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978-0-521-71655-0 - Biodiversity in Environmental Assessment: Enhancing Ecosystem
Services for Human Well-Being

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Part I

Setting the stage

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[More information](#)

1 · *Introduction*

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and Arend Kolhoff*

Biodiversity matters to everyone. Its loss impoverishes the environment and reduces its capacity to support people now and in the future. Impact assessment can help to ensure that development is compatible with the conservation and sustainable use of biodiversity.

These are the opening words of the biodiversity in impact assessment principles formulated by the International Association for Impact Assessment (IAIA, 2005) and perfectly set the stage for a book that stresses the dependency of humanity on benefits from biodiversity, explores how present and future environmental securities are linked with biodiversity, and stimulates the need to balance the need for conservation with that for human development through sustainable use of biodiversity.

Through his simple quote in *Closing Circle* – ‘Everything is connected to everything else’, Barry Commoner (1971) conveyed the importance of interconnectedness between the different components of the living world. Human activities do not occur in a vacuum but are an inherent part of complex biological systems, such as food chains, and large-scale abiotic processes, such as the water cycle or climate change. This interconnectedness helps us to understand that most ecological systems are complex, making it difficult to come to a consensus on cause-and-effect relationships. If we are to develop truly sustainable economies and ensure the perpetuity of the ecosystem benefits that drive economies and human well-being, we must have a better grasp of the intricate relationship between the environment and the factors that bring about changes. Moreover, we must make sure that available knowledge is used in the best possible way to support day-to-day decision making on large human interventions. There is far too much at stake, financially, socially, and environmentally, if we ignore the connectedness between development and conservation objectives.

Increasing evidence that biodiversity and ecosystem services linked to biodiversity are in rapid decline has put biodiversity on the agenda

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Excerpt

[More information](#)4 · **Roel Slootweg *et al.***

of decision makers. Consequently biodiversity has emerged as a major priority for environmental assessors. This book positions impact assessment as a decision support tool and promotes it as an objective-oriented tool to enhance sustainability in decision making on proposed human activities. In this respect, it makes one more modest addition to the existing volumes of the books on the subject. Yet at the same time it is novel in approaching environmental assessment from the perspectives of both conservation community and developers, trying to balance between the 'harvesting' and 'harnessing' of biodiversity resources. To guide decision making, the valuation of biodiversity and its related ecosystem services (in ecological, social, or economic terms) is strongly recommended in the overall assessment of biodiversity-related impacts of developments.

The primary objective of environmental assessment is to aid decision making. To ensure its effectiveness, information gathered by any assessment has to be tailored to the needs of decision makers. Yet, the concepts and language used by the impact assessment community are often not suited to the needs of the decision-making process. Decision makers, more often than not, have no particular interest in biodiversity; they are facing multiple demands from sections in society, all trying to influence decision making. Biodiversity, as the environment in general, does not have a voice to express itself. Environmental assessment was conceived to give the environment a voice. Yet, biodiversity still is badly represented in environmental assessment and decision making. It is either considered to be a 'trifle' or a 'difficult' subject to deal with. Logically, the latter holds to be more correct as is also supported by the analysis of the state of knowledge about biodiversity by Metrick and Weitzman (1998) – 'As a society, we have not even come close to defining what the objective is. What is biodiversity? In what units is it to be measured? . . . We have to make up our minds here what it is we are optimising. This is the essential problem confounding the preservation of biodiversity today'. On the other hand, the Convention on Biological Diversity has provided us with a widely endorsed set of objectives with respect to biodiversity management, including approaches to attain these objectives. So in our view, the problem moreover is to translate these objectives and approaches for environmental assessment to work in practice.

This book is the first attempt to fully integrate the objectives of the Biodiversity Convention, its ecosystem approach (oriented towards the management of biodiversity), and the outputs of Millennium

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Excerpt

[More information](#)**Introduction · 5**

Ecosystem Assessment (oriented towards the proper valuation of biodiversity) into one comprehensive approach for biodiversity-inclusive environmental assessment. We expand from ecology and traditional conservation language, venturing into the need for social and economic development and the act of balancing between present and future.

A fundamental point of departure of this book is that it does not stress the need for an altogether new assessment procedure, but it advocates a more pragmatic and rational treatment of biodiversity within the existing impact assessment framework for better development decisions. Environmental Impact Assessment (EIA) for the assessment of concrete projects and Strategic Environmental Assessment (SEA) for the assessment of impacts resulting from programmes, plans, and policies are widely recognised and used instruments. Such instruments provide important power; yet, with respect to biodiversity there is an urgent need to do a better job and to improve procedures. In this respect we try to keep a middle road between two extremes, eloquently described by Nooteboom (2007):

where no procedures at all may lead to the “boiled frog syndrome” (the frog doesn’t jump out of the water pan as it is slowly boiled – the frog has no procedure that gives warning signals), an overdose of procedures leads to the “frozen deer syndrome” (the deer stays in the car’s headlights – all options for action are rejected by an overdose of checks). Both animals are not sustainable.

The world is struggling to comprehend the implications of the broad concept of biodiversity as agreed by the international Convention on Biological Diversity (CBD). Different perspectives hamper a uniform interpretation of biodiversity, thus confusing decision makers. Added to this, the scientific language of the biodiversity community is unappealing to the outside world. As Pritchard (2005) states, ‘despite the clear role for impact assessment being spelled out in several convention texts . . . for the greater part of the history of both the conventions and EIA, there has been a striking separateness between these two worlds in terms of their processes and the people involved’. There is an obvious need for an unambiguous interpretation of biodiversity, and there is a need for an approach which translates biodiversity into decision maker’s language. This book is an attempt to do so. International conventions, such as the CBD, and agreements, such as the Millennium Development Goals, provide the framework and give direction. Recent developments in ecology and environmental assessment provide the necessary scientific

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Excerpt

[More information](#)

6 · **Roel Slootweg *et al.***

background and the tools to influence decision making for the better. Last but not least, the book aims to provide direction to the scientific agenda; gaps in knowledge are identified and suggestions for further scientific work are provided.

Organisation of the book

The book can be divided into three main parts. Part I provides the appropriate background for appreciating the meaning and importance of biodiversity. This part sets the stage with Chapter 2, introducing in detail the concepts underlying biodiversity and Chapter 3, positioning biodiversity in the context of international agreements on poverty reduction and sustainable development. In Part II, which contains four chapters, the book introduces the range of environmental assessment tools. Chapter 4 is conceptual in nature and introduces the impact assessment framework, which relates biodiversity to human well-being and provides insight in the complex cause–effect chains that may lead to desired or undesired effects of human interventions. Chapter 5 provides a general introduction to Environmental Impact Assessment (EIA) of projects and Strategic Environmental Assessment (SEA) of policies, plans, and programmes, with a special emphasis on recent insights in the performance of these instruments. Chapter 6 extensively explains how biodiversity can be addressed in EIA, following the internationally accepted procedural steps. Chapter 7 addresses biodiversity in SEA. As SEA is linked to changeable planning processes, the approach of the chapter is more conceptual and less procedural. Part III of the book, consisting of two chapters, goes deeper into the practical world of environmental assessment. Two emerging issues are introduced which seem to be particularly powerful in putting biodiversity on the agenda of decision makers. Chapter 8 explains biodiversity offsets, a mechanism for securing conservation in the face of growing development pressure, increasingly being used by the private sector. Chapter 9 provides lessons from ten influential cases in which the valuation of ecosystem services has had a tangible influence on strategic decision making. The book ends with an annex containing the ten case studies referred to in Chapter 9. These cases provide supporting evidence of how many of the concepts introduced throughout the book can be effectively used in practice, and indeed result in better representation of biodiversity in decision making. Ten additional short cases provide additional information for those interested in reviewing a range of practical experiences from around the world.

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Excerpt

[More information](#)

Summary of chapters

Chapter 2 introduces biological diversity (or biodiversity). It aims to provide an unequivocal interpretation of biodiversity, based on internationally accepted definitions. The chapter starts with an overview of historically developed differences in perspectives: biodiversity conservation versus biodiversity as provider of livelihoods. These perspectives are merged by the Convention on Biological Diversity (CBD) in its three objectives, taking into account present needs, but maintaining future options, and introducing the principle of equity. This provides an important message: biodiversity is about people and how people manage it for their own well-being (here, there, and in the future). The CBD provides an approach to put this into more concrete terms, the ecosystem approach. The ecosystem approach is transparent and participatory, putting emphasis on the role of stakeholders. These principles are shared with environmental assessment; the ecosystem approach thus provides an obvious link between biodiversity and environmental assessment.

If biodiversity is about people, biodiversity has to be linked to people. The Millennium Ecosystem Assessment provides us with the vocabulary and the concepts to do this. Ecosystem services translate biodiversity into concepts understandable to people. *Ecosystem services* (goods and services provided by biodiversity) can be linked to stakeholders. For impact assessment, this provides an important mechanism to translate biodiversity into decision makers' language. Valuing of biodiversity is in this respect an important mechanism; the role of stakeholders in expressing values is highlighted. The valuing itself is subject of a separate chapter.

Chapter 2 provides the approaches and the language to describe biodiversity in relevant terms from an environmental assessment and decision-making perspective. The chapter also highlights recent developments in ecology on three aspects of biodiversity: (i) composition, (ii) structure, and (iii) key processes, with a (nonexhaustive) review of relevant literature. These aspects provide the mechanism to assess how human activities interfere with biodiversity, at genetic, species, or ecosystem level. Fundamental principles, such as the 'no net loss principle' and the 'precautionary principle', are explained with examples of how these principles can be practically dealt with.

Chapter 3 addresses the dominant feeling that biodiversity and development are two opposing themes. Nonindustrialised countries face the dilemma of addressing the present needs of poor sections of society while maintaining the potential of biodiversity to meet the needs and

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Excerpt

[More information](#)8 · **Roel Slootweg *et al.***

aspirations of future generations. The chapter gives an overview of the history of the ‘triple bottom line’ concept of sustainable development that encompasses ecological, social, and economic sustainability, and then ventures into newer models of conservation through development that can help bridge the long-standing, conservation–development divide. In this chapter the Millennium Development Goals (MDGs) are taken as the point of departure, providing evidence that biodiversity underpins all MDGs and could ‘be the basis for ensuring freedom and equity for all’ (see Chapter 3). A major portion of the chapter is spent on the exploration of linkages between biodiversity and each of the MDGs.

Chapter 4 introduces the ‘impact assessment framework’. The desire to integrate environmental, social, and economic aspects in assessments of projects, plans, programmes, and policies provides the stimulus for such an integrating framework. In practice, the worlds of environmental impact assessment (in its strict meaning of assessing biophysical impacts only), social impact assessment, and economic cost–benefit analysis largely continue to operate in their separate realms and experience great difficulty in working in a multidisciplinary environment. The framework aims to provide insight into the relations between human society and the biophysical environment and the way in which both biophysical environment and human society are being influenced and managed. The core element of the conceptual approach is the characterisation and classification of ecosystem services provided by the biophysical environment and the assessment of their value for sustaining human livelihoods. Values by definition are assigned by stakeholders; in other words, ecosystem services can be linked to stakeholders.

The impact assessment framework is a framework of thinking. It is not intended to be a ‘standardised procedure’ or a predictive analytical model. It is a device for the facilitation and systematising of the interaction between the different disciplines involved in an assessment process. It mediates between different types of knowledge: natural and social science knowledge, lay and expert knowledge, knowledge about facts, and knowledge about values. It thus does not produce or predict ‘solutions’ by itself, but its active use by those involved in a certain problem situation can help to find sensible and feasible ways forward. In situations where interdisciplinarity or transdisciplinarity are required for effective analysis and decision making, as is the case in most environmental assessment situations, the problem of boundary crossing presents itself. The chapter ends with an overview of how boundaries can effectively be crossed through the use of a boundary concept (ecosystem services),

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Excerpt

[More information](#)**Introduction** · 9

a boundary object (the impact assessment framework), and boundary settings (institutional arrangements).

Chapter 5 provides essential knowledge on both EIA and SEA for those not being fully informed on the instruments of environmental assessment. It is not a handbook text, but highlights recent developments and state of the art thoughts. Environmental assessment has been around for more than 40 years and is practised in most countries around the world. The principle behind environmental assessment is deceptively simple: it directs decision-makers to 'look before they leap'. When there is a clear insight into the environmental consequences, decision makers are in a better position to direct development into a more sustainable course. At its best, environmental assessment does not merely provide information, but it brings parties together. The chapter explains the internationally accepted procedure, with a series of well-defined steps. Crucial elements in the process are highlighted (alternatives, how to deal with gaps in knowledge, public review, participation, etc.). Special attention is paid to the effectiveness of EIA and the conditions that can guarantee good practice.

The practice of SEA is less easily demarcated than that of EIA. There are a large number of assessment tools in planning that do not necessarily carry the label SEA, but have strong similarities. However, the fundamental differences between approaches are fewer than might be assumed from existing publications. There is no generally agreed SEA procedure as such and no 'one-size-fits-all' approach. As planning processes vary greatly from context to context SEA needs to be applied flexibly. However, there is general agreement about the activities that make up an SEA process. These are discussed in some detail with special emphasis on the state of the art: what is needed for effective SEA? The chapter ends highlighting three current trends in environmental assessment thinking and practice: (i) increased attention to the assessment context, (ii) integration of effects for sustainability assessment, and (iii) tailoring the assessment to the decision process.

Chapter 6 provides extensive first-hand background documentation on the EIA guidelines adopted by the Convention on Biological Diversity. The chapter is structured according to a generalised and internationally accepted sequence of steps. The chapter is a practical application of the concepts introduced in Chapter 2 (biodiversity) and in Chapter 4 (impact assessment framework); case examples are used to illustrate both concepts and practice. Special emphasis is given to the screening and scoping stages of EIA, for two reasons. First, the need for an impact

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Excerpt

[More information](#)10 · **Roel Slootweg *et al.***

assessment study has to be defined by good screening criteria and procedures; second, the impact assessment study has to be carried out in such a manner that all relevant issues are properly dealt with. Because scoping determines the contents and quality of the terms of reference of the impact study, good scoping procedures and guidance on the scoping process are of fundamental importance. The chapter also contains an extensive overview of recent initiatives in different sectors to enhance biodiversity in project planning, impact assessment, and operations.

Chapter 7 gives, similar to Chapter 6, extensive background information to the CBD guidance on biodiversity in SEA. It is not structured according to a procedure (as with Chapter 6 on the EIA) because good practice SEA should ideally be fully integrated into a planning (or policy development) process. Since planning processes differ widely, there is, by definition, no one-size-fits-all sequence of procedural steps in SEA. The chapter answers three basic questions. First, WHY is special attention to biodiversity in SEA and decision making needed? This to convince decision makers that biodiversity is a relevant issue. A second question is WHAT biodiversity issues are relevant to SEA? Not all biodiversity can be studied in SEA; on the contrary, the problem usually is how to limit an assessment in such a way that it is done in a timely way, and costs and efforts involved are reasonable. The third and last question is HOW to address biodiversity in SEA? This section is based on the conceptual approaches described in Chapters 2 and 4. To be able to make a judgement whether a policy, plan, or programme has potential biodiversity impact, three conditions are defined that ‘trigger’ the need for special attention to biodiversity. When any one or a combination of these conditions applies, special attention to biodiversity is required. The approach is based on the analysis of a significant number of cases which are referred to throughout the text.

Chapter 8 explores rapid recent developments predominantly taking place in the private sector. Finding innovative ways to link biodiversity conservation with development becomes a challenge and urgency for conservation organisations, businesses as well as voluntary bodies, governments, and civil society. The mitigation step in EIA frameworks, targeted for integrating biodiversity, provides options for preventing and minimising the impacts of development projects on biodiversity by utilising an array of strategies, policy instruments, economic incentives, and market solutions for compensating the residual impacts. The concept of ‘biodiversity offset’ as a compensation measure is relatively new and

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Excerpt

[More information](#)**Introduction · 11**

therefore lacks a universally acceptable definition. In simple wording biodiversity offsets are creatively designed mechanisms to achieve either 'no net environmental loss' or a 'net environmental benefit'.

The chapter provides an overview of the various global directives and country specific regulatory mechanisms in place for promoting legal and voluntary approaches for applying biodiversity offsets. Different forms of biodiversity offset are presented and supported with appropriate examples, including onsite, offsite, and third party offsets and a range of options including conservation-oriented actions to widely applicable market-based approaches such as conservation banking, development of tradable rights and biodiversity credits, direct payments for resources/services, or creation of trust funds and monetary bonds for financing impact mitigation. Practical experience of the design, implementation, and evaluation of biodiversity offsets shared through several case examples provide a useful input to the chapter. These examples illustrate that the various mechanisms of mainstreaming biodiversity conservation in business plans are largely aimed at creating mutually beneficial opportunities for both business and biodiversity. Business groups are beginning to appreciate the benefits from applying offsets and are taking leads to demonstrate that responsible biodiversity stewardship is a fundamental business issue for managing risks, capitalising on opportunities, and improving the corporate performance in environmentally and socially responsible manners. The chapter also presents the many risks and constraints that pose methodological challenges and practical difficulties in the design and implementation of offsets. Despite this, the conclusion is drawn that the objective of offset is ideologically sound, and there is a clear need to overcome these barriers for more and better conservation outcomes for biodiversity to occur by identifying possible routes to achieving better levels of success.

Chapter 9 contains a re-edited text from a recent publication with the same title. In order to put biodiversity into decision-makers language, we have already emphasised the need to translate biodiversity in terms of ecosystem services and to link these services to (present and future) stakeholders. Ecosystem services are the benefits people obtain from ecosystems. Ecosystem services have received significant attention since the appearance of the Millennium Ecosystem Assessment. A growing body of knowledge is developing on ecosystem services and on the valuation of these services. Yet, cases where valuation of ecosystem services has actually made a difference in real-life policies or plans still remain