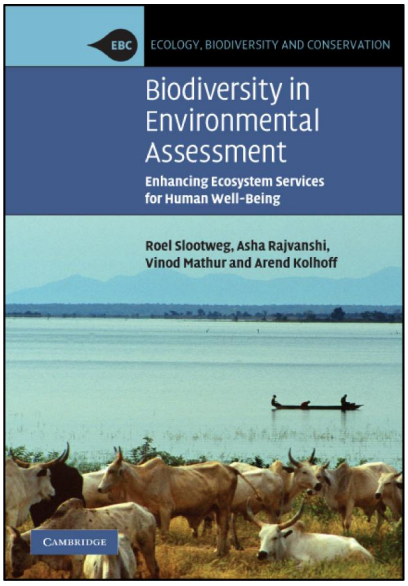

Biodiversity in Environmental Assessment. Enhancing Ecosystem Services for Human Well-Being.

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Roel Slootweg

SevS Natural and Human Environment Consultants

Asha Rajvanshi

Vinod B. Mathur

Wildlife Institute of India, Dehradun

Arend Kolhoff

Netherlands Commission for Environmental Assessment

Summary of chapters

Chapter 2, Interpretation of biodiversity, 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 it's three objectives, taking into account present needs, but maintaining future options, ánd 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.

The chapter 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: composition, structure and key processes, with a (non exhaustive) 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 how these principles can be practically dealt with.

Chapter 3, ***Biodiversity conservation and development: Challenges for impact assessment***, addresses the dominant feeling that biodiversity and development are two opposing themes. Non-industrialised 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 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 than 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'*. 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), a boundary object (= the impact assessment framework), and boundary settings (= institutional arrangements).

Chapter 5, ***Environmental assessment***, provides essential knowledge on both EIA and SEA for those not being fully informed on the instruments. It is not a handbook text, but highlights recent developments and state of the art in thinking. Environmental assessment has been around for over almost 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 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 practise.

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, 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, *Biodiversity in Environmental Impact Assessment*, 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 chapters 2 (biodiversity) and 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. In the first place, the need for an impact assessment study has to be defined by good screening criteria and procedures; secondly, the impact assessment study has to be carried out in such a manner that all relevant issues are properly dealt with. Since 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, *Biodiversity-inclusive Strategic Environmental Assessment*, 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 the EIA chapter) 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 if 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, ***Reconciling conservation and development: the role of biodiversity offsets,*** explores rapid recent developments taking predominantly place in the private sector. Finding innovative ways to link biodiversity conservation with development becomes a challenge and urgency for conservation organizations, 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 minimizing the impacts of development projects on biodiversity by utilizing 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 therefore lacks a universally acceptable definition. In simple wording biodiversity offsets are creatively designed mechanisms to achieve '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 on- site, off-site and third party offsets and a range of options including conservation oriented actions to widely applicable markets 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 provides 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, capitalizing 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, ***Valuation of ecosystem services: lesson from influential cases***, 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 scarce, or in any case hidden. So far, the SEA community has hardly used the opportunities provided by ecosystem services to translate environment into societal benefits..

Therefore, a number of influential cases were documented, where the recognition, quantification and valuation of ecosystem services have significantly contributed to strategic decision-making. In all cases, the use of the ecosystem services concept supported decision-making by providing better information on the consequences of new policies or planned developments. In several cases SEA or a process similar to SEA was followed. Yet, in all cases valuation of ecosystem services, in one form or the other, resulted in major policy changes or decision-making on strategic plans or investment programmes. The analysis of cases reveals that the role of ecosystem services in decision making can range from simple recognition of services, via semi-quantified valuation techniques to full-fledged monetisation of ecosystem services. The presented evidence suggests that at higher strategic level there is less need for fully quantified en monetised information. Seven main messages are derived from the analysis of cases, aimed at decision makers, SEA practitioners, environmental economists and ecologists.

The annex to the book presents the ten case study documents underlying chapter 9. Even though the reason to collect these cases was to evaluate the role of valuation of ecosystem services in decision making, the case studies provide a detailed view on how many of the concepts and approached introduced in this book can be used in practice. The ten cases presented are:

1 Water Conservation & Irrigation Rehabilitation, Egypt (voluntary SEA).

2 Wetland Restoration Strategy, Aral Sea region (SEA-like process).

3 Strategic Catchment Assessment, South Africa (part of SEA process).

4 Making Space for Water, United Kingdom (experimental SEA).

5 Climate policies and the Stern Review (study to inform policy making).

6 Natural gas extraction in the Wadden Sea, Netherlands (study to inform EIA and SEA processes).

7 Management of marine parks, Netherlands Antilles (sustainable financing).

8 Watershed rehabilitation & services provision, Costa Rica (payments for ecosystem services).

9 Water transfer, Spain (advocacy study to influence decision making).

10 Exxon Valdes oil spill, Alaska USA (damage assessment).

Apart from these cases, ten additional cases are presented in boxes to provide supporting evidence.

The references section contains the citations of all book chapters. The cases in the annex contain separate sources of information. S significant number of references comes from non-scientific literature, and therefore is not accessible through regular scientific channels. As much as possible we have tried to provide access to these sources of information, in most cases by providing relevant websites.