraction, as output taxes. However, output taxes have been criticised as being inefficient, because they do not provide incentives to reduce the environmental impact of the production process, for example through the installation of abatement equipment or the targeting of less ecologically sensitive mining sites. Output taxes only provide incentives[ix] to lower production, thus lowering the relative volume of environmental impacts.

Policy makers may use an output tax to encourage the substitution of secondary or recycled material for virgin materials. However, there is consensus that no single tax can generate the optimum results in terms of upstream and downstream waste generation and disposal and that multiple policy instruments may be necessary. A combination of a tax on intermediate materials (to give producers the incentive to produce lighter-weight products) with a recycling subsidy (which lowers the cost of recycled materials relative to virgin materials) may be able to more effectively deliver appropriate incentives. This system is very similar to a deposit-refund system, in which the deposit acts like a tax on the virgin material, while consumers who recycle get their tax refunded.

Box 10 – Danish raw materials and waste taxes

A tax on raw material extraction was introduced in Denmark in 1990. The tax was set at DKK 5 (EUR 0.8) per m^3 for selected extracted raw materials. The tax is levied on raw materials that are extracted and consumed in or imported to Denmark, including sand, gravel, stones, peat, clay and limestone. The raw materials tax was introduced in close conjunction with a 1987 waste tax of DKK 40 (EUR 5.3) per tonne of waste, whether landfilled or incinerated. The waste tax was then differentiated in 1993 and again in 1998, so that the landfill tax rate increased to EUR 50 (DKK 375).

These measures were highly effective: In 1985, 82 percent of the construction and demolition waste in Denmark was landfilled and only 12 percent recycled, but by 2004 the recycling rate had increased to 94 percent. However, an important precondition for this marked increase in the share of waste recycled was a complementary supply-oriented regulatory policy measure introduced in 1997 on the separation of construction and demolition waste. The policy requires that waste from demolition works involving more than one tonne should be separated at source into pure fractions. This has increased the ease with which waste supplies could be re-utilised, for example in construction works.

In this case, taxes on raw material extraction, in combination with the supply-oriented regulatory policy measure, led to a marked increase in recycling, which was the main intention of the taxes. This illustrates the fact that a specific policy mix of instruments may be the key to achieving desired outcomes.

Sources:

- *European Environment Agency. 2008. Effectiveness of Environmental Taxes and Charges for Managing Sand, Gravel and Rock Extraction in Selected EU Countries, EEA Report No. 2/2008, Copenhagen.*
- *Söderholm, P. 2011. Taxing Virgin Natural Resources: Lessons from Aggregates Taxation in Europe. Luleå University of Technology. Available at: http://www.hallbaravfallshantering.se/download/18.7df4c4e812d2da6a41680004968/*

Environmental taxes should be set at a level that reflects the cost of environmental damage that an activity is causing. However, differential taxation that reflects differences in environmental damage is rarely seen in practice. In Sweden for example, rather than employing a virgin gravel extraction tax that reflects differences between the environmental cost of gravel extraction in the north versus the south of the country, Swedish authorities introduced a complementary regulatory instrument to limit gravel extraction where gravel beds are essential for drinking water or where gravel extraction conflicts with other natural and cultural values (see Box 11). The informational requirements necessary to design appropriate regulatory instruments and rules are further increased by regional differences in ecosystem service provisions.

Policy makers may be tempted to employ broad upstream environmental tax bases to minimise monitoring and administration costs and to increase central government funding. Taxing close to damages, or using cap-and-trade to target specific sources of pollution, often requires specific monitoring technologies that can measure pollution levels. Fortunately, the ongoing and rapid advances in information technology and computer processing are improving the ability to monitor changes in the environment and thus the feasibility of developing environmental markets.

Environmental performance bonds

In a relatively small number of countries, industries are required to post environmental performance bonds to fund insurance pools against potential environmental risks associated with extraction, production or use of certain products. The payment is only returned if the environmental damage of the activity does not exceed certain thresholds (or stays within the legal thresholds). Performance bonds are sometimes called “insurance premium taxes.”

Sweden, for instance, has had a compulsory insurance system since 1989. The system, which is managed by private insurance companies for operators of "dangerous facilities," compensates for damages when polluters cannot be identified. France requires operators of quarries and waste storage facilities to post financial guarantees protecting the public from potential non-payment of mitigation expenses, and Spain requires pollution liability insurance from companies handling hazardous waste in the chemical industry.

As the prices for future performance bonds will increase with any environmental damage caused, the system provides an incentive for a company to minimise the negative impacts of its activities. In extreme cases, companies may not be able to purchase performance bonds if insurance companies deem them likely to violate environmental regulations in the future.

However, while performance bonds or insurance premiums are meant to encourage firms to internalise environmental risks in their decision making, they are rarely set in proportion to the risk or potential damage created by the activities. In the United States, for example, all petroleum products are taxed to support the Oil Spill Liability Trust Fund, regardless of how they are transported; this may create small incentives to use less petroleum, but not to use safer ships or other means of transport.

In Western Australia, mining companies are required to have bank-guaranteed unconditional environmental performance bonds that are intended to ensure that the Western Australian Government has sufficient funds to rehabilitate mine sites if operators fail to do so. However, a major concern for the mining industry is that the unconditional performance bond system applies to all companies and does not reflect the overall industry risk of failure to comply with environmental

Box 11 – The Swedish gravel tax

After the introduction of the Swedish gravel tax in 1996, the tax rate was raised on several subsequent occasions. By 2006, the rate was EUR 1.38 (or SEK 13) per tonne natural gravel extracted, twice the original level. The tax must be paid by any company exploiting a site that requires a permit under the Swedish Environmental Code. The rationale for introducing the gravel tax was primarily environmental, based on concerns about resource scarcity, preserving the landscape and water quality, as gravel beds serve as important groundwater reservoirs and are used as a filter for purification of drinking or sewage water in certain parts of Sweden. However, a uniform tax failed to address north-south differences in the availability of natural gravel to purify water. A cost-effective solution would have required a higher tax on gravel extraction in southern Sweden relative to northern Sweden, where gravel beds are more abundant and population pressures are lower.

To account for these differences in environmental externalities, changes were recently made in licensing procedures for quarrying operations, specifying that natural gravel extraction should take place only in locations where gravel beds are not essential for drinking water supply and where there are few conflicts over natural and cultural values. This measure, used in combination with the uniform tax, ensures that gravel extraction only takes place for purposes where alternative materials cannot be used.

The extraction of gravel in Sweden, which totalled 44.6 million tons per year in 1995, had fallen to 18.8 million tons by 2008. Although it is unclear to what extent this reduction is attributable to the tax, it is very likely that the tax has helped to sustain the shift as a part of a package of policy measures that include, among others, a tightening of the permit regime. Moreover, the levying of the tax led to improvements in the quality of information arising from monitoring of the extraction activity at the quarry level. This case indicates that extractive taxes may help improve the quality and the reliability of the extraction data, which can then be used as a basis for encouraging changes in quarry management activities.

Source: Swedish Environmental Protection Agency (SEPA). 2000. Naturgrusskatten: utvärdering av skatteeffekterna (The Tax on Natural Gravel: Evaluation of the Tax Impacts), Report 5077, Stockholm.

Box 12 – The United Kingdom aggregates tax

The UK aggregates tax was introduced in April 2002 for quarry operators. The impetus for the tax was a contingent valuation study that estimated the total external costs (in terms of noise and vibration, dust and other emissions to air, visual intrusion, loss of amenity and damage to wildlife habitats) of aggregates extraction in the region to be EUR 558 million (or GBP 380 million) per year.

The tax was introduced at a rate of EUR 2.35 (or GBP 1.60) per tonne, equivalent to approximately 20 percent of the average price per tonne of material. The goal of the tax is to reduce the environmental costs associated with quarrying operations, as well as to reduce the demand for aggregates and encourage the use of alternative materials, such as secondary aggregate materials (exempt from the tax), waste slate or shale, or recycled aggregate materials.

Although there is no quantitative data available to show the extent to which the tax has been effective, it is likely that the earmarking of the environmental tax revenues has helped reinforce its intended purpose. A proportion of the tax revenue, for instance, was used to develop a quality standard for recycled aggregates, which gave companies confidence in purchasing these materials. This was reinforced through the use of awareness-raising campaigns to encourage local authorities to purchase recycled materials when carrying out local infrastructure projects.

Sources:

- *Söderholm, P. 2011. Taxing Virgin Natural Resources: Lessons from Aggregates Taxation in Europe. Luleå University of Technology. http://www.hallbaravfallshantering.se/download/18.7df4c4e812d2da6a41680004968/*
- *London Economics. 2006. Study to Inform the Policy Review of the Aggregates Levy Sustainability Fund. http://londoneconomics.co.uk/wp-content/uploads/2011/09/78-Study-to-Inform-the-Policy-Review-of-the-Aggregates-Levy-Sustainability-Fund.pdf*

obligations. In an attempt to more closely reflect the overall industry risk of failure, a Mining Securities Fidelity Fund has been proposed as an alternative (see http://www.dmp.wa.gov.au/documents/100957_Policy_Options.pdf).

Quantity-based instruments

Quantity-based market instruments involve creation of a market for a commodity (either biodiversity offsets or transferable quotas/credits) based on a decision to limit emissions levels or total allowable environmental impact.

Cap-and-trade

Cap-and-trade arrangements generally involve a cap being placed on emissions of a given pollutant from all discharges in a specific area. Participants in these programmes are permitted to trade discharge levels amongst themselves, provided the collective discharge from all sources remains below the cap. These schemes are often used to manage greenhouse gas emissions and over-exploitation in fisheries and watersheds. They are also used to regulate levels of effluents (nutrients, salts, pesticides) and salinity in waterways. Australia has been a frontrunner in developing cap-and-trade schemes to regulate discharges of saline water (see Box 13).

As quarrying for cement and aggregates is often associated with discharges of high pH water, which has adverse effects on water quality, a cap-and-trade scheme system may be used to limit such discharges. With regards to land, “tradable development rights” have been trialled to some extent in the United States and in Europe but are still considered a theoretical approach and highly dependent on well-defined property rights.[x]

Box 13 – The Hunter River Salinity Trading Scheme in New South Wales, Australia

The Hunter River Salinity Trading Scheme manages saline water discharges from coal mines and power stations to minimise impacts on water users and the aquatic ecosystem. The scheme manages salinity by restricting discharges to a share of that which can be safely diluted within a high-flow event.

The total salt that can be discharged during the high-flow event is calculated according to the ambient salinity in the Hunter River. A salinity water-trading scheme works by allocating participants discharge credits, which represent a percentage of the allowable discharge of saline water into the basin. These credits can be traded amongst the participants according to individual mines' requirements. Credits are valid for 10 years and can be owned by a third party. In order to maximise the potential benefits from trade and facilitate new entrants, 20 percent of credits expire every two years and are reallocated via auction. A comprehensive system of real-time monitoring is used to ensure that participants do not exceed their pollution entitlement.

Source: Department of Environment and Conservation New South Wales. 2006. Hunter River Trading Scheme: Working together to protect river quality and sustain economic development. Available at: http://www.epa.nsw.gov.au/resources/licensing/hrsts/hrsts.pdf

Box 14 – The Australian Bushbroker® banking scheme

In Australia, offsetting frameworks are encouraged at the federal level under the Environmental Protection and Biodiversity Conservation Act of 1999 and reinforced by planning and conservation laws in a number of states and territories. Over the years, however, experience showed that it was often difficult to provide on-site offsets, whether for ecological reasons or simply because the developer had no interest in native vegetation management. In 2002, the Victorian government introduced BushBroker®, a system to establish, register and trade native vegetation credits, making it easier for developers to obtain offset credits while helping willing landholders to provide those offsets. Under this framework, landowners first register their interest in being credit providers, and then developers subsequently approach BushBroker® when they need to find an offset. BushBroker® registers all transactions and creates the initial credits by recruiting landowners and conservation bank investors on payment agreement or land surrender schemes. The Victorian government has recently increased its role in the Bushbroker® programme by providing online tools, hands-on outreach and facilitation with landowners.

Sources:

- *Bushbroker Information sheet: http://www.depi.vic.gov.au/__data/assets/pdf_file/0020/205049/BB-info-16-OTC.pdf*
- *Biodiversity Offseting (UK Parliament Postnote 369): http://www.parliament.uk/documents/post/postpn_369-biodiversity-offsetting.pdf*

Biodiversity offset implementation

Biodiversity offsets can be used to offset residual impacts on biodiversity that have not been addressed through avoidance, minimisation or on-site rehabilitation measures. Offsets are often considered a market-based instrument, as they enable a baseline and credit market for trading biodiversity values.[xi] While cap-and-trade schemes aim to limit overall environmental impacts, under offset arrangements, an operator may be allowed to undertake an action that reduces ecosystem services if it also undertakes (or purchases from another party) a separate action that increases ecosystem services by at least the same amount at a different site from where the development has taken place. Thus, an offset arrangement enables one action to be matched with another, so that there is at least no net reduction of ecosystem services or biodiversity. In some cases, the requirement may be to produce a net increase in biodiversity.

Offsets were first formalised in the US in the 1970s for wetland mitigation (See Box 15). Today, 45 countries and states have laws or policies that specifically require biodiversity offsets or some form of compensatory conservation for particular sets of impacts, and another 27 countries are currently developing this type of legislation.[xii] Some countries have independent laws or policies requiring compensation (e.g. U.S. wetland mitigation), while others address biodiversity offsets through strategic environmental assessment (SEA), environmental impact assessment (EIA) or planning laws (e.g. Germany).[xiii] In addition to mandatory programmes, a number of business entities, have commitments to no net loss or net positive impact.

While Box 4 (page 28) introduced biodiversity offset policy with a specific focus on incorporating offset provisions into EIA requirements, this section focuses on biodiversity offset implementation. Biodiversity offset implementation generally takes one of the three following forms:

- *The one-off approach:* Once adverse impacts have been evaluated, the biodiversity offset is carried out by the developer or by a subcontractor (e.g. a conservation NGO). The developer assumes financial and legal liability. Verification is normally undertaken by an accredited third party or a government agency.
- *In-lieu arrangement:* A government agency specifies a fee that a developer has to pay to a third party to compensate for residual biodiversity impacts. The third party (i.e., the offset provider) takes on the financial and legal responsibility for the offset. In-lieu arrangements have

been employed in the U.S. Wetland and Species Mitigation program (see Box 15) and forest compensation schemes in India and Mexico.

- *Biobanking:* Biobanking (also called mitigation banking) involves a repository of existing offset credits, where each credit represents a quantified gain in biodiversity resulting from the restoration, establishment, enhancement or preservation of biodiversity. As in the in-lieu arrangement, financial and legal liability is transferred from the developer to the provider.

Credit prices generally reflect the costs of producing a credit (purchase of land, opportunity costs, implementation and administrative costs). Biobanks tend to be designed to offset multiple development projects, which enables pooling of resources and efforts; thus, biobanking reduces offset and transaction costs through economies of scale. Transaction costs associated with establishing biodiversity offsets include costs to identify and secure an offset, apply for development permission, and monitor, report on and enforce biodiversity offset commitments. Biobanking also helps reduce the time required to identify a feasible offset site and process a development permit, as credits are typically registered in advance of a development proposal. Generally speaking, whereas one-off or in-lieu approaches to biodiversity offsets can lead to many dispersed or fragmented restoration efforts, biobanks can help ensure that offsets are designed and implemented in a landscape context to ensure greater ecological and social value (see Boxes 14, 15 and 16).

When appropriate prevention and mitigation measures have been taken, governments should help ensure that the necessary institutional framework is in place to help quarry operators offset residual adverse biodiversity impacts arising from project development. There are certain pre-requisites for the effective implementation of biodiversity offsets:

- Adequate capacity is needed not only to design and implement offsets, but also to monitor and enforce them.

Box 15 – Wetlands banking in the United States

Wetland mitigation banking in the United States has its origins in federal-level regulations. Dating back to 1972, the Clean Water Act (CWA) mandated compensatory mitigation of wetlands and wetland-related services, implying that developers of projects that impact wetlands must: demonstrate that the least environmentally damaging alternative will be used, minimise any unavoidable impacts and compensate for or offset the harm.

Compensation can be achieved through restoration, creation, enhancement or preservation of wetlands, collectively termed mitigation. While developers often prefer on-site mitigation as a way to compensate for unavoidable damage to wetlands, on-site mitigation has been criticised for resulting in fragmented and poorly monitored wetlands with limited ecological value. Consequently, in 1993, the Clinton administration released a comprehensive package of improvements to federal wetlands programmes that included support for the use of mitigation banks. Upon establishing a mitigation bank by enhancing, restoring or creating wetlands habitats, the creator of a mitigation bank (the banker) can satisfy CWA requirements by selling wetlands credits to developers. The system allows buyers and sellers of credits to find each other and agree on prices that reflect the cost of land and offset activities. It stimulates third-party investment in offset creation as well as standardised units of trading.

According to the Ecosystem Marketplace (2010), annual known U.S. wetland and stream payments amounted to $2.2 billion in 2008. In 2005, nearly three quarters (71 percent) of credit sales were undertaken by private commercial banks, and another quarter were sold by single clients. In 2010, an estimated 700,000 cumulative acres (283,280 hectares) had been protected or restored through mitigation programmes in North America. The market has arisen through strong policy drivers, enforcement and detailed regulation.

Source: Identifying and Mobilising Resources for Biodiversity Conservation: https://cmsdata.iucn.org/downloads/information_paper_res_mob_021012.pdf

- Offsets should result in additional investment in conservation, rather than just replacing public financing with private financing for conservation.
- Biodiversity offsets should be permanent, i.e. it is important to ensure that gains last at least as long as the impacts.
- It is also important to put in place safeguards, such as limits on what can be offset and how.

Furthermore, good governance is vital for creating and supporting effective market-based instruments. By allowing project developers to decide how necessary damage avoidance, mitigation or compensatory activities are undertaken, MBIs have the potential to deliver flexibility and effective conservation outcomes through positive incentives, in contrast to command-and-control instruments, penalties or fines.

Box 16 – CDC Biodiversité, France

The first biodiversity bank in France was created on 11 May 2009, in Saint Martin de Crau, by CDC (Caisse de Dépôts et Consignation) Biodiversité. CDC Biodiversité is an operator dedicated to providing the necessary intelligence for biodiversity-related project design and monitoring, including the implementation of offset measures. The first project it managed involved the restoration and reintegration of a 357-hectare abandoned orchard into the adjacent Crau Nature Reserve. This reserve is the last remaining semi-arid steppe in Western Europe, containing several rare and threatened species of birds, insects and plants.

CDC Biodiversité has created a biodiversity bank from which compensation credits can be deducted as needed. The project is helping developers whose activities have a residual impact on an ecosystem similar to the Crau. In addition, the biodiversity bank helps aggregate offsets from several developers, thereby allowing larger areas to be managed and better conservation outcomes to be achieved. At this stage, a developer only receives validation by the state in case there is an environmental equivalence between the residual impacts and the ecological goals of any given offset operation. French legislation has recently made ecological compensation mandatory, such that any public or private project developer is obliged to compensate for the residual impacts of their development projects.

CDC Biodiversité is supported by several national and local agencies, including the Ministry of Ecology, the Regional Environment Agency and the management of the Grau Nature Reserve and the local chamber of agriculture.

Source: CDC Biodiversité: http://www.cdc-biodiversite.fr/

5 Supporting Instruments

To complement and leverage regulations that require the operator to comply with biodiversity management measures, public authorities may employ other legal tools to promote voluntary conservation. For example, authorities can support the efforts of operators wishing to implement biodiversity conservation measures at their extractive sites through non-financial means, such as providing technical assistance and capacity building. Authorities may also encourage and establish a sustainability reporting process, with a view to helping operators set goals, measure performance and manage change.

Capacity building

Capacity building and technical assistance can help strengthen biodiversity management and enhance compliance with environmental laws and regulations, though these measures should always be viewed as complementary to efforts aimed at environmental enforcement and not as a substitute for them. Public support for capacity building may include:

- providing grants for education activities, raising awareness and training programmes for sustainable use of biodiversity (e.g. how to develop an EIA or a biodiversity action plan);
- establishing public-private agreements for research on on-site biodiversity conservation and management;
- rewarding or publicising conservation achievements, such as the development of sustainable biodiversity management standards and practices by the operator to achieve “no net loss” of biodiversity; and
- supporting research and data collection for the creation of centralised biodiversity databases.

Biodiversity in sustainability reporting

Sustainability reporting is the practice of measur ing and disclosing organisational performance towards the goal of sustainable development, and being accountable to internal and external stakeholders for that performance. Reporting involves providing environmental, social and governance information within documents, such as annual reports and sustainability reports.

Sustainability reporting is an important tool for reducing conflicts between companies and local communities and other stakeholders, and assessing the performance of companies in accordance with their sustainability strategy or their biodiversity management strategy. It promotes transparency in corporations’ operations and stakeholder involvement.

The role of governments in sustainability reporting is to establish public policies that contribute to a stronger uptake of sustainability reporting and

reporting on biodiversity performance, whether only through awareness raising or through legislation. Governments can make use of the following tools to further enhance biodiversity in sustainability reporting:[xiv]

- introducing mandatory reporting standards that include provision of summary information about biodiversity values and management performance;
- creating instruments to benchmark and recognise good biodiversity performance, where reporting is voluntary;
- setting an example by introducing biodiversity information when producing a sustainability report in public agencies; and
- introducing mandatory reporting on biodiversity for all state-owned companies, including the adoption of the Global Reporting Initiative's voluntary guidelines (see Box 17).

Sustainable public procurement

Public procurement is the process used by governments, regional and local public authorities or bodies governed by public law (more than 50 percent financed, supervised or managed by public authorities) to obtain goods, services and works.

As major consumers, public authorities can use their purchasing power to choose goods and services with lower impacts on the environment, thereby making an important contribution to sustainable consumption and production. Sustainable public procurement (SPP), which is also called green public procurement (GPP), allows governments to leverage public spending in order to promote the country's social, environmental and economic policies. Sustainable purchasing can help influence the market by providing industry with real incentives for developing green technologies and products, boosting the competitiveness of biodiversity-friendly businesses, saving money and fostering job creation. Economic factors related to public procurement include the costs of products and services over their entire life cycle, such as acquisition, maintenance, operations and end-of-life management costs (including waste disposal) in line with good financial management. Social factors include social justice and equity, safety and security, human rights and employment conditions. Environmental factors include emissions to air, land and water; climate change; biodiversity; natural resource use and water scarcity over the whole product life cycle.

UNEP's Sustainable Public Procurement Initiative (see Box 18) is a global instrument for SPP. This initiative aims to promote a transition to a green economy.

Box 17 – Sustainability reporting: The Global Reporting Initiative

The Global Reporting Initiative (GRI) provides a comprehensive sustainability reporting framework that is widely used around the world. GRI has developed general guidelines for sustainability reporting, which include performance indicators covering the three pillars of sustainability: economic, environmental, and social. The environmental indicators cover impacts on living and non-living natural systems, including land, air, water and ecosystems. With regards to biodiversity, the focus is on reporting related to operations and impacts in areas of high biodiversity value, such as protected areas, as well as reporting on protection and restoration of habitats. GRI has also developed sector-specific supplements and an "Approach for reporting on ecosystem services."

In some countries, reporting is mandatory, whereas in others it is voluntary, although the trend in recent years has been towards governments making sustainability reporting mandatory. Some countries combine voluntary and mandatory approaches, with the voluntary approaches complementary to the mandatory ones.

Sources: The Global Reporting Initiative: http://www.globalreporting.org

Sustainable public procurement is a fundamental policy instrument to reduce the environmental impacts of products throughout their life cycles, increasing innovation and efficiency in the use of energy and materials, reducing public expenditure costs and fostering compliance with the law. Major infrastructure projects, such as those associated with sporting events, can provide a good opportunity for implementing sustainable procurement practices (see Box 19).

Box 18 – The International Sustainable Public Procurement Initiative (SPPI)

The SPPI, which was established in 2012, "aims to scale-up the level of public spending flowing into goods and services that maximise environmental and social benefits." The SPPI seeks to back the worldwide implementation of sustainable procurement by promoting a better understanding of its potential benefits and impacts and facilitating increased cooperation between key stakeholders.

The objectives of the initiative are to build the case for sustainable public procurement by improving awareness of SPP tools, developing progress reports on implementation, analysing barriers and proposing innovative solutions, and to support implementation through increased South-South and North-South cooperation, and enhancing public-private collaboration.

The SPPI seeks to provide countries with a common vision, language and framework for SPP and to guide stakeholders on how to effectively pave the way towards SPP implementation.

Sources:

- *Sustainable Public Procurement Initiative: http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=2688&ArticleID=9188&l=en*
- *UNEP Guidelines for procurement: http://www.unep.fr/SCP/procurement/docsres/ProjectInfo/UNEPImplementationGuidelines.pdf*

Box 19 – Green public procurement for Brazil's Olympics

Infrastructure development for the 2016 Summer Olympics in Brazil will be based on sustainable measures and principles. A bill passed for the purpose of the Olympics mandates the adoption of environmentally sustainable measures, including greenhouse gas reductions and energy and water savings.

This bill is in line with Brazil's public procurement regulations, which aim to ensure the promotion of sustainable national development. Through a public tendering process, private providers are required to use environmentally certified materials on their construction sites, optimise energy use and minimise waste production.

The development of research and monitoring to achieve the goals of reducing pollution and saving resources, as well as advertising of sustainable actions to promote environmental awareness, are all requirements within the procurement policies. These requirements apply to work carried out directly by the government and enterprises that benefit from the state funds or those controlled by it.

Source: Rio 2016 Sustainability: http://www.rio2016.com/en

Glossary of terms

Biobanking: A system that creates a repository of existing offset credits, where each credit represents a quantified gain in biodiversity resulting from the restoration, establishment, enhancement or preservation of biodiversity. Also called mitigation banking.

Biodiversity action plan: A mechanism by which the objectives and targets for biodiversity conservation can be achieved. BAPs can either be stand-alone or be incorporated into the EMS. Numerous specific elements may be covered in a BAP.

Biodiversity conservation: The management of human interactions with genes, species and ecosystems so as to provide the maximum benefit to the present generation while maintaining their potential to meet the needs and aspirations of future generations; encompasses elements of saving, studying and using biodiversity (Convention on Biological Diversity).

Biodiversity enhancement: Measures undertaken to enhance or improve biodiversity, going beyond mitigation or rehabilitation to explore opportunities to enhance the conservation of biodiversity.

Biodiversity offsets: Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development, after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss, and preferably a net gain, of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people's use and cultural values associated with biodiversity.

Biodiversity outcome indicators: Indicators used to measure progress towards a targeted goal.

Biodiversity risk matrix: A tool for assessing the risk to biodiversity of a new development or of an ongoing quarrying operation. The matrix has the biodiversity importance category of a site on the y-axis and the level of likely impact on biodiversity by the anticipated activities on the x-axis.

Cap-and-trade: An environmental policy that sets limits (caps) on emissions of certain pollutants and then allows businesses to buy or sell permits to emit pollutants, as long as the overall amount stays within the prescribed limits.

Command-and-control instruments: Legislative tools that prescribe specifically how a company should comply with specific standards.

Compensation: Generally, a recompense for some loss or service and something which constitutes an equivalent to make good the lack or variation of something else. Compensation can involve something (such as money) given or received as payment or reparation (as for a service or loss or injury). Specifically, in terms of biodiversity, compensation involves measures to restore, create, enhance or avoid loss or degradation of a community type, in order to compensate for residual impacts on it and/or its associated species.

Critical habitats: Areas with high biodiversity value, including (i) habitats of significant importance to critically endangered and/or endangered species; (ii) habitats of significant importance to endemic and/or restricted-range species; (iii) habitats supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

Ecosystem: A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Ecosystem approach: A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.

Ecosystem services: Beneficial functions that are performed by natural ecosystems, such as maintenance of hydrological systems, protection of the soil, breakdown of pollutants, recycling of wastes, support for economically important living resources and regulation of climate.

Environmental and social impact assessment (ESIA): The process of identifying, estimating and evaluating the environmental and social consequences of current or proposed actions.

Environmental impact assessment (EIA): A process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

Environmental management plan (EMP): A document that defines responsibilities, budgets and any necessary training for environmental monitoring and impact management, and describes how results will be reported and to whom. The EMP can be a separate document, but is considered part of the environmental impact statement. An EMP usually is required in order to obtain permission to implement a project. In a number of countries, an EMP is not a legal requirement.

Environmental management system (EMS): A system that provides a framework for monitoring and reporting on an organization's environmental performance. This typically involves organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy.

Environmental taxes: Any compulsory, unrequited payment to the government levied on tax bases deemed to be of particular environmental reference, where the tax bases include energy products, motor vehicles, waste, measured or estimated emissions, natural resources, etc.

Free, prior and informed consent (FPIC): The principle that a community has the right to give or withhold its consent to proposed projects that may affect the lands they customarily own, occupy or otherwise use.

Habitat: The physical and biological environment on which a given species depends for its survival; the place or type of site where an organism or population naturally occurs.

Integrated Biodiversity Management System: A system that includes steps and recommendations for biodiversity management activities at each phase in the life cycle of a development, from planning through operations and eventual closure.

Invasive species: Species that are introduced — intentionally or unintentionally — to an ecosystem in which they do not naturally appear and which threaten habitats, ecosystems or native species. These species become invasive due to their high reproduction rates and by competing with and displacing native species that naturally appear in that ecosystem. Unintentional introduction can be the result of accidents (e.g. when species escape from a zoo) or transport (e.g. in the ballast water of a ship), while intentional introduction can be the result of importing animals or plants or the genetic modification of organisms (Convention on Biological Diversity).

Key biodiversity areas: Nationally identified sites of global significance. The identification of KBAs is an important approach to address biodiversity conservation at the site scale, i.e. at the level of individual protected areas, concessions and land-management units. There is no maximum or minimum size of sites, because appropriate size varies according to socio-economic criteria, such as land use and tenure.

Landscape approach: A mosaic of different types of land use, such as agriculture, forests, pasture and conservation areas. Managed as a whole, a landscape serves a variety of needs for various stakeholders. The Livelihood and Landscape Strategy vision of a landscape is of multiple and complementary land uses based on negotiation rather than centralised planning. Landscapes do not exist in a vacuum, but are influenced by a wide range of external factors, including policies and economic conditions generated far outside it, land use in adjacent landscapes and perhaps remote physical features such as dams. Addressing landscape management issues always requires interventions outside as well as inside the landscape.

Market-based instruments: Instruments or regulations that encourage behavior through market signals rather than through explicit directive.

Mitigation: Anthropogenic intervention to reduce negative or unsustainable uses of ecosystems or to enhance sustainable practices.

Mitigation hierarchy: A hierarchy of management actions that states that (1) significant impacts should be avoided, (2) impacts that cannot be avoided should be minimised, (3) restoration measures should be taken to address any unavoidable impacts, and (4) any significant residual impacts should be offset.

Monitoring: Activities undertaken after the decision is made to adopt the plan, programme or project that are designed to examine its implementation. For example, a monitoring programme can examine whether the significant environmental effects occur as predicted or establish whether mitigation measures are implemented.

Performance bond: A payment made by operators to the respective authority before a potentially environmentally damaging activity is undertaken. The payment is returned only if the environmental damage of the activity does not exceed a specified threshold.

Protected area: A clearly defined geographical space that is recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

Rehabilitation: The recovery of specific ecosystem services in a degraded ecosystem or habitat (Convention on Biological Diversity).

Restoration: The return of an ecosystem or habitat to its original community structure, natural complement of species and natural functions Convention on Biological Diversity).

Species: A group of inter-breeding organisms that seldom or never interbreed with individuals in other such groups, under natural conditions; most species are made up of subspecies or populations.

Stakeholders: Individual persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively (International Finance Corporation).

Strategic environmental assessment (SEA): The formalised, systematic and comprehensive process of identifying and evaluating the environmental consequences of proposed policies, plans or programmes to ensure that they are fully included and appropriately addressed at the earliest possible stage of decision-making, on a par with economic and social considerations.

Sustainable public procurement (SPP): A tool that allows governments to leverage public spending in order to promote the country's social, environmental and economic policies. Also called green public procurement (GPP).

Threatened species: Species that face a high (vulnerable species), very high (endangered species), or extremely high (critically endangered species) risk of extinction in the wild.

World heritage site: Includes both cultural heritage sites and natural heritage sites. Cultural heritage sites are works of man or the combined works of nature and man, and areas including archaeological sites that are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view. Natural heritage sites are natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty (UNESCO World Heritage Convention).

Bibliography and further reading

Bibliography

[i] United Nations Environment Programme (UNEP). 2004. Environmental Impact Assessment and Strategic Environmental Assessment: Towards an Integrated Approach. Available at http://www.unep.ch/etu/publications/textONUbr.pdf

[ii] Department of Mining and Tunnelling University of Leoben, Austria. 2004. Minerals planning policies and supply practices in Europe. Commissioned by the European Commission (EC) Enterprise Directorate General under Contract n° ETD/FIF 2003 0781. Available at http://ec.europa.eu/enterprise/policies/raw-materials/files/best-practices/leoben_extsum_en.pdf

[iii] Food and Agriculture Organization of the United Nations (FAO). 1993. Guidelines for land-use planning. FAO Development Series No. 1. Rome. Available at http://www.fao.org/docrep/T0715E/t0715e00.htm#Contents

[iv] Stavins, R. 2001. Experience with market-based environmental policy instruments. Discussion Paper 01-58, Pp 1. Resources for the Future. Available at: http://www.rff.org/documents/rff-dp-01-58.pdf

[v] Whitten, S.M., Coggan., A., Reeson, A. Gorddard, R. 2007. Putting Theory into Practice: Market Failure and Market Based Instruments. CSIRO Working Paper Series 2007-02. Available at http://www.csiro.au/Outcomes/Environment/Population-Sustainability/SEEDPaper2.aspx

[vi] Stavins, R. N. 2002. Experience with Market-Based Environmental Policy Instruments. FEEM Working Paper No. 52.2002; KSG Working Paper No. 00-004

[vii] This chapter is based on ideas from EEA (2008), Palmer and Watts (1999) and Soderhölm (2011)

[viii] Eurostat 2013. Environmental tax statistics. Available at: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Environmental_tax_statistics

[ix] Palmer, K., and Walls, M. 1999. Extended Product Responsibility: An Economic Assessment of Alternative Policies, Discussion Paper 99-12, Resources for the Future, Washington, DC.

[x] Renard, V. 2007. Property rights and the 'transfer of development rights': Questions of efficiency and equity. Town Planning Review78(1): 41-60.

[xi] Bull, J.W., Suttle, K.B., Gordon, A., Singh, N.J., Milner-Gulland, E.J. 2013. Biodiversity Offsets in Theory and Practice. Oryx 0(0): 1–12.

[xii] Madsen, Becca, Nathaniel Carroll, Daniel Kandy, and Genevieve Bennett, 2011 Update: State of Biodiversity Markets. Washington, DC: Forest Trends, 2011. Available at: http://www.ecosystemmarketplace.com/reports/2011_update_sbdm

[xiii] Organisation for Economic Co-operation and Development (OECD) 2012. Business, Biodiversity and Ecosystem Services: Policy priorities for engaging business to improve the health of ecosystems and conserve biodiversity. Paper prepared by John Stephenson for the 28th Round Table on Sustainable Development

[xiv] Van Wensen, Katelijne, BROER, Wijnand, KLEIN, Johanna, KNOPF, Jutta (2011), The State of Play in Sustainability Reporting in the European Union. Executive Summary. Available at http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=1013

Further Reading

Biodiversity data

Integrated Biodiversity Assessment Tool: https://www.ibat-alliance.org/ibat-conservation/login

IUCN Red List of Ecosystems: http://www.iucnredlistofecosystems.org

IUCN Red List of Threatened Species: http://www.iucnredlist.org

Protected Planet: http://www.protectedplanet.net

Extraction and Biodiversity

Cement Sustainability Initiative: http://www.wbcsdcement.org

European Comission (EC). 2011. Guidance Document "Non-energy mineral extraction and Natura 2000". Luxembourg. http://ec.europa.eu/environment/nature/natura2000/management/docs/neei_n2000_guidance.pdf

International Council on Mining & Metals. 2006. Good Practice Guidance for Mining and Biodiversity. Available at: http://www.icmm.com/page/1182/good-practice-guidance-for-mining-and-biodiversity

IUCN. 2008. World Heritage Caves and Karst. A thematic study. Available at: https://portals.iucn.org/library/efiles/edocs/2008-037.pdf

IUCN. 2014. Integrated Biodiversity Management System (IBMS). Available at: http://www.iucn.org/cementandaggregates

Environmental policy

Baumol and Oates. 1988. The theory of environmental policy. United States of America: Cambridge University Press.

Planning

Department of the Environment, Heritage and Local Government, Ireland, Quarries and Ancillary Activities. 2004. Guidelines for Planning Authorities. Available at http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownLoad,1606,en.pdf

Impact Assessment

International Association for Impact Assessment (IAIA): http://www.iaia.org

Secretariat of the Convention on Biological Diversity (CBD). 2006. Biodiversity in Impact Assessment. Background Document to Decision VIII/28 of the Convention on Biological Diversity: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment. CBD Technical Series No.26. Available at http://www.cbd.int/doc/publications/cbd-ts-26-en.pdf

Secretariat of the Convention on Biological Diversity (CBD). 2013. What is impact assessment? http://www.cbd.int/impact/whatis.shtml

United Nations Environment Programme (UNEP). 2004. Environmental Impact Assessment and Strategic Environmental Assessment: Towards an Integrated Approach. Available at http://www.unep.ch/etu/publications/textONUbr.pdf

Stakeholders, access to information, consultation and participation

IFC, Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets, Washington, DC, 2007.

ILO. 2009. Indigenous and tribal peoples' rights in practice: A guide to ILO Convention no. 169. Available at: http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---normes/documents/publication/wcms_106474.pdf

United Nations Economic Commission for Latin America and the Caribbean (ECLAC). 2013. Access to Information, Participation and Justice in Environmental Matters in Latin America and the Caribbean: Situation Outlook and Examples of Good Practice. Available at http://www.cepal.org/rio20/noticias/paginas/4/49604/2013-247-PR10-Access_to_information.pdf

Market-based Instruments

Bräuer, I., Müssner, R., Marsden, K., Oosterhuis, F., Rayment, M., Miller, C., Dodoková, A. 2006. The Use of Market Incentives to Preserve Biodiversity. Available at http://ec.europa.eu/environment/enveco/biodiversity/pdf/mbi.pdf

Bishop, J., Kapila, S., Hicks, F., Mitchell, P. and Vorhies, F. 2008. Building Biodiversity Business: https://portals.iucn.org/library/efiles/edocs/2008-002.pdf

Palmer, K., and M. Walls. 1999. Extended Product Responsibility: An Economic Assessment of Alternative Policies, Discussion Paper 99-12, Resources for the Future, Washington, DC.

Stavins, R. N. 2000. Experience with market-based environmental policy instruments. Resources for the Future Discussions Paper 0009.

Whitten, S.M., Coggan., A., Reeson, A. Gorddard, R. 2007. Putting Theory into Practice: Market Failure and Market Based Instruments. CSIRO Working Paper Series 2007-02. Available at http://www.csiro.au/Outcomes/Environment/Population-Sustainability/SEEDPaper2.aspx

Whitten, S., van Bueren, M. and Collins, D. 2003. An overview of market-based instruments and environmental policy in Australia. Available at http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.130.4038&rep=rep1&type=pdf

World Business Council for Sustainable Development and IUCN. 2007. Business and Ecosystems. Markets for Ecosystem Services – New Challenges and Opportunities for Business and the Environment. A Perspective. Available at http://cmsdata.iucn.org/downloads/business_and_ecosystems_september2007.pdf

Taxation

Söderholm, P., (2011) Taxing Virgin Natural Resources: Lessons from Aggregates Taxation in Europe. Luleå University of Technology. Available at: http://www.hallbaravfallshantering.se/download/18.7df4c4e812d2da6a41680004968/

Eichner, T. (2005). Imperfect Competition in the Recycling Industry, Metroeconomica, Vol. 56, No. 1, pp. 1-24.

European Environment Agency (EEA). 2008. Effectiveness of Environmental Taxes and Charges for Managing Sand, Gravel and Rock Extraction in Selected EU Countries, EEA Report No. 2/2008, Copenhagen. Available at: http://www.eea.europa.eu/publications/eea_report_2008_2

Offsets

Business and Biodiversity Offsets Programme (BBOP) 2012. Biodiversity Offset Design Handbook. Available at http://www.forest-trends.org/publication_details.php?publicationID=3101

Business and Biodiversity Offsets Programme (BBOP). 2012. Standard on Biodiversity Offsets. Washington, D.C. Available at http://www.forest-trends.org/documents/files/doc_3078.pdf

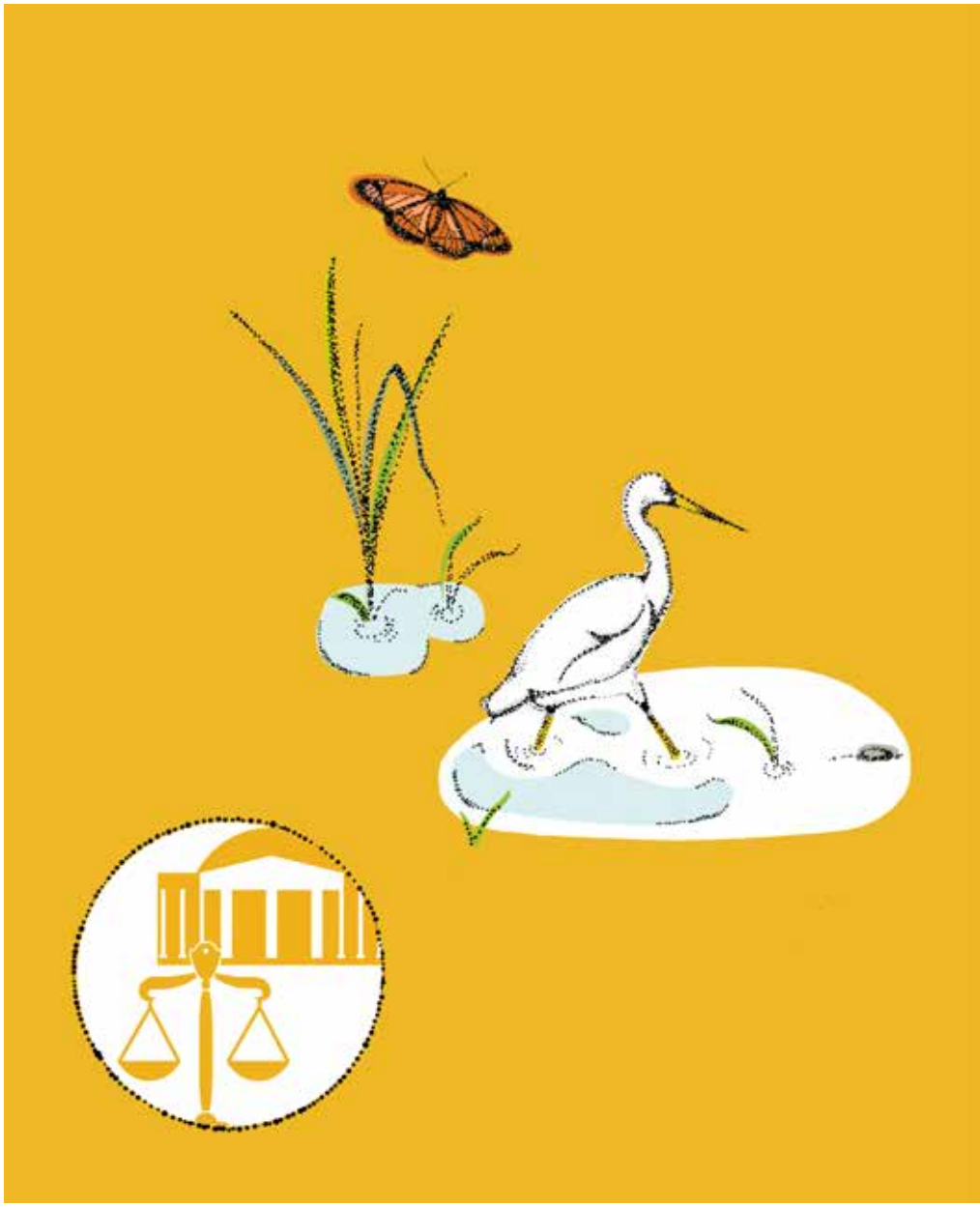
Business and Biodiversity Offsets Programme (BBOP). 2009. The Relationship between Biodiversity Offsets and Impact Assessment: http://www.forest-trends.org/documents/files/doc_3087.pdf

Carroll, N., J., Fox, and R. Bayon (2008). Conservation and Biodiversity Banking: A guide to Setting Up and Running Biodiversity Credit Trading Systems, Earthscan, London.

Reporting

Global Reporting Initiative (GRI): https://www.globalreporting.org

Van Wensen, Katelijne, BROER, Wijnand, KLEIN, Johanna, KNOPF, Jutta. 2011. The State of Play in Sustainability Reporting in the European Union. Full Report. Available at http://ec.europa.eu/social/BlobServlet?docId=6727&langId=en



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