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Environmental Law and the Ecosystem Approach

Maintaining ecological integrity through consistency in law

Froukje Maria Platjouw

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The ecosystem approach embodies a concept of the environment that emphasizes the integrated components of nature as complex adaptive systems. This book examines the relationship between the architecture and design of environmental law and the implementation of the ecosystem approach as a means to maintain ecological integrity. The main issue addressed is: in which manner and to what extent does fragmentation and administrative discretion in environmental law impede the implementation of an ecosystem approach?

This is explored through the analysis of several questions: what is an ecosystem approach and how could it be implemented?; how can economic evaluation of ecosystem services contribute to the debate?; to what extent is environmental law fragmented and how does this affect the implementation of the ecosystem approach?; to what extent does environmental law contain administrative discretion and how does this affect the implementation of the ecosystem approach?; and is there a need for greater consistency, coherence and a stronger rule of law in environmental law in light of the ecosystem approach? In the light of an ecosystem approach, a coherent and consistent legal framework generally consists of a set of legal acts, the objectives of which do not contradict each other and which in conjunction support the maintenance of ecosystem integrity. The main focus is on Europe, with additional international comparisons where appropriate. The book concludes by providing a normative portrayal of future environmental law as protective, systemic and predictable.

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This book is dedicated to Elisa, Elian and Eleanora

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Abbreviations

BQE	biological quality elements
CAP	Common Agricultural Policy
CBA	cost-benefit analysis
CBD	Convention on Biological Diversity
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CFP	Common Fisheries Policy
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
COFI	Committee on Fisheries
COP	Conference of the Parties to the CBD
CTS	Cuttings Transport System
DNV	Norwegian Veritas
EA	ecosystem approach
EC	European Commission
ECE	Economic Commission for Europe
EEA	European Economic Area
EEZ	exclusive economic zone
EIA	environmental impact assessment
EPI	environmental policy integration
EU	European Union
FAO	Food and Agriculture Organization
GHGs	greenhouse gases
HCFCs	hydrochlorofluorocarbons
HELCOM	Commission under the (Helsinki) Convention on the Protection of the Marine Environment of the Baltic Sea Area
ICES	International Council for the Exploration of the Sea
ICZM	integrated coastal zone management
IDLO	International Development Law Organization
ILC	International Law Commission
IMCAM	Integrated Marine and Coastal Management

IMP	Integrated Maritime Policy
IPPC	Integrated Pollution Prevention and Control
IUCN	International Union for Conservation of Nature
JPOI	Johannesburg Plan of Implementation
MEA	Millennium Ecosystem Assessment report of 2005
MSFD	Marine Strategy Framework Directive
MSP	Marine/Maritime Spatial Planning
NCPA	Norwegian Climate and Pollution Agency
NDA	Nature Diversity Act
NGO	nongovernmental organization
OSPAR	Oslo/Paris Convention for the Protection of the Marine Environment of the North-East Atlantic
PDO	Plan for Development and Operation
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RFMO	regional fisheries management organizations
SAC	special area of conservation
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
TCM	travel costs method
TEEB	The Economics of Ecosystems and Biodiversity
TEV	total economic value
TFEU	Treaty on the Functioning of the European Union
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea 1982
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNICPOLOS	United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea
UNTS	United Nations Treaty Series
WCED	World Commission on Environment and Development
WCN	World Charter for Nature 1982
WFD	Water Framework Directive
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization

1 Introduction

The ecosystem approach has now been endorsed in many legal acts at national, European and international levels, as a strategy to halt the degradation of our ecosystems. At its core, the ecosystem approach requires a governance approach which focuses on the structure and functioning of the ecosystem within its ecological boundaries, with the objectives of sustainable use and the maintenance of ecosystem integrity. As such, the ecosystem approach requires both a holistic approach that focuses on the ecosystem as a whole, as well as an approach that integrates various objectives. This book examines the relationship between the architecture and design of environmental law and the implementation of the ecosystem approach.

Two features of contemporary environmental law will be unravelled. These are fragmentation in environmental law and governance, and administrative discretion within legal rules and principles provided to decision-making authorities to weigh and balance competing interests. This book will show that administrative discretion in environmental law may jeopardize ensuring the maintenance of ecosystem integrity. It is certain that this is not caused by discretion in isolation. Rather, the combination of discretion with fragmented structures of law and governance, in addition to the difficulties of weighing and balancing very divergent values in decision-making procedures, and the unpredictability and complexity of ecosystem functioning all contribute to the challenge of governing ecosystems sustainably. These difficulties are interrelated and in conjunction they may lead to ecosystem degradation rather than to the maintenance of ecosystem integrity.

Against the background of these challenges, this book highlights the need for consistency and coherence in environmental law. As being essential for the implementation of an ecosystem approach, the concepts of consistency and coherence are explored and various forms are distinguished. These forms of consistency will ensure that the system of environmental law facilitates the implementation of an ecosystem approach and contributes to the maintenance of ecosystem integrity. As such, environmental law may contribute to ensuring the enjoyment of ecosystem services by current as well as future generations.

1.1 A novel and transdisciplinary approach

The book touches upon some major issues such as the ecosystem approach, the valuation of ecosystem services, fragmentation, consistency and the rule of law. Rather than zooming in on one of these matters in particular, this book aims to shed light on the interrelationships between the concepts. The challenges that derive from administrative discretion and fragmentation, and from the weighing and balancing of highly diverse values may be tackled when considered in isolation. However, in conjunction they may lead to difficulties which impede the implementation of an ecosystem approach.

In order to clarify the interrelationships, a novel and transdisciplinary approach is deemed both appropriate and timely. The book draws on international law as well as European Union (EU) and national law. The viewpoint includes that of the lawmaker as well as the application of existing law. Moreover, the book, while embedded in legal science and research, also employs a transdisciplinary approach drawing on elements from economics as well as ecology. This book employs a novel approach analysing the architecture and design of environmental law and its role for the attainment of environmental objectives.

1.2 Objectives and chronology

In order to examine the relationship between the architecture and design of environmental law and the implementation of the ecosystem approach, this book has been divided into eight chapters.

Chapter 2 introduces the ecosystem approach as a governance approach based on the ecological boundaries of an ecosystem rather than on jurisdictional boundaries with the objective of both sustainable use and the maintenance of ecosystem integrity. This chapter discusses the understanding of the ecosystem approach and the challenge of balancing the objectives appropriately. Despite the dual objective of the ecosystem approach, it is argued that the maintenance of ecosystem integrity needs to be considered as the ultimate objective of the ecosystem approach. The chapter also contains an overview of the development of the concept of the ecosystem approach at the European and international levels.

In addition, in Chapter 3 the nature of ecosystems as being 'complex adaptive systems' is explored. Ecosystems are so-called complex adaptive systems in which all the elements of the system are interconnected. The interaction between these elements generates the unique properties of the ecosystem. The nature and behaviour of ecosystems as complex adaptive systems provide some specific challenges to the architecture and design of the legal system. The chapter finishes off with an assessment of the concept of 'ecosystem integrity' which appears to be a central concept under the ecosystem approach.

Chapter 4 presents one of the major methods to facilitate the implementation of the ecosystem approach, namely the economic valuation of

ecosystem services. Currently, studies are being carried out globally, regionally and nationally to elucidate the value of the services provided by ecosystems. Ecosystem services valuation may play an important role by integrating more explicitly the value of ecosystem services into decision-making procedures. By these means, ecosystem integrity could be more easily maintained. This chapter provides an analysis of the economic valuation methods to value ecosystem services, their potential as well as their difficulties. It will be clarified to what extent this method could be useful in implementing an ecosystem approach in environmental governance.

After discussing the ecosystem approach and the potential of the valuation of ecosystem services, Chapters 5 and 6 delve into the two features of environmental law: fragmentation and administrative discretion. Administrative discretion in law allows the public authorities to weigh and balance various relevant concerns and values in the process of making decisions. Even though ecosystem services valuation may be a useful method, environmental law often remains silent with regard to how to weigh and balance different values. Administrative discretion may serve important purposes; however, it may also pose challenges to the objective of the maintenance of ecosystem integrity. Fragmentation of environmental law may reinforce this challenge. Various legal acts may apply to the same ecosystem and different public authorities may be involved in decision-making procedures affecting a particular ecosystem. When discretion is used differently within the various legal and administrative frameworks, it may be difficult to ensure the maintenance of the integrity of the ecosystem as a whole. Fragmentation also poses an additional challenge: the legal system has split up the ecosystem into various jurisdictional zones. How could a governance approach be based on the ecological boundaries of the ecosystem while the jurisdictional boundaries provide the framework wherein decisions are being taken?

Chapter 7 provides a case study on petroleum exploitation in the North Sea ecosystem. This case demonstrates the practical consequences of fragmentation and administrative discretion in environmental law. More specifically, it will be analysed to what extent the applicable legal acts support an ecosystem approach in terms of geographical scope and pursued objectives. In addition, the chapter will explore to what extent administrative discretion allows for prioritizing of objects other than the conservation of nature. Finally, it will also be considered whether the legal acts prescribe particular methods of using discretion to carry out value judgements, such as the valuation of ecosystem services and the use of cost-benefit analysis. Furthermore, the case study will clarify how administrative discretion in environmental law affects the attainment of environmental objectives in practice. The expectation is that administrative discretion in law allows for lawful discrepancies between the environmental objectives of the acts and the attainment of these objectives in particular situations allowed through a degree of discretion embedded in the acts to weigh and balance the various interests. As

discretion in law allows decisive weight to be given to other concerns, the maintenance of ecosystem integrity is not necessarily ensured.

Chapter 8 then analyses more thoroughly the concept of consistency, coherence and the rule of law. The chapter will explain why consistency is necessary in the light of an ecosystem approach. The relationship between the concepts of consistency and coherence will also be discussed, as well as the importance of consistency in light of the rule of law in environmental law. Moreover, various forms of consistency will be identified in this chapter, which are being put forth from the perspective of an ecosystem approach. A distinction will be made between formal consistency, substantive consistency, and consistency in weighing and balancing. It will be argued that these forms of consistency facilitate the implementation of an ecosystem approach. In addition, they also significantly contribute to the rule of law in environmental law, in the understanding that the strength of the system of environmental law prevents ecosystem degradation and ensures the maintenance of ecosystem integrity.

1.3 Delimitations

As mentioned above, this book explores the interrelationships between the various challenges that exist with regard to the implementation of an ecosystem approach in environmental governance. Concepts such as complex adaptive systems, economic valuation of ecosystem services, fragmentation, discretion, coherence and consistency have been written on extensively within various contexts and disciplines. In this book, however, these notions are being explored to the extent necessary to understand their relationship with one another, in light of the ecosystem approach. This pragmatic approach has been chosen in order to delimit more philosophical assessments of the concepts.[1]

Further delimitations have been made with regard to the concept of the ecosystem approach as used in this book. The concept of the ecosystem approach is very broad, involving many elements. Besides the holistic and integrative intentions of the concept, the ecosystem approach also aims at, amongst others, the adaptive management of ecosystems, and at decentralisation of management to the lowest appropriate level. In addition, the idea of humans as an integral part of ecosystems has also been discussed extensively in the scholarly debates on the ecosystem approach. This book, however, focuses in particular on the holistic and integrative intentions of the ecosystem approach, as the fragmentation and use of administrative discretion in environmental law appears to be in direct tension with these elements.

1 See De Lucia (2015) for an interesting analysis of the complex genealogy of the ecosystem approach.

Another important delimitation has been made with regard to the methodology for the weighing and balancing of divergent values. This book focuses merely on the method of the economic valuation of ecosystem services and cost-benefit analysis, and leaves other methods such as the use of multi-criteria decision analysis outside the discussion. The main reason for this choice has been the current attention given to this method as illustrated by the international project on the Economics of Ecosystems and Biodiversity, and the various regional and national projects on the valuation of ecosystems and biodiversity as a corollary of this international project.[2]

1.4 Key concepts

This final section introduces some of the key concepts that will be used throughout this book. As some of the concepts will be explored more thoroughly elsewhere in the book, the introduction of these will be relatively short.

1.4.1 Ecosystems and their services

The term 'ecosystem' emerged in the 1930s and was first used by Arthur Tansley, who provided an initial scientific conceptualization in 1935 to describe natural systems in a way that encompassed all of the living organisms occurring in a given area and the physical environment with which they interact. This definition explicitly included both living organisms and the abiotic environment as an integral part of a single system.[3]

Much later, in 1992, a similar definition was provided in Article 2 of the Convention on Biological Diversity (CBD). The CBD describes an ecosystem as 'a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit'.[4] An ecosystem is thus an area where biotic and abiotic interactions take place.

1.4.2 Scales and boundaries

Ecosystems may vary enormously in size: a temporary pond in a tree hollow or a drop of water may be defined as ecosystems, as well as an ocean basin and the entire biosphere.[5] An important challenge that arises is the determination of the ecological boundaries of the ecosystem. Obviously, ecosystems do not have firm boundaries, and merge with one another. Smaller systems are part of larger systems, and it is difficult to speak of one system

2 TEEB (2010b).
3 Nagle and Ruhl (2002), 306.
4 The Convention on Biological Diversity (adopted 22 May 1992, entered into force 29 December 1993) 1760 UNTS 79, Article 2.
5 UNEP and MEA (2005), 3. See also Nagle and Ruhl (2002), 302.

as a separate entity from the next. A system in apparent equilibrium may be an integral part of another that is exhibiting change.[6] In the words of Homer-Dixon:

> Complex ecosystems are understood to consist of many intimately interlinked and 'nested' ecosystems. In other words, a large ecosystem, such as a region of Amazonian rainforest, has embedded within it smaller systems, such as the cycles of energy and life operating on a specific hillside or along a specific portion of riverbank. In turn, these sub-systems incorporate ever-smaller sub-subsystems, all the way down to soil bacteria. Nested systems thus contain everything from sweeping macro systems to minutest microsystems.[7]

The difficulty in determining ecosystem boundaries depends on the type of ecosystem; the boundaries of an ecosystem within the marine environment, for instance, may be more difficult to identify than the boundaries of a lake or a forest. The character of the sea appears relatively seamless with ecological processes operating over large scales and distances. Boundaries can be subtle, being defined by temperature, currents, depth, stratification and salinity. In practice, the scales of the marine ecosystems most suitable for application of the ecosystem approach are the scales at which it is most appropriate to manage particular human activities.[8]

The effectiveness of a governance system in relation to the maintenance of the integrity of a particular ecosystem depends on whether its characteristics match those of the ecosystem it addresses. This raises the problem of spatial fit, which is the degree to which a governance regime covers the whole geographical area of the natural resource it is designed to manage. A lack of spatial match is considered problematic since it may cause spatial externalities, benefiting free-riders and harming others beyond the spatial reach of the responsible institution.[9]

As an illustration, in the marine environment, practical difficulties arise when the boundaries of the ecosystem do not correspond with the maritime jurisdictional zones set down by the United Nations Convention on the Law of the Sea (UNCLOS).[10] This may mean that rights and duties of various parties vary across the ecosystem. Frequently, these difficulties are compounded by the absence of a single regulatory body with exclusive legal competence to adopt management measures that apply to the entire ecosystem.[11]

6 Pardy (2005), 42.
7 Homer-Dixon (2000), 132.
8 Laffoley et al. (2004), 7.
9 Hartje et al. (2003), 18.
10 United Nations Convention on the Law of the Sea (opened for signature on 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3.
11 Long (2010), 18–19.

1.4.3 Functions and services

The structure of an ecosystem brings forth particular functions, so-called 'ecosystem functions'. There are many ecosystem functions: regulating atmospheric chemical composition, temperatures and precipitation; decomposing compounds; producing biomass; maintaining balances in carbon dioxide and nitrogen; permitting recovery from natural disturbances; filtering ultraviolet radiation; and cycling nutrients, among others.

These functions in turn yield many potential benefits – so-called 'ecosystem services' – including commodities (such as timber, fish and wildlife), specific services (such as hydropower, biological control or pollution abatement), intangibles (such as preservation of open landscapes, endangered species and wilderness), and amenities (such as places for recreation).[12]

Daily describes these ecosystem services as 'the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life'.[13] It has now been understood that ecosystem services are highly important to human life. As underscored in the Millennium Ecosystem Assessment (MEA) report of 2005,[14] humanity has always depended on the services provided by the biosphere and its ecosystems. The composition of the atmosphere and soil, the cycling of elements through air and waterways, and many other ecological assets are all the result of living processes – and all are maintained and replenished by living ecosystems. The human species, while buffered against environmental immediacies by culture and technology, is ultimately fully dependent on the flow of ecosystem services.[15]

Marine ecosystems may be a good example to illustrate this dependence. As recognized by the United Nations Environment Programme (UNEP) in its Synthesis Report on marine and coastal ecosystems and human well-being:

> People are dependent on the oceans and coasts and their resources for their survival and well-being. Marine and coastal ecosystems provide a wide range of services to human society, including food provision, natural shoreline protection against storms and floods, water quality maintenance, support of tourism and other cultural and spiritual benefits, and maintenance of the basic global life support systems. The effects of coastal degradation and a loss of these services are felt inland and often a long way from the coast.[16]

Due to this dependency on ecosystem services for human well-being, the need to protect ecosystem functions has been acknowledged. As stated by Ruhl et al.:

12 Van Eeten and Roe (2002), 15. See also Ruhl (2005), 14.
13 Daily (1997), 3.
14 UNEP and MEA (2005).
15 Ibid., 1.
16 UNEP (2006), 1.

> Ecosystem functions contribute to the building of the ecosystem's physical structure, such as biomass, and abiotic resources (e.g. soil and water), which in turn supports the sustainability of the functions. Events that degrade ecosystem structure, such as overfishing in coral reef ecosystems, consequently disrupt the integrity of the associated ecosystem functions. These effects are important not only to the sustainability of the ecosystem but also to the sustainability of humans, given the importance of ecosystems to human well-being (MEA 2003, 2005).[17]

This distinction between functions and services, however, is controversial and use of the terms is inconsistent in the literature. Furthermore, at times, it may difficult to distinguish what are functions and what are services.[18] It has also been recognized that the two concepts are closely related. Moreover, some services, for example, food production, are in fact the benefit of several functions together. Pardy states that if ecosystem function is preserved and protected, then ecosystem services are also sustained. The way to maintain ecosystem services is not to target those services themselves, but instead to protect ecosystem functions.[19]

In decision making, most emphasis has been placed on ecosystem services, as these are more visible and concrete than ecosystem functions. Moreover, people appreciate ecosystem services due to the benefits they receive from them. So, the relationship between humans and ecosystem services is relatively straightforward in comparison to ecosystem functions.

The services provided by ecosystems may be divided into four categories.[20] A first important category of services is *provisional services*, which are the products obtained from ecosystems. This category includes food and fibre, fuel, genetic resources, biochemicals, natural medicines, and pharmaceuticals. Fresh water is also an important product obtained from ecosystems.[21]

The second category is *regulating services*, which are the benefits people obtain from the regulation of ecosystem processes. Examples include air quality maintenance, climate regulation, and water regulation. Other examples are erosion control, water purification and waste treatment, regulation of human diseases, biological control, pollination and storm control. The presence of coastal ecosystems such as mangroves and coral reefs can dramatically reduce the damage caused by hurricanes or large waves.

17 Ruhl et al. (2007), 17.
18 Costanza et al. (1997), 253; or Van Eeten and Roe (2002).
19 Pardy (2008a), 451.
20 Goulder and Kennedy (1997), 28–35; or UNEP and MEA (2005), 56–59.
21 Within marine and coastal ecosystems, food provisioning in the form of fisheries catch is one of the most important services derived. With more than a billion people relying on fish as their main or sole source of animal protein, fisheries and fish products provide direct employment to 38 million people, with a further 162 million people indirectly involved in the fisheries industry (UNEP 2006), 1.

In particular, ecosystems such as mangroves, sea grasses and mudflats provide key regulating services through shoreline stabilization, protection from floods and soil erosion, processing pollutants, and stabilizing land in the face of changing sea levels by trapping sediments and buffering land from storms. Terrestrial and ocean ecosystems provide a tremendous service by absorbing nearly 60 per cent of the carbon that is now emitted to the atmosphere from human activities, thereby slowing the rate of global climate change.[22]

The third category is *cultural services*, which are the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences. Many people in fact find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks, 'scenic drives' and the selection of housing locations. Ecosystems also influence the types of social relations that are established in particular cultures. Fishing societies, for example, differ in many respects in their social relations from nomadic herding or agricultural societies.[23]

The fourth category of services is *supporting services*, which are those that are necessary for the production of all other ecosystem services, such as primary production, production of oxygen and soil formation. They differ from provisioning, regulating and cultural services in that their impacts on people are either indirect or occur over a very long time, whereas changes in the other categories have relatively direct and short-term impacts on people. The production of oxygen gas (through photosynthesis) is categorized as a supporting service since any impacts on the concentration of oxygen in the atmosphere would only occur over an extremely long time. Some other examples of supporting services are primary production, soil formation and retention, nutrient cycling, water cycling and provisioning of habitat.[24]

Some services fit under more than one of the categories above. One example is ornamental resources. Animal products such as skins, shells and flowers are used as ornaments, although the value of these resources is often culturally determined. Fresh water is another example of linkages between categories – in this case, between provisioning and regulating services. Some services, like erosion control, can be categorized as both a supporting and a regulating service, depending on the timescale and immediacy of their impact on people. For example, humans do not directly use soil formation services, although changes in this would indirectly affect people through the impact on the provisioning service of food production. Similarly, climate regulation is categorized as a regulating service since ecosystem changes can have an impact on local or global climate over timescales relevant to human decision making (decades or centuries).[25]

22 UNEP and MEA (2005), 28.
23 Ibid., 58–59.
24 Ibid., 28 and 59–60.
25 Ibid.

The quality and quantity of ecosystem services that are provided by an ecosystem depends on the integrity of the particular ecosystem. This relationship will be further discussed in Chapter 3. Here it suffices to say that the degradation of ecosystems has an adverse effect on the capability of ecosystems to provide ecosystem services to mankind. This has an important effect on our well-being.

1.4.4 Ecosystem degradation and the ecosystem approach

Today, many ecosystems around the world are threatened. The degradation of ecosystems has become one of the major concerns, particularly during the last two decades. However, a cognizance of ecosystem degradation dates back to at least as early as Plato:

> What now remains of the formerly rich land is like the skeleton of a sick man with all the fat and soft earth having wasted away and only the bare framework remaining. Formerly, many of the mountains were arable. The plains that were full of rich soil are now marshes. Hills that were once covered with forests and produced abundant pasture now produce only for bees. Once the land was enriched by yearly rains, which were not lost, as they are now, by flowing from the bare land into the sea. The soil was deep, it absorbed and kept the water … and the water that soaked into the hills fed springs and running streams everywhere. Now the abandoned shrines at spots where formerly there were springs attest that our description of the land is true.[26]

The more recent awareness of the degradation of ecosystems was boosted by a scientific article entitled 'Ecosystems in Jeopardy', which defines ecosystems and then begins:

> The most subtle and dangerous threat to man's existence … is the potential destruction, by man's own activities, of those ecological systems upon which the very existence of the human species depends.[27]

Recognizing the threats of ecosystem degradation, in 2000, in his Millennium Report to the United Nations (UN) General Assembly, Kofi Annan emphasized the growing burden that degraded ecosystems are placing on human well-being and economic development, and the opportunity that better-managed ecosystems provide for meeting the goals of poverty eradication and sustainable development.[28] Annan called for an integrated assessment of

26 Plato, quoted in Hillel (1991), 104.
27 Ehrlich and Ehrlich (1970), 1957.
28 UNEP and MEA (2005), 1.

the consequences of ecosystem change for human well-being and to analyse options available to enhance the conservation of ecosystems and their contribution to meeting human needs.

That integrated assessment, known as the Millennium Ecosystem Assessment report (MEA) made clear that human demand for ecosystems is high and that there are many indications that human demands on ecosystems will grow still greater in the coming decades. Current estimates of 3 billion more people and a quadrupling of the world economy by 2050 imply a formidable increase in the demand for ecosystem services. This problem is further complicated by the increasingly serious degradation in the capability of ecosystems to provide these services.

One of the main findings of the MEA was the following:

> Everyone in the world depends completely on Earth's ecosystems and the services they provide, such as food, water, disease management, climate regulation, spiritual fulfilment, and aesthetic enjoyment. Over the past 50 years, humans have changed these ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber, and fuel. This has resulted in a substantial and largely irreversible loss in the biodiversity of life on Earth.[29]
>
> The changes made to ecosystems have contributed to substantial gains in human well-being and economic development, but these gains have been achieved at growing costs. These costs include the degradation of many ecosystem services, increased risks of abrupt changes, and increased poverty for some groups of people. These problems, unless addressed, will substantially reduce the benefits that future generations get from ecosystems.[30]

Indeed, the ever-growing demands being placed on increasingly degraded ecosystems seriously diminish the prospects for sustainable development. Productive ecosystems, with their array of services, provide people and communities with resources and options they can use as insurance in the face of natural catastrophes or social upheaval. While well-managed ecosystems reduce risks and vulnerability, poorly managed systems can exacerbate them by increasing risks of flood, drought, crop failure or disease.

The fifth Global Biodiversity Outlook from 2012 underscores that:

> As human pressures on the Earth System accelerate, several critical global, regional and local thresholds are close or have been exceeded. Once these have been passed, abrupt and possibly irreversible changes

29 Ibid., 1.
30 Ibid., 1–4.

> to the life-support functions of the planet are likely to occur, with significant adverse implications for human well-being.[31]

There are various reasons behind the degradation of ecosystems. Three of them will be mentioned here in particular. The first reason is the complexity of ecosystems; ecosystems are complex adaptive systems and therefore difficult to manage by mankind. The fact that the behaviour of ecosystems is non-linear and dynamic may result in unpredictable and unplanned outcomes.[32] In addition, the performance of the ecosystems arises from the interrelationships among the various elements of the ecosystem. This means that the performance of an ecosystem is affected by the governance of *all* the various elements, such as the land, the water and the species. The complexity of ecosystems makes it difficult to know exactly how human behaviour affects the performance of the ecosystem. Certain behaviour will not significantly affect the performance of the ecosystem in the short term, and even if there are significant changes, these are not always noticed by society in time.

Another reason behind the degradation of ecosystems is that the real value of ecosystems and their services is poorly understood.[33] This is partly due to the fact that many of the services provided by ecosystems are common goods that are not traded on the market. This means that they do not have a clear market price. Although people value them, no one person has an incentive to pay to maintain the good. Collective action is required to uphold the quality, diversity and quantity of ecosystem services. This problem of clarifying the value of ecosystem services and integrating them in decision-making procedures on the environment has been the topic of the ground-breaking study on 'The Economics of Ecosystems and Biodiversity' (TEEB).

In 2007, the environment ministers of 13 industrializing countries agreed to a global study to initiate the process of analysing the global economic benefit of biological diversity, the costs of the loss of biodiversity and the failure to take protective measures versus the costs of effective conservation.

31 UNEP (2012), 6.

32 For a description of ecosystems as complex adaptive systems see, for instance, Doremus et al. (2012), 5; Pardy (2008b), 341; and Ruhl (1997), 945.

33 This easily allows mistreatment of a particular service. As Aristotle already recognized, 'What is common to the greatest number has the least care bestowed upon it. Everyone thinks chiefly of his own, hardly at all of the common interest' (Aristotle et al. 1995), chapter 3. This is what Garret Hardin has called the 'Tragedy of the Commons'. This phrase concerns the threat to shared resources that comes from individuals having few incentives to curb their destructive behaviour. Indeed, if property rights for natural resources are not clearly defined, they may be overused, because there is no incentive to conserve them. For example, unregulated fisheries are an open-access or common property resource – anyone who wants to harvest fish can do so. Because no one person or group 'owns' the resource, open access can lead to severe over-harvesting and potentially severe declines in fish abundance over time. See Hardin (1968), 1244.

This study, led by Pavan Sukhdev, has led to a series of reports, among which was a report in October 2010 that aimed to show how economic concepts and tools can help equip society with the means to incorporate the values of nature into decision making at all levels.[34] The TEEB study is an important step to connect economic tools to the protection of ecosystems and biodiversity.[35]

A third reason that is worth mentioning at this stage is the inadequacies of existing environmental management arrangements. Kidd et al. state that:

> Fragmented administrative structures in which policy and operational responsibilities are divided between a disparate array of organizations, narrow sectoral decision-making systems with competing and contradictory objectives, a disconnection between national, regional and local level activities and between natural and administrative boundaries, are typical features of governance in countries all over the world.[36]

Despite the development of environmental laws and regulations over the past 40 years, these laws and regulations have not been adequate to ensure the maintenance of the integrity of natural systems.[37] To manage ecosystems sustainably and to ensure their provision of ecosystem services, both quantitatively and qualitatively, an ecosystem approach in environmental governance has now been endorsed. This ecosystem approach may be a tool to halt the degradation of our ecosystems. The ecosystem approach encompasses a holistic and an integrative dimension. First of all, the ecosystem approach requires a governance approach that focuses on the geographical boundaries of the ecosystem, rather than the jurisdictional boundaries. It requires a holistic approach whereby ecosystem structure, functioning and productivity are in focus rather than individual species, habitats or landscapes. Second, the ecosystem approach requires the integration of two objectives. The ecosystem approach aims at the sustainable use of ecosystem services while at the same time maintaining the integrity of those ecosystems. Despite this dual objective, the latter may be considered the primary objective of the ecosystem approach. Without the maintenance of ecosystem integrity, ecosystem degradation will in all probability not be halted.[38]

34 TEEB (2010b), 3.

35 The TEEB report also highlighted that degradation of ecosystem services could be significantly slowed or reversed if the *full* economic value of the services were taken into account in decision making. Intensive use of ecosystems often produces the greatest short-term advantage, but excessive and unsustainable development use can lead to losses in the long term.

36 Kidd et al. (2011), 4.

37 Voigt (2013), xiv.

38 For a discussion of the meaning of 'ecosystem integrity', see Trouwborst (2009), 28; or Nagle and Ruhl (2002), 326; Grumbine (1994), 27; Manuel-Navarrete et al. (2008), 335. See further Chapter 3.

The ecosystem approach will be subject to a thorough assessment in Chapter 2 and will therefore not be further introduced here.

1.4.5 Fragmentation and administrative discretion in environmental law

The concepts of fragmentation and administrative discretion are key concepts in this book. Before these concepts are introduced, some words on the term 'environmental law' itself are needed here.

The term *environmental law* in this book is used as shorthand for a body of law that regulates the impacts of human activities on the environment. Environmental law covers a broad range of activities that affect air, water, land, flora and fauna. The book thus refers to environmental law in its broad understanding, focusing not only on laws that have the protection of the environment as their primary focus, but also on laws that regulate certain major activities which can have impacts on the environment. Environmental law thus contains legal acts that regulate different aspects of the environment – for example, air, water, pesticides, waste management, endangered species and so forth – and regulate different activities that directly or indirectly affect the environment, such as transport, industry or energy. Currently, there is a certain development going on, particularly within European environmental law, towards the endorsement of more ecosystem-based approaches in legislation. The EU Water Framework Directive may be a good example. This development will be more thoroughly discussed in Chapter 2. Here it suffices to say the various media of the environment are to a considerable extent still regulated by different regimes, sometimes even at multiple levels of government.

The *fragmentation of environmental law* in this book refers to the phenomenon that environmental law is divided into numerous pieces of legislation that focus on different environmental media – such as water, land, forests, species – in a horizontally fragmented manner. Despite the fact that environmental law is also vertically fragmented whereby the different levels of governance – local, national, regional and international – are regulated by a different set of regulatory acts, this book is mostly concerned with the horizontal dimension of fragmentation.

Besides fragmentation, this book also delves into the concept of *administrative discretion* in environmental law and governance. In very general terms, discretion is the room for choice left to the decision maker by some higher-ranking source or authority. Even though the term administrative discretion may thus refer to a variety of phenomena, Galligan et al. describe the core of discretion as follows:

> In its clearest and strongest sense, discretion means that in deciding whether to do [X] the official has some freedom of choice as to the standards and criteria which ought to govern his decision. To a greater or lesser degree they are left for him to determine as he thinks best. In

> making that determination, the official is not free of all constraints but must act reasonably and in good faith, have good reasons for his actions, and follow certain procedures, including hearing the parties affected. The official could not be criticized, however, for not properly applying the standards, since to a large degree it is left to the official to decide what the standards should be.[39]

Under the concept of administrative discretion, different phenomena are often distinguished: policy decisions linked to the weighing of conflicting private and public interests; decisions involving complex factual evaluations; and decisions involving the interpretation of complex and/or unclear legal rules.[40]

In this book the term is used in a wide sense, so as to cover inaccurate wording as well as administrative discretion under a statutory provision. Environmental legislation often contains ambiguous terms and principles which leave room for different interpretations and applications. In addition, environmental legislation also regularly provides public decision makers with a widely formulated competence to weigh and balance various interests and values when applying law. The distinction between these two forms of discretion may not be very clear in environmental law, as ambiguous terms and principles often implicitly also require a weighing and balancing of different interests and values. Discretion in environmental law in combination with fragmented structures of law and governance may easily lead to inconsistencies in the application of environmental law.

1.4.6 Consistency, coherence and the rule of law in environmental law

Administrative discretion in combination with fragmentation may pose challenges to consistency, coherence and rule of law in environmental law. In general, consistency refers to non-contradiction among a set of rules or norms. In this book, the term consistency is more specifically used to refer to consistency with regard to the objectives pursued by the various applicable statutory acts; consistency with regard to the manner in which the value of the ecosystem (services) is being appreciated and integrated in decision-making procedures under the various legal frameworks; and consistency between rules and principles of the legal acts and their implementation in practice.

In addition to the concept of consistency, the concept of coherence plays an important role. Coherence requires that the rules and norms are not only consistent, but that they 'make sense' in light of an overarching aim. The rules and norms of the various legal acts thus need to be coherent in the

39 Galligan et al. (1997), 16.
40 Caranta (2008), 195.

sense that they promote the maintenance of ecosystem integrity rather than that they work against it.

A greater degree of consistency and coherence enhances the rule of law in environmental law. Strengthening the degree of consistency and coherence may increase the degree of predictability and legal certainty in the field of environmental law. In general, the concept of the rule of law 'requires measures to ensure adherence to the principles of supremacy of law, equality before the law, accountability to the law, fairness in the application of the law, separation of powers, participation in decision-making, legal certainty, avoidance of arbitrariness and procedural and legal transparency'.[41] In the field of environmental law, it may further require a 'rule of law for nature'. This refers to a 'system of governance in which all persons, institutions and entities, public and private, including the state itself, are accountable to laws that aim at protecting the health, integrity and security of the environment'.[42]

Throughout this book, the concept of the rule of law is mainly used to refer to the requirements of legal certainty and predictability. Consistency in environmental law is deemed most important for ensuring predictability in decision-making procedures. Respecting the rule of law in environmental law plays an important role for the implementation of an ecosystem approach and the maintenance of ecosystem integrity.

1.5 References

Aristotle *et al.*, *The Politics* (Oxford University Press, 1995), book II, chapter 3.

Bugge, H.C., 'Twelve Fundamental Challenges in Environmental Law', in Voigt, C. (ed.) *Rule of Law for Nature. New Dimensions and Ideas in Environmental Law* (Cambridge University Press, 2013).

Caranta, R., 'On Discretion', in Prechal, S. and Van Roermund, B. (eds) *The Coherence of EU Law: The Search for Unity in Divergent Concepts* (Oxford University Press, 2008).

Costanza, R. *et al.*, 'The Value of the World's Ecosystem Services and Natural Capital' (1997) 387 *Nature* 253.

Daily, G. (ed.), *Nature's Services: Societal Dependence on Natural Ecosystems* (Island Press, 1997).

De Lucia, V., 'Competing Narratives and Complex Genealogies: The Ecosystem Approach in International Environmental Law' (2015) 27 *Journal of Environmental Law* 1: 91–117.

Doremus, H. *et al.*, *Environmental Policy Law: Problems, Cases and Readings* (6th edn, Foundation Press, 2012).

Ehrlich, P. and Ehrlich, A., *Population, Resources, Environment: Issues in Human Ecology* (W.H. Freeman and Company, 1970).

Galligan, D.J. *et al.*, *Administrative Discretion and Problems of Accountability. Proceedings of the 25th Colloquy on European Law* (Council of Europe Publishing, 1997).

41 Voigt (2013), xv.
42 Bugge (2013), 5.

Goulder, L. and Kennedy, D., 'Valuing Ecosystem Services: Philosophical Bases and Empirical Methods', in Daily, G. (ed.), *Nature Services: Societal Dependence on Natural Ecosystems* (Island Press, 1997).

Grumbine, R.E., 'What is Ecosystem Management' (1994) 8(1) *Conservation Biology* 27.

Hardin, G., 'The Tragedy of the Commons' (1968) 162(3859) *Science* 1243.

Hartje, V., Klaphake, A. and Schliep, R., 'The International Debate on the Ecosystem Approach: Diffusion of a Codification Effort', in Korn, H., Schliep, S. and Stadler, J. (eds) *Report of the International Workshop on the 'Further Development of the Ecosystem Approach'* (BFN Federal Agency for Nat Conserv, Skripten 78, 2003).

Hillel, D., *Out of the Earth: Civilization and the Life of the Soil* (The Free Press, 1991).

Homer-Dixon, T., *The Ingenuity Gap* (Alfred P. Knopf, 2000).

Kidd, S., Plater, A. and Frid, C. (eds), *The Ecosystem Approach to Marine Planning and Management* (Earthscan, 2011).

Laffoley, D. *et al.*, *The Ecosystem Approach: Coherent Actions for Marine and Coastal Environments. A Report to the UK Government* (English Nature, 2004).

Long, R., *EU Law and the Ecosystems Approach: Making it Work in Practice* (6th Advisory Body of Experts on the Law of the Sea Conference, Monaco, October 2010).

Manuel-Navarrete, D., Dolderman, D. and Kay, J.J., 'An Ecosystem Approach for Sustaining Ecological Integrity – But Which Ecological Integrity?' in Waltner-Toews, D., Kay, J. and Lister, N.M. (eds) *The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability* (Columbia University Press, 2008).

Nagle, J.C. and Ruhl, J.B., *The Law of Biodiversity and Ecosystem Management* (Foundation Press, 2002).

Pardy, B., 'In Search of the Holy Grail of Environmental Law: A Rule to Solve the Problem' (2005) 1 *International Journal of Sustainable Development Law and Policy* 29.

Pardy, B., 'The Law and Policy of Ecosystem Services, by Ruhl, J.B., Kraft, S.E. and Lant, C.L.' (2008a) 46(2) *Osgoode Hall Law Journal* 445.

Pardy, B., 'The Pardy-Ruhl Dialogue on Ecosystem Management, Part V: Discretion, Complex-Adaptive Problem Solving, and the Rule of Law' (2008b) 25(2) *Pace Environmental Law Review* 341.

Ruhl, J.B., 'Thinking of Environmental Law as a Complex Adaptive System – How to Clean Up the Environment by Making a Mess of Environmental Law' (1997) 34(4) *Houston Law Review* 933.

Ruhl, J.B., 'Regulation by Adaptive Management – is it Possible?' (2005) 7 *Minnesota Journal of Law, Science & Technology* 21.

Ruhl, J.B., Kraft, S.E. and Lant, C.L., *The Law and Policy of Ecosystem Services* (Island Press, 2007).

TEEB, Pushpam Kumar (ed.), *Mainstreaming the Economics of Nature, A Synthesis of the Approach, Conclusions, and Recommendations of TEEB* (Progress Press, 2010a).

TEEB, Pushpam Kumar (ed.), *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations* (Earthscan, 2010b).

Trouwborst, A., 'The Precautionary Principle and the Ecosystem Approach in International Law: Differences, Similarities and Linkages' (2009) 18(1) *Review of European Community & International Environmental Law* 26.

United Nations Environment Programme (UNEP), *Marine and Coastal Ecosystems and Human Well-being: A Synthesis Report Based on the Findings of the Millennium Ecosystems Assessment* (UNEP, 2006).

United Nations Environment Programme (UNEP), *Global Environment Outlook GEO-5, Summary for Policy Makers* (UNEP, 2012).

United Nations Environment Programme (UNEP) and Millennium Ecosystem Assessment (MEA), *Ecosystems and Human Well-Being: Our Human Planet, Summary for Policy Makers* (Island Press, 2005).

Van Eeten, M. and Roe, E., *Ecology, Engineering and Management: Reconciling Ecosystem Rehabilitation and Service Reliability* (Oxford University Press, 2002).

Voigt, C. (ed.), *Rule of Law for Nature. New Dimensions and Ideas in Environmental Law* (Cambridge University Press, 2013).

1.5.1 Conventions

CBD. The Convention on Biological Diversity (adopted 22 May 1992, entered into force 29 December 1993) 1760 UNTS 79.

UNCLOS. United Nations Convention on the Law of the Sea (opened for signature on 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3.

2 The ecosystem approach
Its understanding and legal development

The ecosystem approach is a strategy to halt the degradation of our ecosystems. This chapter first clarifies the general understanding of the ecosystem approach and identifies its core. It will be shown that the ecosystem approach requires a governance regime focusing on the structure and functioning of the ecosystem within its own ecological boundaries, with the objectives of sustainable use and the maintenance of ecosystem integrity. As such, the ecosystem approach requires both a holistic approach that focuses on the ecosystem as a whole, and an approach that integrates various objectives. The challenge of appropriately balancing these objectives will be discussed.

The second part of the chapter contains an overview of the legal development of the concept in international and European law. The ecosystem approach is not merely a concept that has emerged sporadically, but rather the concept has now been widely endorsed in international and European legal instruments. Key international and EU legal instruments will be discussed.

2.1 Understanding the ecosystem approach

The understanding of the need for a more holistic approach started from the 1980s onwards and was set in motion through the recognition that traditional approaches to resource management, which have been by and large sectorally based, were inadequate to meet the challenges ahead.[1] Even though plenty of laws exist to protect individual natural resources, such as water, air, soils, animals, threatened and endangered species, and particular areas including forests, rangelands, wetlands and wilderness, ecological conditions have deteriorated worldwide.[2] As emphasized in the Millennium Ecosystem Assessment report of 2005 and the fifth *Global Biodiversity Outlook* from 2012, several critical global, regional and local thresholds are close

1 Kidd et al. (2011), 1.
2 Van Eeten and Roe (2002), 21.

or have been exceeded.[3] This trend of ecosystem degradation has made the need for more holistic governance approaches to our ecosystems inevitable.

2.1.1 Lack of a universally agreed definition

Despite general consensus that the implementation of an ecosystem approach is rather urgent, the concept of the ecosystem approach has no formal, universally agreed definition. Rather, the concept is evolving and has been interpreted differently by the various environmental institutions and in the context of various environmental regimes.[4] Regardless of conceptual variation, various attempts have been made in the literature to encapsulate the core of the ecosystem approach. Trouwborst, for example, states that throughout the variety of definitions, there appears to be substantial agreement on three core elements of the ecosystem approach. According to this mainstream opinion, applying the ecosystem approach entails: 1 the holistic management of human activities, 2 based on the best available knowledge on the components, structure and dynamics of ecosystems, and 3 aimed at satisfying human needs in a way that does not compromise the integrity, or health, of ecosystems.[5]

Another attempt to sum up the main elements of the ecosystem approach is provided by Currie. He describes the ecosystem approach as follows:

> The internationally understood definition and implication of the ecosystem approach is as follows. The ecosystem approach emphasizes a holistic, participatory and integrated approach and is contrasted with a more narrowly focused biological and usually single species-oriented approach. It aims to manage human interactions with ecosystems and all associated organisms, rather than only individual species […] The focus of management is maintaining the natural structure and function of ecosystems, including the biodiversity and productivity of natural systems and identified important species.[6]

The core of the ecosystem approach has probably best been summarized in a report by the UN General Assembly in the context of marine ecosystems. According to this report, governance approaches need to:

a Emphasise conservation of ecosystem structures and their functioning and key processes in order to maintain ecosystem goods and services;
b Be applied within geographically specific areas based on ecological criteria;

3 UNEP and MEA (2005); UNEP (2012), 6.
4 De Lucia (2014), 97.
5 Trouwborst (2009), 28.
6 Currie (2007), 1–2.

c Emphasise the interactions between human activities and the ecosystem and among the components of the ecosystem and among ecosystems; […]
d Strive to balance diverse societal objectives; […]
e Use integrated decision-making processes and management related to multiple activities and sectors; […]
f Assess the cumulative impacts of multiple human activities on marine ecosystems; […]
g Seek the appropriate balance between, and integration of, conservation and sustainable use of marine biological diversity.[7]

Obviously, the ecosystem approach embraces many different elements. Throughout this book, however, a 'gal' light will be shed on two elements in particular: the holistic element and the integrative element. The ecosystem approach is thus being understood as requiring a governance approach that focuses on the structure and functioning of the ecosystem within its own ecological boundaries, with the objectives of sustainable use and the maintenance of ecosystem integrity.

2.1.2 The ecosystem approach under the CBD

In the context of the Convention on Biological Diversity (CBD),[8] the ecosystem approach has been defined more specifically in line with the objectives of the convention. In 2000, the Conference of the Parties to the CBD (COP) adopted Decision V/6 with the following definition of the ecosystem approach:

> The ecosystem approach is a strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way.[9]

Parties to the CBD have emphasized that the ecosystem approach could be considered a framework for the implementation of the objectives of the CBD. These are the conservation of biological diversity, the sustainable use of ecosystem services for human purposes, and fair and equitable sharing of the benefits from the use of genetic resources.[10] An ecosystem approach

7 UNGA, Report on the Work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its Seventh Meeting (17 July 2006) A/61/156, paragraph 6.
8 The Convention on Biological Diversity (adopted 22 May 1992, entered into force 29 December 1993)1760 UNTS 79.
9 CBD, Conference of the Parties 5 Decision V/6 'Ecosystem Approach' (22 June 2000) UNEP/CBD/COP/5/23.
10 CBD, Conference of the Parties 4, 'Report of the Workshop on the Ecosystem Approach' (20 March 1998) UNEP/CBD/COP/4/Inf.9.

could enable achieving these objectives in the following ways. First, the conservation of biological diversity is necessary to maintain the production of ecosystem goods and services. The second objective of the CBD relates to the fact that the ecosystem approach also underscores that humans are an integrated part of most ecosystems. They depend on the flow of energy, water and matter to sustain themselves and humans can affect ecosystem structure and functioning substantially. They should have an interest in governing their behaviour and their patterns of use in a manner that maintains the flow of ecosystem goods and services, and that conserves the biodiversity on which these flows depend. In other words, human use needs to be sustainable. Third, there should be equity in access to and the use of ecosystem services.[11]

The concept of the ecosystem approach under the CBD is not only directly related to the three main objectives in Article 1 of the CBD; the concept also appears to underpin the concept of sustainable development. The most common model to understand and implement sustainable development is the three pillars model, which views sustainable development as simultaneously achieving economic, social and environmental sustainability, with a balance between the three elements. This three pillars model is indeed especially apparent when considering the ecosystem approach as relating to the three main objectives established by the CBD.[12]

2.1.3 The challenge of balancing

The development towards an ecosystem approach in environmental governance is a remarkable shift since the ecosystem approach aims to combine the conservation of the structure and functioning of ecosystems with efforts to meet social needs and the sustainable use of ecosystem services for human purposes. It remains unclear, however, how the objectives can be focused on simultaneously or with equal priority in concrete cases. Despite efforts to develop the concept of the ecosystem approach more in the context of the CBD, there have been some questions with regards to its feasibility and criticism from those who find it too vague and undetermined.[13]

The lack of consensus on the precise understanding of the ecosystem approach is probably due to the fact that it leaves room for quite different interpretations, ranging from an anthropocentric perspective to an eco-centric perspective.[14] Similar to the concept of sustainable development, different

11 CBD, Expert Meeting on the Ecosystem Approach, 'Review of the principles of the ecosystem approach and suggestions for refinement: a framework for discussion' (3 July 2003) UNEP/CBD/EM-EA/1/3, paragraph 47.
12 Laffoley et al. (2004), 11. See also De Lucia (2014), 109–110.
13 Hartje et al. (2003), 31.
14 Ibid., 12. An eco-centric approach recognizes ecosystems and the biosphere, i.e. the 'land', as ultimate beneficiaries for which we should be responsible. See Miller (2000), 60.

aspects of the concepts may be prioritized over other aspects. This ambiguity within the concept of the ecosystem approach, and its lack of specific legal obligations that might follow from the concept, may impede the concept's effectiveness in terms of halting the degradation of ecosystems around the world.

For sure, even though the objective of maintaining ecosystem integrity is important, at the same time, an ecosystem may be used for the fulfilment of various purposes: agriculture, aquaculture, transport, hunting, mining, energy production, recreation, building and so forth. How exactly to reconcile the two objectives of both sustainable use and the conservation of a healthy level of production and provision of ecosystem services for the future, is one of the major challenges of the ecosystem approach. Human use affects the structure and functioning of ecosystems, which on their part may affect human well-being and socio-economic development.[15] Marine ecosystems, for instance, being extremely valuable for our well-being and economic development, are now under growing pressure due to over-exploitation and unsustainable use.[16] An appropriate balancing of the objectives is therefore imperative; however, the practical application is difficult.

There are two main reasons behind this challenge of balancing. The first reason finds its grounds in complexity theory and is limited to scientific knowledge. The second reason is related to the institutional design of environmental governance in general.

2.1.4 Ecosystems are complex adaptive systems

As regards the first reason, it has been concluded in a CBD Experts Meeting on the Ecosystem Approach in 2003 that it is difficult to balance between the conservation and use of biological diversity appropriately when knowledge with regard to the ecosystem's functioning is limited or poorly understood.[17] An important explanation behind this difficulty is the fact that ecosystems are complex adaptive systems, which means that everything is connected to everything else, and it is not possible to isolate one element to understand its behaviour separate from the many other elements to which it is attached.[18] Furthermore, these interconnections are complex and rich, which entails that the behaviour of the system as a whole becomes rather unpredictable. How much human impact on the ecosystem would be too much is not easy to know. The nature of ecosystems as complex adaptive systems is further elaborated on below in this chapter.

15 UNGA, Oceans and the Law of the Sea (9 March 2006) A/61/63, paragraph 114.
16 Ibid., paragraph 115.
17 CBD-EM 2003 (n. 11).
18 Pardy (2009), 81.

2.1.5 Difficulties of inter-sectoral coordination

The second reason concerns the design of environmental governance. It has been recognized that the aspect of cooperation and coordination between different governance sectors is highly important for any appropriate balancing between sustainable use and the maintenance of ecosystem integrity, as required by an ecosystem approach. When inter-sectoral cooperation appears difficult to achieve, this increases the challenge of appropriate balancing.

One of the Malawi principles recognized that one of the tools to facilitate the balancing assessment is through the participation of all kinds of stakeholders and decision makers from all relevant administrative sectors.[19] The COP reasoned that inter-sectoral cooperation between different aspects of public policy, for example nature conservation, agriculture, forestry and fisheries, and indeed other public policy areas such as land-use planning and economic development, will ensure that conservation interests are represented and integrated with utilization interests.[20] The COP explained in its rationale to the principle on inter-sectoral cooperation that:

> Inter-sectoral cooperation was prioritized because different sectors of society view ecosystems in terms of their own economic, cultural and societal needs […] Management of natural resources, according to the ecosystem approach, calls for increased inter-sectoral communication and co-operation at a range of levels (government ministries, management agencies, etc.). This might be promoted through, for example, the formation of inter-ministerial bodies within the government or the creation of networks for sharing information and experience.[21]

Not only within the context of the CBD, but also under the Law of the Sea was the need for inter-sectoral cooperation emphasized.[22] Implementation of the ecosystem approach could be achieved through, inter alia, 'sectoral approaches and integrated management and planning on a variety of levels, including across boundaries',[23] and 'effective integrated management across sectors'.[24]

Under the ecosystem approach, the principle of cross-sectoral cooperation or integration has appeared to be rather difficult to achieve. This is so because most sectors have different perceptions, values, interests, ambitions

19 As mentioned as one of the five points of operational guidance and one of the Malawi principles on the operationalization of the ecosystem approach. CBD-COP 1998 (n. 10).
20 CBD-COP 2000 (n. 9).
21 CBD-COP 1998 (n. 10).
22 UNGA 2006 (n. 7).
23 Ibid., paragraph 7(j).
24 Ibid., paragraph 7(k).

and influence over land, water and living resources.[25] In addition, governance structures are still very fragmented, where different sectors govern different elements of the same ecosystem, complying with different legal instruments through the use of divergent decision-making tools and traditions.

Maltby rightly notices that:

> Even though the ecosystem approach requires a holistic approach that is neither spatially constrained nor necessarily linked to formal, traditional governance structures, it is doubtful whether we can ever dismantle the sectoral structures currently in place.[26]

This would require a movement from a predominantly sectoral approach to coherent implementation of actions across the relevant social, economic and environmental sectors.[27]

2.1.6 The role of law in relation to the challenges

Law plays an important role in relation to both explanations. First, fragmented structures of environmental law do not fit well with the nature of ecosystems as complex adaptive systems. The fact that ecosystems are complex adaptive systems, whereby functioning at a systems level significantly differs from the functioning of the system's individual components, requires that ecosystems be regulated as a whole, rather than splitting up the ecosystem into different jurisdictional zones and having in place different regulatory regimes for these various components. This is not an easy task. As recognized by Borg,

> Applicable regimes appear to promote two diametrically opposed management concepts. Whilst regulation and enforcement can be most effective if they are specialized and tailor made for the particular species and zones involved, the need of an ecosystem approach requires horizontal regulation that cuts across species, maritime zones, legal systems and political interests.[28]

Fragmented structures of environmental law thus do not fit very well with the need for more holistic ecosystem approaches that cut across legal systems and maritime zones.

Second, fragmentation of environmental law also affects the aim of intersectoral cooperation and coordination. When the administrative sectors

25 CBD-EM 2003 (n. 11), paragraphs 12–13.
26 Maltby (1998), 216.
27 Laffoley et al. (2004: n. 12), 7.
28 Borg (2012), 278–279.

comply with different legal instruments that contain different and perhaps even conflicting purposes, it may be difficult to ensure an appropriate balancing between the two objectives of the ecosystem approach. This may be even intensified when the different legal acts provide wide discretionary powers to decision makers within the various sectors. Different approaches, mechanisms and traditions with regard to the weighing and balancing of divergent values may practically render inter-sectoral cooperation unrealizable. As a result, a satisfactory balancing on an aggregate level between the use of an ecosystem's services and the maintenance of ecosystem integrity may not be ensured.[29]

Under the discussions on the ecosystem approach, the role of law has not yet been thoroughly assessed.[30] The problem of inconsistent laws, however, was mentioned briefly in a 2004 workshop on the ecosystem approach in Europe.[31] Indeed, during the workshop, several obstacles for the implementation of the ecosystem approach were found. These included inter-sectoral aspects, legal aspects and law enforcement, and economic aspects. More specifically, the problem of outdated and inconsistent laws was highlighted, and the conflict between long-term ecological and short-term social and economic aims was mentioned explicitly.[32]

Similarly, it was argued by Keiter that:

> Even though successful ecosystem management involves coordinated policies addressing natural resources at large spatial and temporal scales, the legal standards governing these resources are anything but coordinated. They represent a fragmented amalgam of federal, state, and local laws, often addressing single resources rather than the ecological complex itself. Laws are often based upon the notion of boundaries, which have rarely been defined in ecological terms. As a result, only a

29 For a more thorough assessment of the three dimensions of integration of the ecosystem approach, see Platjouw (2013).

30 The importance of law has been underlined at various instances though. The Global Environment Facility, for instance, in its Operational Program nr.12 on 'Integrated Ecosystem Management', refers to the development of appropriate policies, regulations and incentive structures in the political, legislative and economic realms as part of creating an enabling environment to support integrated ecosystem management. Korn et al. (2003), 12; Ruhl et al. also notice that, with regard to ecosystem services, the component that is least developed in the literature is the law. While several authors have urged the need for foundational work in this field, the ecological, geographic, economic and social complexities of ecosystem services complicate any effort to forge such a body of law and policy (Ruhl et al. 2007, 9).

31 In 2004, an international workshop, 'Ways to promote ideas behind the CBD's ecosystem approach in Central and Eastern Europe', brought together 26 experts from ten European countries from 5–9 May.

32 Korn et al. (2004), 5–6.

> fragmentary ecosystem-management obligation can be derived from existing law.[33]

Recently, the role of law has become a central issue in the Global Network that is being formed in support of the International Development Law Organization's (IDLO) growing programme on Legal Preparedness for Achieving the Aichi Biodiversity Targets, launched in 2012 in partnership with the Secretariat of the Convention on Biological Diversity. The programme addresses the role of law to help achieve the global goal to preserve biodiversity by 2020 under the Aichi Biodiversity Targets. These Aichi targets have a strong focus on the conservation of ecosystems. To what extent the issues of fragmentation and administrative discretion will be addressed in this context is not yet clear.

2.1.7 In sum

The ecosystem approach has thus no formal, universally agreed definition. The core of the ecosystem approach is, however, an approach focusing on the ecosystem as a whole, balancing and integrating the objectives of sustainable use and the maintenance of ecosystem integrity. The aim of an appropriate balancing between the two objectives has been one of the main challenges of the ecosystem approach to date. Two reasons for this challenge have been provided, the first one related to the nature of ecosystems as complex adaptive systems, the second one related to the fragmented structures of environmental governance and difficulties to achieve inter-sectoral cooperation and coordination. The role of law appears to be relevant in both contexts.

Given the fragmented structures of law and governance, the balancing of sectoral uses of ecosystems and the maintenance of ecosystem integrity could probably be considerably facilitated by a consistent and coherent legal framework. In the light of an ecosystem approach, a coherent and consistent legal framework generally consists of a set of legal acts, the objectives of which do not contradict each other and which in conjunction support the maintenance of ecosystem integrity. Furthermore, it is important that these legal acts contain consistent approaches for the weighing and balancing of divergent interests. The manner in which ecosystem values are being weighed and integrated in decision-making procedures needs to be consistent across sectors independent of the decision-making authority taking the decision or the particular legal acts that apply to the decision.

The role of law will be further explored in Chapters 5 to 8. The remainder of this chapter mainly focuses on the legal development of the concept of the ecosystem approach.

33 Keiter (1998), 332.

2.2 Legal development of the ecosystem approach

In the last four decades, the ecosystem approach has become a subject of legal debate. As reflected in international and European law, there is a development towards the codification of the ecosystem approach in legal instruments. An overview will be given of this development and the diffusion of the concept in international and European law. According to Hartje et al., whether countries are willing to implement governance approaches that are in line with the ecosystem approach depends on at least two important prerequisites. First, effective diffusion of the concept depends on the quality of the concept in terms of its theoretical justification, its internal consistency, its ability to guide and its general connection to the existing natural resource management approaches currently pursued in most countries. Second, international diffusion of such a demanding concept requires flexibility in the international system in the form of international organisations and networks that might serve as adaptors and facilitators for implementation.[34] The next section presents the degree of diffusion of the concept of the ecosystem approach in international and European legal instruments. The aim is to provide a concise, but non-exhaustive, overview of the concept's development.

2.2.1 The ecosystem approach in international environmental law

At the international level, it can be seen that the ecosystem approach has appeared in a number of parallel but related institutional streams: in the law of the sea, through the Law of the Sea Convention (UNCLOS),[35] the UN Fish Stocks Agreement,[36] Informal Consultative Process and the General Assembly; in the Food and Agriculture Organization (FAO), through the Code of Conduct,[37] the Committee on Fisheries (COFI), expert consultations and the Reykjavik Declaration;[38] in the CBD; and from the Stockholm Declaration[39] through the UN Conference on Environment and Development's

34 In Korn et al. (2003), 7.
35 United Nations Convention on the Law of the Sea (opened for signature on 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3.
36 United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (adopted 4 August 1995, entered into force 11 December 2001) 2167 UNTS 88.
37 UN Food and Agriculture Organization, 'Code of Conduct for Responsible Fisheries' (31 October 1995) FAO Doc. 95/20/Rev/1.
38 FAO, Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem (October 2001)
39 United Nations, Declaration of the United Nations Conference on the Human Environment (June 1972) 11 ILM 1416.

(UNCED) Agenda 21,[40] the Rio Declaration,[41] the Johannesburg Plan of Implementation (JPOI)[42] and the Rio+20 Outcome Document, 'The future we want'.[43]

1970s

The development of the ecosystem approach and of ecosystems becoming an object of conservation and protection can be traced to the 1972 Stockholm Declaration on the Human Environment of the UN Conference on the Human Environment. The Stockholm Declaration states that:

> The natural resources of the earth including flora and fauna and representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management.[44]

Another milestone from the early 1970s was the adoption of the 1971 Ramsar Convention on Wetlands of International Importance.[45] The Ramsar Convention provides the framework for national action and international cooperation for the *conservation and wise use of wetlands* and their resources, and is at present the only global environmental treaty that deals with a particular ecosystem.[46] The wise use of wetlands has now been defined as 'the maintenance of their ecological character achieved through the implementation of the ecosystem approach, within the context of sustainable development'.[47] 'Wise use' has at its heart the conservation and sustainable use of wetlands and their resources, for the benefit of humankind.[48] The ecosystem approach has thus been recommended as a strategic approach to implementing the requirements of the convention.

40 United Nations Conference on Environment and Development (UNCED), *Agenda 21: Programme of Action for Sustainable Development* (1992) UN Doc A/Conf.151/26.
41 United Nations, Rio Declaration on Environment and Development (13 June 1992) 31 ILM 874.
42 World Summit on Sustainable Development, 'Johannesburg Plan of Implementation' (September 2002) A/Conf. 199/20.
43 United Nations General Assembly, Resolution 66/228 'The future we want' (27 July 2012) A/Res/66/288.
44 Article 2 of the Stockholm Declaration.
45 Convention on Wetlands of International Importance especially as Waterfowl Habitat (opened for signature 2 February 1971, entered into force 21 December 1975) 996 UNTS 245.
46 Ibid., Article 3.1.
47 Ramsar, Conference of the Parties 9, 'A Conceptual Framework for the wise use of wetlands and the maintenance of their ecological character' (November 2005) Resolution IX.1 Annex A (2005), paragraph 22.
48 Ibid.

Two other conventions from that decade focus more on the protection of species, although they do refer to the importance of these species within their ecosystem. This is first the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES),[49] and second the 1979 Convention on Migratory Species (CMS).[50] The latter does also take into account ecosystems in assessing conservation status and thus considers migratory species in their ecosystem context. The parties recognize that 'wild animals in their innumerable forms are an irreplaceable part of the Earth's natural system which must be conserved for the good of mankind'.[51] Within the convention there are a number of references to the importance of ecology and sound ecological principles.[52]

1980s

During the 1980s there were some further references to the ecosystem approach notably with the 1982 Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)[53] and UNCLOS of 1982. According to the preamble to the CCAMLR, the parties 'recognise the importance of safeguarding the environment and protecting the integrity of the ecosystem of the seas surrounding Antarctica'.[54] Principle 1 states that the objective of the Convention is the conservation of Antarctic marine living resources and that the term 'conservation' includes rational use.[55] Decisions about rational use must be based on an ecosystem approach; the CCAMLR requires consideration to be given to all species in the ecosystem and to conserving ecological relationships. Indeed, Article 2 of the convention requires parties to take into account all the delicate and complex relationships between organisms of all sizes and physical processes, such as currents and sea temperature that constitute the Antarctic marine ecosystem.

49 Convention on International Trade in Endangered Species of Wild Fauna and Flora (opened for signature 3 March 1973, entered into force 1 July 1975) 983 UNTS 243. The CITES Convention refers to the role of a species in its ecosystem, and present practice within CITES takes account of the ecosystem approach. In addition, synergies between CITES and the CBD are being pursued. See further CITES, Fifty-third meeting of the Standing Committee, Synergy between CITES and the Convention on Biological Diversity (CBD) (June 2005) SC53 Doc.8 (rev. 1).

50 The Convention on the Conservation of Migratory Species of Wild Animals (opened for signature 23 June 1979, entered into force on 1 November 1983) 1651 UNTS 333.

51 CITES (n. 48), preamble paragraph 1.

52 Currie (2007), 3.

53 Convention on the Conservation of Antarctic Marine Living Resources (adopted 20 May 1980, entered into force 7 April 1982) 1329 UNTS 48.

54 Ibid., preamble paragraph 1.

55 Ibid., Article 1.

Contrary to the CCAMLR, the reference to the ecosystem approach in UNCLOS is more implicit. The preamble, for instance, points out that the problems of ocean space are closely interrelated and need to be considered as a whole. Similarly, the convention mandates a science-based approach to decision making regarding uses and conservation of the marine environment.[56] Within the context of UNCLOS, the concept of the ecosystem approach has been developed more within, for instance, the UN Fish Stocks Agreement and the FAO Code of Conduct. The 1995 Code of Conduct, for instance, stressed the need for the adoption of the ecosystem approach to fisheries. The provisions have the scope to provide effective protection of marine ecosystems by protecting target and non-target species and the ecosystems associated with those species.[57]

An important instrument for the development of the ecosystem approach has been the 1982 World Charter for Nature (WCN)[58] that called upon states to manage ecosystems and organisms in such a way as not to endanger the integrity of those other ecosystems or species with which they coexist.[59] The WCN recognizes that 'lasting benefits from nature depend on the maintenance of essential ecological processes and life support systems, and upon the diversity of life forms, which are jeopardised through excessive exploitation and habitat destruction by man'.[60] Furthermore, the Hague Declaration on the Environment of 1989 codified the 'fundamental duty' of states to protect and preserve ecological systems.[61]

1990s

In the 1990s, development on the ecosystem approach accelerated. In particular, the 1992 Rio Declaration and Agenda 21, the FAO Code of Conduct and the 1995 UN Fish Stocks Agreement were important cornerstones in the development of the ecosystem approach.[62]

56 Long et al. (2010), 417.
57 Ibid.
58 UNGA, 'World Charter for Nature' (28 October 1982) A/RES/37/7.
59 Ibid., principle 4.
60 Ibid., preamble.
61 The Hague Declaration on the Environment (11 March 1989) 28 ILM 1308, paragraph 4.
62 Other outstanding examples of the application of the ecosystem approach are to be found in the Antarctic conventions. In the 1991 Madrid Protocol, parties commit themselves to the comprehensive protection of the Antarctic environment and dependent and associated ecosystems, and establish a comprehensive system of environmental impact assessment to that end. CCAMLR defines its application by reference to the Antarctic Convergence, itself an ecological boundary. The prevention of irreversible changes in the marine ecosystem is one of its principles, and conservation measures are to include measures concerning the effects of harvesting and associated activities on components of the marine ecosystem other than the harvested populations.

The 1992 Rio Declaration states in Principle 7:

> States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem.[63]

In Agenda 21 which was adopted at the UNCED that was held in Rio de Janeiro, certain elements of the ecosystem approach may be recognized.

In chapter 17 of Agenda 21:

> The marine environment – including the oceans and all seas and adjacent coastal areas – forms an integrated whole that is an essential component of the global life-support system and a positive asset that presents opportunities for sustainable development.

In paragraph 5 of chapter 17:

> Coastal States commit themselves to integrated management and sustainable development of coastal areas and the marine environment under their national jurisdiction. To this end, it is necessary, inter alia, to:
>
> (1) Provide for an integrated policy and decision-making process, including all involved sectors to promote compatibility and a balance of uses;

Thus far, several conventions and agreements had referred implicitly or more explicitly to the importance of the conservation of ecosystems as well as their sustainable use. In many instances they also stressed the importance to consider impacts on the ecosystem as a whole. Even though the concept of the ecosystem approach had appeared within various environmental regimes, a clear understanding of the precise legal implications following from the ecosystem approach was lacking.

However, the concept has been significantly advanced within the context of the CBD that was adopted in 1992. Indeed, among multilateral environmental agreements, the CBD is considered a leader in the adoption of the ecosystem approach. The concept of the ecosystem approach has been considerably more evolved here than in other regimes. Even though the ecosystem approach has not been explicitly mentioned in the CBD, both the protection of ecosystems as well as the rehabilitation and restoration of degraded ecosystems has been promoted in Articles 8d and 8f of the convention.

At its first meeting, the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) of the CBD discussed how to address the conservation of biological diversity from a wider perspective:

63 Rio Declaration 1992 (n. 41), Principle 7.

> The Convention recognises the need to take a holistic and not merely a conservation- oriented approach to action to address the threatened components of biological diversity. Accordingly, this note and its annexes look at the conservation approaches while highlighting the need to integrate these across a broader spectrum of action […] The CBD was born at least partially because traditional conservation methods were found lacking in stemming the loss of biological diversity. The Convention sets a new context for considering biological diversity which recognises the causes of biodiversity are complex and multi-faceted and that action to address the loss must therefore reach beyond traditional approaches […] In this context, it is critical that socio-economic and other issues share the centre stage with the more purely biological considerations.[64]

The discussions led to SBSTTA recommendation I/32 which was reaffirmed by the COP at its second meeting. The ecosystem approach was adopted as the primary framework for action under the CBD at COP-2 in 1995 in Decision II/8 which adopted the ecosystem approach as a framework for the analysis and implementation of the objectives of the CBD:

> The conservation and sustainable use of biological diversity and its components should be addressed in a holistic manner, taking into account the three levels of biological diversity and fully considering socioeconomic and cultural factors.[65]

At this time no definition of the ecosystem approach was given, nor was there a common understanding of the holistic concept as referred to in the decision. This situation was also reflected by the fact that in subsequent CBD documents and decisions a consistent terminology was lacking.[66] The need for clarification and further elaboration of the concept was thus apparent.[67]

From the very beginning, international nongovernmental organizations (NGOs) played a major role in developing and promoting the ecosystem approach within the CBD. To name but one example, in 1996 participants of

64 CBD-SBSTTA, 'Alternative ways and means in which the conference of the parties could start the process of considering the components of biological diversity particularly those under threat and the identification of action which could be taken under the Convention' (24 July 1995) UNEP/CBD/SBSTTA/1/4.

65 CBD-COP, Conference of the Parties 2 Decision II/8, 'Preliminary consideration of components of biological diversity particularly under threat and action which could be taken under the convention' (November 1995) UNEP/CBD/COP/2/19.

66 Terms used in thematic and cross-cutting programmes of work of the CBD: ecosystem approach, ecosystem process-oriented approach, ecosystem management approach, ecosystem-based approach, integrated approach, and holistic approach.

67 CBD-COP 1998 (n. 10) called for further elaboration of the ecosystem approach.

the 'Sibthorp seminar' elaborated a set of '10 principles for ecosystem management'.[68] These principles were a key input to a workshop convened by the Secretariat of the convention and the governments of the Netherlands and Malawi in Lilongwe, Malawi, in 1998. The findings of this workshop were central to all further discussions of the ecosystem approach under the CBD. Among the results was a description of the ecosystem approach with 12 principles for its application, the so-called 'Malawi principles'.[69] These 'Malawi principles' are set out in Box 2.1.

Box 2.1 Malawi principles

1 The objectives of management of land, water and living resources are a matter of societal choices.
2 Management should be decentralized to the lowest appropriate level.
3 Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.
4 Recognizing potential gains from management there is a need to understand the ecosystem in an economic context, considering, e.g. mitigating market distortions, aligning incentives to promote sustainable use, and internalizing costs and benefits.
5 The conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
6 Ecosystems must be managed within the limits of their functioning.
7 The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
8 Recognizing the varying temporal scales and lag effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
9 Management must recognize that change is inevitable.
10 The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.
11 The ecosystem approach should consider all forms of relevant information, including scientific, indigenous and local knowledge, innovations and practices.
12 The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

68 Korn et al. (2003), 27. This workshop was supported by the Sibthorp Trust, the Royal Holloway University of London, the International Union for Conservation of Nature (IUCN) Commission on Ecosystem Management and WWF-UK.
69 CBD-COP 1998 (n. 9). For a presentation of the rationales behind these principles see pages 7–10 of the same report.

The COP at its fourth meeting in 1998 took note of the results of the Malawi Workshop and requested SBSTTA to develop principles and other guidance on the ecosystem approach.[70] SBSTTA-5 submitted recommendation V/10 which was adopted by COP-5 in 2000 with minor changes as the Annex to Decision V/6.[71] Decision V/6 thus contains an endorsement of the description of the ecosystem approach and recommended the implementation of the 12 principles of the ecosystem approach[72] and five points of Operational Guidance for the application of the ecosystem approach.[73]

The ecosystem approach was being described as follows:

> The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Thus, the application of the ecosystem approach will help to reach a balance of the three objectives of the Convention: conservation; sustainable use; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.[74]

COP-5 also encouraged further conceptual elaboration and practical verification.[75] Decision V/6 called for case studies, and in response, the Secretariat has compiled a number of case studies, and an experts' meeting was held in Montreal in 2003.[76] The CBD Experts Meeting that was held in 2003 to review and refine the principles of the ecosystem approach expressed a number of concerns:

> The principles are also vaguely worded, poorly structured and overlapping. For example, Principles 1, 11 and 12 share a common theme, as do Principles 2, 3, 7 and 8.[77]

70 CBD-COP 1998 (n. 10).

71 The proposals of the CBD Liaison Group Meeting at Paris in 1999 laid down in CBD-SBSTTA 5, 'Ecosystem approach: further conceptual elaboration' (23 October 1999) UNEP/CBD/SBSTTA/5/11. See in particular Annex II, on the 'Elaboration of Guidance and actions for each of the Malawi principles by the Liaison Group'.

72 These 12 cross-cutting principles need to be considered holistically rather that selectively. However, it is legitimate to give different weight to each principle according to particular circumstances of the application.

73 Convention on Biological Diversity, Conference of the Parties 5 Decision V/6 'Ecosystem Approach' (22 June 2000) UNEP/CBD/COP/5/23. These Operational Points of Guidance were the following: 1 Focus on relationships and processes within ecosystems; 2 Enhance benefit-sharing; 3 Use adaptive management practices; 4 Carry out management actions at the scale appropriate for the issue being addressed with decentralization to the lowest level, as appropriate; 5 Ensure inter-sectoral cooperation.

74 Ibid.

75 Stadler (2003), 27.

76 Currie (2007), 40–41.

77 CBD-EM 2003 (n. 11).

Other points of discussion were related to each of the principles. For instance, with regard to the principle that the objectives of ecosystem management should be a societal choice, the experts agreed that:

> This principle is true at the most general level, but does not expand on the question of how societal choices are made through trade-offs and compromises among different sectors of society. This is an important process since most sectors have different perceptions, values, interests, ambitions and influence over land, water and living resources. Expressing societal choice through consensus between competing sectors is a difficult process that should not be underestimated.[78]

An important element of the ecosystem approach is the objective of building consensus. The experts recognized that human society is diverse in the kind and manner of relationships that different groups have with the natural world, each viewing the world around them in different ways and emphasizing their own economic, cultural and societal interests and needs. For this reason and due to the complexity of ecosystem management, sustained use and conservation requires the integration of the activities and actions of many different stakeholders.[79]

Based on the understanding that 'the dynamic properties of ecosystems such as resilience or persistence depend greatly on the nature, extent and intensity of interactions within and among species, between species and their abiotic environment, and on physical and chemical interactions within the environment', it was acknowledged that 'managing this diversity is complex, more so when many of these interactions and their outcomes are poorly understood'.[80] Uncoordinated sectoral initiatives only add to this complexity and uncertainty. In this situation, the involvement of all relevant stakeholders and technical expertise in planning and carrying out joint activities, sharing management resources, or simply exchanging information, whichever is appropriate, is essential for effective management.[81]

With regard to the principle on finding the appropriate balance between conservation and use of biological diversity, the experts uttered:

> The problem still remains one of identifying the limits to ecosystem functioning, within which to achieve 'balance between' and 'integration of' conservation and sustainable use.[82]

78 Ibid., 12–13.
79 Ibid., 10–11.
80 Ibid., 10–11.
81 Ibid.
82 Ibid., 8.

The experts also explicitly mentioned that sustainable development requires management regimes that balance conservation of biodiversity with careful use of natural resources.[83] Furthermore, it was acknowledged that there are limits to the level of demand that can be placed on an ecosystem, though current ecological understanding is limited in knowing what the limits are. In such cases, a precautionary approach, coupled with adaptive management, is advised.[84]

In 2004, in COP-7, the 12 principles of the ecosystem approach were refined and implementation guidelines for each principle were provided. In addition, the CBD has developed a user's guide on the ecosystem approach, which provides guidance on applying the ecosystem approach to a project or issue.[85]

2000–10

In the years after 2004, discussions have focused on the implementation of the ecosystem approach in particular arenas, such as forests, fisheries and agriculture, and on more specific issues such as ecosystem restoration and the ecosystem approach in protected areas.[86] In the context of Integrated Marine and Coastal Management (IMCAM), the ecosystem approach has also been further applied.[87] Decision II/10, as adopted by the COP at its second meeting in Jakarta in November 1995, encourages the use of IMCAM as the most suitable framework for addressing human impacts on marine and coastal biological diversity and for promoting its conservation and sustainable use, and encourages parties to establish and/or strengthen, where appropriate, institutional, administrative and legislative arrangements for the development of integrated management of marine and coastal ecosystems, plans and strategies for marine and coastal areas, and their integration within national development plans.[88]

83 Ibid., 12.
84 Ibid.
85 CBD-COP, Conference of the Parties 7 Decision VII/11 'Ecosystem Approach' (13 April 2004) UNEP/CBD/COP/7/21. A crucial element is translating the high-level principles (from the CBD) into practical actions at regional, country and local levels. Parties to the Convention have yet to make substantial progress on meeting this challenge. Laffoley et al. (2004), 5.
86 See for instance, CBD, Ad Hoc Open-Ended Inter Sessional Working Group on Article 8(j) and related provisions of the Convention on Biological Diversity, 'In-Depth dialogue on thematic areas and other cross-cutting issues, Ecosystem management, ecosystem services and protected areas' (22 July 2011) UNEP/CBD/WG8J/7/6.
87 Laffoley et al. (2004), 9.
88 CBD-COP, Conference of the Parties 2 Decision II/10, 'Conservation and Sustainable Use of Marine and Coastal Biological Diversity' (30 November 1995) UNEP/CBD/COP/2/19, paragraph 2.

In 2004, IMCAM was one of the programme elements of the elaborated programme of work on marine and coastal biological diversity adopted at the seventh meeting of the COP and contained in the Annex to decision VII/5 on Conservation and Sustainable Use of Marine and Coastal Biological Diversity. The implementation of this programme of work has been subject to an in-depth review of progress. The conclusions have been presented in 2010 in COP-10 in Decision X/29. The COP, amongst others:

> *Notes with concern* that these efforts [made in the implementation of the elaborated programme of work on marine and coastal biological diversity] have not been able to prevent the serious decline in marine and coastal biodiversity and ecosystem services.[89]

While the concept of the ecosystem approach considerably advanced in the context of the CBD, the concept evolved in other regimes as well.

Within the fishery regime for instance, the ecosystem approach advanced. The 2001 Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem, which resulted from the FAO Code of Conduct, recognized the importance of interactions between fishery resources and all components of the ecosystem, and the need to conserve marine environments. This declaration called upon states to develop 'guidelines for best practices with regard to introducing ecosystem considerations into fisheries management'.[90]

In the same year, the 2001 UN agreement for the implementation of the Fish Stocks Agreement established a comprehensive and detailed legal regime to ensure the long-term conservation and sustainable use of straddling fish stocks and highly migratory fish stocks by, among other things, establishing general principles, including the ecosystem approach, for the conservation and management of the subject stocks. Conscious of the need to maintain the integrity of marine ecosystems, the agreement states that:

5(d) States shall 'assess the impacts of fishing, other human activities and environmental factors on target stocks and species belonging to the same ecosystem or associated with or dependent upon the target stocks …';

5(e) States shall 'adopt, where necessary, conservation and management measures for species belonging to the same ecosystem or associated with or dependent upon the target stocks'.[91]

89 CBD-COP, Conference of the Parties 10 Decision X/29, 'Marine and Coastal Biodiversity' (29 October 2010) UNEP/CBD/COP/DEC/X/29, emphasis in original.

90 Ibid., Article 10.

91 Fish Stocks Agreement (n. 36), Article 5.

After the ecosystem approach had been endorsed by the CBD COP-5 in May 2000 to be the fundamental tool for delivery of the convention's three primary objectives, it was also endorsed by the World Summit on Sustainable Development (WSSD) in Johannesburg (2002) and features strongly in the subsequent plan of implementation. Indeed, the JPOI endorsed the ecosystem approach for fisheries, biodiversity protection and sustainable development, and called for its implementation by 2010.[92]

In paragraph 30 it states that [emphasis added]:

> Oceans, seas, islands and coastal areas form an integrated and essential component of the Earth's ecosystem […] Ensuring the sustainable development of the oceans requires effective coordination and cooperation, including at the global and regional levels, between relevant bodies, and actions at all levels to:
>
> (d) Encourage *the application by 2010 of the ecosystem approach*, noting the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem 15 and decision V/6 of the Conference of Parties to the Convention on Biological Diversity.

In 2006, the seventh meeting of the UN Open-ended Informal Consultative Process on Oceans and the Law of the Sea (UNICPOLOS) was held to identify areas where coordination and cooperation at the intergovernmental and inter-agency levels should be enhanced. Within the report, it was first of all noted that states should be guided in the application of ecosystem approaches by a number of existing instruments:

> In particular, the United Nations Convention on the Law of the Sea, which sets out the legal framework for all activities in the oceans and seas, and its Implementing Agreements, as well as other commitments, such as those contained in the Convention on Biological Diversity and the World Summit on Sustainable Development call for the application of an ecosystem approach by 2010.[93]

Moreover, the report recognizes that there is no universally agreed definition of an ecosystem approach, since it is interpreted differently in different contexts. The General Assembly, however, stressed that an ecosystem approach needs to, amongst other things:

a Emphasise conservation of ecosystem structures and their functioning and key processes in order to maintain ecosystem goods and services;

92 Ibid., paragraphs 30(5), 32(c), 44(e) and 70(b).

93 UNGA, Report on the Work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its Seventh Meeting (17 July 2006), Part A of Report A/61/156.

b Be applied within geographically specific areas based on ecological criteria;
c Emphasise the interactions between human activities and the ecosystem and among the components of the ecosystem and among ecosystems; […]
d Strive to balance diverse societal objectives; […]
e Use integrated decision-making processes and management related to multiple activities and sectors; […]
f Assess the cumulative impacts of multiple human activities on marine ecosystems; […]
g Seek the appropriate balance between, and integration of, conservation and sustainable use of marine biological diversity.[94]

The report emphasized that implementation of the ecosystem approach could be achieved through, inter alia, 'sectoral approaches and integrated management and planning on a variety of levels, including across boundaries';[95] and 'effective integrated management across sectors'.[96] In addition, the report recognized that improved application of an ecosystem approach requires 'improving, as appropriate, legal and policy frameworks to support and facilitate the application of the precautionary approach and ecosystem approaches'.[97]

The work of the UNICPOLOS was followed by the adoption of three UN General Assembly resolutions, in 2006, 2007 and 2009, which provide a political backdrop to the development of the concept in international law. Indeed, as the resolutions put it succinctly, ecosystem approaches 'should be focused on managing human activities in order to maintain and, where needed, restore ecosystem health'.[98]

Post-2010

Recently, an important development has been the adoption of a revised Strategic Plan for Biodiversity 2011–2020 with its Aichi targets. The mission of the new plan is to:

> Take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide

94 Ibid., paragraph 6.
95 Ibid., paragraph 7(j).
96 Ibid., paragraph 7(k).
97 Ibid., paragraph 8(l).
98 UNGA, Resolution 61/222 on Oceans and the Law of the Sea (20 December 2006) A/RES/61/222, paragraph 119(b); UNGA, Resolution 62/215 on Oceans and the Law of the Sea (22 December 2007) A/RES/62/215, paragraph 99(b); UNGA, Resolution 63/111 on Oceans and the Law of the Sea (12 February 2009) A/RES/63/111, paragraph 117(b).

> essential services, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication. To ensure this, pressures on biodiversity are reduced, ecosystems are restored, biological resources are sustainably used and benefits arising out of utilization of genetic resources are shared in a fair and equitable manner; adequate financial resources are provided, capacities are enhanced, biodiversity issues and values mainstreamed, appropriate policies are effectively implemented, and decision-making is based on sound science and the precautionary approach.[99]

The rationale for the new plan is that biological diversity underpins ecosystem functioning and the provision of ecosystem services essential for human well-being. It provides for food security, human health, the provision of clean air and water; it contributes to local livelihoods and economic development, and is essential for the achievement of the Millennium Development Goals, including poverty reduction.[100] The new plan consists of five strategic goals including 20 Aichi biodiversity targets. The goals and targets comprise both aspirations for achievement at the global level, and a flexible framework for the establishment of national or regional targets. All targets focus on the conservation of biodiversity and ecosystems. As an example, target 14 requires that by 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

The application of ecosystem approach has also been emphasized in the Rio+20 outcome document, 'The future we want'. The endorsement concerned the marine environment in particular. In paragraph 158 it is stated that:

> We recognize that oceans, seas and coastal areas form an integrated and essential component of the Earth's ecosystem and are critical to sustaining it, and that international law, as reflected in the United Nations Convention on the Law of the Sea, provides the legal framework for the conservation and sustainable use of the oceans and their resources […]
>
> We therefore commit to protect, and restore, the health, productivity and resilience of oceans and marine ecosystems, to maintain their biodiversity, enabling their conservation and sustainable use for present and future generations, and to effectively apply an ecosystem approach and the precautionary approach in the management, in accordance with international law, of activities having an impact on the

99 CBD-COP, Conference of the Parties 10 Decision X/2, 'Strategic Plan for Biodiversity 2011–2020' (29 October 2010) UNEP/CBD/COP/10/27.
100 Ibid.

marine environment, to deliver on all three dimensions of sustainable development.[101]

2.2.2 In sum

In terms of international instruments, the UN Law of the Sea Convention, Johannesburg Plan of Implementation, the Reykjavik Declaration, CBD decisions V/6 and VII/11 and other CBD decisions, the FAO guidelines, and the FAO Code of Conduct are principal instruments in laying out the application of the ecosystem approach. The concept of the ecosystem approach has thus appeared in a wide range of international environmental regimes. Under the CBD, the ecosystem approach has particularly evolved and has now become central in the revised Plan for Biodiversity and the Aichi targets. In general, descriptions and definitions of the ecosystem approach vary. In the context of the CBD, the ecosystem approach in particular contributes to the three objectives of the CBD. Outside the CBD, the ecosystem approach mainly requires an appropriate balance between the sustainable use of ecosystem services and the maintenance of ecosystem integrity.

Table 2.1 and Table 2.2 provide a timeline of the development of the concept of the ecosystem approach in general international law and in the CBD regime in particular.

2.2.3 The ecosystem approach in the European Union

This section provides a brief overview of the development of the ecosystem approach within the EU. A focus on the protection of the environment has long been included in the Treaty on the European Communities in Article 6, now Article 11 Treaty on the Functioning of the European Union, which requires environmental protection requirements to be integrated in the EU's policies and activities. Furthermore, the EU and the member states are international actors in their own right and party to many of the international agreements referred to above. The EU had, for instance, also recorded its commitment to implement the ecosystem approach in line with the 2002 WSSD and the JPOI by 2010.[102]

In the context of the Convention on Biological Diversity, the EU has also developed policies more specific to the situation of the EU. As an illustration, the EU decided in 1998 to devise a community-wide 'Biodiversity Strategy', to implement it by action plans and to specify these in various

101 UNGA, Resolution 66/228, 'The future we want' (11 September 2012) A/Res/66/288, paragraph 158.

102 European Commission, 'Halting the Loss of Biodiversity by 2010 – And Beyond: Sustaining ecosystem services for human well-being' (Communication) COM (2006) 216 final.

Table 2.1 Development of the ecosystem approach on the international plan

Date	*Event*
1972	**The Stockholm declaration** States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem
1982	**United Nations Law of the Sea Convention** Requires coastal states to take into account effects on associated or dependent species
	World Charter for Nature Declares the need to preserve species and ecosystems for the benefit of future generations and provides that ecosystems and organisms shall be managed to achieve and maintain optimum sustainable productivity, but not in such a way as to endanger the integrity of those other ecosystems or species with which they coexist
1985	**The Association of Southeast Asian Nations (ASEAN) Agreement on the Conservation of Nature and Natural Resources** Included as a fundamental principle the need to adopt measures necessary to maintain essential ecological processes and life-support systems. Also required parties to aim at maintaining the ecological relationship between harvested, dependent and related populations of living resources of the ecosystem, preventing irreversible changes in the ecosystem
1986	**The World Commission on Environment and Development (WCED) Experts Group on Environmental Law** States that states shall maintain ecosystems and ecological processes essential for the functioning of the biosphere
1988	**The Economic Commission for Europe (ECE) Declaration on Conservation of Flora, Fauna and their Habitats** Member states agreed to conserve living natural resources in the interest of present and future generations by maintaining essential ecological processes and life-support systems, preserving genetic diversity and ensuring sustainable utilization of species and ecosystems
1989	**The Hague Declaration on the Environment** Spoke of the fundamental duty to preserve the ecosystem
1992	**The Rio Declaration and Agenda 21** Emphasized multi-species management and other approaches that take into account the relationships among species
	The Convention on Biological Diversity Focused on the conservation of biodiversity and the protection of ecosystems
1993	**The FAO Compliance Agreement** Led to the 1995 FAO Code of Conduct on Responsible Fisheries, which required conserving, protecting and safeguarding ecosystems, and laid down principles and international standards of behaviour to ensure the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity
1995	**The United Nations Fish Stocks Agreement** Implemented the ecosystem approach in Articles 5 and 6
1996	**Sibthorp (IUCN) Seminar** Questioned conventional thinking and traditional approaches to conservation and sustainable development. Distils ten principles of ecosystem management

Table 2.1 (continued)

Date	*Event*
2000	**The Conference of the Parties to the Convention on Biological Diversity** Decision V/6 provided guidance for applying the ecosystem approach
2001	**The Reykjavik Declaration** Declared that states will individually and collectively work on incorporating ecosystem considerations into fisheries management
2002	**The Johannesburg Plan of Implementation on the World Summit on Sustainable Development** Called for the application of the ecosystem approach to fisheries management by 2010 and called for the development and facilitation of the ecosystems approach
	FAO study of the State of the World's Fisheries Observed that the traditional approach to managing fisheries is insufficient
	The Bergen Declaration The North Sea Ministers agreed to implement an ecosystem approach by identifying and taking action on influences that are critical to the health of the North Sea
2003	**The Bremen Statement** Defining the ecosystem approach and setting out detailed plans of implementing the approach by the Commission under the (Helsinki) Convention on the Protection of the Marine Environment of the Baltic Sea Area (HELCOM) and the Oslo/Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR)
2006	**UNICPOLOS (Open-ended Informal Consultative Process on Oceans and the Law of the Sea)** Focused on the ecosystem approach; an Ad Hoc Open-ended Informal Working Group on Marine Biological Diversity was held; the Oceans Resolution emphasized the ecosystem approach and ecosystem integrity
	St John's Conference on the Governance of High Seas Fisheries and the UN Fish Agreement Ministers declared that they would work within regional fisheries management organizations (RFMOs) to incorporate ecosystem considerations in fisheries management
	United Nations General Assembly (UNGA) Resolution 61/222 on Oceans and the Law of the Sea Emphasized that ecosystem approaches 'should be focused on managing human activities in order to maintain and, where needed, restore ecosystem health'
2007	**UNGA Resolution 62/215 on Oceans and the Law of the Sea** Emphasises that ecosystem approaches 'should be focused on managing human activities in order to maintain and, where needed, restore ecosystem health'
2008	**UNGA Resolution 63/111 on Oceans and the Law of the Sea** Reaffirms paragraph 119 of resolution 61/222 regarding ecosystem approaches and oceans, including the proposed elements of an ecosystem approach, means to achieve implementation of an ecosystem approach and requirements for improved application of an ecosystem approach
2012	**Rio+20 Outcome Document, 'The future we want'** 'Commitment to protect, and restore, the health, productivity and resilience of oceans and marine ecosystems […], and to effectively apply an ecosystem approach and the precautionary approach in the management […] of activities having an impact on the marine environment'

Table 2.2 Timeline of the development of the ecosystem approach under the CBD

Date	*Event*
1995	**SBSTTA 1 Recommendation I/3** Recommended that a holistic approach be taken towards conservation and sustainable use of biological diversity and that the ecosystem approach should be the primary framework for action taken
	COP 2 Decision II/8 Reaffirmed that the ecosystem approach should be the primary framework of action
1996	**SBSTTA 2 Recommendation II/1** Advocated regional or ecosystem approaches to the development of guidelines and indicators, and identified certain priority tasks
	COP 3 Decision III/10 and SBSTTA 3 Recommendation III/5, Recommendation III/7 Annex 3 Endorsed recommendation II/1 and outlined work in thematic areas and indicators
1998	**COP 4 Decision IV/1b** For SSTTA to develop principles and other guidance on the ecosystem approach and report to COP V
	Malawi workshop (Governments of Malawi/The Netherlands and CBD) Distilled 12 principles that build on the output from the Sibthorp seminar and elsewhere and introduced new elements. Analysis presented: UNEP/CBD/COP4/inf.9
1999	**IUCN, Commission on Ecosystem Management, Technical meeting on the Ecosystem Approach (UNESCO/CBD)** Participants stressed the importance of pilot projects in demonstrating the approach and the feedback of scientific research to stakeholders
1999	**Trondheim Meeting (Norway/UN Conference on Ecosystem Approach and Biodiversity)** Broad consensus that the ecosystem approach, including adaptive management, is the most appropriate framework to achieve the optimum balance of the convention objectives
1999	**CBD Liaison Group meeting** Elaborated proposals for actions aiming at the implementation of the proposed principles of the EA
2000	**COP 5 Decision V/6** Endorsed the description of the ecosystem approach (EA). Concretes the EA in the form of 12 principles and five operational guidelines. Encourages further conceptual elaboration and practical verification
2002	**International workshop 'Further Development of the Ecosystem Approach'**
2003	**CBD Experts Meeting** Reviewed and refined the principles of the EA
2004	**COP 7 Decision VII/11** The 12 principles of the ecosystem approach were refined and implementation guidelines for each principle were provided

Table 2.2 (continued)

Date	*Event*
2010	**COP 10 Decision X/29** The programme of work on marine and coastal biological diversity was reviewed
	COP 10 Decision X/2 Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets
2012	**COP 11 Decision XI/3** Monitoring progress in Implementation of the Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets

policy areas, including development cooperation.[103] The 2001 policy paper entitled 'The Biodiversity Action Plan for Economic and Development Co-operation' has also been central in EU policy.[104] This policy paper refers to international targets such as the reversal of the current trends in degradation and loss of natural resources by 2015 in addition to the implementation of national strategies for sustainable development by 2005. The policy paper underscores the ecosystem approach as a guiding principle for the conservation and sustainable use of biodiversity.

Impetus for the ecosystem approach is also obtained through the establishment of the Natura 2000 network under the Habitats and Birds Directives.[105] The Habitats and Birds Directives are aimed at the maintenance of biodiversity and contribute to the general objective of sustainable development in EU law. The Habitats Directive seeks to preserve and restore the natural habitats, the wild fauna and flora by obliging member states to establish a comprehensive network of special areas of conservation (SAC) for endangered and vulnerable species and habitats.[106]

More recently, elements of the ecosystem approach have appeared in some of the newer EU directives, such as the Water Framework Directive,[107] the Marine Strategy Framework Directive,[108] and the Directive on Maritime Spatial Planning.[109] Moreover, various EU policies and strategies are based

103 European Commission, 'Biodiversity Strategy' (Communication) COM (1998) 42.
104 European Commission, 'Biodiversity Action Plan for Economic and Development Co-operation' (Communication) COM (2001) 162 final.
105 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora [1992] OJ L 206/7; Council Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds [2009] OJ L 20/7.
106 Article 2(1) of the Habitats Directive. See also Apitz et al. (2006), 80, 81.
107 Council Directive 2000/60/EC of 22 December 2000 establishing a framework for community action in the field of water policy (Water Framework Directive) [2000] OJ L 327.
108 Council Directive 2008/56/EC of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) [2008] OJ L 164/19.
109 Council Directive 2014/89/EU of 23 July 2014 establishing a framework for maritime spatial planning (Maritime Spatial Planning Directive) [2014] OJ L 257/135.

on an ecosystem approach. Examples are European Integrated Maritime Policy, European Common Fisheries Policy, and Integrated Coastal Zone management. These directives and strategies will now be discussed briefly.

Secondary EU legislation has moved towards more ecosystem-based legislation. The 2000 Water Framework Directive (WFD), for instance, marks a change in emphasis adopting a holistic approach to environmental protection and regulation. This directive calls for a single system of water management based on a river basin, a natural geographical and hydrological unit instead of according to administrative or political boundaries. The directive requires a high level of protection for all types of water by a set deadline.

More specifically, the WFD aims at achieving 'good ecological status' for all waters by 2015 or, failing that, by 2021.[110] In the WFD, the assessment of 'ecological status' is primarily based upon several biological quality elements (BQE). These BQEs are fish, benthic macro invertebrates, benthic algae and macrophytes, and phytoplankton. In addition, physical-chemical and hydromorphological quality elements are also considered supporting. This means that the assessment also takes into account the quality of the structure and functioning of aquatic ecosystems associated with surface waters, and the physic-chemical nature of the water and sediment, the flow characteristics of the water and physical structure of the water body.[111]

Another example of ecosystem-based EU legislation is the 2008 European Marine Strategy Framework Directive (MSFD) which takes an ecosystem-based perspective for maintaining healthy ecosystems in marine waters.[112] The MSFD establishes a framework for the development of marine strategies designed to achieve 'good environmental status' in the marine environment, by the year 2020, using 11 qualitative descriptors. Examples of these are elements of marine food webs, biological diversity, hydrographical conditions and sea floor integrity.[113] 'Good environmental status' refers to marine waters that provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions.

110 Article 4 of the Water Framework Directive (n. 107).

111 Apitz et al. (2006), 80.

112 As a background, in 2005, the International Council for the Exploration of the Sea provided guidance for the application of the ecosystem approach in the European marine environment. They identified seven practical steps in applying the approach. These are as follows: 1 scoping (evaluate current ecosystem status; evaluate current ecosystem policies; inventory human activities; evaluate social and economic policies); 2 contrasting current situation with the vision; 3 identify important ecosystem properties and threats; 4 setting ecological objectives; 5 derive operational objectives, indicators and reference points; 6 design ongoing management; 7 periodic updates. This methodology is now reflected in the European Marine Strategy Framework Directive. Rice (2005).

113 See further Annex 1 to the Marine Strategy Framework Directive; see also European Commission, 'Relationship between the initial assessment of marine waters and criteria for good environmental status' (Working Paper) SEC (2011) 1255 final. This document distinguishes the descriptors further into criteria and indicators.

The use of the marine environment should be at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations.[114]

The two directives spatially overlap in the coastal area as the WFD extends to 1 nautical mile from the coastline, whereas the MSFD covers all marine waters from the baseline of territorial waters until the exclusive economic zone.[115] In fact, the adoption of an MSFD was intended to realize integrated ecosystem management philosophies from the terrestrial and freshwater areas through the estuaries and coasts to the open sea, including the continental shelf, as expressed in the Integrated Coastal Zone Management Recommendation.[116] This recommendation calls for the:

> 'Combination of instruments designed to facilitate coherence between sectoral policy objectives and coherence between planning and management' and 'improved coordination of the actions taken by all the authorities concerned both at sea and on land, in managing, the sea-land interaction'.[117]

Even though the adoption of the MSFD in 2008 created an opportunity for a merged approach enabling a harmonized, seamless transition from catchment through transitional waters and coast to an open marine system,[118] it has turned out to be rather difficult to achieve consistency between the two directives, amongst other things because of a different understanding of the ecosystem approach within the two directives. Other potential conflicts are related to a difference in definitions, the level of status, time frames, and elements or qualitative descriptors to be used in assessing the ecological or environmental status.[119]

Long notes, however, that the overlap in the geographical scope of the two directives in the coastal zone will apparently not lead to any conflicts:

> The [Marine Strategy Framework] Directive only applies to coastal waters of the Member States as defined in the Water Framework Directive insofar as the environmental status of those waters is not already addressed in that instrument or in other European legislation. This means that the Water Framework Directive applies to the first nautical mile of the territorial sea on the seaward side of the baselines extending where appropriate up to the outer limit of transitional waters

114 Article 3(5) of the Marine Strategy Framework Directive (n. 108).
115 Borja et al. (2010), 2176.
116 Ibid.
117 Council of the European Union, 'Recommendation concerning the implementation of Integrated Coastal Zone Management in Europe' (2002/413/EC) L 148/24.
118 Borja et al. (2010), 2184.
119 Ibid., 2176; also Herring (2008), 4007.

> and the MSFD applies to all other marine waters in line with the functional jurisdiction exercised by the coastal Member State under public international law.[120]

Notwithstanding, the different ecosystem approaches adopted in these directives is surprising. The ecosystem approach in the WFD has been described as a 'deconstructing, structural approach', whereas the MSFD takes a 'holistic, functional approach'.[121] Under the WFD, 'good ecological status' is assessed by first splitting up the ecosystem into several BQEs, then by comparing the structure of these individually before combining them and attempting to determine the overall condition. So, an ecosystem is deconstructed into its constituent parts, or at least those parts considered important, then assessing the individual quality of each BQE, and using a combining rule to put these back together, and then assuming that the outcome summarizes and protects the whole ecosystem. The approach is based on the practice that the status of the worst element, used in the assessment, determines the final status.[122]

In contrast, the MSFD concentrates on a set of 11 descriptors which together summarize the way in which the whole system functions. The MSFD aims to provide a more holistic, functional approach as it takes the ecosystem and separates it into a set of process-related (functional) objectives and then recombines these to give a holistic approach, ensuring the integrity of the ecosystem. The qualitative descriptors of 'sea floor integrity' for instance, refer to a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.[123] This requires assessing the structure and functioning of the ecosystem. While the WFD mainly focuses on ecological status, measured by the structure of each of the BQEs and supporting elements, the MSFD takes into account structure, function and processes in marine ecosystems. Hence, the MSFD is potentially a more integrated approach to the management of European seas, resources and ecosystems, promoting conservation and sustainable use of marine systems.[124]

As shown, different applications of the ecosystem approach in different legal instruments may cause conflict, particularly where these legal instruments partly overlap. Borja et al. argue that the challenge for the future is not only to integrate indicators for single ecosystem elements (as the WFD does), but also to include measures of ecosystem structure, function and process (as demanded by the MSFD).[125]

120 Long (2011), 23.
121 Borja et al. (2010), 2179.
122 Ibid., 2175–2176.
123 Rice (2010).
124 Herring (2008), 4015.
125 Borja et al. (2009), 3.

It has been argued by Holt that the implementation of these directives by policy makers has failed to meet the more holistic aspirations of the original legislation.[126] Even though the marine areas have different and unique characteristics, it is necessary to have in place coherent approaches and consistent principles across member states in setting the 'good environmental status' criteria and targets. The MSFD includes a requirement to adopt specific and standardized methods for monitoring and assessment to ensure consistency, to compare the achievement of 'good environmental status' throughout European seas, with the same levels of ambition in protection and restoration.[127] To what extent this is realizable remains to be seen.

Directive on maritime spatial planning

Interestingly, the European Commission proposed a new directive in 2013, 'establishing a framework for maritime spatial planning and integrated coastal management', which was adopted in 2014.[128] According to this directive, member states will be asked to draw up maritime spatial plans, which will map existing human activities and identify their most effective future spatial development at sea, and develop integrated coastal management strategies which will ensure coordinated management of these human activities in coastal areas. They will have to fulfil minimum requirements which are of a procedural nature: develop maritime spatial plans and integrated coastal management strategies, and establish appropriate cross-border cooperation among them. The directive respects member states' prerogative to tailor the content of the plans and strategies to their specific economic, social and environmental priorities, as well as their national sectoral policy objectives and legal traditions. The planning details and the determination of management objectives are left to member states.[129]

The directive was preceded by a number of regulations and strategies eventually leading to the proposal of this directive. As an illustration, in 2011, an EU Regulation was adopted, establishing an EU programme to promote further the development and the implementation of the EU's Integrated Maritime Policy (IMP).[130] This programme shall, amongst other things, support the protection and preservation of the marine and coastal environment, and contribute to the health, biological diversity and resilience

126 Holt et al. (2011), 215.
127 Borja et al. (2010), 2176.
128 Council Directive 2014/89/EU of 23 July 2014 establishing a framework for maritime spatial planning (Maritime Spatial Planning Directive) [2014] OJ L 257/135.
129 European Commission, 'Questions and Answers on Proposed Directive on Maritime Spatial Planning and Integrated Coastal Management' (MEMO/13/210) 13 March 2013.
130 Council Regulation 1255/2011 of 5 November 2011 establishing a programme to support the further development of an Integrated Maritime Policy, OJ L 321/1.

of marine and coastal ecosystems.[131] Article 1 of the regulation stipulates that the policy:

> shall foster coordinated and coherent decision-making to maximize the sustainable development, economic growth and social cohesion of Member States, in particular with regard to coastal, insular and outermost regions in the Union, as well as maritime sectors, through coherent maritime-related policies and relevant international cooperation.[132]

The regulation states that 'the strategic objectives of the IMP include integrated maritime governance at all levels; the further development and implementation of integrated sea-basin strategies tailored to the specific needs of Europe's different sea basins; the further development of cross-cutting tools for integrated policy-making aiming to improve synergies and coordination between existing policies and instruments, […] and the definition of the boundaries of the sustainability of human activities and the protection of the marine and coastal environment and biodiversity in the framework of the Marine Strategy Framework Directive, as well as the Water Framework Directive'.[133] Article 3 of the regulation stipulated that:

> The program established by the Regulation shall foster the development of Maritime Spatial Planning and Integrated Coastal Zone Management, which are both important tools for the sustainable development of marine areas and coastal regions and both contributing to the aims of ecosystem-based management […][134]

Both maritime spatial planning (MSP) and integrated coastal zone management (ICZM) are thus important aspects of the regulation, as well as they are of the directive on maritime spatial planning. Both tools are planning frameworks for public authorities and stakeholders to coordinate their action with a view to optimizing the use of marine space under the sovereignty and jurisdiction of the member states.

MSP has particularly been identified as a cross-sectoral tool supporting the implementation of the IMP.[135] MSP has been described as 'an integrated and balanced tool that has the potential to provide long-term stability and predictability, as well as to manage competition for space in intensively used areas'. This is crucial for all economic sectors such as maritime transport, oil and gas, sand and gravel, renewable energy, fisheries, aquaculture,

131 Ibid., Articles 3(a) and 3(b).
132 Ibid., Article 1.
133 Ibid., preamble paragraph 12.
134 Ibid., Article 3.
135 European Commission, 'An Integrated Maritime Policy for the European Union' (Blue Paper) COM (2007) 574 final; European Commission, 'Action Plan on an EU Integrated Maritime Policy' COM (2007) 575 final.

tourism and for the protection of the environment.[136] In the Roadmap for Maritime Spatial Planning, which the Commission adopted in 2008, the ecosystem approach was highlighted as an overarching approach for MSP.[137]

The European Commission emphasizes that even though a great deal of maritime spatial planning can be achieved at the national level, the commission considers it important to pursue action at EU level to achieve a coherent framework for MSP within the EU. A common approach would enable efficient and smooth application of MSP in cross-border marine areas, favouring the development of maritime activities and the protection of the marine environment based on a common framework and similar legislative implications. MSP is also crucial for legal certainty, predictability and transparency, thus reducing costs for investors and operators, in particular those operating in more than one member state.[138]

Similar to MSP, ICZM is also considered an important tool to implement EU IMP. ICZM is aimed at integrating policies, sectors and interests into the planning and management of human activities to achieve sustainable development particularly in the coastal zone.

EU Common Fisheries Policy

Finally, at the European level, the ecosystem approach has also appeared within the European Common Fisheries Policy (CFP). The 2013 Regulation on the Common Fisheries Policy states in Article 2(3):

> The Common Fisheries Policy shall implement the ecosystem-based approach to fisheries management so as to ensure that negative impacts of fishing activities on the marine ecosystem are minimized, and shall endeavour to ensure that aquaculture and fisheries activities avoid the degradation of the marine environment.[139]

The ecosystem approach in fisheries management has been understood by the EU Commission as being about ensuring goods and services from living aquatic resources for present and future generations within meaningful ecological boundaries. Such fisheries management will strive to ensure that benefits from living marine resources are high while the direct and indirect impacts of fishing operations on marine ecosystems are low and not

136 European Commission, 'Maritime Spatial Planning in the EU – Achievements and future development' COM (2010)771, 2.
137 European Commission, 'Roadmap for Maritime Spatial Planning: Achieving common principles in the EU' COM (2008) 791 final.
138 European Commission, 'Maritime Spatial Planning in the EU – Achievements and future development' COM(2010)771, 1.
139 Council Regulation 1380/2013 of 11 December 2013 on the Common Fisheries Policy, OJ L 354/22.

detrimental to the future functioning, diversity and integrity of these ecosystems.[140]

An important element of the Common Fisheries Policy is the focus on a cross-sectoral approach and coherence with the MSFD and the Habitats Directive:

> An ecosystem approach to managing the seas cannot and should not be implemented in a specific sector alone, but must be cross-sectoral. The Integrated Maritime Policy constitutes the overall framework for integrated action in the maritime field, and its environmental pillar, the Marine Strategy Framework Directive, constitutes the general basis for implementing an ecosystem approach to the marine environment. The Habitats Directive, with its requirement to establish networks of protected areas in the marine domain, provides some important tools for an ecosystem approach.[141]

Consistency with other EU policies has thus been recognized as one of the principles of good governance in the regulation.[142] The regulation states that:

> [Existing directives] impose certain obligations on Member States as regards special protection areas, special areas of conservation and marine protected areas, respectively. Such measures might require the adoption of measures falling under the CFP. It is therefore appropriate to authorise Member States to adopt, in waters under their sovereignty or jurisdiction, such conservation measures that are necessary to comply with their obligations under those Union acts where such measures do not affect the fisheries interests of other Member States.[143]

The general boundaries of an overall ecosystem approach will thus be defined by identifying 'good environmental status' through the implementation of the MSFD, specific objectives for fisheries will be developed through long-term management plans based on the maximum sustainable yield concept.[144] Fish stocks should be brought up to healthy levels and be maintained in healthy conditions. They should be exploited at 'maximum sustainable yield' levels, which can be defined as the highest catch that can be safely taken year after year and which maintains the fish population size at maximum productivity.[145] The conditions of fish stocks and fish habitats will thus be

140 European Commission, 'The role of the CFP in implementing an ecosystem approach to marine management' COM (2008) 187 final, 3.
141 Ibid., 2.
142 Regulation on CFP (n. 139), Article 3.
143 Regulation on CFP (n. 139), preamble paragraph 25.
144 European Commission 2008 (n. 140) 7.
145 European Commission, 'Reform of the Common Fisheries Policies' COM (2011) 417 final, 3.

important elements in the assessment of good environmental status, which is envisaged in the MSFD.

In sum, the task of fisheries management with an ecosystem approach in an EU context is thus to:

1 Keep direct and indirect impacts of fisheries on marine ecosystems within bounds in relation to healthy marine ecosystems and ecologically viable fish populations by including all the knowledge we have about the interactions between fisheries and marine ecosystems in decisions under the CFP, and
2 Ensure that actions taken in fisheries are consistent with and supportive of actions taken under the cross-sectoral Marine Strategy and Habitats Directive.[146]

Overall, the ecosystem approach to marine management implies that multiple and often conflicting interests need to be reconciled in the process. While there may be short-term contradictions between social objectives and the requirement to conduct fisheries within meaningful ecological boundaries, such contradictions largely disappear in the long term because healthy ecosystems are a prerequisite for the continued existence of a fishing industry.[147]

2.3 In sum

This chapter has shed light on the understanding of the ecosystem approach and has provided an overview of the development of the concept within international law and within EU environmental law. The chapter has shown that the concept of the ecosystem approach has no formal, universally agreed definition. Rather, the concept is evolving and has been interpreted differently by the various environmental institutions and in the context of various environmental regimes. The overview demonstrated that the ecosystem approach is not a concept that has emerged sporadically, but rather that the ecosystem approach now has been widely endorsed in international and European legal instruments. Despite this diffusion, the ecosystem approach has been difficult to implement in practice.

Regardless of conceptual variation, the core of the ecosystem approach is considered a governance regime focusing on the structure and functioning of the ecosystem within its own ecological boundaries, with the objective of sustainable use of ecosystem services and the maintenance of ecosystem integrity. The balancing between these two objectives is difficult and has been one of the main challenges of the ecosystem approach. Two main reasons behind this difficulty have been explained; the nature of ecosystems

146 European Commission 2008 (n. 140) 4.
147 Ibid., 6.

as complex adaptive systems, and the lack of inter-sectoral cooperation and coordination as a result of fragmented structures of environmental governance. The role of law has been identified as important because of the relationship between the role of law and these two explanations.

The following chapter aims to contribute to a better understanding of the ecosystem approach. Even though elements of the ecosystem approach may have been more concretely applied in the EU directives discussed above than in international legal and political instruments, the essence of the ecosystem approach may still be rather unclear. A better understanding of the nature of ecosystems as being complex adaptive systems is necessary in order to better comprehend the role of law.

2.4 References

Apitz, S.A. *et al.*, 'European Environmental Management: Moving to an Ecosystem Approach' (2006) 2(1) *Integrated Environmental Assessment and Management* 80.

Borg, S., *Conservation on the High Seas: Harmonizing International Regimes for the Sustainable Use of Living Resources* (Edward Elgar, 2012).

Borja, A., Ranasignhe, A. and Weisberg, S.B., 'Assessing Ecological Integrity in Marine Waters, Using Multiple Indices and Ecosystem Components: Challenges for the Future' (2009) 59(1–3) *Marine Pollution Bulletin* 1.

Borja, A. *et al.*, 'Marine Management – Towards an Integrated Implementation of the European Marine Strategy Framework and the Water Framework Directives' (2010) 60(12) *Marine Pollution Bulletin* 2175.

Brand, F., 'Critical Natural Capital Revisited: Ecological Resilience and Sustainable Development' (2009) 68(3) *Ecological Economics* 605.

Cilliers, P., *Complexity and Postmodernism: Understanding Complex Systems* (Routledge, 1998).

Cilliers, P., 'Complexity, Ethics and Justice' (2004) 5(19) *Journal for Humanistics* 19.

Currie, D.E.J., *Ecosystem-Based Management in Multilateral Environmental Agreements: Progress Towards Adopting the Ecosystem Approach in the International Management of Living Marine Resources* (World Wildlife Fund, 2007).

De Lucia, V., 'Competing Narratives and Complex Genealogies: The Ecosystem Approach in International Environmental Law' (2015) 27 *Journal of Environmental Law* 91–117.

Doremus, H.D., Lin, A.C. and Rosenberg, R.H., *Environmental Policy Law: Problems, Cases and Readings* (6th edn, Foundation Press, 2012).

Duit, A. and Galaz, V., 'Governance and Complexity: Emerging Issues for Governance Theory' (2008) 21(3) *Governance* 311.

Grumbine, R.E., 'What is Ecosystem Management' (1994) 8(1) *Conservation Biology* 27.

Hartje, V., Klaphake, A. and Schliep, R., 'The International Debate on the Ecosystem Approach: Diffusion of a Codification Effort', in Korn, H., Schliep, R. and Stadler, J. (eds) *Report of the International Workshop on the 'Further Development of the Ecosystem Approach'* (BFN Federal Agency for Nat Conserv, Skripten 78, 2003).

Herring, D. *et al.*, 'The European Water Framework Directive at the Age of 10: A Critical Review of the Achievements with Recommendations for the Future' (2008) 408(19) *Science of Total Environment* 4007.

Holt, A.R. *et al*., 'Mismatches between Legislative Frameworks and Benefits Restricts the Implementation of the Ecosystem Approach in Coastal Environments' (2011) 434(213–228) *Marine Ecology Progress Series* 213.

Keiter, R.B., 'Ecosystems and the Law: Towards an Integrated Approach' (1998) 8(2) *Ecological Applications* 332.

Kidd, S., Plater, A. and Frid, C. (eds), *The Ecosystem Approach to Marine Planning and Management* (Earthscan, 2011).

Korn, H., Schliep, R. and Stadler, J. (eds), *Report of the International Workshop on the 'Further Development of the Ecosystem Approach'* (BFN Federal Agency for Nat Conserv, Skripten 78, 2003).

Korn, H., Schliep, R. and Stadler, J. (eds), *Report of the International Workshop on 'Ways to Promote the Ideas behind the CBD's Ecosystem Approach in Central and Eastern Europe'* (BFN Federal Agency for Nat Conserv, Skripten 120, 2004).

Laffoley, D. et al., *The Ecosystem Approach: Coherent Actions for Marine and Coastal Environments. A Report to the UK Government* (English Nature, 2004).

Long, R., 'Legal Aspects of Ecosystem-based Marine Management in Europe' (2010) 26 *Ocean Yearbook* 417.

Long, R., 'The Marine Strategy Directive: A New European Approach to the Regulation of the Marine Environment, Marine Natural Resources and Marine Ecological Services' (2011) 29(1) *Journal of Energy and Natural Resources Law* 23.

Maltby, E., 'Some European Perspectives of the Ecosystem Approach', in Korn, H. *et al*. (eds) *The Ecosystem Approach – What Does it Mean for European Ecosystems?* (BFN Federal Agency for Nat Conserv, Skripten, 1998).

Manuel-Navarrete, D., Dolderman, D. and Kay, J.J., 'An Ecosystem Approach for Sustaining Ecological Integrity – But Which Ecological Integrity?' in Waltner-Toews, D., Kay, J. and Lister, N.E. (eds) *The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability* (Columbia University Press, 2008).

Miller, P., 'Approaches to Ecological Integrity: Divergence, Convergence and Implementation', in Crabbé, P. et al. (eds) *Implementing Ecological Integrity: Restoring Regional and Global Environmental and Human Health* (Kluwer Law International, 2000).

Müller, F., Hoffmann-Kroll, R. and Wiggering, H., 'Indicating Ecosystem Integrity – Theoretical Concepts and Environmental Requirements' (2000) 130 *Ecological Modelling* 13.

Nagle, J.C. and Ruhl, J.B., *The Law of Biodiversity and Ecosystem Management* (Foundation Press, 2002).

OECD Global Science Forum, *Applications of Complexity Science for Public Policy: New Tools for Finding Unanticipated Consequences and Unrealized Opportunities* (OECD, 2009).

Pardy, B., 'The Hand is Invisible, Nature Knows Best, and Justice is Blind: Markets, Ecosystems, Legal Instrumentalism, and the Natural Law of Systems' (2009) 44 *Tulsa Law Review* 67.

Platjouw, F.M., 'The Need to Recognize a Coherent Legal System as an Important Element of the Ecosystem Approach', in Voigt, C. (ed.) *Rule of Law for Nature. New Dimensions and Ideas in Environmental Law* (Cambridge University Press, 2013), 158–174.

Rammel, C., Stagl, S. and Wilfing, H., 'Managing Complex Adaptive Systems – A Co-evolutionary Perspective on Natural Resource Management' (2007) 63 *Ecological Economics* 9.

Rapport, D. *et al.*, *Ecosystem Health* (Blackwell Science, 1998).
Rice, J. *et al.*, 'Guidance on the Application of the Ecosystem Approach to Management of Human Activities in the European Marine Environment' (2005) *ICES Cooperative Research Report no.* 273.
Rice, J. *et al.*, *Marine Strategy Framework Directive Task Group 6 Report 'Seafloor Integrity'* (Joint Report) (Office for Official Publications of the European Communities, 2010).
Ruhl, J.B., 'Thinking of Environmental Law as a Complex Adaptive System – How to Clean Up the Environment by Making a Mess of Environmental Law' (1997) 34(4) *Houston Law Review* 933.
Ruhl, J.B., Kraft, S.E. and Lant, C.L., *The Law and Policy of Ecosystem Services* (Island Press, 2007).
Stadler, J., 'A Brief History of the Development of the Ecosystem Approach within the Framework of the Convention of Biological Diversity', in Korn, H., Schliep, R. and Stadler, J. (eds) *Report of the International Workshop on the 'Further Development of the Ecosystem Approach'* (BFN Federal Agency for Nat Conserv, Skripten 78, 2003).
Trouwborst, A., *Evolution and Status of the Precautionary Principle in International Law* (Kluwer Law International, 2002).
Trouwborst, A., *Precautionary Rights and Duties of States* (Martinus Nijhoff Publishers, 2006).
Trouwborst, A., 'The Precautionary Principle and the Ecosystem Approach in International Law: Differences, Similarities and Linkages' (2009) 18(1) *Review of European Community & International Environmental Law* 26.
Valiante, M., 'The Law of the Ecosystem: Evolution of Governance in the Great Lakes – St Lawrence River Basin' (2007) 12(2) *Lex Electronica*.
Van Eeten, M.J.G. and Roe, E., *Ecology, Engineering and Management. Reconciling Ecosystem Rehabilitation and Service Reliability* (Oxford University Press, 2002), 2.
Walker, B. and Salt, D., *Resilience Thinking: Sustaining Ecosystems and People in a Changing World* (Island Press, 2006).

2.4.1 International and EU primary documents

Agenda 21. United Nations Conference on Environment and Development (UNCED), Agenda 21: Programme of Action for Sustainable Development (1992) A/Conf.151/26.
Antarctic Treaty. The Antarctic Treaty (opened for signature 1 December 1959, entered into force 23 June 1961) 401 UNTS 71.
CBD. The Convention on Biological Diversity (adopted 22 May 1992, entered into force 29 December 1993) 1760 UNTS 79.
CFP Regulation. Council Regulation 1380/2013 of 11 December 2013 on the Common Fisheries Policy [2013] OJ L 354/22.
CITES. Convention on International Trade in Endangered Species of Wild Fauna and Flora (adopted 3 March 1973, entered into force 1 July 1975) 983 UNTS 243.
CMS. The Convention on the Conservation of Migratory Species of Wild Animals.
Bonn Convention (adopted 23 June 1979, entered into force on 1 November 1983) 1651 UNTS 333.
FAO Code of Conduct. UN Food and Agriculture Organization, 'Code of Conduct for Responsible Fisheries' (31 October 1995) FAO Doc. 95/20/Rev/1.

Habitats Directive. Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora [1992] OJ L 206/7.

Hague Declaration. The Hague Declaration on the Environment, 28 ILM 1308 (1989).

IMP Regulation. Council Regulation 1255/2011 of 5 November 2011 Establishing a Programme to Support the Further Development of an Integrated Maritime Policy [2011] OJ L 321/1.

Marine Strategy Framework Directive. Council Directive 2008/56/EC of 17 June 2008 Establishing a Framework for Community Action in the Field of Marine Environmental Policy [2008] OJ L164/19.

Maritime Spatial Planning Directive. Council Directive 2014/89/EU of 23 July 2014 Establishing a Framework for Maritime Spatial Planning (Maritime Spatial Planning Directive) [2014] OJ L 257/135.

Ramsar Convention. Convention on Wetlands of International Importance Especially as Waterfowl Habitat (adopted 2 February 1971, entered into force 21 December 1975) 996 UNTS 245.

Reykjavik Declaration. Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem (October 2001).

Rio Declaration. Rio Declaration on Environment and Development (13 June 1992) 31ILM 874.

Stockholm Declaration. Declaration of the United Nations Conference on the Human Environment (June 1972) 11 ILM 1416.

UNCLOS. United Nations Convention on the Law of the Sea (opened for signature on 10 December 1982, entered into force 16 November.

UN Fish Stocks Agreement. United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (adopted 4 August 1995, entered into force 11 December 2001) 2167 UNTS 88.

UN World Summit on Sustainable Development, 'Johannesburg Plan of Implementation' (September 2002) A/Conf. 199/20.

Water Framework Directive. Council Directive 2000/60/EC of 22 December 2000 Establishing a Framework for Community Action in the Field of Water Policy [2000] OJ L327/22.

Wild Birds Directive. Council Directive 2009/147/EC of 30 November 2009 on the Conservation of Wild Birds [2009] OJ L 20/7.

2.4.2 Official documents

CBD, Ad Hoc Open-Ended Inter Sessional Working Group on Article 8(j) and Related Provisions of the Convention on Biological Diversity, 'In-depth Dialogue on Thematic Areas and Other Cross-cutting Issues, Ecosystem Management, Ecosystem Services and Protected Areas' (22 July 2011) UNEP/CBD/WG8J/7/6.

CBD-COP, Conference of the Parties 2 Decision II/8, 'Preliminary Consideration of Components of Biological Diversity Particularly Under Threat and Action which could be Taken Under the Convention' (November 1995) UNEP/CBD/COP/2/19.

CBD-COP, Conference of the Parties 2 Decision II/10, 'Conservation and Sustainable Use of Marine and Coastal Biological Diversity' (30 November 1995) UNEP/CBD/COP/2/19, paragraph 2.

CBD-COP, Conference of the Parties 4, 'Report of the Workshop on the Ecosystem Approach' (20 March 1998) UNEP/CBD/COP/4/Inf.9.
CBD-COP, Conference of the Parties 5 Decision V/6, 'Ecosystem Approach' 2000 (22 June 2000) UNEP/CBD/COP/5/23.
CBD-COP, Conference of the Parties 7 Decision VII/11, 'Ecosystem Approach' (13 April 2004) UNEP/CBD/COP/7/21.
CBD-COP, Conference of the Parties 10 Decision X/2, 'Strategic Plan for Biodiversity 2011–2020' (29 October 2010) UNEP/CBD/COP/10/27.
CBD-COP, Conference of the Parties 10 Decision X/29, 'Marine and Coastal Biodiversity' (29 October 2010) UNEP/CBD/COP/DEC/X/29.
CBD-EM, Expert Meeting on the Ecosystem Approach, 'Review of the Principles of the Ecosystem Approach and Suggestions for Refinement: A Framework for Discussion' (3 July 2003) UNEP/CBD/EM-EA/1/3.
CBD-SBSTTA 1, 'Alternative Ways and Means in which the Conference of the Parties could Start the Process of considering the Components of Biological Diversity, Particularly those Under Threat and the Identification of Action which could be Taken Under the Convention' (24 July 1995) UNEP/CBD/SBSTTA/1/4.
CBD-SBSTTA 5, 'Ecosystem Approach: Further Conceptual Elaboration' (23 October 1999) UNEP/CBD/SBSTTA/5/11.
CITES, Fifty-third Meeting of the Standing Committee, 'Synergy between CITES and the Convention on Biological Diversity' (June 2005) SC53 Doc.8 (rev. 1).
Council of the European Union, 'Recommendation Concerning the Implementation of Integrated Coastal Zone Management in Europe' (2002/413/EC) L 148/24.
European Commission, 'Biodiversity Strategy' (Communication) COM (1998) 42.
European Commission, 'Biodiversity Action Plan for Economic and Development Co-operation' (Communication) COM (2001) 162 final.
European Commission, 'Integrating Environmental Considerations into Other Policy Areas – A Stock-taking of the Cardiff Process' (working document) COM (2004) 394.
European Commission, 'Halting the Loss of Biodiversity by 2010 – and Beyond: Sustaining Ecosystem Services for human Well-being' (Communication) COM (2006) 216 final.
European Commission, 'An Integrated Maritime Policy for the European Union' (Blue Paper) COM (2007) 574 final.
European Commission, 'Action Plan on an EU Integrated Maritime Policy' SEC (2007) 575 final.
European Commission, 'The Role of the CFP in Implementing an Ecosystem Approach to Marine Management' COM (2008) 187 final.
European Commission, 'Roadmap for Maritime Spatial Planning: Achieving Common Principles in the EU' COM (2008) 791 final.
European Commission, 'Reform of the Common Fisheries Policy' (Green Paper) COM (2009) 163 final.
European Commission, 'Maritime Spatial Planning in the EU – Achievements and Future Development' COM (2010) 771.
European Commission, 'Relationship Between the Initial Assessment of Marine Waters and Criteria for Good Environmental Status' (Working Paper) SEC (2011) 1255 final.
European Commission, 'Proposal for a Directive of the European Parliament and of the European Council Establishing a Framework for Maritime Spatial Planning and Integrated Coastal Management' COM (2013) 133 final.

European Commission, 'Questions and Answers on Proposed Directive on Maritime Spatial Planning and Integrated Coastal Management' (MEMO/13/210) 13 March 2013.

European Parliament, 'European Parliament Legislative Resolution of 17 April 2014 on the Proposal for a Directive of the European Parliament and of the Council Establishing a Framework for Maritime Spatial Planning and Integrated Coastal Maritime Spatial Planning and Integrated Coastal Management' COM (2013) 0133.

Ramsar-COP, Conference of the Parties 9, 'A Conceptual Framework for the Wise Use of Wetlands and the Maintenance of their Ecological Character' (November 2005) Resolution IX.1 Annex A.

United Nations Environment Programme, Millennium Ecosystem Assessment (MEA), Ecosystems and Human Well-being: A Framework for Assessment (Island Press, 2003).

United Nations Environment Programme, Millennium Ecosystem Assessment (MEA), Ecosystems and Human Well-Being: Our Human Planet, Summary for Policy Makers (Island Press, 2005).

United Nations Environment Programme, Global Environment Outlook GEO-5, Summary for Policy Makers (UNEP, 2012).

United Nations General Assembly, Resolution 37/7, 'World Charter for Nature' (28 October 1982) A/RES/37/7.

United Nations General Assembly, Resolution 61/63 on Oceans and the Law of the Sea (9 March 2006) A/61/63.

United Nations General Assembly, 'Report on the Work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its Seventh Meeting' (17 July 2006) A/61/156 (part A).

United Nations General Assembly, Resolution 61/222 on Oceans and the Law of the Sea (20 December 2006) A/RES/61/222.

United Nations General Assembly, Resolution 62/215 on Oceans and the Law of the Sea (22 December 2007) A/RES/62/215.

United Nations General Assembly, Resolution 63/111 on Oceans and the Law of the Sea (12 February 2009) A/RES/63/111.

United Nations General Assembly, Resolution 66/228, 'The Future We Want' (27 July 2012) A/Res/66/288.

3 Ecosystems as subjects of environmental law

Their complexity and integrity

Implementing an ecosystem approach and ensuring the maintenance of ecosystem integrity requires a better understanding of the distinctive nature of ecosystems as being complex adaptive systems. Precisely because of the fact that ecosystems are complex adaptive systems, this makes them very distinctive subject matter of environmental law. Furthermore, merely comprehending the importance of applying an ecosystem approach in environmental governance does not necessarily aid much in solving the question of how to govern and regulate ecosystems in a way that is sustainable and halts their degradation. Further insight is needed into the nature and behaviour of ecosystems. In addition, there is also a need to deepen our understanding of the concept of 'ecosystem integrity', and how this is related to an ecosystem capacity for self-organization and the provision of ecosystem services.

This chapter first explores the concept of complex adaptive systems. One of the reasons why ecosystems are so difficult to govern sustainably is precisely because of their nature. Being complex adaptive systems, everything is connected with everything else and it is not possible to isolate one element to understand its behaviour separate from the many other elements to which it is attached.[1] Furthermore, these interconnections are complex and rich, which entails that the behaviour of the system as a whole becomes rather unpredictable. This particular nature of ecosystems as complex adaptive systems needs to be acknowledged in governance and regulatory approaches to ecosystems.

This chapter also thoroughly assesses the concept of 'ecosystem integrity', which appears in almost every definition of the ecosystem approach. It will be clarified how ecosystem integrity is related to the self-organizing capacity of the ecosystem and why the objective of maintaining ecosystem integrity is crucial in an ecosystem approach. The role of ecosystem services in light of this concept of ecosystem integrity will also be touched upon.

Presently, the complexity and adaptive capacity of ecosystems is far from being fully explored. Not much is known about the changes in ecosystems'

1 Pardy (2009), 81.

functions and services that have taken or will take place on different scales due to human interference.[2] This uncertainty makes ecosystems as subject matter difficult to govern and regulate in essence. Coping with uncertainty in relation to complex adaptive ecosystems can be considered a major challenge in environmental governance. Nevertheless, a greater insight into their specific nature is essential for a better understanding of the role of law, as will be discussed further in Chapters 5–8.

3.1 Ecosystems as complex adaptive systems

In simple terms, as mentioned above, in complex adaptive systems everything is connected to everything else and it is not possible to isolate one element to understand its behaviour separate from the many other elements to which it is attached. Furthermore, these interconnections are complex and rich, which entails that the behaviour of the system as a whole becomes rather unpredictable.[3] Complex adaptive systems also contain a capacity of adaptivity: through interacting with and learning from its environment, a complex adaptive system modifies its behaviour to adapt to changes in its environment. This entails some inevitable uncertainty as the rules, behaviour and structures of the system vary over time as they adapt to a changing external environment (for instance, climate effects).[4]

This interconnectedness of the components enables positive and negative feedback and processes to occur over a range of spatial and temporal scales.[5] As a consequence, small changes might have large effects on the system, while large ones could have little or no effect.[6] Indeed, small changes do not necessarily produce small effects in other particular parts of the system or in the characteristics of the system as a whole.[7] The possibility remains that something that appears insignificant can be amplified tremendously.

The fact that within ecosystems everything is connected with everything else, and that the 'whole is more than the sum of its parts', clearly distinguishes them from the more common subject matter of environmental law. A reductionist approach which focuses on individual species and population dynamics of species within isolated ecosystems opposes a holistic

2 The ability of ecosystems and the biosphere as a whole to respond to perturbations such as changes in climate, declines in biodiversity, and disruption of regional and global biogeochemical cycles is difficult to predict. Understanding how change at one level of biological organization will alter emergent patterns or mechanisms at another level of biological organization is one of the most pressing problems in ecology. See Hartvigsen et al. (1998), 429.
3 Walker and Salt (2006), 35; see also Cilliers (1998), 2–3.
4 Rammel et al. (2007), 10.
5 Duit and Galaz (2008), 313.
6 OECD Global Science Forum (2009).
7 Duit and Galaz (2008), 312.

governance approach that focuses on the macro-level functional aspects of ecosystems (such as flows and productivity).[8]

The various features of complex adaptive systems pose challenges to existing governance approaches to the environment. As already mentioned, fragmented governance structures ignore the interconnectedness between the various components of ecosystems. Furthermore, the adaptivity of the system and its self-organizing capacity involves a degree of unpredictability and uncertainty about the possible consequences of human impacts and the performance of the system as a whole. Attempts to maintain the integrity of an ecosystem need to be carried out in the awareness of the unique nature of ecosystems.

This section describes the main features of complex adaptive systems, amongst which are emergence, self-organization and resilience, surprises and tipping points, and unpredictability.

3.1.1 Emergence: the whole is more than the sum of the parts

A first important feature of complex adaptive systems is 'emergence'. This means that the systems are composed of very large numbers of diverse, interacting parts and that the interaction of these parts brings forth *novel* patterns. In fact, a complex system has a large amount of components that could by themselves be fairly simple. These components are, however, richly interconnected so that they can interchange energy and/or information. The characteristics of the system are not primarily a result of the nature of the components, but of the patterns of interconnection.[9]

Particularly this feature is an important reason behind the argument that an ecosystem needs to be governed holistically rather than focusing on the individual components; the variables involved are numerous and interactions are complex, creating novel patterns at a systems level.[10] Kay holds that '[t]here is a certain myopia in the dominant reductionist approaches, and it hinders our ability to deal with situations where emergence is an important feature'.[11]

System behaviour thus arises from the interactions of the components. Importantly, the novel patterns that arise at a system level cannot be predicted by the fundamental properties of the systems' components.[12] For example, hydrogen oxide is a simple, unexceptional three-atom molecule, but combining a large number of these molecules produces a liquid – water – which has intriguing and essential properties (e.g. transparency, role as universal solvent, capillary action, expansion upon freezing).[13] Another

8 De Leo and Levin (1997), 3.
9 Cilliers (2004), 25.
10 Currie (2007), 6.
11 Kay (2008), 4.
12 OECD Global Science Forum (2009), (n. 7), 5.
13 Ruhl (1997), 933.

example is consciousness: something that arises from the interaction between a number of simple neurons. The brain consists of a large number of neurons connected through the synapses. Although the neurons are, at least in terms of information-processing capacities, fairly simple, the capacities of the brain as a whole are striking.[14]

So, the patterns of relationships and how these translate into emergent behaviour are highly important.[15] This is founded on the premise that systems behave as a whole and that such behaviour cannot be explained solely in terms that simply accumulate the individual elements: collective behaviour that emerges from the working together of the interconnected parts differs from the behaviour of one individual component of the system.[16] As an illustration, an estuarine ecosystem might perform badly even though the coastal area, the land area and part of the marine environment are managed well. Therefore, there is no reliable way to predict, simply on the basis of observation of any of the system's individual components, what form the system's emergent behaviour might take and to what end.[17]

In short, emergence is an ecosystem feature that arises at the macroscopic level through interactions within inferior levels. These interactions create additional quality within the system that makes 'the whole more than the sum of the parts'. Emergent properties are always consequences of self-organizing processes.[18]

3.1.2 Self-organization, adaptivity and resilience

A second important feature of ecosystems is that they are self-organizing and adaptive. The adaptive capacity of ecosystems is related to the property of 'self-organization'. A system that is formed and operates through many mutually adapting constituents is called self-organizing because no entity designs it or directly controls it. The system runs itself.[19] Being self-organizing, successful complex adaptive systems are constantly changing to maintain adaptivity, but they also exhibit a stability of basic structure in the face of externally caused stress.[20]

This is caused by the fact that the systems possess an 'attractor state' to which the system eventually will return after transitions or disruptions.[21] Indeed a self-organizing system shows a set of behaviours that are coherent and organized, within limits. The nexus of this organization at any time is referred to as an attractor. The system behaves as if it were 'attracted'

14 Cilliers (2004), 25.
15 Kay (2008), 3.
16 Ibid., 4. See also Cilliers (2004), 25.
17 Ruhl (1997), 945–953.
18 Müller et al. (2000), 18.
19 Doremus et al. (2012), 5; Pardy (2009), 78–81; and Ruhl (1997), 945.
20 Halley and Winkler (2008), 11.
21 Ruhl (1997), 945–953; see also Cilliers (1998), 6.

towards this domain. As self-organizing systems evolve they may shift between attractors within the system's overall state space. The reorganization that these shifts entail is not smooth and continuous but rather step-wise. The system 'flips' its organizational state in often dramatic ways.[22]

A difficulty for the governance of ecosystems is that these systems may have more than one attractor state. Ecosystems have multiple possible operating states or attractors, and may shift or diverge suddenly from any one of them.[23] This makes the system unpredictable. Indeed, as there is the possibility of more than one appropriate self-organizing response (i.e. multiple attractors), there is not necessarily a unique preferred state.[24] The existence of multiple attractor states, multiple possibilities necessarily implies indeterminacy, as which path is taken depends on the system's history and various external conditions that can never be completely predicted, thus the unpredictable nature of complex systems.[25]

The alternative attractor state to which a system can move might be undesirable. A social-ecological system based on wild fishery, for example, can cross a threshold and experience a catastrophic collapse in fish numbers. The fishing then stops but the fish population does not recover. The system has moved to a different state, a state in which the commercial levels of the fish populations are absent.[26]

Despite the existence of multiple attractor states, a self-organizing system has also the ability to maintain itself at an attractor state regardless of changes in its environment. It is possible for a system's environment to change substantially, without the system exhibiting major change. This capacity to organize and maintain itself about an attractor is the hallmark of a self-organizing system.[27]

According to Kay and Schneider, ecosystems can respond to changes in the environment in five qualitatively different ways:

1 The system can continue to operate as before, even though its operations may be initially and temporarily unsettled;
2 The system can operate at a different level using the same structures it originally had (for example, a reduction or increase in species numbers);
3 Some new structures can emerge in the system that replace or augment existing structures (for example, new species or paths in the food web);
4 A new ecosystem, made up of quite different structures, can emerge;
5 The final, and very rare possibility, is that the ecosystem can collapse completely and no regeneration occurs.[28]

22 Kay et al. (1999), 725.
23 Ibid.
24 Ibid., 727.
25 Kay (2008), 7.
26 Walker and Salt (2006), 36.
27 Kay et al. (1999), 721–722. See also Kay and Boyle (2008), 53.
28 Kay and Schneider (1995), 49.

Whether or not a system moves to an alternative attractor state after a distortion depends on its buffering capacity. Self-organizing systems have in their repertoire of behaviours a way of dealing with disturbance through their buffering capacity. In essence, one can substantially change the environmental context for such a system up to a point (a threshold or tipping point) with little apparent effect on the system. However, a slight change beyond the threshold and the system will suddenly change – that is, it reorganizes itself in a very dramatic and often unpredictable way.[29] There is, in principle, no inherent or predetermined state to which they will return. Although in general systems tend to maintain their current state, however, when change does occur, it can be very rapid and even catastrophic. Precisely when the change will occur and to what state the system will change are often not predictable.[30]

For quite a while our interaction with the system appears not to have any (deleterious) effect. As we increase what we are doing to the system, nothing appears to happen. Then suddenly, with little warning, a small change in our behaviour causes the system to change dramatically, and too late we realize that we are impacting the system. 'The ability of systems to buffer themselves from external influences and to incorporate external disturbance as an integral part of their patterns of organisation is part of what gives us our sense of them as a whole, a whole that is adapted to the situation that it is in'.[31]

With regard to an ecosystem's ability to maintain its current state, the concept of ecosystem *resilience* is highly relevant. Ecosystem resilience is the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state that is controlled by a different set of processes. A resilient ecosystem can withstand shocks and rebuild itself when necessary.[32] In ecology, the term 'resilience' has come to refer to both 'the magnitude of disturbance that can be absorbed, and the speed of an ecosystem's return to equilibrium without flipping the current ecosystem to another regime of behaviour'.[33] When the duration of the recovery phase is short in comparison to other ecosystems, the system is considered to be more resilient than others. Resilience is a desirable feature of an ecosystem as a resilient ecosystem in a 'desirable' state has a greater capacity to continue providing us with the goods and services that support our quality of life while being subjected to a variety of shocks.[34]

In a less resilient ecosystem certain disturbances may fundamentally disrupt the system and cause a dramatic shift to another state of the ecosystem,

29 Kay (2008), 6.
30 Ibid., 11. See further Kay and Schneider (1995), 49.
31 Kay (2008), 6.
32 Brand (2009), 607.
33 Pardy (2009), 79.
34 Walker and Salt (2006), 32.

controlled by a different set of processes. Reduced resilience increases the vulnerability of a system to smaller disturbances than it could previously cope with. Even in the absence of disturbance, gradually changing conditions, such as nutrient loading, climate, or habitat fragmentation, can surpass threshold levels, triggering an abrupt system response.[35]

When resilience is lost or significantly decreased, a system is at high risk of shifting into a qualitatively different state. The new state of the system may be undesirable, as in the case of productive freshwater lakes that become eutrophic, turbid and depleted of their biodiversity. Restoring a system to its previous state can be complex, expensive, and sometimes even impossible.[36]

In the context of ecosystem resilience, there is an important link to the concept of *biodiversity*. In each ecosystem, there is a diversity of species, genes, nutrients, habitats and more. This diversity generally enhances resilience because it makes the system less susceptible to disruption or failure of one or more of its elements. Biodiversity thus plays a crucial role by providing functional redundancy.[37] Within a system that is diverse enough, the decline of one species is mitigated by the presence of others performing the same or similar functions.[38]

For example, in a grassland ecosystem, several different species will commonly perform nitrogen fixation, but each species may respond differently to climatic events, thus ensuring that even though some species may be lost, the process of nitrogen fixation within the grassland ecosystem will continue. Another example is that within a tropical rainforest ecosystem, a single tree can harbour over 10,000 distinct species of insects, and it is possible to walk long distances in the rainforest without twice encountering the same species of tree. Diversity of such magnitude is the signature of complex adaptive systems. The system as a whole depends on no single component for its long-term sustainability.[39]

It needs to be underscored that the number of a particular species is less relevant than the diversity of the species. Not all species are of equal importance to the maintenance of the system's functioning. Robert Paine demonstrated, for instance, that in the intertidal zone there are species that play roles disproportionate to their numbers in the dynamics of their

35 Resilience Alliance (2015).

36 Ibid.

37 Functional redundancy is based on the observation that some species perform similar roles in communities and ecosystems, and may therefore be substitutable with little impact on ecosystem processes. Rosenfield (2002), 156.

38 Pardy (2009), 79.

39 Ibid. Notwithstanding, De Leo and Levin also emphasize that it should be noted that simple generalizations about the relations between diversity or complexity and stability are elusive. Very complex systems, such as tropical forests, may still lack resilience with respect to major anthropogenic perturbations. For example, pasture created from rainforest not only fails to return to rainforest but often degrades into barren sites. See De Leo and Levin (1997), 5.

communities. The removal of a keystone species can trigger nonlinear responses that lead to a fundamental change in the nature of the ecosystem. Clearly, biodiversity provides some degree of buffering for critical ecosystem processes.[40]

Developing sustainable approaches to system use implies understanding what maintains resilience and how human intervention might affect it. The key to resilience in any complex adaptive system appears to be the maintenance of heterogeneity, the essential variation that enables adaptation. Heavily managed systems, such as agriculture or forestry, are not purely complex adaptive systems, in that their simplified structures are imposed exogenously rather than arising endogenously. As such, they are fragile, vulnerable to single stresses such as pest outbreaks that cause system crashes in the absence of adaptive responses. Thus, if resilience is a goal, managers must understand the properties that enable an ecosystem, as a complex adaptive system, to maintain its integrity in the face of changing environmental conditions and human impacts.[41] The ultimate question we need to answer is how much, or rather how little, redundancy we can afford to lose without pushing the system to the edge of some irreversible and catastrophic change.[42]

3.1.3 Surprises and tipping points

Ecosystems tend to reorganize themselves in case of disturbance. This self-organizing behaviour can, however, suddenly change whenever the system reaches a catastrophe threshold, and 'flips' into a different behavioural state.[43] The system has then reached a 'tipping point'.

Changes in an ecosystem may thus push the system towards a so-called 'tipping point' or 'phase transition point' whereby the system enters a new phase. The main point is that small events may trigger changes that are difficult or even impossible to reverse. In some cases the transition is sharp and dramatic. In others, although the dynamics of the system have shifted from one state to another, the transition itself may be slow but definite. Hence, seemingly stable systems can suddenly undergo comprehensive transformations into something entirely new, with internal controls and characteristics that are profoundly different from those of the original.[44]

Indeed, these tipping points in ecosystems represent dramatic, usually sudden (less than a decade) deviations from average system behaviour. Such dramatic shifts are often primed by a steady change in internal or external conditions that increase a system's susceptibility to being triggered to enter

40 Levin (1998), 433.
41 Ibid., 435.
42 De Leo and Levin (1997), 5.
43 Kay et al. (1999), 722.
44 Duit and Galaz (2008), 313.

an alternative state. For example, on a global scale, small, steady increases in global warming may lead to a sudden reorganization of Earth's ocean circulation patterns. On a local scale, the increase in grazing animals by ranchers or herders may be responsible for shifts in steppe to tundra ecosystems.[45]

Another illustration of shift is the case of the Caribbean coral reefs. Coral reefs are spectacular marine ecosystems known for their diversity of fish and corals. In the Caribbean, overfishing and increased nutrient loading from land water run-off is considered to be responsible for declines in herbivorous fish populations, which allowed the sea urchin to dominate the coral reefs. In 1981, a hurricane severely damaged the coral reefs. The sea urchin continued to graze on the algae, which allowed the coral to recolonize the reefs. In subsequent years the urchin was hit hard by a pathogen and, as a consequence, was no longer in a position to control the algae. Fleshy brown algae came to dominate the reefs. The adult algae that now cover the reefs are largely unpalatable to the remaining herbivores, which serves to keep the reefs in this state of algal dominance.[46]

When exactly the system reaches a tipping point is unpredictable as they behave in a non-linear manner; relationships between the systems' components do not exhibit mathematical proportionality.[47] Developments in self-organizing systems can proceed in spurts during which changes in the system suddenly accelerate very rapidly or even occur catastrophically, independent of environmental changes. The onset of such spurts may not be predictable and this is surprising. Also enduring environmental changes can drive ecosystems past catastrophic thresholds, e.g. an algae bloom in response to nutrient loading beyond a threshold could be a surprise.[48]

Importantly, the response of an ecosystem to environmental change is a function of both the immediate environmental change and changes to which the ecosystem has been subjected in the past. Historical environmental change can have both positive and negative implications for the ability of the system to cope with current changes.[49] Similarly, current environmental change has implications for the future ability of an ecosystem to respond to other, later occurring environmental changes.[50]

45 UNEP and MEA (2005), 68.
46 Resilience Alliance (2015).
47 Duit and Galaz (2008), 313. To illustrate, when a system is linear, a change in one component produces a proportional change in others. A simple example is a mercury thermometer in which change in the height of the liquid in the tube is proportional to the change in temperature. However, if an attempt is made to measure a temperature that is less than −39°C, the predictable regular behaviour of the device breaks down, since the now frozen mercury will no longer respond to all the further cooling: a drastic form of non-linearity. OECD Global Science Forum (2009), (n. 7).
48 Kay (1991), 489.
49 Ibid.
50 Ibid.

In addition to these inter-temporal linkages, ecosystem responses may cascade further across scale and system. Insights from the last decades of empirical and theoretical research on complex adaptive systems clearly show that change in ecosystems is characterized by both positive and negative feedback loops operating over a range of spatial and temporal scales. Indeed, consequences of tipping points or surprises may cascade across scale, from local to regional to global; across time through delayed impacts; and/or through systems, from the technical to the economic or the political system.[51] As an illustration, extreme weather events in South Asia such as floods or droughts tend to spread across interconnected systems – that is, from the biophysical to the social and economic system.[52]

Thus, it is to be noted that by their nature, ecosystems exhibit surprising behaviour; behaviour that cannot be a priori predicted and may be catastrophic. No matter how much knowledge we have, we will always be subject to surprise when we observe ecosystems.[53]

3.1.4 In sum

The various components of ecosystems are interconnected; a change in one component will affect other components at other points or at other times. This means that to understand a problem, one needs to understand how the parts of the whole system interact internally and externally. Since the interactions are not only non-linear, but also rich in the sense that each component interacts with many others, it becomes practically impossible to predict the behaviour of the system. Importantly, the behaviour of the system cannot be deduced from an examination of its components alone.[54]

Ecosystems are dynamic, complex and self-organizing. The interconnected, dynamic and complex character of ecosystems makes it difficult to predict the consequences of particular actions and impossible ever to eliminate uncertainty.[55] Nevertheless, systems that are diverse contain a degree of resilience that advances the self-organizing capacities of the system. However, there is, in principle, an upper limit to this organizational response. Beyond a critical distance from equilibrium, the organizing capacity of the system's behaviour leaves the domain of self-organization and becomes chaotic.[56]

How to get a better analytical grip on the limits and possibilities of governance in a world where change is nonlinear, uncertain and imbedded in a diversity of multilevel systems ranging from the natural to the social world

51 Duit and Galaz (2008), 311–312.
52 Ibid., 315.
53 Kay (1991), 489.
54 Cilliers (1998), 2–5.
55 Valiante (2007), 3–5.
56 Kay et al. (1999), 723.

remains a matter of great concern for the future of governance theory.[57] Obviously, ecosystems clearly distinguish themselves from the more common subject matter of environmental law, such as particular species and habitats. Sectoral approaches that focus on the components of the ecosystem rather than on the ecosystem as a whole ignore the fact that ecosystems are complex adaptive systems and will probably impede the conservation of the ecosystem.

On the other hand, however, a holistic approach focusing on the macroscopic level and the complexity of ecosystems might be practically difficult. As a matter of fact, uncertainty and unpredictability of ecosystem performance complicates long-term ecosystem governance significantly. Without a stronger base of scientific knowledge, decision makers will not be able to judge possible losses of ecosystems' functions and processes on the long term.

Understanding the complex and adaptive nature of ecosystems has important implications for the way law and governance is used to protect the environment. As Woolley reasons,

> This understanding of ecosystems as being complex, dynamic and vulnerable to external events, coupled with recognition that prediction cannot be relied on to inform decision-making on the likely effects of proposed actions, points to the needs for a cautious approach to governing human activities.[58]

How exactly environmental law and governance should be designed in order to account for the complex and adaptive nature of ecosystems is subject to discussion.[59] Whilst my contribution to this discussion is displayed in Chapter 8, it suffices here to say that the concept of ecosystem integrity and ecosystem services is important for any legal and governance approaches to complex adaptive ecosystems. As one of the key objectives of the ecosystem approach is the maintenance of ecosystem integrity, finding an appropriate governance and regulatory approach to the management of ecosystems which ensures the maintenance of ecosystem integrity is therefore imperative. As the next section will show, the concept of ecosystem integrity is strongly interlinked with an ecosystem's self-organizing capacity and its ability to provide ecosystem services from which humans benefit.

3.2 The objective of ecosystem integrity and its primacy

The concept of ecosystem integrity that appears in many definitions of the ecosystem approach, as one of the objectives of the ecosystem approach, requires some further explanation here. This final section aims to clarify the

57 Duit and Galaz (2008), 329.
58 Woolley (2014), 17.
59 See for instance, Pidot (2015), Adler (2015), or Green et al. (2015).

concept of ecosystem integrity more thoroughly and aims to explain why the maintenance of ecosystem integrity is to be prioritized over the sustainable use of ecosystem services.

As with many other concepts that are used throughout this book, the concept of ecosystem integrity can be defined and interpreted in different ways.[60] According to De Leo and Levin, 'ecosystem integrity is so complex an issue that a single indicator or operational definition is insufficient to grasp its multifaceted aspects'.[61] According to Webster's dictionary, however, 'integrity' is 'the state of being unimpaired, sound', 'the quality or conditions of being whole of complete'. Therefore, a system subject to external disturbance will retain its integrity if it preserves all its components as well as the functional relationships among the components. Hence, integrity is a definition that reflects the capability of the system to support services of value to humans.[62]

Trouwborst also notes that ecosystem integrity encompasses the structure and functions of the ecosystem. Maintaining ecosystem integrity includes maintaining diversity at the generic, population, species and ecosystem levels, as well as the maintenance of the ecological patterns and processes that support both biodiversity and resource productivity.[63]

Kay explains that the concept of 'ecosystem integrity' should be seen as an umbrella concept that integrates the many different characteristics of an ecosystem (for example, resilience, elasticity, vulnerability, catastrophe, etc.), which, when taken together, describe an ecosystem's ability to maintain its organization:

> Integrity of a system refers to our sense of it as a whole. If a system is able to maintain its organization in the face of changing environmental conditions, then it is said to have integrity. If a system is unable to maintain its organization, then it has lost its integrity.[64]

Here change in 'organization' refers to changes in the functions of a system and its internal connections (structure) so as to better carry out some organizational imperative. 'Environment' refers to the biotic and abiotic components external to an ecosystem which impact upon it, including humans.[65]

Thus, integrity has to do with a system's ability to maintain its organization and to continue its process of self-organization. Integrity may thus be a feature of an ecosystem's self-organization. Müller et al. reason that the interrelationships between these two concepts are clear since ecosystem integrity represents the degree of self-organization a system has gone

60 Manuel-Navarrete et al. (2008), 335.
61 De Leo and Levin (1997), 2.
62 Ibid., 3.
63 Trouwborst (2009), 28; Grumbine (1994), 27; Nagle and Ruhl (2002), 326.
64 Kay (1991), 483.
65 Ibid.

through.[66] The notion of integrity must also accept the dynamic view incorporating processes. It must recognize a human perspective, the ability of an ecosystem to continue to provide the services that humans expect.[67]

Rapport et al. also emphasize the link with the self-organizing capacity of the system. They state that ecological integrity gives primacy to conservation – not of species, however, but of ecosystem organization. Thus, the goal might be to manage these systems so as to safeguard the functional complexity of these systems. Achieving this goal requires not the precise configuration of the system that would have been in place in the absence of human activity, but the protection of an 'equivalent' degree of complexity and ecosystem function.[68] In this manner its capacity of self-organization would be maintained.[69]

More specifically, integrity has to do with the ability of the system to attain and maintain its optimum operating point. Kay stresses that there is an important implicit aspect of the definition of integrity of which the reader must be aware. Ecosystems are not static. Their organization is often changing, both in the short term and in an evolutionary sense. Furthermore, any loss of organization is often gradual. Thus it is not possible to identify a single organizational state of the system that corresponds to integrity. Instead there would be a range of organizational states for which the ecosystem is considered to have integrity.[70]

Suppose an ecosystem has reached its optimum operating point and some change occurs in its environment. What immediate effect will this have on the ecosystem's organization and hence its integrity? If the system is moved away from its optimum operating point, the question is whether the system is able to return to its original optimum operating point. If the answer is yes, the system is able to reorganize itself to cope with the environmental change and its integrity is preserved. If the answer is no, the system does not return to its original optimum operating point. Then there are two possibilities: a new optimum operating point exists or it does not. In the latter case, the organization breaks down and the system loses its integrity. In this case, the system collapses. The environment changes in such a way as to be uninhabitable. An example is the process of desertification; another is severe prolonged drought in mangrove systems, which leads to the total collapse of the system.[71]

66 Müller et al. (2000), 18. Integrity may, however, also be considered a feature of emergence. Emergent properties are always consequences of self-organizing processes. Therefore, emergence is directly linked with the principle of ecosystem integrity and many emergent properties are suitable indicators for it.
67 De Leo and Levin (1997), 2.
68 Rapport et al. (1998), 47.
69 For an overview of other approaches to ecological integrity, see Miller (2000), 65–68.
70 Kay (1991), 484.
71 Ibid., 485–487.

In the former case, the system's organization has changed and the system may move to a new thermodynamic path or branch. In the case of a move to a new thermodynamic branch the system undergoes a catastrophic change that leaves the system so reorganized that it is clearly different from the original system. There is no possibility of the system returning to its original optimum operating point, even if the environmental conditions return to their original state. In one sense the integrity of the system has been seriously undermined, as the system will be quite different from the original. However, the fact remains that an ecosystem still exists, so in some sense, it has been able to maintain some degree of integrity.[72]

3.2.1 Ecosystem integrity and ecosystem services

The concept of ecosystem integrity might be multifaceted and unclear. Yet De Leo and Levin maintain that '[its] definition simply reflects the capability of ecosystems, however defined, to support services, including pure aesthetics, that humans value'. They underscore that ecosystem integrity is not an absolute, monolithic concept, but a multidimensional, scale-dependent abstraction; there is no unequivocal way to apply it in decision making. Measures of integrity must recognize the importance of maintaining processes that support those critical services. Integrity reflects the ability of ecosystems to sustain services to humans.[73]

Rapport et al. also emphasize that ecosystem services are a good indicator of any dysfunction in the ecosystem. They hold that '[in] many instances, these services are sharply curtailed when ecosystems come under stress. As a consequence, clean air, clean water, and renewable resources such a fish and timber can no longer be taken for granted'. In most cases, declines in ecosystem services are permanent, and efforts to restore such services have met with meagre results. It appears to be the exception rather than the rule when apparent damage to ecosystems proves temporary and the system 'bounces back' when the stress disappears. In most cases, however, transformations of ecosystems under stress result in irreversible damage, where even heroic efforts are unlikely to succeed in re-establishing ecosystem services. In general, once degradation has proceeded to moderate levels, efforts to rehabilitate ecosystems achieve at best only partial success and at very high costs.[74]

Given the fact that ecosystem integrity is related to the self-organizing capacity of the system and the system's capability to continue providing services to humans, this aim logically is to be prevailed over the sustainable use of the ecosystem services. Use of ecosystem services is only possible when these services first are provided by the system. For that reason sustainable use of ecosystem services will be constrained by the systems' ability

72 Ibid., 485–487.
73 De Leo and Levin (1997), 8.
74 Rapport et al. (1998), 19–20.

to continue the process of self-organization and maintaining its integrity. When making decisions, we ought to prevent the irreplaceable loss of ecosystem functions or processes in order to enable a long- term and dependable flow of benefits from the use of ecosystems. Maintaining ecosystem integrity may also require significant measures to recover ecosystem structure and function, where the flow of benefits is already reduced or impaired, or where the ecosystem's resilience is at risk.[75]

Though most definitions on the ecosystem approach require a balance between the two objectives of sustainable use and the maintenance of ecosystem integrity, this section has shown the importance of maintaining ecosystem integrity for the functioning of the ecosystem and its capability of providing ecosystem services. Even though the ecosystem approach requires a balancing, the importance of maintaining ecosystem integrity entails some limits to the extent the objective of ecosystem integrity could and should be balanced with the aim of the sustainable use of ecosystem services.

3.3 In sum

This chapter has assessed the nature of ecosystems as being complex adaptive systems and the concept of ecosystem integrity more thoroughly. Its content has been unravelled and its imperative has been emphasized. Even though the ecosystem approach requires a balance between the conservation of ecosystems and their sustainable use, there are limits to the extent people can use ecosystems without impairing its integrity. While the role of law for the implementation of the ecosystem approach will be further explored in Chapters 5–8, the next chapter first presents one methodology to carry out such difficult balancing assessments.

Indeed, it has been pointed out that ecosystem services might be a good indicator of ecosystem integrity. For that reason alone, the valuation of ecosystem services may provide insight into any changes in the services provided by ecosystems and corresponding changes in ecosystem integrity. A second reason for the valuation of ecosystem services may be to facilitate the weighing and balancing assessments that need to be carried out in the context of the ecosystem approach. The various uses of the ecosystem often need to be assessed and weighed against the aims of conservation. Explicit weighing and balancing assessments through the valuation of ecosystem services probably better ensures that the maintenance of ecosystem integrity is given proper weight in decision-making processes. This would allow ecological integrity to be incorporated in an economic framework. The valuation of ecosystem services will therefore be addressed in the next chapter.

75 See also Laffoley et al. (2004), 3.

3.4 References

Adler, J.H., 'Dynamic Environmentalism & Adaptive Management: Legal Obstacles and Opportunities' (2015) *Journal of Law, Economics and Policy* (forthcoming).

Brand, F., 'Critical Natural Capital Revisited: Ecological Resilience and Sustainable Development' (2009) 68(3) *Ecological Economics* 605.

Cilliers, P., *Complexity & Postmodernism: Understanding Complex Systems* (Routledge, 1998), 2–3.

Cilliers, P., 'Complexity, Ethics and Justice' (2004) 5(19) *Journal for Humanistics* 19.

Currie, D.E.J., 'Ecosystem-Based Management in Multilateral Environmental Agreements: Progress Towards Adopting the Ecosystem Approach in the International Management of Living Marine Resources' (World Wildlife Fund, 2007).

De Leo, G. and Levin, S., 'The Multifaceted Aspects of Ecosystem Integrity' (1997) 1(1) *Ecology and Society* 3.

Doremus, H. *et al.*, *Environmental Policy Law: Problems, Cases and Readings* (6th edn, Foundation Press, 2012).

Duit, A. and Galaz, V., 'Governance and Complexity: Emerging Issues for Governance Theory' (2008) 21(3) *Governance* 311.

Green, O.O. *et al.*, 'Barriers and Bridges to the Integration of Social-Ecological Resilience and Law' (2015) 13 *Frontiers in Ecology and the Environment* 332.

Grumbine, R.E., 'What is Ecosystem Management' (1994) 8(1) *Conservation Biology* 27.

Halley, J.D. and Winkler, D.A., 'Consistent Concepts of Self-organization and Self-assembly' (2008) 14(2) *Complexity* 10.

Hartvigsen, G., Kinzig, A. and Peterson, G., 'Use and Analysis of Complex Adaptive Systems in Ecosystem Science: Overview of Special Section' (1998) 1 *Ecosystems* 428.

Kay, J.J., 'A Nonequilibrium Thermodynamic Framework for Discussing Ecosystem Integrity' (1991) 15(4) *Environmental Management* 483.

Kay, J.J., 'An Introduction to Systems Thinking', in D. Waltner-Toews, J.J. Kay and N.E. Lister (eds) *The Ecosystem Approach: Complexity, Uncertainty and Managing for Sustainability* (Columbia University Press, 2008).

Kay, J.J. and Boyle, M., 'Self-Organizing, Holarchic, Open Systems (SOHOs)', in David Waltner-Toews, James J. Kay and Nina-Marie E. Lister (eds) *The Ecosystem Approach. Complexity, Uncertainty, and Managing for Sustainability* (Columbia University Press, 2008).

Kay, J.J. and Regier, H.A., 'Uncertainty, Complexity, and Ecological Integrity: Insights from an Ecosystem Approach', in P. Crabbé *et al.* (eds) *Implementing Ecological Integrity: Restoring Regional and Global Environmental and Human Health* (Kluwer International Law, 2000).

Kay, J.J. and Schneider, E., 'Embracing Complexity: The Challenge of the Ecosystem Approach', in Laura Westra and J. Lemons (eds) *Perspectives on Ecological Integrity* (Kluwer International Law, 1995).

Kay, J.J. *et al.*, 'An Ecosystem Approach for Sustainability: Addressing the Challenge of Complexity' (1999) 31(7) *Futures* 721.

Laffoley, D. *et al.*, *The Ecosystem Approach: Coherent Actions for Marine and Coastal Environments. A Report to the UK Government* (English Nature, 2004).

Levin, S., 'Ecosystems and the Biosphere as Complex Adaptive Systems' (1998) 1 *Ecosystems* 433.

Manuel-Navarrete, D., Dolderman, D. and Kay, J.J., 'An Ecosystem Approach for Sustaining Ecological Integrity – But Which Ecological Integrity?' in D. Waltner-Toews, J. Kay and N.-M. Lister (eds) *The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability* (Columbia University Press, 2008).

Miller, P., 'Approaches to Ecological Integrity: Divergence, Convergence and Implementation', in P. Crabbé *et al*. (eds) *Implementing Ecological Integrity: Restoring Regional and Global Environmental and Human Health* (Kluwer International Law, 2000).

Müller, F., Hoffmann-Kroll, R. and Wiggering, H., 'Indicating Ecosystem Integrity – Theoretical Concepts and Environmental Requirements' (2000) 130 *Ecological Modelling* 13.

Nagle, J.C. and Ruhl, J.B., *The Law of Biodiversity and Ecosystem Management* (Foundation Press, 2002).

OECD Global Science Forum, *Applications of Complexity Science for Public Policy: New Tools for Finding Unanticipated Consequences and Unrealized Opportunities* (OECD, 2009).

Pardy, B., 'The Hand is Invisible, Nature Knows Best, and Justice is Blind: Markets, Ecosystems, Legal Instrumentalism, and the Natural Law of Systems' (2009) 44 *Tulsa Law Review* 67.

Pidot, J.R., 'Governance and Uncertainty' (2015) 37 *Cardozo Law Review* 113.

Rammel, C., Stagl, S. and Wilfing, H., 'Managing Complex Adaptive Systems – A Co-evolutionary Perspective on Natural Resource Management' (2007) 63 *Ecological Economics* 9.

Rapport, D. *et al*., *Ecosystem Health* (Blackwell Science, 1998).

Resilience Alliance, 'Research on Resilience in Social-ecological Systems – A Basis for Sustainability', www.resalliance.org/index.php/resilience (accessed 20 September 2015).

Rosenfield, J.S., 'Functional Redundancy in Ecology and Conservation' (2002) 98(1) *Oikos* 156.

Ruhl, J.B., 'Thinking of Environmental Law as a Complex Adaptive System – How to Clean Up the Environment by Making a Mess of Environmental Law' (1997) 34(4) *Houston Law Review* 933.

Trouwborst, A., 'The Precautionary Principle and the Ecosystem Approach in International Law: Differences, Similarities and Linkages' (2009) 18(1) *Review of European Community & International Environmental Law* 26.

United Nations Environment Programme (UNEP) and Millennium Ecosystem Assessment (MEA), *Ecosystems and Human Well-Being: Our Human Planet, Summary for Policy Makers* (Island Press, 2005).

Valiante, M., 'The Law of the Ecosystem: Evolution of Governance in the Great Lakes – St Lawrence River Basin' (2007) 12(2) *Lex Electronica* 3.

Walker, B. and Salt, D., *Resilience Thinking. Sustaining Ecosystems and People in a Changing World* (Island Press, 2006), 35.

Woolley, O., *Ecological Governance: Reappraising Law's Role in Protecting Ecosystem Functionality* (Cambridge University Press, 2014).

4 Ecosystem services valuation
Usage and challenges

The conservation of ecosystem structure and functioning, and the maintenance of ecosystem integrity, have been regarded as important objectives of the ecosystem approach. At the same time, however, humans may use an ecosystem for the fulfilment of various purposes: food production, aquaculture, transport, hunting, mining, energy production, recreation, building and so forth. How exactly to reconcile the two objectives of sustainable use and the conservation of a healthy level of production and provision of ecosystem services for the future is one of the major challenges of the ecosystem approach. Whether the maintenance of ecosystem integrity could be ensured depends on whether the various interests are balanced in an appropriate manner.

This chapter first explains the main rationale behind the valuation of ecosystem services. This chapter also presents the various values of ecosystem services, and the main economic valuation methods that are being used to monetize these values. The different valuation techniques can be combined to provide a relatively complete picture of an ecosystem's total value.[1] Finally, three difficulties and controversies related to the valuation of ecosystem services will be discussed: scientific uncertainty, discounting and ethical objections.

4.1 The rationale for valuation in light of the ecosystem approach

As a tool, ecosystem services valuation could considerably facilitate the application of the ecosystem approach. It may facilitate decisions on the sustainable use or conservation of particular ecosystem services and facilitates a transparent balancing or integration of these objectives in decision-making procedures. These valuation exercises may have an additional benefit as well: they may contribute to a more *consistent* integration of ecosystem services values in decision-making procedures across different sectors. Particularly in the case of larger ecosystems, decisions taken in different sectors under different regulatory frameworks often have an impact on the same ecosystem. A

1 TEEB (2011), 142.

consistent valuation of the services provided by that particular ecosystem may ensure a more consistent governance approach to the ecosystem when all sectors value the ecosystem in a similar manner and when this value is integrated into decision-making procedures consistently.

With regard to the balancing and integration of divergent interests, the valuation of ecosystem services thus allows for rationalizing decisions on ecosystems. The mechanism used to carry out the weighing and balancing assessment is cost-benefit analysis (CBA). Particularly in the context of CBA, economic valuation offers a way to compare the diverse benefits and costs associated with ecosystems by attempting to measure them and expressing them in a common denominator.[2] This provides a means of comparing alternative choices and thus of rationalizing particular management and policy choices.[3] In the context of the ecosystem approach, the values of ecosystem services are thus monetized and compared with other monetary values. This may facilitate the integration of the value of ecosystem services into decision-making processes, and rationalize trade-offs between divergent values.[4]

One approach to tackle this challenge is to express the various values that may be ascribed to or derived from ecosystems by a common denominator. In this manner, the costs and benefits of economic activities, such as food production, aquaculture, transport, hunting, mining, energy production, recreation, building and so forth, could be more easily weighed and balanced against the economic values of the ecosystem services provided by the ecosystem. Ecosystem services valuation thus provides a practical tool to enable the appropriate balancing of the conservation of the structure and functioning of ecosystems while also meeting the need for sustainable use of ecosystem services for human purposes. The valuation of ecosystem services is therefore an important tool under the ecosystem approach. Moreover, there is currently an apparently increasing interest in this approach as illustrated, for instance, by the international project on *The Economics of Ecosystems and Biodiversity* (TEEB)[5] and numerous projects carried out nationally as a corollary of this international project.

Even though it might be difficult and perhaps controversial to value ecosystem services in monetary units, the method may facilitate decision-making processes and increase transparency with regard to both the process and the outcome. As the World Bank Report on assessing the economic value of conservation stated regarding assigning monetary value:

> This is in fact purely a matter of convenience, in that it uses units that are widely recognized, saves the effort of having to convert values

2 The World Bank (2004), 9.
3 Chavas (2000), 12. See also National Research Council (2005), 97.
4 Nunes et al. (2014), 1. Also Brander and Van Beukering (2015), 132.
5 TEEB (2010).

> already expressed in monetary terms into some other unit of account, and facilitates comparison with other activities that also contribute to well-being, like spending on education or health. In particular, it expresses the impacts of changes in the services that ecosystems provide in terms of units that are readily understood by decision-makers and the general public. When all impacts of ecosystem change are expressed in these terms, they can easily be introduced into frameworks such as cost-benefit analysis in order to assess and compare alternative courses of action.[6]

The following section presents the various economic values that ecosystem services may contain, followed by a discussion of the most relevant valuation methods to monetize these values, and a discussion of their limitations.

4.2 The economic values of ecosystem services

The valuation of ecosystem services is founded on the total economic value (TEV) approach.[7] TEV is defined as the sum of the values of all service flows that natural capital generates both now and in the future – appropriately discounted.[8] The total value of an environmental asset is composed of use value and non-use value. *Use value* refers to the value of ecosystem services that are used by humans for consumption or production purposes. Use values include direct and indirect values, and option value. *Non-use value* includes bequest value and existence value. The services can be used directly or indirectly, now or in the future.

Direct use values refer to ecosystem services that are used directly by human beings. They include the value of consumptive uses such as harvesting of food products, timber for fuel or construction, medicinal products, and hunting of animals for consumption; and the value of non-consumptive uses such as the enjoyment of recreational and cultural activities that do not require harvesting of products such as wildlife and birdwatching, water sports, and spiritual and social utilities.[9]

Ecosystem services can also have *indirect values*. Indirect use values are derived from ecosystem services that provide benefits outside the ecosystem itself. Examples include natural water filtration which often benefits people far downstream, the storm protection function of mangrove forests which benefits costal properties and infrastructure, and carbon sequestration which benefits the entire global community by abating climate change.[10]

6 The World Bank (2004), 10.
7 The World Bank (2004), 9.
8 TEEB (2010), 188.
9 The World Bank (2004), 9–10. Also TEEB (2010), 195–196.
10 Ibid.

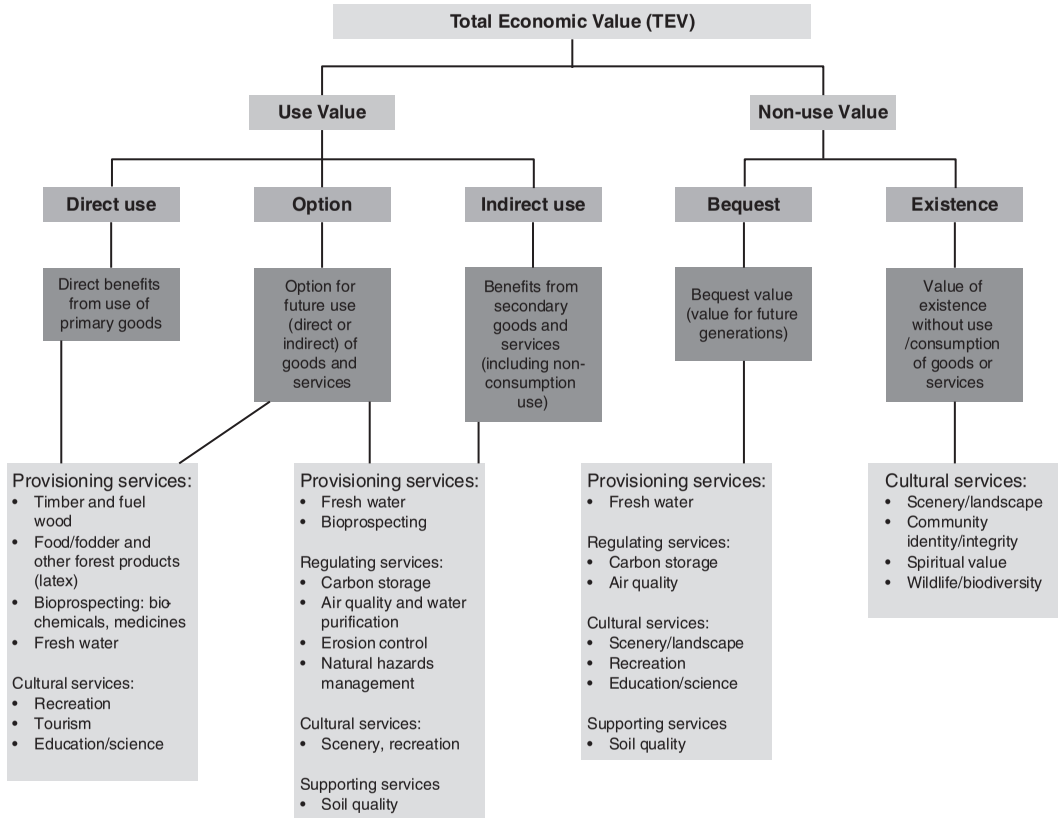

Figure 4.1 The total economic value approach

Ecosystem services can have different values simultaneously. As an illustration, ecosystems generate direct use values by supporting the various types of birds that we enjoy either non-consumptively as birdwatchers or consumptively as bird hunters. They generate indirect use values by supporting the life of various plants or insects which in turn enable birds to thrive. A different example: people consume fish and therefore fish have a direct use value; the plankton that provide nutrients for the fish consumed by people have an indirect use value. A final example: the Norwegian fjords provide direct use values to the people who visit the area. Other people might enjoy watching a television documentary about the area and its wildlife, thus receiving indirect use values.

The services provided by ecosystems could be used currently or in the future. Even though people may not currently be deriving any utility from them, many ecosystem services still hold value for preserving the option to use such services in the future either by the individual (option value) or by others or heirs (bequest value). *Option value* refers to a sort of insurance premium individuals may be willing to pay to retain the option of possible future use. For example, people will be willing to pay some amount of money for the preservation of wilderness or the protection of a unique site – such as the Grand Canyon – not because they are currently using it, but because they want to reserve an option that would guarantee their future access to such a resource.[11]

Option value can be understood as a way of framing TEV under conditions of uncertainty as an insurance premium or as the value of waiting for the resolution of uncertainty. In the latter case, it is generally known as *quasi-option value*. An example to illustrate uncertainties surrounding the potential future uses and related option value of ecosystems is given by bioprospecting activities to discover potential medicinal uses of plants. Crucial issues in this example involve the question of whether or not any particular organism will prove to have a commercial use in the future, and what commercial uses will need to be developed over time.[12]

Bequest value refers to the satisfaction that people gain from the knowledge that a natural resource endowment is being preserved for future generations. Strictly speaking, bequest value is an intergenerational component of the option value. Bequest value would have considerable relevance in a situation where the natural resources under consideration are unique and damage will be irreversible, and there exists uncertainty regarding future generations' demand for, and/or the supply of, these resources. Examples are national parks, wilderness, tropical forests, aquifers, blue whales, coastal wetlands, coral reefs and so on. Basically, bequest demand exists to the extent that the present generation is willing to pay for preserving natural resources for the use of future generations.[13]

11 Hussen (2004), 157.
12 TEEB (2010), 196.
13 Hussen (2004), 157.

In addition to use values, ecosystem services also provide non-use values. These do not involve any actual direct or indirect use of the goods or services provided, but are attached to the satisfaction one enjoys from the pure knowledge that the natural resource exists.[14] People may benefit from the knowledge that an ecosystem simply exists unfettered by human activity.[15] This is referred to as *existence value*.

A good example might be the polar bear. As described by Heinzerling:

> The public cares a great deal about the fate of the polar bear [...] Yet the overwhelming majority of us will never use a polar bear or even see one outside captivity. We will not eat its meat, wear its fur, or even travel to see it. Nor, in all likelihood, will we make any use of the Arctic marine resources – the ringed seal on which the polar bear feeds, the small fish and krill on which the seals feed, and so on down the ecological chain – which depend on the polar bear for their own flourishing and even survival. Our economic relationship with the polar bear, conventionally speaking, is nil.[16]

People ascribe value to the polar bear for simply knowing that the bear exists and remains to exist for future generations. Another example is whaling. There are many people who have never seen a whale or plan to see one, but are nevertheless willing to pay significant sums of money to ensure that whales are not hunted to extinction.[17]

The economic valuation of impacts of the *Exxon Valdez* oil spill on the aquatic and related ecosystems of Prince William Sound, Alaska, also illustrates the importance of non-use values in natural damage assessments and project appraisals. The *Exxon Valdez* study revealed that many Americans who have never visited Alaska and never intend to do so nevertheless place high values on maintaining its pristine and unique but fragile coastal and aquatic ecosystems.[18]

4.3 Economic valuation methods

4.3.1 Methods for the valuation of provisioning services

Direct use values are probably most straightforward as the products obtained from ecosystems are often traded on markets. In this situation, the market price indicates the value people place on the particular asset. For

14 Note that some analysts place option value as a subset of non-use value rather than of use value, but they do not otherwise treat it differently. Asafu-Adjaye (2005), 111.
15 National Research Council (2005), 47. See also Hussen (2004), 157.
16 Heinzerling (2008), 54.
17 Asafu-Adjaye (2005), 111.
18 National Research Council (2005), 47.

instance, a particular habitat might be used intensively by species that are traded on markets. Part of the value of marine ecosystems is conveyed by the value of commercial fish that they help sustain.[19] The commercial market price of these species then provides an estimate of the value of the habitat. This method is particularly used for provisional and supporting services.[20] Although the market price method is a relatively simple method to use, it contains some limitations. Most importantly, it is argued that the true economic value of goods and services may not be fully reflected in market transactions. The market price only tells us the *minimum* amount that people who buy the good are willing to pay for it. Many people are actually willing to pay more than the market price for goods, and thus their values exceed the market price.[21] Second, the market price method can only be used to value environmental goods and services that have established markets.[22] So, valuations based on market prices are likely to be incomplete.[23] Other valuation methods need to be used to supplement this method.

4.3.2 Methods for the valuation of regulating services

Measuring indirect use values is often considerably more difficult than measuring direct use values. For one thing, the 'quantities' of the service being provided – such as the amount of carbon stored in biomass or in the soil – are often hard to measure. Yet regulating services, such as pest control, flood control, soil fertilizer and water filtration, often provide production inputs, which are inputs to the sustained production of agricultural products.[24] Nevertheless, while their contribution of ecosystem services to the production of marketed goods and services may be significant, it is often difficult to distinguish it from that of other, marketed inputs to production.

One method that could be used here is the production function method. This method is used to estimate the economic value of ecosystem goods or services that contribute to the production of commercially marketed goods. The method may be particularly useful for estimating the value of productivity services, such as the value of a wetland in terms of their contribution to the production of crabs, scallops, clams, birds and waterfowl. Wetlands provide

19 Ibid., 33.
20 TEEB (2010), 197–198.
21 Dennis M. King and Marisa J. Mazzotta, 'Ecosystem Valuation', www.ecosystemvaluation.org/1-02.htm (accessed 20 September 2015). More specifically, the standard economic assumption is that consumers will continue to purchase a good or service until the marginal value of it (or willingness to pay) is equal to the marginal sacrifice (or price). Under these circumstances, the market price is only an expression of the marginal willingness to pay, or the marginal value. The value of the total sales might, however, be less that the total value to consumers. See Goulder and Kennedy (1997), 33.
22 Asafu-Adjaye (2005), 12.
23 National Research Council (2005), 97.
24 Goulder and Kennedy (1997), 29.

both food chain and habitat support for these species.[25] The approach thus estimates how much a given ecosystem service contributes to the delivery of another service or commodity which is traded on an existing market.[26] This method has its demands in terms of ecological and economic data, and there must be sufficient scientific knowledge of how environmental goods and services support or protect economic activities. It has proven difficult to provide a direct measure of the environmental quality change.[27] Nevertheless, for the approach to be applied effectively, it is important that the underlying ecological and economic relationships are well understood.[28]

Regulating services could also be valued by estimating what people are willing to pay to avoid the adverse effects that would occur if these services were lost, or to replace the lost service. Three methods that are often used in case no market exists, are the 'damage costs avoided method', 'replacement cost method' and 'substitute costs method'. These methods are not based on people's willingness to pay for a good or service, but assume that the costs of avoiding damages or replacing ecosystem services provide useful estimates of the value of these services. This assumption is based on the idea that if people incur costs to avoid damages caused by lost ecosystem services, or to replace the services of ecosystems, then those services must be worth at least what people paid to replace them. These methods are most appropriately applied in cases where damage avoidance or replacement expenditures actually have been, or will be, made.[29]

For example, flood control services offered by ecosystems eliminate farmers' need to undertake alternative flood-control expenditure. The avoided costs of flood control may indicate the value of the services provided by ecosystems. The same logic applies to soil fertilization and water filtration services.[30] Another example is that where ecosystems provide effective pest control, farmers can avoid undertaking expenditure on alternative pest-control methods such as the use of synthetic pesticides.[31]

4.3.3 Methods for the valuation of cultural services

Many ecosystem services often do not enter markets at all, so that their 'price' is also difficult to establish. The aesthetic benefits provided by a landscape, for example, are non-rival in consumption, meaning that they can be enjoyed by many people without necessarily detracting from the enjoyment of others. Their value is not reflected in people's behaviour and is thus almost wholly unobservable. There have been developed valuation methods

25 King and Mazzotta, 'Ecosystem Valuation'.
26 TEEB (2010), 198.
27 Ibid., 124.
28 National Research Council (2005), 113.
29 King and Mazzotta, 'Ecosystem Valuation'.
30 Nunes et al. (2014), 27.
31 Naylor and Ehrlich (1997), 151–177.

to capture the values of these services too. One example may be the hedonic price method, which is a method used to estimate values of non-marketed goods or services by looking particularly at the change in the market price of property due to a change in one of the characteristics of this piece of property. So, the hedonic price method focuses on non-marketed characteristics that differentiate market goods.[32] Characteristics such as environmental quality (including air pollution, water pollution or noise), or environmental amenities (such as aesthetic views or proximity to recreational sites), tend to affect the price of the property. These characteristics can increase land and house values if they are viewed as attractive or desirable, or they can reduce values if they are viewed as a nuisance or danger, and therefore undesirable.[33]

Recreation is also relatively easy to value as the number of visits is directly observable. Assessing the benefit received by visitors is more difficult, but a large literature has developed to tackle this problem, mainly using surveys of tourists' actual travel costs or of their stated willingness to pay to visit particular sites. An economic valuation method often used to value cultural services is the 'travel costs method' (TCM). This method can be used to monetize the value of an ecosystem or a site that is used for recreation, and has been applied to ascertain some values provided by parks, rivers and lakes, or equivalently, the costs that result from the loss of these elements of nature.[34] When applied to recreational sites, 'the travel cost method uses the cost of a visit to each site as a proxy for the (non-observed) price of its services'.[35] In other words, it assumes that the value of the site or its recreational services is reflected in how much people are willing to pay to get there. The overall travel costs consist of the entry fee, the transportation cost and time cost expended to visit a particular site.[36]

An important limitation of the method is that the value of the site might be overestimated or underestimated. For instance, when a trip serves multiple purposes, the value of the site may be overestimated, because the method assumes that individuals take a trip for a single purpose. It can be difficult to apportion the travel costs among the different purposes. The value can also be underestimated – for instance, in the situation where those who value certain sites may choose to live nearby. If this is the case, they will have low travel costs, but high values for the site that are not captured by the method.[37]

4.3.4 Methods for the valuation of supporting services

Many ecosystem services are not traded directly in markets, and are not closely related to any marketed goods. Thus people cannot 'reveal' what they are willing to pay for them through their market purchases or actions.

32 Chavas (2000), 12.
33 Hussen (2004), 150.
34 Goulder and Kennedy (1997), 33. See also TEEB (2010), 199.
35 Chavas (2000), 12.
36 Asafu-Adjaye (2005), 121–123.
37 Asafu-Adjaye (2005), 124–125.

In these cases, surveys can be used to ask people directly what they are willing to pay based on a hypothetical scenario. These survey methods, consisting of 'contingent valuation methods', 'conjoint analysis' and 'choice experiments', are the most widely accepted methods for estimating non-use values, existence values, option values and bequest values.[38]

The methods could, for instance, be used to measure the value of the basic life support functions associated with ecosystem health or biodiversity, the enjoyment of a scenic vista or a wilderness experience, the appreciation of the option to fish or birdwatch in the future, or the right to bequest those options to your grandchildren. It also includes the value people place on simply knowing that giant pandas or whales exist.[39] So, a major advantage of the methods is their potential as a general procedure for assessing the total economic value (use values plus non-use values) of any type of environmental asset. However, it remains the case that even the most sophisticated design of contingent valuation instruments cannot fully capture the total value of environmental assets, for several reasons.[40] The conceptual, empirical and practical problems associated with developing monetary estimates of economic value on the basis of how people respond to hypothetical questions about hypothetical market situations are debated constantly in the economics literature. Contingent valuation researchers are attempting to address these problems, but they are far from finished. Meanwhile, many economists, as well as many psychologists and sociologists, for many different reasons, do not believe that the monetary estimates that result from contingent valuation are valid. More importantly, many jurists and policy makers will not accept the results of contingent valuation where they are controversial.[41] Yet it is also argued that, in spite of its shortcomings, contingent valuation remains a feasible way to measure people's value of the environment and is likely better than no measurement at all.[42] Moreover, there is also substantial evidence that answers to carefully designed surveys contain valuable information.[43]

4.3.5 Other methods

A valuation method that is used more and more frequently is the 'benefit transfer method'. Benefit transfer uses economic information captured at one place and time to make inferences about the economic value of ecosystems at another place and time.[44] This method thus involves transferring

38 See Heal (2000b), 28, and Asafu-Adjaye (2005), 113. See also Goulder and Kennedy (1997), 34–35, and more generally Fisher and Hanemann (1986), 169.
39 King and Mazzotta, 'Ecosystem Valuation'.
40 Hussen (2004), 160.
41 King and Mazzotta, 'Ecosystem Valuation'.
42 Chavas (2000), 12. For more on this matter, see the article written by Diamond and Hausman (1994), 45.
43 Azevedo et al. (2003), 526.
44 Wilson and Hoehn (2006), 335.

values and information from studies that have already been completed in another location and/or context to the current valuation study.

Benefit transfer is often used when it is too expensive and/or there is too little time available to conduct an original valuation study, yet some measure of benefits is needed.[45]

The benefit transfer method consists of several steps. The first step is to identify existing studies or values that can be used for the transfer. The goods or services in both sites should have roughly similar characteristics. The method is most reliable when the original site and the study site are very similar in terms of factors such as quality, location and population characteristics. The second step is to decide whether the existing values are transferable. The next step is to evaluate the quality of studies to be transferred. The better the quality of the initial study, the more accurate and useful the transferred value will be.[46] Preferably, the values in the first study should not have been estimated a long time ago because preferences change over time. The final step is to adjust the existing values to better reflect the values for the site under consideration, using whatever information is available and relevant.

While the method clearly has advantages, the technique is controversial.[47] A critical feature of the method is that it uses value estimates in ways that were often not intended by the original researchers.[48] Other critique includes that the benefit transfer may not be accurate, or that it may be difficult to track down appropriate studies, since many are not published, and that the adequacy of existing studies may be difficult to assess.[49]

4.4 The difficulties and controversies surrounding economic valuation

This section describes some general controversial issues on the economic valuation of ecosystem values. This concerns in particular the practice of

45 Demands for environmental valuation estimates are rising in the policy community in both Europe and the USA. In Europe, this is partly being driven by the introduction of the Water Framework Directive, which requires benefit-cost analysis of water quality improvements throughout the EU, and by greater emphasis on the application of cost-benefit principles in environmental policy design in the EU. Hanley and Barbier (2009), 70.

46 The dependency of benefit transfer relies on the quality of the original valuation studies. Accuracy of benefit transfer is conditioned, in part, by the measurement errors contained in original studies. Wilson and Hoehn (2006), 336.

47 For an overview of challenges in benefit transfer for ecosystem services, see also TEEB (2010), 231–237.

48 Wilson and Hoehn (2006), 336.

49 Iovanna and Griffiths (2006), 476; See also Allen and Loomis (2008), 1, for a method to determine the economic returns to using original valuation research rather than benefit transfer. They argue that for almost all projects and policies with benefits in terms of increased environmental quality affecting recreational opportunities, original benefits estimation research would likely yield real economic benefits in terms of more accurate information for decision makers.

discounting, the problems of scientific uncertainty, and the anthropocentric nature of economic valuation.

4.4.1 Scientific uncertainty

A first important issue that needs to be discussed is uncertainty.[50] Scientific knowledge on ecosystems and the services they provide is never complete. It is possible, for instance, that at one point in the future we discover that the benefits of ecosystem services are larger as more scientific information becomes available over time. If it is discovered that the value of coastal and marine ecosystem services is actually much larger, then the future benefits of ecosystem services exceeds the costs of coastal zone development. Unfortunately, when making development decisions today we often do not know if the future value of ecosystem services will turn out to exceed future development benefits. There is thus value in keeping future options open.[51]

The possibility of reducing uncertainty in the future through learning can affect current decisions, particularly when the impacts of these decisions are irreversible.[52] In the case of uncertainty, we thus need to incorporate 'option values'. Today's biodiversity would have an option value insofar as the variety of existing plants may already contain a cure against the as yet unknown disease, or a biological control of the as yet unknown pest.[53] Calculating option value, however, is not straightforward. Even though such values may be significant especially with regard to irreversible changes to natural capital, it is not easy to reveal risk preferences of individuals with regard to ecosystem services in the future. It is important to know the extent to which ecosystem services may be demanded in the future and which ones may become unavailable. It is this information about future preferences and future availability that is most highly needed to calculate option values.[54] Currently, calculating option values is perhaps one of the most problematic issues surrounding valuation of ecosystem services.

Besides the uncertainty concerning the future preferences for and availability of particular ecosystem services, there is a more profound type of uncertainty. This is usually referred to as 'radical uncertainty' or 'ignorance',

50 Three sources of uncertainty or ignorance may be distinguished. First, we may face uncertainty and/or ignorance in terms of the nature of the ecosystem services to be valued. Second, we may be uncertain and/or ignorant about the way people form their preferences about ecosystem services, that is, the way they subjectively value changes in the delivery of ecosystem services and biodiversity. Lastly, another layer of uncertainty exists regarding the application of valuation tools. For a thorough discussion of these types of uncertainty, see TEEB (2010), 212–217.

51 Chavas (2000), 13.

52 National Research Council (2005), 219.

53 TEEB (2010), 224.

54 Ibid., 225.

and should be acknowledged when science cannot explain some complex functioning of ecosystems and biodiversity.[55] As Chavas stated,

> Ecosystems change over time in complex ways. First, ecosystems involve many ecological variables that interact with each other. Second, ecosystem dynamics can be highly nonlinear, meaning that knowing the path of a system in some particular situation may not tell us much about its behavior under alternative scenarios. As a result, learning about an ecosystem is difficult, especially if one is interested in its long-term trajectory. Third, ecosystems are subject to unpredictable effects of variables that are not anticipated by decision-makers. These unpredictable effects generate uncertainty due to lack of knowledge and/or lack of information. The best available scientific information typically is incomplete and uncertain for most decision-makers.[56]

Under circumstances of radical uncertainty, standard valuation methods are less useful particularly when the ecosystem is close to an ecological threshold or regime shift. In such a situation the distance to an ecological threshold affects the economic value of ecosystem services given the state of the ecosystem. Valuation exercises cannot be carried out reliably without accounting for this distance. The reason is that when the system is sufficiently close to a threshold, radical uncertainty or ignorance about the potential and often non-linear consequences of a regime shift becomes a critical issue. This makes standard valuation approaches of little use. Available scientific knowledge has not yet progressed enough to anticipate shifts with precision. This implies that the existence of radical uncertainty poses formidable challenges to valuation.[57]

Standard valuation approaches thus only ought to be used over the non-critical range and far from ecological thresholds. Serious constraints on traditional economic valuation methods exist when ecological thresholds are identified by science as being 'sufficiently' close and when the potential irreversibility and magnitude of the non-marginal effects of regime shifts are also deemed sufficiently important. Our ability to observe and predict the dynamics of ecosystems and biodiversity will always be limited and ecosystem management strategies need to consider how we live with irreducible sources of uncertainty about future benefits.[58]

The TEEB report also acknowledges that the valuation techniques in general and the stated preference methods specifically are affected by uncertainty stemming from gaps in knowledge about ecosystem dynamics, human preferences and technical issues in the valuation process. There is a need to include uncertainty issues in valuation studies; however, when uncertainty is

55 Ibid., 212–217.
56 Chavas (2000), 11–12.
57 TEEB (2010), 219.
58 Ibid., 219.

compounded by ignorance about ecosystem functioning or when there is even a small possibility of disastrous damage, such as complete ecological collapse of ecosystems, current valuation techniques used to estimate values to feed into cost-benefit analysis are insufficient.[59]

4.4.2 Discounting

Another important issue that needs to be discussed at this stage is 'discounting'. Once all relevant cost and benefits flows that can be expressed in monetary amounts have been expressed, it is necessary to convert them all into *present value* terms in order to make cost and benefit flows comparable regardless of when they occur. Many decisions made now have consequences that persist well into the future. Exhaustible energy resources, once used, are gone. Biological renewable resources can be overharvested, leaving smaller and possibly weaker populations for future generations. Persistent pollutants can accumulate over time. How can we make choices when the benefits and costs may occur at different points in time?[60]

The answer is that all cost and benefit flows are converted into present value, providing a way to compare net benefits received in different time periods. The conversion of future costs and benefits into present value is called discounting.

From an economic point of view, discounting future costs and benefits is the right way to approach the problem of time preference – at least where projects of reasonably short duration, say up to 30 years, are involved. However, the method has troubling implications for projects yielding huge gains in the far distant future, because after discounting these gains are deemed to have considerably less worth. In general, a higher discount rate applied to specific cases may lead to the long-term degradation of biodiversity and ecosystems.[61]

Many economists have suggested alternatives to conventional discounting, including the use of declining discount rates over time[62]; the use of social discount rates; and including a 'sustainability' requirement that effectively amounts to a requirement to consider future generations' well-being.[63] Notwithstanding these suggestions, the practice of discounting has been subject to an intense debate, particularly the discounting of ecosystems and biodiversity in the very long run.[64] The release of the Stern Review and the ensuing debate among economists as to its merit did much to illuminate the role of discounting the costs and benefits of policies having very long time spans and very broad spatial scales – climate change and biodiversity loss being the prime examples. Several prominent environmental economists

59 TEEB (2010), 292.
60 Tietenberg and Lewis (2008), 24.
61 TEEB (2010), 259.
62 Hanley and Barbier (2009), 154. Weitzman (2001), 260.
63 Sumaila and Walters (2005), 135. Pearce et al. (2006), 189.
64 See also Hoel and Sterner (2007), 265; and Sterner and Persson (2008), 61.

came to the conclusion that the standard economic model offers an inadequate framework to analyse environmental issues characterized by irreversibilities, pure uncertainty and very long time horizons.[65]

Part of the debate also revolves around the question of whether all preferences should have the same weight. An underlying critical issue is whether some preferences are better than others and ought to count more. Decisions are made on the basis of the preferences of the current generation, while the actual effects of the decisions are often experienced by a future generation. How can it be ethically justified to use a positive discount rate whereby gains and losses to society are valued less the more distant they are in the future?[66]

Thus, especially for projects with long-term horizons, the practice of discounting has undesirable effects: it might put the well-being of future generations at risk. Given this, there are economists who argue that the principle of intergenerational equity justifies no discounting at all – a zero discount rate. Some economists have gone even further and argued for negative discounting to reflect the need for greater protection of the well-being of future generations through cautious decisions about irreplaceable amenities (such as the Grand Canyon) and/or decisions with irreversible outcomes (such as global warming and species extinction).[67]

4.4.3 Ethical objections

Slightly related to the above is the issue of ethical objections. An important critique of the economic approach to environmental valuations is that environmental values should not be reducible to a single one-dimensional standard that is ultimately expressed only in monetary terms. Hussen explicates on the effort of 'co-modification of environmental goods' that:

> It is argued that this principle should not be accepted because it blatantly denies the existence of certain intangible values of the natural environment that are beyond the economic. They are immeasurable and can be described only in qualitative terms that are non-economic in nature. Improved quality of life, the protection of endangered species and ecosystems, the preservation of scenic or historic sites (such as the Grand Canyon) and the aesthetic and symbolic properties of wilderness are examples of this. The main message here is that it would be wrong and misleading to ignore intangibles in an effort to obtain a single dollar-value estimate for benefits. There are irreplaceable and priceless environmental assets whose values cannot be captured either through the market or by survey methods designed to elicit people's willingness to pay.[68]

65 TEEB (2010), 263.
66 Hussen (2004), 183.
67 Starret (2000), 17; and Ludwig (2000), 33.
68 Hussen (2004), 164.

The application of economic valuation techniques to environmental changes is by no means uncontroversial. There are several reasons for this, many of which stem from a misunderstanding of monetization. The use of money as a standard is sometimes a barrier to wider acceptance. Many people believe that some environmental assets are 'priceless' in the sense that they cannot accept trade-offs involving these assets, or they consider it immoral to place a value on goods, such as clean air or water, that are generally seen as a right for all. However, monetization is simply a convenient means of expressing the relative values that society places on different uses of resources. Valuation is a means of measuring public preferences for environmental resources and is not a valuation of those resources in itself (so-called intrinsic values).[69]

Moreover, an economic assessment of ecosystem benefits and opportunity costs is one important element of the information set that must go into social decision making, even though a simple cost-benefit test cannot determine what actions are appropriate. By laying out the economic and non-economic information in a way that facilitates both informed decision making and accountability, competing values can be better reconciled.[70]

4.5 Where do we stand?

This chapter has provided an overview on the rationale behind economic valuation of ecosystem services, the available methods and tools, and some of the key challenges. Since many ecosystem services are produced and enjoyed in the absence of market transactions, their value is often underestimated and even ignored in daily decision making. One of the ways to tackle this information failure and make the value of ecosystems explicit in economic decision making is to estimate the value of ecosystem services and biodiversity in monetary terms.

The chapter has shed light on a few limitations of ecosystem services valuation. Valuation techniques face important challenges, especially regarding uncertainty and irreversibility. These limitations of monetary valuation are particularly important as ecosystems reach critical thresholds and ecosystem change is irreversible, or reversible only at extreme costs. In this case and until more understanding of ecological dynamics become available, TEEB indicates that at the policy level it is better to address this uncertainty and ignorance by employing a safe minimum standard approach and the precautionary principle.[71]

Despite the limitations, demonstrating the approximate contribution of ecosystem services to the economy remains urgently needed. Valuation

69 Pearce and Seccombe-Hett (2000), 1421.
70 Toman (1998), 59; Turner et al. (1998), 61.
71 Ibid., 241.

exercises can still provide information that is an indispensable component of environmental policy in general. Ignoring information from valuation methods is thus neither a realistic nor a desirable option. Instead, policy makers should interpret and utilize the valuable information provided by the techniques while acknowledging the limitations of this information. The economic valuation of ecosystem services has the potential of making the weighing and balancing of ecosystem services a more transparent exercise. This will possibly lead to a better, and probably more consistent, integration of ecosystem values into decision-making procedures and provide a tool to ensure the maintenance of ecosystem integrity.

Notwithstanding the potential of ecosystem services valuation in light of an ecosystem approach, what is of more importance, however, is how the value of ecosystem services is actually *integrated* and *used* in decision-making processes. Whether or not ecosystem integrity is truly maintained depends on the balancing assessments where the value of the ecosystem services are weighed and balanced against the other values that are at stake in a particular situation. How should the balancing assessment take place and how may the value of ecosystem services be traded off when other concerns are deemed more important? These questions are expected to be regulated in the legal framework that applies to those particular situations. The role of law would be to ensure that particular overriding concerns of public interest are protected. The conservation of our ecosystems and the maintenance of their integrity would be one of these concerns. In this regard, the role of environmental law for facilitating this needs to be further examined. In particular, the fragmentation of environmental law and the existence of broad discretionary rules and principles may provide challenges. The next chapter discusses more thoroughly the concepts of fragmentation and discretion in environmental law.

4.6 References

Allen, B.P. and Loomis, J.B., 'The Decision to Use Benefit Transfer or Conduct Original Valuation Research for Benefit-Cost and Policy Analysis' (2008) 26(1) *Contemporary Economic Policy*.

Arrow, K.J. and Fisher, A., 'Environmental Preservation, Uncertainty and Irreversibility' (1974) 88(2) *Quarterly Journal of Economics* 312.

Asafu-Adjaye, J., *Environmental Economics for Non-Economists: Techniques and Policies for Sustainable Development* (2nd, edn World Scientific, 2005).

Azevedo, C.D., Herriges, J.A. and Kling, C.L., 'Combining Revealed and Stated Preferences: Consistency Tests and their Interpretations' (2003) 85(3) *American Journal of Agricultural Economics* 525.

Barbier, E.B. *et al.*, 'Coastal Ecosystem-based Management with Nonlinear Ecological Functions and Values' (2008) 319 *Science* 321.

Bockstael, N.E. *et al.*, 'On Measuring Economic Values for Nature' (2000) 34(8) *Environmental Science & Technology* 1384.

Boscolo, M. and Vincent, J.R., 'Nonconvexities in the Production of Timber, Biodiversity, and Carbon Sequestration' (2003) 46 *Journal of Environmental Economics and Management* 251.

Boulding, K.E., 'The Economics of the Coming Spaceship Earth', in H. Jarret (ed.) *Environmental Quality in a Growing Economy: Essays from the Sixth RFF Forum* (Resources for the Future/Johns Hopkins University Press, 1966).

Boyer, T. and Polasky, S., 'Valuing Urban Wetlands: A Review of Non-market Valuation Studies' (2004) 24(4) *Wetlands* 744.

Brander, L. and Van Beukering, P.J.H., 'Trade-offs and Decision-support Tools for Managing Ecosystem Services', in J.A. Bouma and P.J.H. Van Beukering (ed.) *Ecosystem Services: from Concepts to Practice* (2015), 132–160.

Brouwer, R., 'Environmental Value Transfer: State of the Art and Future Prospects' (2000) 32 *Ecological Economics* 137.

Brouwer, R. and Pearce, D.W., *Cost-benefit Analysis and Water Resources Management* (Edward Elgar, 2005).

Carson, R.T., 'Contingent Valuation: A User's Guide' (2000) 34(8) *Environmental Science & Technology* 1413.

Chavas, J.P., 'Ecosystem Valuation under Uncertainty and Irreversibility' (2000) 3 *Ecosystems* 11.

Chichilnisky, G., 'The Costs and Benefits of Benefit-cost Analysis' (1997) 2 *Environment and Development Economics* 195.

Diakoulaki, D. and Grafakos, S., 'Externalities of Energy: Extension of Accounting Framework and Policy Applications', Final Report on Work Package 4: Multi-Criteria Analysis (2004).

Diamond, P. and Hausman, J., 'Contingent Valuation: Is Some Number Better than No Number?' (1994) 8(4) *Journal of Economic Perspectives* 45.

European Commission, *Common Implementation strategy for the Water Framework Directive (2000/60/EC). Guidance document no. 20 Exemptions to the Environmental Objectives under the Water Framework Directive* (Office for Official Publications of the European Communities, 2009).

Farber, S. and Griner, B., 'Using Conjoint Analysis to Value Ecosystem Change' (2000) 34(8) *Environmental Science & Technology* 1407.

Fischhoff, B., 'Informed Consent for Eliciting Environmental Values' (2000) 34(8) *Environmental Science & Technology* 1439.

Fisher, A.C. and Hanemann, W.M., 'Option Value and the Extinction of Species' (1986) 4 *Advances in Applied Microeconomics* 169.

Freeman, A.M., *The Measurement of Environmental and Resource Values: Theory and Methods* (2nd edn, Resources for the Future, 2003).

Gatto, M. and De Leo, G.A., 'Pricing Biodiversity and Ecosystem Services: The Never Ending Story' (2000) 50(4) *BioScience* 347.

Getzner, M., Spash, C. and Stagl, S., *Alternatives for Environmental Valuation* (Routledge, 2004).

Goulder, L. and Kennedy, D., 'Valuing Ecosystem Services: Philosophical Bases and Empirical Methods', in G. Daily (ed.) *Nature Services: Societal Dependence on Natural Ecosystems* (Island Press, 1997).

Hanemann, W.M., 'Valuing the Environment through Contingent Valuation' (1994) 8(4) *The Journal of Economic Perspectives* 19.

Hanley, N. and Barbier, E.B., *Pricing Nature: Cost-Benefit Analysis and Environmental Policy* (Edward Elgar Publishing, 2009).

Hanley, N., Shogren, J. and White, B., *Introduction to Environmental Economics* (Oxford University Press, 2001).

Hanley, N., Wright, R.E. and Adamowicz, V., 'Using Choice Experiments to Value the Environment' (1998) 11(3–4) *Environmental and Resource Economics* 413.

Haug, C. and Gupta, J., 'The Emergence of REDD on the Global Policy Agenda', in J. Gupta, N. Van der Grijp and O. Kuik (eds) *Climate Change, Forests and REDD. Lessons for Institutional Design* (Routledge, 2013).

Heal, G., *Nature and the Marketplace: Capturing the Value of Ecosystem Services* (Island Press, 2000a).

Heal, G., 'Valuing Ecosystem Services' (2000b) 3(1) *Ecosystems* 24.

Heinzerling, L., 'Why Care About the Polar Bear? Economic Analysis of Natural Resources Law and Policy', in L.J. MacDonnell and S.F. Bates (eds) *The Evolution of Natural Resources Law and Policy* (ABA Publishing, 2008).

Hoel, M. and Sterner, T., 'Discounting and Relative Prices' (2007) 84(3–4) *Climatic Change* 265.

Hussen, A., *Principles of Environmental Economics: Ecology, Economics and Public Policy* (2nd edn, Routledge, 2004).

Institute for European Environmental Policy, *Costs and Socio-Economic Benefits associated with the Natura 2000 Network* (Institute for European Environmental Policy, 2010).

Iovanna, R. and Griffiths, C., 'Clean Water, Ecological Benefits, and Benefit Transfer: A Work in Progress at the U.S. EPA' (2006) 60(2) *Ecological Economics* 473.

Johansson-Stenman, O., 'The Importance of Ethics in Environmental Economics with a Focus on Existence Values' (1998) 11(3–4) *Environmental and Resource Economics* 429.

Kiker, G.E. et al., 'Application of Multicriteria Decision Analysis in Environmental Decision Making' (2005) 1 *Integrated Environmental Assessment and Management* 95.

Kotchen, M.J. and Reiling, S.D., 'Environmental Attitudes, Motivations, and Contingent Valuations of Nonuse Values: A Case Study Involving Endangered Species' (2000) 32 *Ecological Economics* 93.

Ludwig, D., 'Limitations of Economic Valuation of Ecosystems' (2000) 3 *Ecosystems* 31.

Lyster, R., MacKenzie, C. and McDermott, C. (eds) *Law, Tropical Forests and Carbon. The Case of REDD+* (Cambridge University Press, 2013).

MacMillan, D., Hanley, N. and Lienhoop, N., 'Contingent Valuation: Environmental Polling or Preference Engine?' (2009) 60(1) *Ecological Economics* 299.

Marshall, A., *Principles of Economics* (8th, edn Macmillan, 1930).

Mendoza, G.A. and Martins, H., 'Multi-criteria Decision Analysis in Natural Resource Management: A Critical Review of Methods and New Modelling Paradigms' (2006) 230(1–3) *Forest Ecology and Management* 1.

Næss, A., 'The Shallow and the Deep, Long-Range Ecology Movement' (1973) 16 *Inquiry* 95.

National Research Council, *Valuing Ecosystem Services: Toward Better Environmental Decision-Making* (The National Academies Press, 2005).

Naylor, R. and Ehrlich, P., 'Natural Pest Control Services and Agriculture', in G. Daily (ed.) *Nature's Services: Societal Dependence on Natural Ecosystems* (Island Press, 1997).

Nunes, P., Kumar, P. and Dedeurwaerdere, D. (ed.), *Handbook on the Economics of Ecosystem Services and Biodiversity* (Edward Elgar, 2014).

O'Neill, J., *Markets, Deliberation and Environment: Economics as Social Theory* (Routledge, 2007).

O'Neill, J., Holland, A. and Light, A., *Environmental Values* (Routledge, 2008).

Organisation for Economic Co-operation and Development (OECD), *Handbook for Biodiversity Valuation. A Guide for Policy Makers* (OECD, 2002).

Pearce, D. and Atkinson, G.D., 'Capital Theory and the Measurement of Sustainable Development: An Indicator of "Weak" Sustainability' (1993) 8(2) *Ecological Economics* 103.

Pearce, D., Atkinson, G. and Mourato, S., *Cost-Benefit Analysis and the Environment: Recent Developments* (OECD Publishing, 2006).

Pearce, D. and Seccombe-Hett, T., 'Economic Valuation and Environmental Decision-Making in Europe' (2000) 34(8) *Environmental Science & Technology* 1419.

PritchardJr, L., Folke, C. and Gunderson, L., 'Valuation of Ecosystem Services in Institutional Context' (2000) 3 *Ecosystems* 36.

Proctor, W. and Dreschler, M., 'Deliberative Multicriteria Evaluation' (2006) 24(2) *Environment and Planning C: Government and Policy* 169.

Sagoff, M., 'Environmental Economics and the Conflation of Value and Benefit' (2000) 34(8) *Environmental Science & Technology* 1439.

Smith, V.K. and Kaoro, Y., 'Signals or Noise? Explaining the Variation in Recreation Benefit Estimates' (1990) 72(2) *American Journal of Agricultural Economics* 419.

Spash, C.L. *et al.*, 'Motives behind Willingness to Pay for Improving Biodiversity in a Water Ecosystem: Economics, Ethics and Social Psychology' (2009) 68(4) *Ecological Economics* 955.

Starret, D.A., 'Shadow Pricing in Economics' (2000) 3 *Ecosystems* 16.

Sterner, T. and Persson, U.M., 'An Even Sterner Review: Introducing Relative Prices into the Discounting Debate' (2008) 7(2) *Review of Environmental Economics and Policy* 61.

Stevens, T.H. *et al.*, 'Comparison of Contingent Valuation and Conjoint Analysis in Ecosystem Management' (2000) 32(1) *Ecological Economics* 63.

Strange, T. and Bayley, A., *OECD Insights Sustainable Development Linking Economy, Society, Environment: Linking Economy, Society, Environment* (OECD Publishing, 2008).

Sumaila, U. and Walters, C., 'Intergenerational Discounting: A New Intuitive Approach' (2005) 52 *Ecological Economics* 135.

TEEB, Pushpam Kumar (ed.), *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations* (Routledge, 2010a).

TEEB, Pushpam Kumar (ed.), *Mainstreaming the Economics of Nature, A Synthesis of the Approach, Conclusions, and Recommendations of TEEB* (Progress Press, 2010b).

TEEB, Patrick Ten Brink (ed.), *The Economics of Ecosystems and Biodiversity in National and International Policy Making* (Routledge, 2011).

Ten Brink, P. *et al.*, *Estimating the Overall Economic Value of the Benefits provided by the Natura 2000 Network. Final Report to the European Commission, DG Environment on Contract ENV.B.2/SER/2008/0038* (Institute for European Environmental Policy, 2011).

Tietenberg, T. and Lewis, L., *Environment & Natural Resource Economics* (Addison Wesley, 2008, 8th edn).

Tisdell, C., *Environmental Economics: Policies for Environmental Management and Sustainable Development* (Edward Elgar Publishing, 1993).

Toman, M., 'Why Not to Calculate the Value of the World's Ecosystem Services and Natural Capital' (1998) 25 *Ecological Economics* 57.

Turner, R.K., Adger, W.N. and Brouwer, R., 'Ecosystem Services Value, Research Needs, and Policy Relevance: A Commentary' (1998) 25(1) *Ecological Economics* 61.

UN, EC, IMF, OECD and World Bank, *Handbook of National Accounting: Integrated Environmental and Economic Accounting* (Studies in Methods, Series F, No.61, Rev.1, United Nations, 2003).

United Nations Environment Programme (UNEP) and Millennium Ecosystem Assessment (MEA), *Ecosystems and Human Well-being: A Framework for Assessment* (Island Press, 2003).

United Nations Environment Programme (UNEP) and Millennium Ecosystem Assessment (MEA), *Ecosystems and Human Well-Being: Our Human Planet, Summary for Policy Makers* (Island Press, 2005).

Weitzman, M.L., 'Gamma Discounting' (2001) 91(1) *American Economic Review* 260.

Wilson, M.A. and Hoehn, J.P., 'Valuing Environmental Goods and Services Using Benefit Transfer: The State-of-the Art and Science' (2006) 60(2) *Ecological Economics* 335.

Woodward, R., Nayga, R.M. and Aiew, W., 'Experiments on the Divergence between Willingness to Pay and Willingness to Accept: The Issue Revisited' (2005) 17(4) *Economics Bulletin* 1.

The World Bank, *How Much is an Ecosystem Worth? Assessing the Economic Value of Conservation* (World Bank, 2004).

5 Fragmentation in environmental law

The previous chapters have described the objectives of the ecosystem approach and presented the ecosystem approach as a strategy to halt the degradation of ecosystems. Furthermore, the valuation of ecosystem services has been introduced as a means to facilitate the integration of the objectives of the ecosystem approach into decision-making procedures. This chapter moves on to an assessment of the architecture and nature of environmental law. As this book aims to shed light on the role of law with regard to the implementation of the ecosystem approach, two features of contemporary environmental law will be discussed now. Fragmentation in environmental law will be discussed first, followed by an assessment of the issue of administrative discretion in environmental law in Chapter 6. As will be shown, both these features pose certain challenges to the implementation of the ecosystem approach, particularly when decision-making procedures require the weighing and balancing of divergent values, among which are the values of ecosystem services.

5.1 Environmental law and its fragmentation

Environmental law consists of a body of law that regulates the impacts of human activities on the environment. In its broadest understanding, environmental law focuses not only on laws that have the protection of the environment as their primary focus, but also on laws that regulate certain major activities that can have impacts on the environment. Environmental law thus contains legal acts that regulate different aspects of the environment, for example, air, water, pesticides, waste management, endangered species and so forth, and regulate different activities that directly or indirectly affect the environment, such as transport, industry and energy.

As will be shown in this section, environmental law is not only fragmented vertically in the sense that different pieces of legislation exist at the national, EU and international levels, but also, perhaps more importantly,

environmental law is fragmented horizontally. Different environmental problems and subject matter of environmental law are regulated by different legal instruments. In addition to this problem of horizontal and vertical fragmentation of environmental law, governance structures are fragmented whereby various administrative bodies are involved in the application and interpretation of legal rules.

The concept of fragmentation has been widely discussed in the context of environmental law and of international law in more general. In general terms, the concept of fragmentation refers to 'the emergence of specialised and relatively autonomous spheres of social action and structure'.[1] According to the International Law Commission, 'the fragmentation of the international social world receives legal significance as it has been accompanied by the emergence of specialised and (relatively) autonomous rules or rule-complexes, legal institutions and spheres of legal practice'.[2]

Fragmentation thus emphasizes the isolation and disconnection between legal regimes and institutions. Especially in the field of environmental law the concept of fragmentation has particular resonance. Scott describes this field as 'a complex regulatory field comprising multiple regimes and institutions giving rise to overlapping and occasionally conflicting legal and political mandates'.[3] As described by Steinway and Botts,

> Over the past four decades, 'environmental law' has evolved into a legal system of statutes, regulations, guidelines, requirements, policies, and case-specific judicial and administrative interpretations that address a wide-ranging set of environmental issues and concerns. These laws and requirements address not only the natural environment, including the air, water, and land, but also how humans interact with that natural environment and ecological systems. In addition, this system of environmental laws involves multiple layers of regulatory controls, since not only the federal government, but also state and local levels of government, have imposed interrelated and sometimes overlapping environmental requirements. This legal system is complex in itself and is made even more challenging by the difficulty of the interdisciplinary subject matter to be regulated (health, safety, and environment) and the quickly evolving scientific and technical issues typically presented in environmental cases.[4]

1 UNGA (2006), 3.
2 Ibid.
3 Scott (2011), 1.
4 Steinway and Botts (2011), 1.

Fragmentation could perhaps be considered the 'hallmark of environmental law'.[5]

5.2 Dimensions of fragmentation

Environmental law is fragmented horizontally as law has been created around media-specific compartments, such as water, land or air, or in reaction to specific environmental problems, such as pollution and waste. This dimension of fragmentation where legal acts focus on a single type of environmental problem or on the protection of a single kind of environmental resource is called 'horizontal fragmentation'. Horizontal fragmentation refers to the fact that much of our regulatory system is divided into media-specific compartments.[6] On this issue, Owen concludes that:

> Environmental regulation is often highly compartmentalized, with distinct agency offices applying separate statutes to address different environmental consequences of the same underlying action.[7]

This form of fragmentation appears within all three spheres of governance: international, EU and national. This will be illustrated hereunder.

5.2.1 The national level

At a national level environmental law is fragmented horizontally where various compartments or problems are regulated by various pieces of legislation. As an illustration, national environmental law may consist first of legal instruments that have the protection of the environment or the regulation of activities that affect the environment as their main goal. Examples from the Norwegian legal system include the 2009 Nature Diversity Act,[8] the 2008 Marine Resources Act,[9] the 2005 Forestry Act,[10] the 2000 Water Resources Act,[11] or the much older 1981 Pollution Act.[12] In addition, environmental law also consists of legal acts that have the regulation of

5 Carlarne (2008), 451.
6 Owen (2013), 230.
7 Ibid.
8 Act of 19 June 2009 no. 100 relating to the management of biological, geological and landscape diversity (Nature Diversity Act).
9 Act of 6 June 2008 no. 37 relating to the management of wild living marine resources (Marine Resources Act).
10 Act of 27 May 2005 no. 32 relating to forestry (Forestry Act).
11 Act of 24 November 2000 no. 82 relating to river systems and groundwater (Water Resources Act).
12 Act of 13 March 1981 no. 6 concerning protection against pollution and concerning waste (Pollution Control Act).

non-environmental activities as their main goal but nevertheless have an impact on the environment. Examples of the latter are the 2008 Planning and Building Act,[13] the 1990 Energy Act,[14] the 2010 Offshore Energy Act,[15] the 1996 Petroleum Act,[16] the 2005 Aquaculture Act,[17] and the 1917 Watercourse Regulation Act.[18]

The number of legal instruments that regulate environmental issues appears to be a common feature of national environmental law,[19] despite efforts to harmonize environmental legislation to a greater extent in certain countries. In the Netherlands, for instance, a development has been going on to integrate various legislation into single acts. One example is the Environmental Management Act, which is a framework act that contains various rules for the protection of the environment, among which are a number of general issues that before had been regulated within different sectoral environmental acts.[20] Another important piece of legislation is the 2008 Environmental Licensing Act,[21] which collates more than 25 permit systems relating to the physical social environment under a single act. Another example is the 2009 Water Act,[22] which integrates eight existing water management statutes and serves as the national implementation of the EU WFD and the EU MSFD.

A different illustration of harmonization may be the Swedish Environmental Code which replaces 15 previous acts that were repealed on its entry into force on 1 January 1999. The rules of the code relate to the management of land and water, nature conservation, the protection of plant and animal species, environmentally hazardous activities and health protection, water operations, genetic engineering, chemical products and waste. The Swedish Environmental Code is a framework act, which means that its rules do not generally specify limit values for various operations and it does not go into detail when it comes to striking a balance between

13 Act of 27 June 2008 no. 71 relating to planning and the processing of building applications (the Planning and Building Act).
14 Act of 29 June 1990 no. 50 relating to the generation, conversion, transmission, trading, distribution and use of energy, etc. (Energy Act).
15 Act of 4 June 2010 no. 21 relating to offshore renewable energy production (Offshore Energy Act).
16 Act of 29 November 1996 no. 72 relating to petroleum activities (Petroleum Act).
17 Act of 17 June 2005 no. 79 relating to aquaculture (Aquaculture Act).
18 Act of 14 December 1917 no. 17 relating to regulation of watercourses (Watercourses Act).
19 See for instance, Owen (2013) using examples from the USA; or Kotzé (2007) analysing fragmentation in South Africa.
20 Act of 2 July 1992 'Environmental Management Act' Official Journal 1992, 551.
21 Act of 6 November 2008 'Environmental Licensing (General Provisions) Act' Official Journal 2008, 496 (first text) and Official Journal 2010, 231 (entry into force).
22 Act of 29 January 2009 'Water Act' Official Journal 2009, 107.

various interests. The rules need to be made more specific by additional regulations.[23]

Yet another example is the Resource Management Act (1991) in New Zealand. This act established one integrated framework that replaced the many previous resource-use regimes, which had been fragmented between agencies and sectors, such as land use, forestry, pollution, traffic, zoning, water and air.[24] More specifically, a total of 69 acts and amended acts were repealed and 19 regulations and orders were revoked.[25]

Despite some trends of harmonization in certain countries, environmental law may still be rather fragmented. In the Netherlands, for instance, besides a number of sector-specific legal acts, environmental issues within the territorial zone of the Dutch part of the North Sea are regulated by at least ten different major legal instruments. Also in Norway, this horizontal dimension of fragmentation is very noticeable. The Norwegian part of the North Sea is also regulated by at least ten major legal acts. So clearly, the North Sea ecosystem is subject to a rich amount of legal instruments. Among the legal acts, however, there is a difference in the manner the environment is involved. Certain acts have a more direct aim to protect a particular part of the environment; other legal acts may have a more indirect effect on the environment. Overall, however, national environmental law is rather extensive, diverse and fragmented.

5.2.2 The EU level

The horizontal fragmentation of environmental law is not merely a national phenomenon. To a certain extent, the architecture of domestic environmental law and EU environmental law are comparable. This is so, because European environmental law, which is mainly based on either Article 191 of the Treaty on the Functioning of the EU (TFEU) or Article 114 TFEU,[26] has brought forth an enormous body of both specific and more general legislation, principles, communications and decisions that have shaped and influenced the design and nature of domestic environmental law.[27] Particularly, the number of EU directives that need to be implemented into domestic law have covered a wide spectrum of environmental matters. Examples are the

23 Ministry of the Environment (2001). For a thorough assessment of the Swedish Environmental Code see Michanek and Zetterberg (2012).

24 Fisher (1999), 2.

25 Frieder (1997), 12.

26 Article 192 TFEU is normally used as the legal base for measures that pursue an environmental objective, while Article 114 TFEU should be used for measures that 'have as their objective the establishment and functioning of the internal market'. Jans and Vedder state that 'at any rate certain environmental measures fall within the scope of Article 114(3)'. Jans and Vedder (2012), 74.

27 It falls outside the scope of this section to describe in detail to various types of EU environmental law that exist and how this has affected domestic environmental law.

Directive establishing a greenhouse gas emissions trading scheme,[28] a Waste Framework Directive,[29] and a Directive on industrial emissions,[30] Ambient Air Quality Directive[31] and the Renewable Energy Sources Directive.[32] In addition, the REACH regulation that regulates chemicals and their safe use has also been important.[33] Besides this, the European Commission has generated communications that may specify or clarify the content of those directives, or of other policies.[34]

Thus, at the European level as well a considerable amount of legal instruments exist that regulate activities that can have an impact on the environment. The more recent directives on water and the marine environment aim, however, to achieve a more integrated approach to the regulation of water and the marine environment. As mentioned in Chapter 2, both the WFD and the MSFD aim to provide a more integrated protection instrument. It remains to be seen to what extent these directives accomplish a more integrated approach in water regulation and the regulation of the marine environment. Furthermore, even though these directives provide an integrated approach, this remains an integrated approach focusing only on one particular environmental medium – water.

5.2.3 The international level

On an international level, the fragmentation of international environmental law has been extensively discussed. There are numerous global and regional multilateral environmental agreements in force today.[35] As Carlarne states:

28 Council Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC [2003] OJ L 275/32.
29 Council Directive 2008/98/EC of 19 November 2008 on waste and repealing certain directives [2008] OJ L 312/3.
30 Council Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control) [2010] OJ L 334/17.
31 Council Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe [2008] OJ L 152/1.
32 Council Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources [2009] OJ L 140/16.
33 REACH is the European Community Regulation on chemicals and their safe use (EC 1907/2006). It deals with the registration, evaluation, authorization and restriction of chemical substances. The law entered into force on 1 June 2007. Council Regulation 1907/2006 of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) [2006] OJ L 396/1.
34 An example may be the climate change strategy, which advocated practical action to prevent temperatures from increasing to more than 2°C above pre-industrial levels. See European Commission (2005).
35 Scott (2011), 3.

> Since the 1970s, treaty proliferation has meant that each new MEA that has been negotiated has created a set of issue specific institutions, rules and procedures. This problem-specific approach has enabled the international community to negotiate numerous treaties and tackle complex environmental problems that otherwise would have gone unaddressed. Treaty proliferation has created a field that can point to numerous success stories, for example, reductions in ozone depleting substances and control of trade in endangered species. It has also, however, created a field where issue overlaps and gaps are all too common and, where there are no effective mechanisms for either assessing gaps and establishing overarching goals and priorities within the field, for facilitating coordination with other areas of international law.[36]

The extensive number of multilateral environmental agreements in force has led to criticism that international environmental law is characterized by both 'treaty congestion' and fragmentation. According to Scott:

> The fragmentation of international environmental law arising from the creation of multiple regimes and institutions with similar or conflated regulatory mandates is extant, and has undoubtedly given rise to the risk of duplication, divergence, and even conflict between environmental standards and obligations.[37]

This risk has been illustrated by Van Asselt, who has explored the linkages and tensions between the climate and biodiversity regimes. He assessed strategies to manage the overlap between two legal regimes dealing with the interconnected global environmental threats of biodiversity loss and climate change. Van Asselt argued that 'although the climate and biodiversity treaties are not fundamentally in discord, there is potential for conflict between the regimes, particularly following decisions on forest carbon sinks in the Kyoto Protocol, while at the same time there are synergies to be exploited by tackling deforestation'.[38]

International environmental law is not only a fragmented legal field in itself, but there exists also a more general fragmentation of international law where environmental law intersects with various other areas of international law. Especially this topic of the fragmentation of international law into different legal regimes has been subject to scholarly debate.[39] Already in 1971, Niklas Luhmann predicted this fragmentation of international law:

36 Carlarne (2008), 458.
37 Scott (2011), 4.
38 Van Asselt (2011), 1205; Van Asselt et al. (2008), 423.
39 See for instance, Stephens (2007), 227. For a more recent piece of work see also Young (2012).

> Global law would experience a radical fragmentation, not along territorial, but along social sectoral lines.[40]

Since Luhmann made this prediction, the fragmentation of international law has received considerable academic attention,[41] as many commentators feared that compartmentalization and fragmentation threaten the integrity of international law by creating legal and doctrinal inconsistencies.[42] Koskenniemi, in examining modern compartmentalization and fragmentation, saw the roots of it as resting in the increasing deformalization of international law. As a result of deformalization, standard making takes place within the framework of multilateral treaty law-making processes and, thus, creates issue-specific substantive and procedural rules rather than developing general behavioural standards – as was common in the early days of international law.[43]

In 2006, the International Law Commission (ILC) thoroughly assessed the issue of fragmentation of international law in a report entitled, 'Fragmentation of International Law: Difficulties arising from the diversification and expansion of international law'. The rationale for the Commission's treatment of fragmentation is that the emergence of new and special types of law, 'self-contained regimes' and geographically or functionally limited treaty systems creates problems of coherence in international law. New types of specialized law do not emerge accidentally but seek to respond to new technical and functional requirements. The emergence of environmental law is a response to growing concern over the state of the international environment. Trade law develops as an instrument to regulate international economic relations. Human rights law aims to protect the interests of individuals and international criminal law gives legal expression to the 'fight against impunity'. Each rule-complex or regime comes with its own principles, its own form of expertise and its own ethos, which is not necessarily identical to (or compatible with) the ethos of neighbouring specializations. Trade law and environmental law, for example, have highly specific objectives and rely on principles that may often point in different directions.[44] In the wording of the ILC:

> The Commission has understood the subject to have both positive and negative sides […] On the one hand, fragmentation does create the danger of conflicting and incompatible rules, principles, rule-systems and institutional practices. On the other hand, it reflects the rapid expansion of international legal activity into various new fields and the diversification of its objects and techniques.[45]

40 As cited by Fischer-Lescano and Teubner (2004), 1000.
41 See for instance, Koskenniemi and Leino (2002), 553.
42 Carlarne (2008), 456; Fischer-Lescano and Teubner (2004), 1001–02.
43 Koskenniemi (2005), 61.
44 UNGA (2006), paragraph 15.
45 UNGA (2006), paragraph 14.

Notwithstanding, the Commission also noticed that there is one aspect that unites practically all of the new regimes: this is the framework provided by the Vienna Convention on the Law of Treaties.[46] The Commission 'held it useful to have regard to the wealth of techniques in the traditional law for dealing with tensions or conflicts between rules and principles'.[47] The Commission concluded, among others, that there are meaningful relationships between the various norms and principles. In applying international law, it is often necessary to determine the precise relationship between two or more rules or principles that are both valid and applicable in respect of a situation. This needs to be done by the use of interpretation in accordance with the Vienna Convention on the Law of Treaties and especially the provisions in its articles 31 to 33 that apply to the interpretation of treaties.[48]

Besides the risk of conflicts, there are thus also opportunities for synergy. Voigt explored this opportunity within the areas of climate change law and trade law. More specifically, she explored the potential of sustainable development as a principle of integration of international law to resolve conflicts between climate change measures as regulated by the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol and rules of the World Trade Organization (WTO):

> In the trade and environmental nexus the most significant legal instrument in this regard is the principle of sustainable development, which seeks to link and balance environmental protection with economic and social interests and encompasses the concepts of intra- and intergenerational equity. The application of the principle is possible because of its explicit recognition in WTO law and as a principle of general international law.[49]

Notwithstanding, it could reasonably be concluded that environmental law is rather extensive and fragmented in a horizontal fashion. This fragmentation is apparent at the international, EU and national levels.

5.3 Why is there fragmentation?

The fragmentation of environmental law, especially at the national level, appears to be strongly interrelated with the fragmentation of environmental governance. According to Kotzé, the fragmentation of environmental law partly results from fragmented environmental governance:

46 United Nations Convention on the Law of Treaties (opened for signature 23 May 1969, entered into force 27 January 1980) 1155 UNTS 331.
47 UNGA (2006), paragraph 13.
48 Ibid., paragraph 7–8.
49 Voigt (2009), 377.

> Fragmentation includes disjointed governance structures along separate, autonomous line functioning organs of state that operate at national, provincial and local spheres of government. These fragmented governance structures result in fragmented governance processes that culminate in fragmented policies. This may lead to disjointed legislation that emanates from separate policy processes.[50]

The fragmentation of environmental governance might thus be an important contributor to the fragmented field of environmental law. An important question that needs to be answered, then, is why environmental *governance* is so fragmented. Bugge recognizes that this, ironically enough, is probably caused by the principle of environmental policy integration,[51] which requires that environmental issues be reflected in the design and substance of sectoral policies.

Environmental policy integration, as a concept, appeared in the context of sustainable development. In fact, from the 1970s onwards, the environment and environmental problems gained more and more awareness. Particularly the 1972 Conference on the Human Environment (the 'Stockholm Conference') marked a turning point in the development of international environmental politics. Furthermore, where the Stockholm Conference introduced environmental issues to the formal political development sphere, the WCED in 1987 placed environmental issues firmly on the political agenda, by its publication of *Our Common Future*, or the 'Brundtland Report'.[52] The WCED aimed to discuss the environment and development as a single issue, under the overarching aim of sustainable development. In the Brundtland Report, and subsequently in the Rio Declaration[53] and in Agenda 21,[54] the principle of environmental policy integration was strongly advocated.[55] Also at an EU level, this principle played an important role:

> The ability to choose policy paths that are sustainable requires that the ecological dimensions of policy be considered at the same time as the economic, trade, energy, agricultural, industrial, and other dimensions

50 Kotzé (2007), 49–50.
51 Bugge (2010), 8–12.
52 UNGA (1987).
53 Rio Declaration on Environment and Development (13 June 1992) 31 ILM 874. Principle 4 of the Rio Declaration states that: 'In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it'.
54 UNCED (1992).
55 Chapter 8(a) Agenda 21 entitled 'Integrating environment and development at the policy, planning and management levels'. This chapter states, amongst other things, that governments should adopt strategies for sustainable development and that these strategies should build upon and harmonize the various sectoral economic, social and environmental policies and plans that are operating in the country (para. 8.7).

> on the same agendas and in the same national and international institutions. That is the chief institutional challenge of the 1990s.[56]

The principle of environmental policy integration thus refers to the integration of environmental objectives and considerations into sector policy making and planning (e.g. energy, transport, agriculture and urban development), and is considered a key principle for realizing sustainable development. Environmental policy integration means moving environmental issues from the periphery to the centre of decision making, whereby environmental issues are reflected in the very design and substance of sectoral policies.[57]

The reasons for supporting the environmental policy integration principle as a tool for finding sustainable policy paths are twofold. First, there is a broad agreement that it facilitates more rational policy making, in that negative environmental consequences of a sector policy decision can be considered at an earlier stage and more easily prevented or mitigated. Likewise, positive environmental consequences could more easily be maximized. Second, many also agree on the normative case for giving a higher priority to environmental issues in relation to traditional sector and economic objectives.[58]

Notwithstanding this potential, Persson notices that even though the rationale of the environmental policy integration concept seems straightforward and desirable at a global level, it is more complicated and difficult to implement in concrete terms at sector level. While many 'win-win' opportunities exist for achieving environmental and sector policy objectives together, there will inevitably be trade-offs. Trade-offs between the three dimensions of sustainable development – environmental, economic and social aspects – can be highly complex and politically controversial.[59]

Lafferty discusses the matter of prioritization more thoroughly and argues on the shift of environmental policy from periphery to the centre in regional, national and local decision making, that:

> This shift must not be seen just as a matter of bringing environmental objectives into the policy-making process in non-environmental sectors in a 'balanced' way; but as involving an increasing recognition and acceptance of the fact that the challenge of sustainable development involves *the prospect of irreversible damage to life-support systems*. This implies that there will be at least *some* environmental/ecological

56 European Environment Agency (2005), 12.
57 Ibid.
58 Perrson (2004), 1.
59 Ibid. Moreover, Bugge holds that to 'integrate' environmental concerns into sector policy means not only that environmental issues and effects must be assessed and taken into account when decisions are made but also that the objective and content of important sector policies in reality are modified in order to ensure long-term environmental protection. Bugge (2010), 11.

> objectives that simply cannot be 'balanced' with political goals that challenge the basis for such life-support systems […] Vital environmental concerns must – when 'push comes to shove' in policy and budgetary conflicts – be seen as principal.[60]

Likewise, Voigt states that the integration of environmental, social and economic considerations in the context of sustainable development entails setting limits. Certain ecological limits simply need to be respected:

> The framework within which sustainable development and the integration of all aspects of society need to be viewed derives ultimately from fundamental, universal, and indispensable ecological functions on which they depend. To respect these functions is an absolute priority.[61]

Given these difficulties of determining the appropriate manner of integration and balancing, application of the principle of environmental policy integration may lead to divergent and fragmented approaches across different sectors of environmental governance. According to Bugge:

> The principle of integration may increase fragmentation of environmental management and weaken environmental protection […] The reason is that the different authorities weigh and balance their sector objectives against the related environmental effects differently.[62]

Based on this challenge, the idea of cross-sectoral coordination or integration has been recognized as an important element of environmental policy integration (EPI). In the context of Agenda 21, it was formulated as follows:

> Governments, in cooperation, where appropriate, with international organisations, should adopt a national strategy for sustainable development based on *inter alia* the implementation of the decisions taken at the Conference, particularly in respect to Agenda 21. This strategy should build on and *harmonise the various sectoral economic, social and environmental policies and plans that are operating in the country*.[63]

60 Lafferty (2004), 203, emphasis added. He adds that the priority aspect of integration should not be taken to mean that environmental objectives must *in every case* override other societal or economic objectives. The caveat *primarily* must, therefore, be included in the definition to be open to the very real possibility that other policy objectives will, at times, be deemed more important than environmental concerns. In the words of the Brundtland Report: 'every ecosystem everywhere cannot be preserved intact'. UNGA (1987), 44. For a further discussion of the two dimensions of EPI: horizontal EPI and vertical EPI, see ibid., 204–208.

61 Voigt (2009), 52.

62 Bugge (2010), 9.

63 UNCED (1992), 67, emphasis added.

Environmental policy integration thus requires cross-sectoral initiatives that concern policy coordination and the development of a more comprehensive cross-sectoral strategy for sustainable development.[64]

5.3.1 Cross-sectoral horizontal integration at the EU level

This element of cross-sectoral horizontal integration will now be shortly discussed from an EU-level perspective. The principle of environmental policy integration has been laid down in Article 11 TFEU:

> Environmental protection requirements must be integrated into the definition and implementation of the Union policies and activities, in particular with a view to promoting sustainable development.[65]

Already in 1998, the European Commission provided a strategy for the integration of environmental considerations into EU policies.[66] This strategy, known as the Cardiff process, is designed to introduce a horizontal approach to environment policy by incorporating it into all Community policies. The European Council took a significant step to give practical application to Article 11 TFEU by requesting different Council formations to prepare strategies and programmes aimed at integrating environmental considerations into their policy areas, starting with energy, transport and agriculture. The process has now also covered industry, internal market, development, fisheries, general affairs, and economic and financial affairs.[67] The integration of environmental considerations within the various sectors has been recognized as an important means of implementing the environmental objectives of the 2001 Sustainable Development Strategy.[68]

In 2004, the European Commission reviewed the Cardiff process on the integration of environmental considerations in the different sectors, and

64 Lafferty et al. (2002), 11.
65 Treaty on the Functioning of the European Union, Article 11.
66 European Commission (1998).
67 European Commission (2004), 4.
68 The year 2001 marked a turning point in the process of environmental integration with the adoption by the European Council of an EU Sustainable Development Strategy and the addition of a third, environmental, pillar, to the Lisbon Strategy. Economic growth and social cohesion now need to be promoted alongside environmental protection. In this new policy context, the European Council invited the Council 'to finalise and further develop sector strategies for integrating environment into all relevant Community policy areas with a view to implementing them as soon as possible […] Relevant objectives set out in the forthcoming 6th EAP [Environment Action Programme] and the Sustainable Development Strategy should be taken into account'. The sectoral integration strategies developed under the Cardiff process are therefore one of the means of implementing environmental objectives of the Sustainable Development Strategy. See further European Commission (2004), 4.

identified several weaknesses, among which was the lack of consistency of strategies among Council formations.[69] The European Commission showed that quality and ambition varied widely from one sector to another, and that not all Council formations had shown the same degree of commitment to the process. Some strategies have taken the form of a fully developed set of environmental commitments, with deadlines, milestones, and reporting and review mechanisms. Others are limited to declarations of intent through Council conclusions, more focused on how environmental policy should be pursued than on commitments for environmental integration in the concerned sectors.[70]

This lack of consistency between the different sectors is not surprising given the fact that the sectors have diverse interests, are facing different challenges, they have different planning traditions, and are subject to their own policies and administrations, with specific economic and legal instruments.[71] The various sectors may also have divergent views on how environmental considerations could be best integrated, and they may have separate integration strategies.[72] They may also have different views on how much weight they should give to environmental considerations. A few countries, most notably Norway and Sweden, do make extensive use of sector-based environmental integration strategies. At the same time, strategies for integrating the environment in the transport sector and the agriculture/rural development sector are increasingly common.[73] These various sector integration strategies are specific to the problems and challenges that exist in that particular sector.

This concern of inconsistent integration of environmental considerations into sector policies is not only present at the European level, but also at the national level. In Norway, for instance, the sectors have very different traditions and interests and different authorities weigh and balance their sector objectives against the related environmental effects differently.[74] This may

69 Ibid., 31. On the positive side, it has helped bring about concrete improvements in some sectors – the Commission's initiatives on renewable energy and energy efficiency being an undeniable step forwards on that score. The 2003 and 2004 Common Agricultural Policy (CAP) reform greatly contributed to progress towards Cardiff process objectives. The Cardiff process has also contributed to raising the profile of environmental integration, now regularly discussed at EU level.

70 Ibid., 31.

71 Nordic Council of Ministers (1998).

72 See also Krämer (2008), 394, who states that 'There is no attempt by the [European] Commission to create the necessary administrative structure to make this provision [Art 11 TFEU] operational; contacts between the environmental and the industry, trade, regional, fisheries or development departments are rare; no institutional frame exists for that'.

73 European Environment Agency (2005).

74 Bugge (2010), 9–11.

easily lead to inconsistent approaches to the integration of environmental considerations.[75]

Thus, there may be inconsistency in the manner environmental considerations are integrated into sector policies both at the national and European levels. On the one hand, this is inevitable; sectors comply with the aim of environmental policy integration in different manners. In order to put this principle into practice, it needs to become more specific and contextualized. On the other hand, however, this divergence in how the different sectors integrate environmental considerations could be seen as an important contributor to the fragmentation of environmental governance.

Fragmentation of environmental governance may have led to a similar fragmentation of environmental law, as legislation may have been drafted within disjointed policies and fragmented structures of governance. More importantly, perhaps, this legislation often only addresses the environmental 'problems' or media governed by the particular sector.

Besides the understanding that the fragmentation of environmental law may be a corollary of the fragmentation of environmental governance, the fragmentation of environmental law, in particular international environmental law, has also been explained by the fact that multilateral environmental agreements appeared in a piecemeal fashion. Indeed, the fragmentation of international environmental law has been explained by the fact that the 'international community has taken a piecemeal approach to environmental issues, responding to them as they emerge, and in isolation from one another'.[76] Loibl also recognizes that this disjointed approach reflects how environmental problems were viewed mainly as separate (scientific) issues at the time treaties were negotiated.[77]

In fact, it has been recognized that a degree of specialization appears to be necessary due to the particular complexities of the environmental issues. Recently, an international conference addressed the fragmentation of global environmental governance.[78] The participants discussed the increasing institutional fragmentation of global governance architectures, with an empirical focus on various environmental policy domains, including climate change, renewable energy, biological diversity, water, fisheries, forestry and chemicals. They agreed that fragmentation is an inevitable structural characteristic of all environmental architectures today, but that the degree of complexity varies considerably across issue areas. For instance, the level of fragmentation on

75 See also Hovden and Torjussen (2002), who emphasize that the horizontal dimension of environmental policy integration is relatively weak in Norway. They argue that the ambition of Agenda 21 – 'to harmonize the various sectoral economic, social and environmental policies and plans' – has been broadly neglected.

76 UNEP (n.d.).

77 Loibl (2008).

78 Workshop, 'The Fragmentation of Global Environmental Governance: Causes, Consequences, and Responses' (Bonn, Germany, August 2011).

water and fisheries is significantly advanced while being relatively low for a realm like ozone layer depletion. As to the cause of this diversity, it was recognized that different environmental problems might perhaps require different types of institutional complexity. While much is yet unknown about these differences in complexity, the conference was considered a first step towards comparing the different requirements across the areas of environmental governance.

Importantly, the fragmentation of environmental law may also be caused by spill-over effects of fragmentation between the various levels of governance. As such, fragmentation of international environmental law could also be considered an important reason behind the fragmented structures of European and national environmental law. When national states aim to bring their legal standards in line with the requirements of EU law and international law, they may often follow the developments and structures that derive from these higher levels. The 'piecemeal' fashion in which multilateral environmental agreements were concluded may therefore have caused a similar development at the national level, where regulation on the relevant environmental topics appeared in a similar 'piecemeal' manner.

Fragmentation of environmental law, in particular national environmental law, may thus be caused by spill-over effects from EU and international environmental law as well as by fragmented structures of environmental governance.

5.4 Consequences for the protection of ecosystems

The biggest challenge that fragmentation entails, in light of the ecosystem approach, is its implicit neglect of ecological interlinkages.[79] Indeed, 'fragmented governance is contrary to the very nature of the environment as an integrated, inter-related and holistic phenomenon'. Kotzé holds that 'fragmented governance is the direct opposite of holistic governance, and that it may lead to unsustainable results'.[80]

The fragmentation of both law and governance has caused problems for numerous decision makers and sectoral authorities involved in decisions that may affect different parts of the same ecosystem. Ecological interlinkages between the various parts of the ecosystem are being neglected as rather than considering the integrity of the ecosystem as a whole, separate parts of the

79 Within the context of multilateral treaties, UNEP (n. 75) states in its brief: 'The continual revision and change of multilateral treaties has resulted in variations in interpretation of international rules and principles and it has led to discrepancies in the use, interpretation and strength of international environmental law. While many areas of the environment are now covered by MEAs the specialization of specific sectors has resulted in the neglect of the interlinkages between the specialized MEAs. The fragmentation of international environmental law may thus lead to the neglect of ecological linkages.'

80 Kotzé (2007), 93.

ecosystem can be weighed and considered in an inconsistent manner. The reason, according to Bugge, is that:

> The different authorities weigh and balance their sector objectives against the related environmental effects differently. Environmental values are not treated consistently across sectors. The environment becomes a 'consideration' which is given different weight by different authorities, on a case-by-case basis.[81]

In this situation, the ecosystem will hardly be considered holistically as one system. Instead, various parts and elements of and problems within the ecosystem will be regulated and governed separately.[82]

Besides the risk of neglecting ecological linkages, fragmentation can also lead to counterproductive regulation. It has been suggested that 'constraints designed to protect one environmental medium can encourage alternative activities with even worse environmental effects'.[83] A number of examples from the USA have been provided by Owen:

> If multiple agencies hold responsibility over different aspects or effects of the same activity, they may act at cross-purposes. Local land use regulators, for example, might pass large-lot zoning requirements designed to preserve aesthetic qualities, yet those requirements can spread development across more of the landscape, create perverse outcomes for water quality protection, habitat protection, air quality, and energy use. Energy regulators might try to promote energy-efficient power plant cooling systems even as water quality and fishery regulators complain of impacts upon aquatic systems. Regulators also may not act at all […] even where multiple jurisdictions share the burden of an environmental problem, a 'regulatory commons' dynamic, in which no agency has enough incentive to act, can preclude effective responses. Combinations of inaction and conflicting action also may arise.[84]

This issue has also been addressed by Scott in the context of international environmental law. She mentions the example of the restrictions on the production of chlorofluorocarbons under the 1987 Montreal Protocol[85]

81 Bugge (2010), 9.

82 The responsibility for the ecosystem is thus divided among a large number of agencies that work under different jurisdictions and that have diverging mandates. See for instance, Cortner and Moote (1998), 162; Van Eeten and Roe (2002), 23. The number and diversity of decision makers involved in the governance of ecosystems was also highlighted in UNEP (2005), 91–92.

83 Fontaine (1993), 33–34; Breyer (1993), 22.

84 Owen (2013), 21–22.

85 Montreal Protocol on Substances that Deplete the Ozone Layer (opened for signature 16 September 1987, entered into force 1 January 1989) 1522 UNTS 3.

which led to a significant increase in the production of substitutes to ozone-depleting substances such as hydrochlorofluorocarbons (HCFCs), which are 10,000 times more potent as a greenhouse gas than carbon dioxide. Thus actions taken under the auspices of the Montreal Protocol directly undermined the aims and objectives of the Kyoto Protocol.[86]

Also within Europe this problem of conflicting action was experienced. As Faure argues, 'not only the pieces of legislation in which the protective measures could be found were very different, but also the licensing and standard-setting procedures varied'.[87] This caused practical challenges as, for instance, 'one authority could issue licences allowing the discharge of waste water into the surface water, while another authority could allow noxious gas to be emitted into the air, without any coordination between the decisions'.[88]

Fragmentation may thus lead to both inaction and conflicting action: 'even where no direct conflict between treaty obligations occurs, the creation of divergent standards or the development of different managerial approaches to environmental problems carries the potential to undermine the effectiveness of all the regimes concerned'.[89]

In sum, the fact that different parts of the same ecosystem may be regulated by different legal instruments, at times overlapping in scope and conflicting in substance, seriously complicates the implementation of holistic ecosystem approaches. This challenge may be exacerbated when the legislation is discretionary and open to interpretation. Discretion in environmental law is the subject matter of the next chapter.

5.5 References

Breyer, S., *Breaking the Vicious Circle: Toward Effective Risk Regulation* (Harvard, 1993), 22.

Brownlie, I., 'The Rights of Peoples in Modern International Law', in Crawford, H. (ed.) *The Rights of Peoples* (Clarendon, 1988).

Bugge, H.C., 'Environmental Law's Fragmentation and Discretionary Decision-making. A Critical Reflection on the Case of Norway', in Røsæg, E., Schäfer, H.B. and Stavang, E. (eds) *Law and Economics: Essays in Honour of Erling Eide* (Cappelen Damm Akademisk, 2010).

Carlarne, C., 'Good Climate Governance: Only a Fragmented System of International Law Away?' (2008) 30(4) *Law and Policy* 450.

86 Kyoto Protocol to the United Nations Framework Convention on Climate Change (opened for signature 11 December 1997, entered into force 16 February 2005) 37 ILM 22 (1998). In response to this problem, the parties to the 1987 Montreal Protocol agreed, in 2007, to accelerate the phase-out of production and consumption of HCFCs. See UNEP Ozone Secretariat (2007), 33–4.

87 Faure (2000), 174.

88 Ibid.

89 Scott (2011), 4.

Cortner, H. and Moote, M.A., *The Politics of Ecosystem Management* (Island Press, 1998).

European Commission, 'Partnership for Integration – A Strategy for Integrating Environment into EU Policies' *(Communication)* COM (1998) 333 final.

European Commission, 'Integrating Environmental Considerations into Other Policy Areas – A Stocktaking of the Cardiff Process' (working document) COM (2004) 394.

European Commission, 'Winning the Battle Against Global Climate Change' *(Communication)* COM (2005) 35 final.

European Environment Agency, *Environmental Policy Integration in Europe. State of Play and an Evaluation Framework* (26 May 2005) Technical Report No. 2-2005.

Faure, M.G., 'The Harmonization, Codification, and Integration of Environmental Law: A Search for Definitions' (2000) 9(6) *European Environmental Law Review*.

Fischer-Lescano, A. and Teubner, G., 'Regime-Collisions: The Vain Search for Legal Unity in the Fragmentation of Global Law' (2004) 25 *Michigan Journal of International Law* 999.

Fisher, D.E., 'The Resource Management Legislation of 1991: A Judicial Analysis of its Objectives', in Hassan, J. *et al*., *Resource Management* (Brooker & Friend Ltd, 1999), vol.1A, intro. 1–30.

Fontaine, P.J., 'EPA's Multimedia Enforcement Strategy: The Struggle to Close the Environmental Compliance Circle' (1993) 18 *Columbia Journal of Environmental Law* 31.

Frieder, J., 'Approaching Sustainability: Integrated Environmental Management and New Zealand's Resource Management Act' (1997) Ian Axford (New Zealand) Fellowship in Public Policy.

Hovden, E. and Torjussen, S., 'Environmental Policy Integration in Norway', in Lafferty, W.M., Nordskag, M. and Aakre, H. (eds) *Realizing Rio in Norway: Evaluative Studies of Sustainable Development* (ProSus, University of Oslo, 2002).

Jans, J.J. and Vedder, H.H.B., *European Environmental Law* (3rd, edn Europa Law Publishing, 2012).

Koskenniemi, M., 'International Legislation Today: Limits & Possibilities' (2005) 23 *Wisconsin International Law Journal* 61.

Koskenniemi, M. and Leino, P., 'Fragmentation of International Law? Postmodern Anxieties' (2002) 15(3) *Leiden Journal of International Law* 553.

Kotzé, L., *A Legal Framework for Integrated Environmental Governance in South Africa and the North-West Province* (Wolf Legal Publishers, 2007).

Krämer, L., 'Sustainable Development in EC Law', in Bugge, H.C. and Voigt, C. (eds) *Sustainable Development in International and National Law* (Europa Law Publishing, 2008).

Lafferty, W.M., 'From Environmental Protection to Sustainable Development: The Challenge of Decoupling through Sectoral Integration', in Lafferty, W.M. (ed.) *Governance for Sustainable Development* (Edward Elgar Publishing, 2004).

Lafferty, W.M., Nordskag, M. and Aakre, H.A. (eds), *Realizing Rio in Norway: Evaluative Studies of Sustainable Development* (ProSus, University of Oslo, 2002).

Loibl, G., 'International Environmental Regulations – Is a Comprehensive Body of Law Emerging or is Fragmentation Here to Stay?' in Buffard, I. et al. (eds) *International Law Between Universalism and fragmentation. Festschrift in Honour of Gerhard Hafner* (Martinus Nijhoff Publishers, 2008).

Michanek, G. and Zetterberg, C., *Den Svenske Miljörätten* (3rd, edn Iustus Förlag, 2012).

Ministry of the Environment, *The Swedish Environmental Code. A Résumé of the Text of the Code and related Ordinances* (2001) www.government.se/content/1/c6/02/05/49/6736cf92.pdf (accessed 20 September 2015).

Nordic Council of Ministers, *EIA and its Application for Policies, Plans and Programmes in Sweden, Finland, Iceland and Norway* (TemaNord, 1998).

Owen, D., 'Mapping, Modelling, and the Fragmentation of Environmental Law' (2013) 1 *Utah Law Review* 219.

Perrson, Å., *Environmental Policy Integration: An Introduction* (Stockholm Environmental Institute, 2004).

Scott, K., 'International Environmental Governance: Managing Fragmentation through Institutional Connection' (2011) 12 *Melbourne Journal of International Law* 1.

Steinway, D.M. and Botts, B., 'Fundamentals of Environmental Law', in Steinway, D. M. *et al*. (ed.) *Environmental Law Handbook* (21st, edn Government Institutes, 2011).

Stephens, T., 'Multiple International Courts and the "Fragmentation" of International Environmental Law' (2007) 25 *Australian Year Book of International Law* 227.

United Nations Conference on Environment and Development (UNCED), *Agenda 21: Programme of Action for Sustainable Development* (1992) A/Conf.151/26.

United Nations Environment Programme (UNEP), *Millennium Ecosystem Assessment, Ecosystems and Human Well-Being: Our Human Planet, Summary for Policy Makers* (Island Press, 2005).

United Nations Environment Programme (UNEP), 'Fragmentation of Environmental Pillar and its Impact on Efficiency and Effectiveness', The Environmental Dimension of IFSD, *Issue Brief no*. 2, n.d., www.unep.org/environmentalgovernance/Portals/8/InstitutionalFrameworkforSustainabledevPAPER2.pdf (accessed 20 September 2015).

United Nations Environment Programme (UNEP) Ozone Secretariat, *Meeting of the Parties to the Montreal Protocol 19 'Decision XIX/6: Adjustments to the Montreal Protocol with regard to Annex C, Group I, Substances (Hydro chlorofluorocarbons)'* (21 September 2007) UNEP/OzL.Pro.19/7.

United Nations General Assembly (UNGA), 'Report of the World Commission on Environment and Development: "Our Common Future"', published as annex to UNGA, 'Development and International Cooperation: Environment' (4 August 1987) A/42/427.

United Nations General Assembly (UNGA), 'Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law. Report of the Study Group of the International Law Commission' (18 July 2006) A/CN.4/L.702.

Van Asselt, H., 'Managing the Fragmentation of International Environmental Law: Forests at the Intersection of the Climate and Biodiversity Regimes' (2011) 44(4) *New York University Journal of International Law and Politics* 1205.

Van Asselt, H. *et al*., 'Global Climate Change and the Fragmentation of International Law' (2008) 30(4) *Law & Policy* 423.

Van Eeten, M. and Roe, E., *Ecology, Engineering and Management: Reconciling Ecosystem Rehabilitation and Service Reliability* (Oxford University Press, 2002).

Voigt, C., *Sustainable Development as a Principle of International Law: Resolving Conflicts Between Climate Measures and WTO Law* (Martinus Nijhoff Publishers, 2009).

Young, M.A. (ed.), *Regime Interaction in International Law. Facing Fragmentation* (Cambridge University Press, 2012).

5.5.1 Legislation

Air Quality Directive. Council Directive 2008/50/EC of 21 May 2008 on Ambient Air Quality and Cleaner Air for Europe [2008] OJ L 152/1.

GHG Emission Trading Directive. Council Directive 2003/87/EC of 13 October 2003 Establishing a Scheme for Greenhouse Gas Emission Allowance Trading within the Community and Amending Council Directive 96/61/EC [2003] OJ L 275/32.

IPPC Directive. Council Directive 2010/75/EU of 24 November 2010 on Industrial Emissions (Integrated Pollution Prevention and Control) [2010] OJ L 334/17.

Kyoto Protocol. Kyoto Protocol to the United Nations Framework Convention on Climate Change (opened for signature 11 December 1997, entered into force 16 February 2005) 37 ILM 22 (1998).

Montreal Protocol. Montreal Protocol on Substances that Deplete the Ozone Layer (opened for signature 16 September 1987, entered into force 1 January 1989) 1522 UNTS 3.

REACH Directive. Council Regulation 1907/2006 of 18 December 2006 Concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) [2006] OJ L 396/1.

Renewable Energy Directive. Council Directive 2009/28/EC of 23 April 2009 on the Promotion of the Use of Energy from Renewable Sources [2009] OJ L 140/16.

Rio Declaration. Rio Declaration on Environment and Development (13 June 1992) 31 ILM 874.

Vienna Convention. United Nations Convention on the Law of Treaties (opened for signature 23 May 1969, entered into force 27 January 1980) 1155 UNTS 331.

Waste Directive. Council Directive 2008/98/EC of 19 November 2008 on Waste and Repealing Certain Directives [2008] OJ L 312/3.

5.5.2 Norway

Aquaculture Act of 17 June 2005 no.79 relating to aquaculture.

Energy Act of 29 June 1990 no. 50 relating to the generation, conversion, transmission, trading, distribution and use of energy, etc.

Forestry Act of 27 May 2005 no. 32 relating to forestry.

Marine Resources Act of 6 June 2008 no. 37 relating to the management of wild living marine resources.

Nature Diversity Act of 19 June 2009 no. 100 relating to the management of biological, geological and landscape diversity.

Offshore Energy Act of 4 June 2010 no. 21 relating to offshore renewable energy production.

Petroleum Act of 29 November 1996 no. 72 relating to petroleum activities.

Planning and Building Act of 27 June 2008 no. 71 relating to planning and the processing of building applications.

Pollution Control Act of 13 March 1981 no. 6 concerning protection against pollution and concerning waste.

Watercourses Act of 14 December 1917 no. 17 relating to regulation of watercourses.

Water Resources Act of 24 November 2000 no. 82 relating to river systems and groundwater.

5.5.3 The Netherlands

Environmental Licensing Act of 6 November 2008 'Environmental Licensing (General Provisions) Act' Official Journal 2008, 496 (first text) and Official Journal 2010, 231 (entry into force).

Environmental Management Act of 2 July 1992 'Environmental Management Act' Official Journal 1992, 551.

Water Act of 29 January 2009 'Water Act' Official Journal 2009, 107.

6 Administrative discretion in environmental law

The implementation of an ecosystem approach and the proper weighing and balancing of divergent values is not only complicated by fragmentation of environmental law, but also administrative discretion poses several challenges to holistic ecosystem approaches. Even though discretion is a broad concept that can hardly be framed in a conclusive definition,[1] in this book the term is used in a wide sense, so as to cover inaccurate wording as well as administrative discretion under a statutory provision. Environmental legislation often contains ambiguous terms and principles which leave room for different interpretations and applications. In addition, environmental legislation also regularly provides public decision makers with a widely formulated competence to weigh and balance various interests and values when applying law. The distinction between these two forms of discretion may not be very clear in environmental law, as ambiguous terms and principles often implicitly also require a weighing and balancing of different interests and values. Discretion in environmental law in combination with fragmented structures of law and governance may easily lead to inconsistencies in the application of environmental law.

6.1 What is discretion?

More generally though, discretion refers to the room for choice left to the decision maker by some higher-ranking source or authority. Discretion exists wherever the law leaves a public official free to make a choice.[2] In fact, discretion has become a central and inevitable part of the legal order. It is central to law because contemporary legal systems have come increasingly to rely on express grants of authority to legal and administrative officials to attain broad legislative purposes. It is inevitable because the translation of rule into action, the process by which abstraction becomes actuality, involves people in interpretation and choice.[3] So, discretion is all-pervasive

1 Caranta (2008), 218–219.
2 Babbitt et al. (2004), 1.
3 Hawkins (1992), 11.

in legal systems, though its extent in any particular instance may vary enormously. It is, however, difficult to contemplate the making of a legal decision that does not have at least a measure of discretion.[4]

Discretion can take the prominent place as a concept intimately connected with divergence that provides the freedom to follow alternative routes within a bound framework. In other words, discretion can give the necessary room to existing divergences within a legal system.[5] As an illustration, broad concepts such as 'public order' or 'public policy' are vaguely formulated concepts that leave decision-making authorities a broad margin of discretion. In the cases where they are found to be present, authorities can claim a wide range of powers. Often, they provide a justification for 'deviating' from the law.[6]

Many of the key substantive provisions and rules of environmental law are quite general and formed in an open style; they leave much administrative discretion to the executive in the application of the provisions. They either explicitly or implicitly prescribe a general balancing between the various interests when decisions are taken.[7] Even though the degree of discretion varies across the legal acts and from one country to the other, a certain degree will often be present in legal instruments dealing with environmental matters. Throughout this chapter the term discretion is used in a wide sense, so as to cover inaccurate wording as well as administrative discretion under a statutory provision. Environmental legislation often contains ambiguous terms and principles which leave room for different interpretations and applications. In addition, environmental legislation also regularly provides public decision makers with the authority to weigh and balance various interests and values when applying law. As mentioned above, the distinction between these forms of discretion is not always very clear as authorities often need to balance different concerns and interests as a result of legal principles and ambiguous legal provisions and requirements.

6.2 Forms of discretion

This section will describe two forms of discretion. First, discretion within certain types of legal rules of environmental law and second, discretion that follows from some of the principles of environmental law.

6.2.1 Discretion in the rules of environmental law

The rules of environmental law are numerous. As for every activity with a potential effect on the environment, different legal rules apply. The rules of

4 Ibid., 11–12.
5 Brand (2008), 230.
6 Ibid., 227.
7 Bugge (2010), 3.

environmental law are not homogenous in character. They may vary from being more abstract to being more concrete. A considerable number of legal rules are rather abstract and formulated in an open form; they contain a degree of discretion. For instance, the term 'disproportionate costs' used in the EU Water Framework.[8] This term is used in a derogation clause, therefore understanding its meaning in context is highly important. It appears that if there could be a measure taken that is the best option for the environment but entails 'disproportionate costs', a member state is free to choose an alternative that would not be the most environmentally beneficial measure.[9]

Another example can be found in one of the management aims of the Norwegian Nature Diversity Act of 2009, which states that: 'The objective is to maintain the diversity of habitat types within their natural range and the species diversity and ecological processes that are characteristic of each habitat type. The objective is also to maintain ecosystem structure, functioning and productivity *to the extent this is considered to be reasonable*.'[10]

Administrative discretion may appear most significantly within sector legislation. Since the beginning of the development to integrate environmental considerations into sector policies, various legal instruments have in fact included references to environmental protection. The main aim of these legal acts is often to regulate particular activities such as planning and building, or energy production. The legal rules that require environmental considerations to be taken into account when decisions need to be made are formulated rather generally and openly, and contain a high degree of discretion for decision makers to weigh and balance various interests. A common requirement that may be found in sector legislation is that the environmental impacts that will follow from the particular planned activity need to be assessed ex ante.

One example of administrative discretion within sector legislation is the discretion given to the pollution control authority to decide whether to provide a permit for an activity that may cause pollution. Pursuant to the Norwegian Pollution Control Act, the pollution control authority 'shall pay particular attention to any pollution-related nuisance arising from the project as *compared with any other advantages and disadvantages so arising*'.[11]

Some other Norwegian environmental legal acts also serve to illustrate the degree of administrative discretion. The key provision in the Energy Act simply states that production or transmission of energy requires a permit, and the objective of the act is to ensure energy production that is 'rational' for society.[12] According to the Aquaculture Act, an installation

8 Article 4(7)d of Council Directive 2000/60/EC of 22 December 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive) [2000] OJ L 327.
9 Ibid. For a detailed assessment of this article, see European Commission (2009).
10 Article 4 of the Nature Diversity Act, emphasis added.
11 Article 11 of the Pollution Control Act, emphasis added.
12 This reading lies within the definition of Articles 1–2 of the Energy Act.

for aquaculture requires a permit, which may be granted if it is environmentally 'reasonable'.[13] Also, the legal framework for spatial and land use planning in the Planning and Building Act, which is decisive for major infrastructure developments, provides the planning authority with very broad discretionary powers.[14] Obviously these rules are not very clear.

Environmental law does not merely consist of rules with a considerable degree of administrative discretion. The degree of discretion differs from legal act to legal act; the legal rules vary from being highly concrete and specific to being more abstract and vague. Even though concrete legal rules may be found, a certain degree of discretion may often be present.

The problem with discretionary rules in light of an ecosystem approach is in particular that the protection of the environment or of an ecosystem may not be ensured by law. Rather, the actual level of protection of an ecosystem will be determined by weighing and balancing assessments carried out by public authorities from different sectors. As shown in Chapters 2 and 3, these weighing and balancing assessments often involve scientific uncertainties, complexities and controversial values. This entails not only that the actual level of protection of an ecosystem may be very inconsistent and disjointed, but also that this level of protection is insufficient to ensure the maintenance of ecosystem integrity.

6.2.2 Discretion in the principles of environmental law

When rules contain a certain degree of discretion, environmental principles may play an important role. The section shows that even though the principles provide some direction, most principles allow for a varying range of interpretations. This, in combination with the fragmentation of environmental law, may increase inconsistency in the manner environmental considerations are integrated within sectors policies.

The development of principles and legal rules that now form the body of environmental law has been influenced by the concept of sustainable development[15] that really became popular in 1987 through the publication of

13 Article 6(a) of the Aquaculture Act.

14 Bugge (2010), 5.

15 Almost all environmental legal acts from the past two decades refer to the ideal of sustainable development, either in its preamble or within the legal text itself. For instance, at the European level, the ideal of sustainable development has been explicitly mentioned in various EC directives, such as the Directive on Industrial Emissions (n. 724) or the Council Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe [2008] OJ L 152/1. Throughout this section, sustainable development is referred to as an overarching objective or ideal, and not as one of the principles of environmental law. Several scholars do, however, refer to sustainable development as a principle of environmental law. See for instance Bosselmann (2008), 50–56.

'Our Common Future'.[16] Indeed, to support environmental protection and sustainable development, a group of experts under the WCED formulated a set of 22 legal principles and 13 proposals for 'strengthening the legal and institutional framework'.[17] In addition, the 1992 Rio Declaration on Environment and Development particularly mentions a number of environmental principles that now play an important role in international and national environmental law and policy.[18] Examples are the integration principle,[19] the precautionary principle[20] and the principle of public participation.[21] The formulation of these principles can be seen as an effort to make the rather abstract ideal of sustainable development more concrete.[22]

Principles have been developed and have influenced legal instruments also at the European and at the national levels. Currently, Article 191(2) TFEU, in which the principles of precaution, prevention, rectification at the source, and the 'polluter pays' principle have been included, reads as follows:

> Union policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Union. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay.

The principles of environmental law are also present within various EU directives. For instance, the Directive on Industrial Emissions states it is in compliance with the 'polluter pays' principle and the principle of prevention, while Article 11(b) of the directive prescribes that measures to control pollution must be in accordance with the principle of best available techniques.[23] Moreover, the precautionary principle, which is understood as a part

16 In this report, sustainable development was described as 'a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations'. UNGA (1987), 46.

17 WCED (1986), 6.

18 Rio Declaration on Environment and Development (13 June 1992) 31 ILM 874.

19 Article 4 of the Rio Declaration states that, '[i]n order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it'.

20 Article 15 of the Rio Declaration states that, '[i]n order to protect the environment, the precautionary approach shall be widely applied by states according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation'.

21 Principle 10 of the Rio Declaration.

22 Verschuuren (2006), 220.

23 Council Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control) [2010] OJ L334/17.

of the principle of best available techniques in this directive, also plays an important role.[24]

Among the principles of environmental law, there are principles of a more substantive nature and procedural principles. Principles such as the precautionary principle and the 'polluter pays' principle are more of a substantive nature and will help us discover the foundations for decisions to be taken and judgements to be made. Procedural principles are often more like rules. An example of the latter may be the principle that 'an environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significantly adverse impact on the environment and are subject to a decision of a competent national authority'.[25] Other examples are the principles on the access to information, participation in decision making and access to justice.[26]

With regard to the relationship between environmental principles and legal rules, it may be argued that the ideal of sustainable development requires more concrete legal instruments to be brought into action to generate more sustainable use of the Earth's resources. The formulation of legal principles is a first step to make the ideal more concrete, and to apply these principles certain, even more concrete, rules are developed.[27]

Thus, it may be argued that these principles are bridging the gap between the objective of sustainable development and the directly applicable and enforceable environmental legal rules. Verschuuren argues that they are a necessary medium for the ideal to find its way into concrete rules.

Principles may play an important role when legal rules are formulated openly. When legal rules are formulated openly, and decisions need to be taken, that involve conflicting concerns, recourse may be taken back to the environmental principles. Indeed, these principles may be used by administrative authorities and by courts in the process of interpreting legal rules in concrete cases, especially in cases where the rules are unclear or leave the competent authorities a great deal of room for discretion, or where there are conflicting rules. So, the relevance of principles for legal practice is especially apparent when applying and interpreting rules in concrete cases.[28] Importantly, the use of these principles can thus contribute to consistency in the application of discretionary rules.

More concretely, when the precise content of the legal rule is unclear, the legal rules may be applied in the light of relevant environmental principles that explicitly or more implicitly have shaped the legal act. Furthermore, environmental principles can enhance the normative power of legal rules.

24 Ibid. Article 11(h) states that the necessary measures are taken upon definitive cessation of activities to avoid any risk of pollution and return the site of operation to the satisfactory state defined in accordance with Article 22.
25 Principle 17 of the Rio Declaration.
26 The three principles are to be found within Principle 10 of the Rio Declaration.
27 Verschuuren (2006), 225.
28 Ibid., 244–247.

When a legal act, for instance, includes a rule that states that in a protected area of natural beauty certain activities can only be carried out after a permit has been obtained, this does not give any clue as to what criteria such a request must be tested against and under what conditions such a permit can be granted. The legal rule acquires a greater normative power if principles are included in the legal act itself, or if the legal rules in practice are influenced by environmental principles outside the legal act.[29]

Principles, however, do not aspire to denoting or determining exactly the outcome of decision-making processes. Instead they imply a certain normative direction and indicate different possible factors that may be taken into account and weighed against each other.[30] Even within the normative direction set by the principle in question, a variety of interpretations seem possible. As also stated by Tarlock:

> Principles such as environmental impact assessment, polluter pays, precaution and sustainable development are useful starting points but they can only serve as guideposts to structure dynamic, but inevitably ad hoc, decision making processes.[31]

The principles of environmental law could actually serve to reduce the problems of fragmentation and broad discretionary powers, provided that they are understood and applied consistently by the various public authorities. Most of the substantive principles, however, are interpreted inconsistently and the application of legal rules in the light of these principles seems not to result in consistent outcomes.

Even the overarching objective of sustainable development is subject to an extensive debate on its concrete understanding and its role within individual decisions. In Norway, for instance,

> The meaning of the expression varies considerably, and the objective [of sustainable development] is more related to a sustainable management of the resource for the benefit of the respective industry and the

29 Ibid., 227–228, 244–247.

30 Ebbesson (2010), 418–419; see also Winter (2004), 9–28, for a discussion on the difference between environmental principles and legal rules. Winter states on p.15: 'There is wide agreement among legal philosophers that principles are open for balancing against other principles whilst rules have to be applied in any case. Whilst principles are committed to one objective or value and must be compromised if conflicting with opposing principles, rules are conclusive. Rules may however provide that exceptions are possible. Often such exceptions will be door openers for other concerns, which represent a counter principle to the principle which primarily stands behind the rule'. See also Bosselmann (2008), 54: 'Most legal theorists hold the view that principles differ from rules by degrees, rather than substantially, with principles representing "a greater generality than rules" and rules having more focus and practicality'.

31 Tarlock (2004), 239–240.

> Norwegian society, than to the broad meaning of the concept as defined by the Brundtland Commission. It thus remains somewhat unclear what its real legal meaning and importance is in Norwegian law.[32]

This may be due, to a certain extent, to the vagueness of the definition itself. In 'Our Common Future', sustainable development has been described as follows:

> Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.[33]

Pardy argues that sustainable development is accomplished when everything is taken care of – the environment is protected, the economy is developed and social equity is achieved. However, the definition does not prescribe a way to resolve conflicting priorities so as to reach that end:

> Sustainable development incorporates environmental, social, and economic concerns, but it does not prioritize them, or define their relationship. Where environmental, social, and economic interests are in conflict, sustainable development does not say which interest should prevail.[34]

An impressive amount of literature exists that discusses the meaning of sustainable development and the relationship between the various goals that sustainable development aims to accomplish. It goes beyond the extent of this chapter to present this extensive academic dialogue. However, it could be mentioned that there have been developed two approaches to sustainable development.[35] Under the first approach, which is referred to as 'weak sustainability', ecological sustainability and economic development are considered equally important and they are substitutable. So, when degradation of the environment is compensated by economic growth, this would be in accordance with the principle of sustainable development. Under the second approach, which is referred to as 'strong sustainability', it is recognized that certain assets of the environment are not substitutable and that a particular state of the environment should always be protected.[36]

32 Bugge (2014), 35. See also Jerkø (2009), 354.
33 UNGA (1987), 43.
34 Pardy (2001), 403–404.
35 In an influential work on this issue, Pearce and Atkinson (1993) introduced more precision and rigour into the thinking around substitutability by defining the concepts of weak sustainability and strong sustainability. Pearce and Atkinson (1993), 103.
36 For an endorsement of strong sustainability, see for example Voigt (2009), 41, where she states that 'sustainable development demands more than the abstract juggling of ecological, economic and social goals. It implies that ecological functions exist that are indispensable for a durable and globally equitable human society. It requires nations to set out and implement concrete goals that submit

Variations of the understanding of sustainable development have been developed in the academic world. In addition, a variety of interpretations have been applied in legal practice. Notwithstanding the need for 'strong sustainability' given the trend of degradation of our ecosystems, there appears to be no consensus on the concrete meaning of sustainable development, and it seems therefore difficult to interpret the legal rules in the light of the objective of sustainable development.[37]

The precautionary principle faces similar challenges. The core of the precautionary principle is that:

> [I]n performing their obligations of environmental protection and sustainable use of natural resources states cannot rely on scientific uncertainty to justify inaction when there is enough evidence to establish the possibility of a risk of serious harm, even if there is as yet no proof of harm.[38]

Notwithstanding international consensus on this core, 'uncertainties in the meaning, application and implications of the precautionary principle still exist'.[39]

Birnie, Boyle and Redgwell noted that:

> The precautionary approach is not universally applied: instead, states have been selective, adopting it in the Climate Change and Biological Diversity Conventions, but not in the 1994 Nuclear Safety Convention or the 1995 Washington Declaration on the Protection of the Marine Environment from Land-based Activities; or the 1998 Rotterdam PIC Convention. There are also different thresholds of harm: Rio Principle 15 and the Climate Change Convention require a risk of 'serious or irreversible harm' before the principle becomes applicable, but treaties on the marine environment do not. In some cases […] there is a reversal of the burden of proof, while in others it merely lowers the standard of proof, but to what level remains uncertain. A precautionary approach can also be characterized in different ways.[40]

all other activities under the protection of those essential natural conditions on which human societies depend.' See also Bosselmann (2008), 53: 'Development is sustainable if it tends to preserve the integrity and continued existence of ecological systems: it is unsustainable if it tends to do otherwise'.

37 For a more detailed overview of the concept of sustainable development in European law, see Krämer (2008), 391 and 393, who concludes that 'Community law and policy have not been able to develop a meaningful interpretation of "sustainable development"', and that 'whatever measure or action is taken, it can be declared as "sustainable"'.

38 Birnie and Boyle (2002), 120.

39 Ibid.

40 Birnie et al. (2009), 160.

The role of the environmental principles for reducing the problems of fragmentation and discretionary rules is thus limited. Even though they may indicate a certain normative direction, a variety of applications seems possible. This follows from their nature as legal principles. As Ronald Dworkin stated:

> A principle […] states a reason that argues in one direction, but does not necessitate a particular decision […] [T]here may be other principles or policies arguing in the other direction […] If so, our principle may not prevail, but that does not mean that it is not a principle of our legal system, because in the next case, when these contravening considerations are absent or less weighty, the principle may be decisive. All that is meant, when we say that a particular principle is a principle of our law, is that the principle is one which officials must take into account, if it is relevant, as a consideration inclining in one direction or another.[41]

The use of these principles will thus not necessarily contribute to increased consistency in the application of discretionary rules in the era of fragmentation. This may have some important consequences for the protection of ecosystems.

6.3 Rationales behind discretion in environmental law

Discretion in environmental law serves a number of purposes. An important argument is related to the often complicated decision-making structures that characterize decision making on the environment. In his article, Bugge addresses the question of whether key elements of environmental law need to be so open and 'political' in their form, and reasons that this is necessary to some extent:

> This has to do with the nature of the problem that environmental law relates to, in particular the *complexity* of the problems and of the many interests – often many conflicting interests – involved […] There are a number of third party interests involved in environmental cases. These are of various types and strengths; both multiple and conflicting *public* interests, and several contradictory *private* interests, and interests at different levels – local, national, and international […] [I]t is difficult to see how these complex types of conflicts can be regulated in a just and reasonable way through simple, clear-cut legal rules. Therefore it is difficult to make conflict-solving here a legal exercise alone, in the sense of applying a given rule to a given fact and getting the answer. If one does this, the risk is that the decisions are neither environmentally acceptable, nor socially just, nor efficient in the economic sense of the word.[42]

41 Dworkin (1978), 26.
42 Bugge (2010), 7, emphasis in original.

Ruhl also suggests that decisions on environmental matters will be difficult to make without the exercise of discretion. This is so because decisions on the environment and ecosystems frequently involve incomplete scientific information and trade-offs, not only between ecological and economic interests, but also between different ecological interests.[43] Discretion in environmental law thus enables the solving of legal disputes that involve different interests on a case-by-case base.

A different argument behind discretion in environmental law is related to the need for the adaptive management of ecosystems. Adaptive management has been recognized as a method to manage complex ecological systems. The concept promotes the notion that management policies should be flexible and should incorporate new information as it becomes available. It stresses the continuous use of scientific information and monitoring to help organizations and policies change appropriately to achieve specific environmental and social objectives.[44]

Adaptive management, as a requirement for ecosystem management, is considered an important tool to deal with uncertainty, especially uncertainties with regard to the relationship between human behaviour and ecosystem performance. Nagle and Ruhl argue that:

> Just as ecosystems are continually changing over time, so, too, will the understanding of their ecology and, by implication, the management choices based on this understanding. Scientists and policy analysts generally recognize that their understanding of how different ecosystems function and change and how they are affected by human activities is incomplete. For this reason, they see a need for continually researching, monitoring, and evaluating the ecological conditions of ecosystems and where necessary, modifying management on the basis of new information to better accommodate socioeconomic considerations while ensuring the minimum or desired ecological conditions are being achieved.[45]

Ebbesson emphasizes that this nature of environmental problems and of ecosystems requires a degree of flexibility:

> Indeed, the complexity of ecosystems, its non-linear dynamics, uncertainties and surprises, and the many interests that may be involved, requires a certain degree of flexibility for institutions to deal with changes.[46]

43 Ruhl (2007), 32.
44 Ibid., 29.
45 Nagle and Ruhl (2002), 334.
46 Ebbesson (2010), 414. Other factors and conditions that he identifies as particularly relevant for the ability to govern socio-ecological systems and common-pool resources and to cope with surprises and unpredicted and complex changes are: openness of institutions so as to provide for broad participation, not least in local decision making and administration; effectiveness of multilevel governance;

There is thus an understanding that a certain degree of discretion in environmental law is inevitable, especially in the case of the governance of (parts of) ecosystems. In his book *Wild Law*, Cullinan argues that if laws are to be effective they need to recognize the inherent nature of the subject matter with which they are concerned. This means that a governance system must to some extent reflect, or at least correspond with, the qualities of that which it is seeking to regulate. For example, if we observe that one of the qualities of the environment is that it is constantly changing, we need environmental laws and governance structures that are flexible and adaptable.[47]

It has been argued that facilitating adaptive management thus requires discretion in the legal system in order to be able to respond quickly to changes in the system. Suppose you first had to alter the law in order to be allowed to undertake particular measures, this could unnecessarily delay the process.

6.4 Consequences for the protection of ecosystems

Above, several arguments behind discretion in environmental law have been mentioned. This section will emphasize that even though discretion in law enables decision makers to deal with sudden changes, it may, however, not necessarily ensure the maintenance of ecosystem integrity. According to Bugge:

> It remains difficult to use this discretion in a manner that will lead to sustainable outcomes, particularly when many diverging interests are involved, and these interests are of various types and strengths; both multiple and conflicting public interests, and several contradictory private interests, and interests at different levels – local, national and international. The interests range from clear and short term economic profit on the one hand, to uncertain, vague, long term effects on ideal, 'soft' and disputed values such as environmental values and future concerns at the other end of the spectrum.[48]

Likewise, due to the risk that environmental concerns are not properly taken into account, discretion has also been criticized by Pardy:

> When there is a high degree of discretion, everything is up for grabs – a particular decision can be justified by social, economic, political, cultural, or aesthetic benefits if they are thought to outweigh the permanent effects caused to ecosystem function; allowing alteration of an ecosystem

and social structures that promote learning and adaptability without limiting the options for future development.

47 Cullinan (2011), 26.

48 Bugge (2010), 7.

> because, for example, the economic benefits will 'improve the overall human environment'.[49]

Wherever there is room for judgement, there is room for bias.[50] Notwithstanding the possibility to integrate and weigh 'environmental' arguments, there is no guarantee that these arguments will influence the outcome of a particular decision. Moreover, discretion allows public officials to integrate and weigh in their own manner, which may result in an inconsistent approach towards the ecosystem and fragmented governance of different parts of the same ecosystem. It is argued that discretion allows public officials to impute their own values. As a result, two identical cases may be dealt with quite differently.[51]

Environmental law has also been criticized for lacking a 'hard core' of substantive legal rules. The legislation establishes institutions, systems and procedural rules, and it lays down certain general objectives and principles to be observed. However, when it comes to the actual protection of the environment, *the legal core* is neither very precise nor very 'hard'.[52] In the words of Tarlock:

> Environmental law has substantially influenced other, established areas of law such as administrative law, international law, property, torts, and water law as well as more remote subjects such as corporations, securities regulations, and intellectual property. However, when one sums up the cases, statutes, and administrative regulations that make up the core of what most people consider environmental law, one is hard pressed to reduce them to a set of distinctive, fundamental principles, let alone rules that can be applied to a wide range of current and future issues, as one can do in other areas of 'real law'.[53]

While the rationale behind a certain degree of discretion in environmental law is explicable, it is also crucial to comprehend the hazards of discretion in light of the overall aim of the ecosystem approach, which is the maintenance of ecosystem integrity. As explained in Chapter 4, decisions on the environment often involve ecological values that cannot be easily monetized and compared with, for instance, economic or social values. It is not only difficult to set a 'right' price on these ecological values; it is also highly challenging to weigh and balance all these divergent values. In addition, due to the number of decision makers involved from different sectors of governance which

49 Pardy (2006), 213–214.
50 Babbitt et al. (2004), 2.
51 Ibid., 3.
52 Bugge (2010), 6.
53 Tarlock (2004), 218.

maintain different priorities, the protection of the ecosystem is not necessarily ensured.

Verschuuren believes that due to discretion and flexibility, the ecological aspects of the ideal of sustainable development can be sufficiently advanced in decision-making processes by governmental authorities and courts, because most principles that rule environmental decision-making processes create enough room to take into account the more eco-centred arguments.[54]

Yet especially the use of substantive principles in environmental governance has been condemned by various scholars in particular because of the soft character of these principles. Tarlock expresses the following concerns:

> Such [substantive] rules do not exist in environmental law, which instead consist of a mess of incoherent ideas that lack traction.[55]
>
> However, the hoped-for substantive rules are unlikely to emerge in the future. The basic reason is the science-based nature of environmental law precludes the definition of hard rules and pushes the law toward process rather than consistent outcome.[56]
>
> Principles such as environmental impact assessment, polluter pays, precaution and sustainable development are useful starting points but they can only serve as guideposts to structure a dynamic, but inevitably ad hoc, decision making processes.[57]

Pardy states that environmental law principles, such as sustainable development, the precautionary principle and the 'polluter pays principle', among others, cannot be used to determine the outcome of particular cases, nor have they been given this role in environmental legislation. Instead of articulating a priority or defining a hierarchy, they merely describe an ideal. Sustainable development, for example, does not prescribe ways or means to resolve conflicting priorities so as to reach that end:

> Sustainable development incorporates environmental, social, and economic concerns, but it does not prioritize them, or define their relationship. Where environmental, social, and economic interests are in conflict, sustainable development does not say which interest should prevail.[58]

Even though discretion in the legal system enables actors to respond to changes in the ecosystem as they emerge, however, there may simultaneously be a risk of ecosystem degradation.[59] In sum, discretion in law may serve

54 Verschuuren (2006), 54.
55 Tarlock (2004), 219.
56 Ibid., 239–240.
57 Ibid., 219.
58 Pardy (2001), 403–404.
59 Pardy (2006), 213–214.

several well-grounded purposes. Yet in light of the overall protection of the ecosystem, there may be various challenges and the maintenance of the ecosystem's integrity will not necessarily be ensured.

6.5 The interrelationship between fragmentation and discretion

Assessed in combination, the difficulties arising from fragmentation and discretion may reinforce one another. Weighing and balancing assessments are carried out on parts of the ecosystem under different legal and political constraints. This is caused by the fragmentation of environmental law and governance and the discretionary powers given to officials by certain environmental rules and principles. Discretionary rules and principles are problematic because they allow officials to outweigh values of ecosystem services by other values that are, according to their criteria, more overriding. Currently, a considerable degree of uncertainty about the functioning of ecosystems still exists. Particularly in the case of ecosystems that provide life-supporting systems, it becomes clear that certain ecological values cannot simply be traded off.

In addition, subjectivity in weighing assessments may lead to inconsistent outcomes where the value of the ecosystem is contextualized to the facts of the case and the other values at stake. The conservation of ecosystem structure and functioning may not be ensured. This problem is exacerbated when environmental governance is fragmented: the scope of the valuation and weighing exercises then covers only a fragment of the larger ecosystem. How to ensure the integrity of the ecosystem as a whole, while we are only valuing and governing parts of the system?[60]

Various legal acts may apply to the same ecosystem and different public authorities may be involved in decision-making procedures affecting a particular ecosystem. When discretion is used differently under various legal and administrative frames, it becomes difficult to ensure the maintenance of the integrity of the ecosystem as a whole. Besides complicating the governance of an ecosystem 'as a whole', the fragmentation of environmental law could even disable the possibility of ecosystem-based governance due to the demarcation of the ecosystem into different jurisdictional zones. Legal instruments differ in their geographical scope and public officials often have been assigned particular mandates within the frame of the applicable legislation. How could a governance approach be based on the ecological boundaries of the ecosystem while the jurisdictional boundaries provide the framework wherein decisions are being taken?

Both fragmentation and discretion in environmental law may impede approaching ecosystems as complex adaptive systems, integral wholes composed of a dynamic network of relationships. The nature and behaviour of one part is determined by the whole rather than the other way around and

60 See further Platjouw (2013).

everything is interconnected. For this reason, the effectiveness of environmental law may be questioned when it only addresses single issues at a time and provides a wide degree of discretion to public officials to decide on highly multifaceted and complex matters.[61]

6.6 The need for strong substantive rules

Environmental law is in need of clear substantive rules that ensure the protection of our ecosystems. Indeed, substantive rules which actually protect ecosystems against excessive human impacts are crucial for the maintenance of ecosystem integrity. As long as much of the uncertainty remains around the functioning of our ecosystems, the main focus should be on the protection of their integrity by substantive law. For sure, learning and monitoring should be encouraged while governing our ecosystems in order to increase knowledge on how human activities affect ecosystems' functioning and productivity. However, already degraded ecosystems do not easily return to their original states even after people's knowledge has increased. Due to the possibility of severe consequences on the capacity of ecosystems to provide ecosystem services on which our well-being and sustenance depends, the key focus should be on the *protection* of essential ecosystems by law.

When substantive ecosystem-protective rules are lacking or not strong enough, it is very likely that short-term interests are prioritized over long-term ecological protection in decision-making procedures. As demonstrated in Chapter 3 on the valuation of ecosystem services, not all values of ecosystem services will be easily captured in monetization exercises. In particular the values that do not provide any direct and 'visible' benefits to people often remain badly represented in decisions. In addition, certain species that perform key functions in respect of an ecosystem's degree of resilience may not have any short-term utilitarian value at all. Without the protection of such species by law, it will be hard to ensure their protection against competing short-term interests.

The need for substantive ecosystem-protecting rules has also been emphasized by Annecoos Wiersema. She notices that:

61 A number of scholars have argued that the problem is not just that environmental law is rather fragmented and at times provides a wide margin of discretion to public officials. There is a deeper challenge that is related to the nature of environmental law itself. Environmental law has at times been described as being an example of instrumentalist law, which is law that has been designed to achieve particular purposes. Pardy argues that this instrumentalist approach 'overtly rejects rule of law ideas such as precedent and the application of general rules. Instead it claims to address each new environmental situation as a unique case'. Pardy (2009), 69. Similarly, Tarlock holds that 'adaptation to new knowledge and experimentation should be the hallmark of environmental law'. Tarlock (2004), 232. See further Tamanaha, who states that the rule of law and legal instrumentalism is a mismatched pair, in Tamanaha (2007), 469.

> The main focus has been institutional design, advocating procedures that will allow institutions to be responsive to science, to be flexible and adaptive to new information, to encourage deep collaboration, and to operate non-hierarchically in a manner cognizant of multiple scales of time and spaces. This needs to be supplemented. In order to ensure effective conservation, the procedures must have sufficiently specific substantive goals to guide their activity and that these substantive goals are embedded in law […] [W]ithout attention to these goals, some of the interests that are crucial to ensuring long-term protection will be left out of decision-making processes and the procedures advocated in the new models.[62]

Wiersema raises the question of whether there is a way that law might play a role in ensuring that the goal of environmental protection over the long term is not lost to competing short-term interests. 'We cannot always be sure that reliance on a broad set of goals will move towards better environmental protection. Further, we cannot depend on the activity of scientists to move us in that direction without some kind of framework that can guide their activity, and that can act as a bulwark against counter-pressures with more short-term and/or economic force.'[63] She thus recognizes that the use of strong substantive rules can be used to withstand the combination of flexibility and short-term political and economic interests that come into play in environmental decision making.

Recognizing the need of substantive rules that protect ecosystems against excessive and distorting human impacts, she also acknowledges that it is not easy to know how specific the rules should be. She claims that '[t]he goal of ecological integrity is too broad. Although a goal of maintaining ecological integrity can constrain behaviour that is overly harmful, it cannot help us make the more discrete value decisions that will help us determine what level of protection is appropriate in any given instance'.[64]

So, what level of specificity should the substance of those environmental laws contain? In an attempt to develop a rule to solve the problem, Bruce Pardy claims that the aim of ecosystem integrity could be reflected in one simple rule that applies equally to all.[65] He proposes the following rule:

> No one may produce an environmental *impact* that, if multiplied by the number of humans in the ecosystem, would cause a permanent ecosystem *change*, unless a larger encompassing ecosystem can be identified in which no permanent change would result from the impact multiplied by the number of humans in that larger ecosystem.

62 Wiersema (2008), 79.
63 Ibid., 70–71.
64 Ibid., 30–31.
65 Pardy (2005), 50, emphasis in original.

This rule acknowledges that it is not necessary to safeguard all ecosystems. Very small ecosystems may not need to be preserved for the very reason that they form part of larger ones.[66] A marine ecosystem, for instance, may consist of thousands or millions of mini-system pools and puddles that are being regularly created and destroyed. This does not necessarily create a permanent change to the overall marine ecosystem. If there is a change within a small system but there is a larger encompassing ecosystem that has not experienced permanent change, then no ecological damage has occurred. Of importance is the cumulative effect or total load. Moving to a larger system means that the effects of all the human activity within that system must be combined to determine if there is any permanent effect. The larger the system, the more human effects must be included in the calculation of the total impact. Ecological 'damage' thus occurs only when an ecosystem experiences permanent change caused by human impact, unless a larger ecosystem can be identified in which no such permanent change is found.[67]

Importantly, the rule distinguishes between ecosystem impact and ecological harm. Ecosystem impacts in themselves are not prohibited by this rule. Yet it might be difficult to know how much impact on an ecosystem will be too much. Indeed,

> [t]he legal challenge is to identify, in abstract terms, when human impact has exceeded the limits that an ecosystem's self-governing mechanisms can tolerate without altering the ecosystem's developmental path. Cut down a few trees here and there, and no permanent change occurs to the forests. Clear-cut a hundred acres and the ecosystem is fundamentally altered. Drawing an environmental line in the sand is conceptually difficult. How much impact on an ecosystem is too much?[68]

The rule proposed by Pardy defines when human impacts exceed their limits. It says that any kind or extent of impact is permissible unless some fundamental characteristics of the system would be permanently changed if all people within that system inflicted a similar impact. Human activity must take place within the ecosystem's capacity to absorb it without becoming a different system.[69]

While the precise design of these substantive ecosystem-protective rules might need further research, it has become clear that there is an urgent need for them. Discretion in environmental law has drawbacks and may not ensure the maintenance of ecosystem integrity. The alternative is to create strong substantive rules which aim at the protection of essential ecosystems. Scientific knowledge on the state of the ecosystem as well as on its resilience

66 Ibid., 47.
67 Ibid., 48, 50.
68 Pardy (2009), 85.
69 Pardy (2005), 52.

is important as well as knowledge on the nature of our human relationship with the particular ecosystem. Law needs to be designed in a manner which effectively addresses the main challenges and ensures the long-term protection of the particular ecosystem.

6.7 Conclusion

This chapter has assessed the issue of administrative discretion in environmental law. It has been shown that administrative discretion often requires the weighing and balancing of diverse values, amongst which are the values of ecosystem services. Discretion in environmental law raises suspicion, yet the type of discretion needs to be specified. Does the discretion affect the strength of substantive rules and norms in environmental law, or does it merely concern procedural rules? Ebbesson maintains that flexibility is required with regard to organizational matters, to decision-making procedures, and to the leeway bestowed upon actors and institutions when deciding on the management of resources.[70] This appears to be rather broad. When it also involves discretion in environmental law providing public authorities with wide discretionary powers to make decisions and value judgements on (parts of) ecosystems, all the concerns discussed so far will emerge.

When this flexibility mainly concerns procedural aspects that would increase the speed of decision-making procedures for instance, less concern would perhaps be appropriate. At the same time, however, certain procedural aspects may also affect the strength of substantive ecosystem-protective rules. This may concern in particular the lack of finality of decisions and the lack of accountability, which both may contribute to slippage and gaps between the 'laws in the book' and the 'laws in action'. Implementation discrepancies affect the application of the substantive rules in practice. For that reason, it may be questioned which purposes flexibility in procedural rules would serve and whether this is desirable in light of an ecosystem approach.

For now, the arguments in favour of administrative discretion and flexibility in the legal system in order to manage ecosystems effectively are neither well developed, nor are they very convincing. In addition, administrative discretion may also involve unpredictability in legal outcomes and might clash with the notion of the rule of law, as will be shown in Chapter 8.

Rather than complicating the role of law, it may be appropriate to simplify the discussion on the role of law and emphasize the need for environmental law to operate as a system. This mainly refers to the requirement that rules should hang together and that these rules overall support the aim of maintaining ecosystem integrity. Different parts of the legal system need to be consistent and overall the system needs to be coherent. Frankly, we do not necessarily require complex and difficult legal systems to protect ecosystems

70 Ebbesson (2010), 415.

effectively. In fact, the more complex the picture becomes and the more flexibility would be involved in every part of it, the more difficult will it be to establish and maintain consistency and coherence in that legal system. Systemic environmental law is essential in order to protect ecosystems from being degraded. When law is designed as a system, predictability and consistency increase while complexity and discretion decrease.

The next chapter will illustrate the effects of administrative discretion and fragmentation in environmental law by a case study on petroleum exploitation in one part of a marine ecosystem. The challenges that arise out of fragmentation and discretion will be clarified in light of the requirements of an ecosystem approach. Chapter 8 then will further explore the concepts of consistency, coherence and the rule of law in the context of environmental law. It will be clarified that there is a need for consistency and coherence in environmental law for the maintenance of ecosystem integrity.

6.8 References

Babbitt, C. *et al*., 'Discretion and the Criminalization of Environmental Law' (2004) 15(1) *Duke Environmental Law and Policy Forum* 1.

Birnie, P.W. and Boyle, A., *International Law and the Environment* (2nd edn, Oxford University Press, 2002).

Birnie, P., Boyle, A. and Redgwell, C., *International Law and the Environment* (3rd, edn Oxford University Press, 2009).

Bosselmann, K., *The Principle of Sustainability: Transforming Law and Governance* (Ashgate, 2008).

Brand, M., 'Discretion, Divergence, and Unity', in Prechal, S. and Van Roermund, B. (eds) *The Coherence of EU Law: The Search for Unity in Divergent Concepts* (Oxford University Press, 2008).

Bugge, H.C., 'Environmental Law's Fragmentation and Discretionary Decision-making. A Critical Reflection on the Case of Norway', in Røsæg, E., Schäfer, H.B. and Stavang, E. (eds) *Law and Economics: Essays in Honour of Erling Eide* (Cappelen Damm Akademisk, 2010).

Bugge, H.C., *Environmental Law in Norway* (2nd, edn Kluwer Law International, 2014).

Caranta, R., 'On Discretion', in Prechal, S. and Van Roermund, B. (eds) *The Coherence of EU Law: The Search for Unity in Divergent Concepts* (Oxford University Press, 2008).

Cullinan, C., *Wild Law: A Manifesto for Earth Justice* (2nd edn, Chelsea Green Publishing, 2011).

Dworkin, R., *Taking Rights Seriously* (Harvard University Press, 1978).

Ebbesson, J., 'The Rule of Law in Governance of Complex Socio-ecological Changes' (2010) 20 *Global Environmental Change* 414.

European Commission, *Common Implementation Strategy for the Water Framework Directive (2000/60/EC). Guidance document no. 20 Exemptions to the Environmental Objectives under the Water Framework Directive* (Office for Official Publications of the European Communities, 2009).

Hawkins, K., 'The Use of Legal Discretion: Perspectives from Law and Social Science', in Hawkins, K. (ed.) *The Uses of Discretion* (Oxford University Press, 1992), 11–46.

Jerkø, M., 'Det norske formålet 'bærekraftig utvikling' (2009) 3 *Tidsskrift for Rettsvitenskap* 354.

Krämer, L., 'Sustainable Development in EC Law', in Bugge, H.C. and Voigt, C. (eds) *Sustainable Development in International and National Law* (Europa Law Publishing, 2008).

Nagle, J.C. and Ruhl, J.B., *The Law of Biodiversity and Ecosystem Management* (Foundation Press, 2002).

Pardy, B., 'Sustainable Development: In Search of a Legal Rule' (2001) 28 *Journal of Business Administration and Policy Analysis* 391, 403–404.

Pardy, B., 'In Search of the Holy Grail of Environmental Law: A Rule to Solve the Problem' (2005) 1 *International Journal of Sustainable Development Law and Policy* 29.

Pardy, B., 'Ecosystem Management in Question: A Reply to Ruhl' (2006) 23 *Pace Environmental Law Review* 209, 213–214.

Pardy, B., 'The Hand is Invisible, Nature Knows Best, and Justice is Blind: Markets, Ecosystems, Legal Instrumentalism, and the Natural Law of Systems' (2009) 44 *Tulsa Law Review* 67.

Pearce, D.W. and Atkinson, G.D., 'Capital Theory and the Measurement of Sustainable Development: An Indicator of "Weak" Sustainability' (1993) 8(2) *Ecological Economics* 103.

Platjouw, F.M., 'The Valuation of Ecosystem Services: Are the Challenges Too Many to Ensure the Maintenance of Ecosystem Integrity?'(2013) 4 *IUCNAEL EJournal* 5.

Ruhl, J.B., 'The Pardy-Ruhl Dialogue on Ecosystem Management, Part IV: Narrowing and Sharpening the Questions' (2007) 24 *Pace Environmental Law Review* 25.

Tamanaha, B., 'How an Instrumental View of Law Corrodes the Rule of Law' (2007) 56 *DePaul Law Review* 469.

Tarlock, A.D., 'Is There a There There in Environmental Law?' (2004) 19 *Journal Land Use & Environmental Law* 213.

United Nations General Assembly (UNGA), 'Report of the World Commission on Environment and Development: 'Our Common Future', published as annex to UNGA, 'Development and International Cooperation: Environment' (4 August 1987) A/42/427.

Verschuuren, J.M., 'Sustainable Development and the Nature of Environmental Legal Principles' (2006) 9(1) *PER/PELJ* 209.

Voigt, C., *Sustainable Development as a Principle of International Law: Resolving Conflicts Between Climate Measures and WTO Law* (Martinus Nijhoff Publishers, 2009).

WCED, *Legal Experts Group on Environmental Law of World Commission on Environment and Development, 'Legal Principles for Environmental Protection and Sustainable Development'* (WCED, 1986).

Wiersema, A., 'A Train without Tracks: Rethinking the Place of Law and Goals in Environmental and Natural Resources Law' (2008) 38(4) *Environmental Law* 79.

Winter, G., 'The Legal Nature of Principles of International, EC and German Law', in Macrory, R. (ed.) *Principles of European Environmental Law* (Europa Law Publishing, 2004).

6.8.1 Legislation

Air Quality Directive. Council Directive 2008/50/EC of 21 May 2008 on Ambient Air Quality and Cleaner Air for Europe [2008] OJ L 152/1.

IPPC Directive. Council Directive 2010/75/EU of 24 November 2010 on Industrial Emissions (Integrated Pollution Prevention and Control) [2010] OJ L 334/17.
Rio Declaration. Rio Declaration on Environment and Development (13 June 1992) 31 ILM 874.
Water Framework Directive. Council Directive 2000/60/EC of 22 December 2000 Establishing a Framework for Community Action in the Field of Water Policy (Water Framework Directive) [2000] OJ L 327.

6.8.2 Norway

Aquaculture Act of 17 June 2005 no. 79 relating to aquaculture.
Energy Act of 29 June 1990 no. 50 relating to the generation, conversion, transmission, trading, distribution and use of energy, etc.
Nature Diversity Act of 19 June 2009 no. 100 relating to the management of biological, geological and landscape diversity.
Pollution Control Act of 13 March 1981 no. 6 concerning protection against pollution and concerning waste.

7 An illustration of the problem

Offshore petroleum exploitation in the North Sea ecosystem

This chapter presents a case study that illustrates the effects of fragmentation and administrative discretion in environmental law. So far, this book has clarified the risks that fragmented legal frameworks entail for the sustainable governance of our ecosystems. In addition, the weighing and balancing assessments that are required due to administrative discretion in law also entail challenges to the sustainable governance of ecosystems. This chapter demonstrates these challenges more concretely in the context of petroleum exploitation in the Norwegian part of the North Sea ecosystem.

Petroleum exploitation is one of the major activities in the Norwegian part of the North Sea. This case study analyses the legal framework and the decision-making process of the activity of oil exploitation within a valuable ecological area in the Norwegian part of the North Sea. The legal acts that apply to this activity will be examined and their consistency will be discussed. Furthermore, based on the decision-making process and the application of the legal acts, conclusions will be drawn on the consistency between the objectives of the acts and the attainment of these objectives in practice. The effects of administrative discretion will also be clarified. This case study also assesses whether the legal framework in general supports an ecosystem approach, and to what extent values and interests have been explicitly weighed and balanced through the use of ecosystem services valuation.

7.1 Description of the activity and ecological impacts

This case concerns the exploitation of petroleum by Statoil within a specific area in the North Sea called 'The Stjerne Field'. The main issue in this case is that the Stjerne Field is located about 500 metres within the edge of Vikingbanken, a sandy bank area and traditional fishing ground. In the 2013 Management Plan for the North Sea and Skagerrak, Vikingbanken has been recognized as a 'particularly valuable and vulnerable area' due to its important function as a sandeel habitat. Sandeel is a key species in the North Sea ecosystem and is particularly locally based.[1] More specifically, sandeel is a

1 Stortingsmelding nr. 37 [Storting White Paper nr. 37] *Helhetlig forvaltning av det marine miljø i Nordsjøen og Skagerrak (forvaltningsplan)* [Integrated Management of

very important plankton feeder in the region, and is regarded as a key species in the ecosystem due to its ecological function as a vital prey species for sea birds, sea mammals and larger fish.[2]

The fishery of lesser sandeel has been one the most important, if not the most important fishery in the North Sea for the last 30–40 years, with yearly catches around 800,000 tons. However, the stock has declined dramatically during the last ten years, due to overfishing and poor stock recruitment. In order to improve the sandeel stock, Norwegian fisheries management has implemented some important management measures, e.g. reducing quotas and closing the most heavily impacted areas, like Vikingbanken.[3] The exploitation of petroleum from this field may have some severe impacts on the sandeel population and its habitat.

An interesting matter in this case is the considerable periods of time that have passed between the various phases of the decision-making process. In fact, a major part of the North Sea was opened for petroleum activities in 1965. In 1985, in the ninth licensing round, the production licence for the Stjerne Field was awarded to Statoil. Statoil's Plan for Development and Operation was approved by Royal Decree on 16 September 2011 in accordance with Article 4.2, first paragraph of the Petroleum Act.[4] On 20 June 2012, Statoil applied for a licence pursuant to the Pollution Control Act to exploit oil reserves at the Stjerne Field. As will be shown in section 7.3, the opening of an area for petroleum activities has an important effect on future decisions on, for instance, the granting of a production licence. At the same time, however, the time periods between the various stages may be considerable. This has an important effect on the extent to which new scientific knowledge may come into play.

The following activities are expected to take place during the exploitation of the oil field:

- The drilling of four wells (two production wells and two water injection wells), 26'' without riser down to 1,200-metre depth, then with riser beyond 1,200-metre depth.
- The drilling will take place from a floating drilling rig, kept in position by anchors.
- One offshore service vessel will be on location for standby duties, for storage of equipment and for collection of drill cuttings.

the Marine Environment in the North Sea and Skagerak (Management Plan)] (2012–2013), 41.

2 Det Norske Veritas, *Technical Report. Stjerne Field Noise Impact on Marine Organisms Report No. 2012–1382* (15 October 2012).

3 Integrated Management of the Marine Environment in the North Sea and Skagerak (Management Plan) (n. 1), 47.

4 Kongen i Statsråd [King in Council of State], Kongelig Resolusjon [Royal Decree] 'Utbygging og Drift av Stjerne' [Development and Operation of Stjerne Field] (13 September 2011).

- One additional offshore service vessel will probably visit the rig occasionally for supply of equipment/material or for other service purposes. This vessel will not be at the site on a permanent basis.
- No underwater acoustical equipment or borehole seismic is planned to be used.[5]

The exploitation of oil from the Stjerne Field is expected to have the following environmental impacts.

7.1.1 Discharge of drill cuttings

The drilling activities within the Stjerne Field will entail a discharge of drill cuttings from the top holes of the four wells of 300 metres^3 per well, which means a total discharge of 1,200 metres^3. The discharge of cuttings causes sedimentation of the sea bottom near the point of discharge, and organisms in the water will be exposed to cutting particles. Larger particles will sediment in the immediate vicinity of the drilling point, while fine particles will be refined and spread over a larger area. Discharges of cuttings could mean that the seabed near the drill site would be unsuitable for sandeel, and there is little knowledge about the likely impact of a possible re-establishment of an affected sandeel stock.[6]

7.1.2 Noise

The second phase of the exploitation activity will partly take place within the spawning period for the sandeel. During this phase, there will be no discharge of cuttings. The major impact during this phase will be noise and vibrations caused by the drilling.[7]

Considerable efforts, from scientific and management communities, have been made to address the general issue of potential effects of anthropogenic noise on marine life, and a substantial amount of results have been compiled from a range of studies. However, it is recognized that current knowledge on the impacts of marine life is incomplete, frequently inconclusive and occasionally contradictory.[8] An important reason for this is the highly complex nature of the topic, involving a range of organisms (species) differing in their physiology makeup and ecological function, as well as the range of sound sources producing sound signals with different acoustic characters.[9]

For this reason a specific 'noise impact assessment' has been carried out to model the expected underwater noise situation at and around the Stjerne

5 *Stjerne Field Noise Impact on Marine Organisms Report No. 2012–1382* (n. 2).
6 Klima- og forurensningsdirektoratet [Norwegian Environment Agency] *Boring av produksjonsbrønner på Stjernefeltet, lisens 104, blokk 30/9* [Drilling of the production wells in the Stjerne Field, licence 104 block 30/9] 16 March 2012 (reference: 2011/1925), 3.
7 Ibid., 5.
8 OSPAR Commission (2009).
9 *Stjerne Field Noise Impact on Marine Organisms* (n. 2), 7.

Field. This assessment was based on information received about the expected activities at the field, the geological formations in the ground, the bathymetry, on current knowledge about biological susceptibility to underwater noise and on the marine species expected to be present at and around the area. Four different fish species and two types of marine mammals have been identified for the area. The most vulnerable of these may be the sandeel.[10]

The 'noise impact assessment' indicated that the expected typical noise level scenarios for the field will be moderate and only exceed the general background noise in the area for a limited range from about 100 metres to a maximum of 2,000 metres from the drilling location. The results show that the noise from the service vessel(s) will be the strongest noise source.[11]

In sum, the exploitation of petroleum from this field may thus have impacts on the sandeel population and its habitat, resulting from the discharge of drill cuttings and the effects of noise. Given the fact that the sandeel population and the Vikingbanken already are strongly affected by human activities, certain impacts may be undesirable.

7.2 Norway's legal framework to petroleum exploitation

The exploitation of petroleum resources in the Norwegian part of the North Sea needs primarily to be in accordance with the Petroleum Act (1996),[12] the Pollution Control Act (1981)[13] and the Nature Diversity Act (2009).[14]

7.2.1 The Petroleum Act

The Petroleum Act is the main act that regulates petroleum activities. As stated in Article 1-2, second paragraph, of the Petroleum Act, various purposes are to be aimed at while carrying out petroleum activities. This provision stipulates that:

> Resource management of petroleum resources shall be carried out in a *long-term perspective* for the benefit of the Norwegian society as a whole. In this regard the resource management shall provide revenues to the country and shall contribute to ensuring welfare, employment and an *improved environment*, as well as to the strengthening of Norwegian trade and industry and industrial development, and at the same time take due regard to regional and local policy considerations and other activities.

10 Ibid.
11 Ibid.
12 Act of 29 November 1996 no. 72 relating to petroleum activities [Petroleum Act].
13 Act of 13 March 1981 no. 6 concerning protection against pollution and concerning waste [Pollution Control Act].
14 Act of 19 June 2009 no. 100 relating to the management of biological, geological and landscape diversity [Nature Diversity Act].

The main aim is thus that resource management of petroleum activities shall benefit the entire Norwegian society. The second sentence then sums up examples of how petroleum activities benefit society. The activities shall provide income; they shall contribute to ensure welfare; employment; strengthening trade and industry and industrial development. These are straightforward examples of how petroleum activities may benefit the society. The provision further states that petroleum activities shall contribute to an 'improved environment'. The contribution of petroleum activities to an improved environment may be less straightforward. The essence though is that petroleum activities must be carried out in such a manner that gives due consideration to the environment. In this regard, the environmental provisions embedded in Article 112 of the Constitution of Norway may also be of relevance.[15]

The long-term perspective mentioned in the first sentence is interesting. It requires that a governance approach also take into account the interests of future generations. The wording may indicate some guideline on the rate of exploitation of the petroleum resources in the Norwegian continental shelf, in the sense that not all resources are exploited as fast as possible but that part of the resources are conserved for the benefit of future generations. This is, however, not the intention of this phrase. The preparatory works state that the intention of this phrase is that petroleum activities will contribute to sustainable development.[16] Petroleum resources are expected to contribute to the greatest extent possible to Norway's national capital. Wealth development is the central element. In this regard the concept of a 'long-term perspective' is to be understood as contributing to sustainable development. What exactly sustainable development will be is a discretionary decision based on political and value-related assessments.[17]

The list of objectives that this article aims to address is non-exhaustive. The objectives that are *not* explicitly mentioned in Article 1-2, second paragraph, are at least as important according to Hammer. He refers in particular to the objectives of prudent production (Article 4-1) and the requirement of prudent petroleum activities (Article 10-1).[18] Article 10-1 requires that:

> Petroleum activities according to this Act shall be conducted in a prudent manner and in accordance with applicable legislation for such petroleum activities […] The petroleum activities must not unnecessarily or to an unreasonable extent impede or obstruct shipping, fishing, aviation or other activities, or cause damage or threat of damage to pipelines, cables or other subsea facilities. *All reasonable precautions shall be taken to prevent*

15 Hammer et al. (2009), 17.
16 Ot.prp. nr.43 (1995–1996) [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om petroleumsvirksomhet [Concerning the Act relating to Petroleum Activities], 26.
17 Hammer et al. (2009), 41.
18 Ibid., 40.

> *damage to animal life and vegetation in the sea*, relics of the past on the sea bed and *to prevent pollution and littering of the seabed, its subsoil, the sea, the atmosphere or onshore.*

Even though Article 10-1 lays down a requirement to prudent petroleum activities, it does not specify further how prudency could be achieved in practice. Hammer argues that the requirement of prudency may entail that authorities may decide not to open areas that are designated as particularly valuable and vulnerable ecological areas. If a vulnerable area has been opened for petroleum activities, the prudency requirement may entail that the activity is subject to more stringent conditions and restrictions than otherwise would be natural.[19] What is 'reasonable precaution' in accordance with this article will in practice depend on a balancing assessment of the effects of the measure on the marine environment against the costs and technical and practical difficulties the measure will entail.[20]

The overall objectives of the Petroleum Act as embedded in Article 1-2, second paragraph (and elsewhere in the Petroleum Act), provide a guideline for the governance of petroleum resources by authorities. Even though the main aim is that petroleum activities will benefit the entire Norwegian society, an overall assessment of all the relevant considerations needs to be carried out. In the preparatory works on this paragraph, it has been clarified that in case of a conflict of interests between petroleum activities and other activities, a balancing assessment has to take place in which a solution prevails that overall benefits society in the best way.[21]

The question of what benefits society best will, however, primarily be a political one. Article 1-2, second paragraph, provides first and foremost a list of relevant and important concerns the decision-making authorities shall take into consideration, but the degree of discretion provided to the authorities is extensive.[22] In essence the provision stresses that petroleum resources should benefit the Norwegian society as a whole. A broad spectrum of concerns is relevant but the relative weight of these concerns has not been further determined in the Petroleum Act. Necessary consideration must also be given to other activities and also to concerns related to nature conservation and environmental protection. Also fisheries and other uses of the sea must be taken into consideration.[23]

The broad objectives of the Petroleum Act do not always fit in with all types of assessments required pursuant to the Act. Some of the objectives may be more relevant in the case of overarching decisions that, for instance,

19 Ibid., 687.
20 Ibid., 693.
21 Ot.prp. nr.43 (1995–1996) [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om petroleumsvirksomhet [Concerning the Act relating to Petroleum Activities], 2.
22 Hammer et al. (2009), 40.
23 Ibid., 26.

concern the opening or not of particular areas for petroleum activities. With regard to decisions on the approval of Plans for Development and Operation or the granting of particular production licences, these broad objectives may be of less relevance. These decisions are often taken under the assumption that the area already has been opened. In other words, not all concerns of Article 1-2, second paragraph, will be of relevance for these decisions given the fact that they probably have been taken into due consideration under the decision to open an area for petroleum activity.[24]

The objectives of the Petroleum Act do not necessarily contradict an ecosystem approach. The objective of prudent production and the requirement of reasonable precaution refer not only to effects on the continental shelf, but also to effects on the seabed, its subsoil, the sea, the atmosphere or onshore. Even though these effects are more directly regulated by the Pollution Control Act, it appears that effects on these elements of the North Sea ecosystem may be taken into consideration when assessing the environmental effects. On the other hand however, the fact that the Norwegian petroleum regime delimits the continental shelf into blocks of 15 latitude minutes and 20 longitude minutes in size[25] may in practice artificially delimit the geographical scope within which environmental effects are being considered. A decision on the scope wherein environmental impacts need to be assessed is required at various stages in the process of petroleum production. Examples are the process of the opening of a particular area for petroleum activities, and in the process of the granting of a production licence to a particular company to produce oil in a particular area.

The opening of an area

Before a production licence is awarded for exploration or production, the area where the activity will occur must be formally opened for petroleum activities. Pursuant to Article 3-1 of the Petroleum Act and chapter 2a of the Petroleum Regulation,[26] an environmental impact assessment has to be carried out before the decision to open a particular area. Article 3-1, first paragraph, stipulates that:

> In this evaluation, an assessment shall be made of the impact of the petroleum activities on trade, industry and the environment, and of possible risks of pollution, as well as the economic and social effects that may be a result of the petroleum activities.

24 Ibid., 42.

25 'Unless adjacent land areas, common boundaries with the continental shelf of other states, or other circumstances warrant otherwise'. Article 3-2 of the Petroleum Act 1996.

26 Regulation of 27 June 1997 no. 653 relating to refunding of expenses in connection with regulatory supervision of safety, working environment and resource management in the petroleum activities [Petroleum Regulation].

The impact assessment shall thus clarify the consequences the opening of an area for petroleum activities may have on commercial activities and environmental aspects, including the possibility of pollution and expected economic and social effects.[27] More specifically, the assessment shall contain a description of the impacts in relation to, among others, living conditions for animals and plants, the sea bed, water, air, climate, landscape, emergency preparedness and risk, and the interaction between these impacts.[28] The assessment shall also describe the assumed impacts on employment and commercial activities.[29]

Even though a broad spectrum of concerns shall be evaluated, the Petroleum Act does not specify further how these various aspects need to be weighed.[30] Though the impacts on ecological processes and interactions can be assessed in the impact assessment, such as the interactions between animal and plant life, the seabed and water, the public authorities decide on the weight to be given to these impacts.

With regard to the geographical scope of the impact assessment for the 'opening decision', Article 6a of the Petroleum Regulation states that the interests that are relevant *in the area concerned* need to be weighed and assessed. According to Hammer, however, this should not be taken literally. The environmental impacts may stretch over a larger area than where the petroleum activities will take place. The overall assessment that will be carried out does in fact not face any geographical boundaries, yet the type of interest and its geographical proximity are factors that affect the weight of that interest under the evaluation.[31] In the phase of opening an area, the block system is thus not so apparent, particularly in the case where a larger area is opened at once. In the case of the North Sea, for instance, the majority of the blocks have been opened for petroleum activities since 1965.[32]

The production licence and the Plan for Development and Operation

When an area has been opened for petroleum activities, companies may apply for a production licence which gives them the exclusive rights to exploration, drilling and production of petroleum resources in the areas covered by the licence.[33] The document supplements the requirements in

27 Ibid., Article 6a.
28 Ibid., Article 6c under (e).
29 Ibid., Article 6c under (c).
30 Hammer et al. (2009), 118.
31 Ibid.
32 Stortingsmelding nr. 28 [Storting White Paper 28] (2010–2011) *En næring for framtida – om petroleumsvirksomheten* [An industry for the future – Norway's petroleum activities], paragraph 6.3.
33 Article 3–3 of the Petroleum Act.

the Petroleum Act and sets out detailed terms and conditions for each individual licence.

If the licensee decides to develop a petroleum deposit, the licensee shall submit to the Ministry of Petroleum and Energy a Plan for Development and Operation (PDO) of the petroleum deposit. The granting of a production licence and the approval of a PDO are thus two different decisions and the time lapse between these decisions may be long.

The PDO shall include a description of the economic, resource, technical, safety, industrial and environmental conditions as well as information on how a facility may be disposed at the end of the activities. Articles 22- to 22c of the Regulation to the Petroleum Act contain more detailed rules concerning the environmental impact assessment that has to be carried out in connection to a PDO. The ministry has to approve this PDO and may in special circumstances require the licensee to produce a detailed account of the environmental impacts, possible risks of pollution and impacts on other affected activities, in respect of a larger defined area.[34] Pursuant to Article 4-2, third paragraph, the ministry can require the licensee to carry out an impact assessment that covers a greater area. This is in order to give proper consideration to the cumulative impacts that might follow from several developments together.[35] Environmental impacts thus need to be assessed as part of the PDO.

Interestingly, the Norwegian Petroleum Directorate has stressed in general that various parts of announced areas were located in areas with specific environmental challenges. In connection with any PDO for new developments in these areas, it may be appropriate to set requirements with special emphasis on safeguarding the marine environment. For the areas where there are fisheries on the sandeel, drilling on and in a zone around sandeel fields must be completed with no discharge of drill cuttings, including the drilling of the hole, so that the quality of sandeel fields are not degraded through sedimentation from the drilling activity. In case of future developments in these areas, there should be as few as possible alterations of the seabed of the sandeel. The minister of petroleum and energy when considering the PDO has to ensure that these conditions are maintained in a good way.[36]

34 Article 4–2, third paragraph, of the Petroleum Act. In accordance with the guidelines of the Ministry of Petroleum and Energy, the Plan for Development and Operation consists of a development or installation section and an impact assessment section. See further: Oljedirektoratet [Norwegian Petroleum Directorate] 'Guidelines for plan for development and operation of a petroleum deposit (PDO) and plan for installation and operation of facilities for transport and utilisation of petroleum (PIO) 4 February 2010', www.npd.no/Global/Engelsk/5%20-%20Rules%20and%20regulations/Guidelines/PDO-PIO-guidelines_2010.pdf (accessed 20 September 2015).

35 Hammer et al. (2009), 260.

36 Oljedirektoratet [Norwegian Petroleum Directorate], 'Virksomhetsbeskrivelse' [Business Description], www.npd.no/Templates/OD/Article.aspx?id=3921 (accessed 20 September 2015).

In sum

As shown above, the weighing and balancing of environmental impacts vis-à-vis other interests is required at various phases of petroleum exploration and production, most apparent in the process of opening new areas for petroleum activities and the approval of a PDO. The wording of a number of key provisions of the Petroleum Act, in particular Articles 1-2, 3-1, 4-1 and 10-1, makes it clear, however, that the effects on the environment will not be decisive for a decision.[37] The degree of discretion is rather broad.

Interestingly, this broad spectrum of interests could be easily converged by the economic valuation of the ecosystem services provided by the affected area. As referred to above, the preparatory works to the term 'long-term perspective' mentioned in Article 1-2, second paragraph, state that petroleum resources are expected to contribute to the greatest extent possible to Norway's national capital. Wealth development is the central element. This idea clearly promotes the capital approach to sustainable development. This approach describes sustainable development as:

> Development that ensures non-declining per capita national wealth by replacing or conserving the sources of that wealth; that is stocks of produced, human, social and natural capital.[38]

Natural capital refers to the earth's natural resources, land and the ecological systems that provide goods and services necessary for the economy, society and all living things. In its discussion of the capital approach, the UN (2003) characterizes natural capital as follows:

> Natural capital is generally considered to comprise three principal categories: natural resource stocks, land and ecosystems. All are considered essential to the long-term sustainability of development for their provision of 'functions' to the economy, as well as to mankind outside the economy and other living beings.[39]

While the Petroleum Act thus appears to promote the capital approach to sustainable development, it is actually surprising that the valuation of ecosystem services is not required or mentioned explicitly anywhere in the Act or the Regulation as a possible means to carry out the trade-offs between

37 Article 3–1 is mentioned here as well since the decision to open new areas with a view to granting production licences is also subject to an evaluation covering a wide spectrum of interests: 'An assessment shall be made of the impact of the petroleum activities on trade, industry and the environment, and of possible risks of pollution, as well as the economic and social effects that may be a result of the petroleum activities'.

38 UN et al. (2003), 4.

39 Ibid., paragraph 1.23.

the various interests. By monetizing the ecosystem services and valuing them as an element of Norway's national capital, it could be estimated whether loss of ecosystem services is sufficiently compensated for by an increase in national capital through petroleum production and whether the activity contributes to the society as a whole. It might be interesting to find out to what extent ecosystem services are being valued, or whether a cost-benefit analysis is being carried out as a tool to facilitate these trade-offs. This will be further examined in section 7.3.

7.2.2 The Pollution Control Act

Any company interested in the exploration or exploitation of a field needs, besides an approved PDO, a licence in accordance with Article 11 of the Pollution Control Act. The Pollution Control Act is an Act that concerns pollution and waste issues. The main aim of the Act is outlined in Article 1:

> The purpose of this act is to *protect the environment* against pollution and to reduce existing pollution, to reduce the quantity of waste and to promote better waste management. The act shall ensure that the *quality of the environment is satisfactory*, so that pollution and waste do not result in damage to human health or adversely affect welfare, or *damage the productivity of the natural environmental and its capacity for self-renewal*.

The 'environment' as mentioned in the first paragraph includes all recipients in the outer environment: air, water and soil. With regard to water, the act applies to pollution of watercourses, groundwater and the sea.[40] In addition, the Act is meant to entail more than just the natural environment. Also living and urban environments are included. Overall, the Act not only intends to meet human and economic interests but also the aim of conserving nature's biological diversity.[41]

The term 'pollution' has been further elaborated on in Article 6, which states that for the purpose of this act, pollution means:

1 the introduction of solids, liquids or gases to air, water or ground,
2 noise and vibrations,
3 light and other radiation to the extent decided by the pollution control authority,
4 effects on temperature, which cause or may cause *damage or nuisance to the environment*.

'Damage' in this paragraph is to be understood as physical harm to a person, an object or to nature and its ecological balance. 'Nuisance' includes

40 Backer (2012), 317; Bugge (2014), 70.
41 Wang (2005), 15.

discomfort and reduced life quality that does not necessarily involve any physical or financial harm.[42]

The reference to 'ecological balance' that lies in the concept of damage, as well as the reference to nature's productivity and its self-renewal in Article 1 is interesting in the light of an ecosystem approach. These references give room to focus on ecological structure and processes when considering the effects of pollution on the quality of the environment. On the other hand, however, this potential might be significantly overshadowed for a number of reasons: first, licences pursuant to the Pollution Control Act are often applied for in relation to a particular area described in the PDO pursuant to the Petroleum Act. It might be difficult in practice, or too demanding, to assess an ecosystems balance, productivity and self-renewal outside the particular area where the petroleum activity is planned to take place. Second, other interests shall also be taken into account when implementing the Act. Article 2 of the Pollution Control Act requires a trade-off to be made between environmental considerations and other social needs and objectives:

> The Act shall be used to achieve a *level of environmental quality that is satisfactory* on the basis of an *overall evaluation* of human health and welfare, the natural environment, the costs of the measures implemented, and general economic considerations.[43]

Article 2(3) makes again an important reference to the future use of the environment. This article requires that efforts to prevent and limit pollution and waste problems 'shall be based on the technology that will give the best results in the light of an overall evaluation of current and future use of the environment and economic considerations'.[44] This could be interpreted in conjunction with the main aim embedded in Article 1. Despite the margin of discretion to give decisive weight to other needs and objectives and to allow the pollution, the ecosystem's productivity and capacity for self-renewal should be maintained in order to ensure the use of the ecosystem by future generations.

The Pollution Control Act is based on the principle of prevention. Pollution, or the risk thereof, should be avoided unless allowed pursuant to the Pollution Control Act. Article 7 stipulates that:

> No person may possess, do, or initiate anything that may entail a risk of pollution unless this is lawful pursuant to Article 8 or 9 or permitted by a decision made pursuant to Article 11.

42 Ibid., 26.
43 Article 2, paragraph 1 of the Pollution Control Act.
44 Article 2, paragraph 3 of the Pollution Control Act.

Though this Article does not mention the precautionary principle, an understanding of the principle is implicit in the text. Article 7 of the Act states that it is considered prohibited not only actually to pollute, but also to create a risk of pollution. As a consequence, the authorities do not need to prove the actual occurrence of pollution in order to apply the provisions of the Pollution Control Act. The mere risk of pollution, above a certain minimum level, is enough to take measures.[45]

In practice, the precautionary principle would imply that the possible effects of pollution and of environmental interventions should be assessed as thoroughly as possible in advance and be available when decisions relating to the environment must be made. However, it goes further: it also requires that uncertainties be highlighted and be given importance when the consequences are described. The environmental risks have to be assessed thoroughly and weighed properly when decisions are made.[46]

Licences are granted pursuant to Article 11 of the Pollution Control Act. The pollution control authority may, on application, issue a licence or permit for any activity that may lead to pollution. The authority that is responsible for granting these licences in Norway is the Norwegian Environment Agency (before the Climate and Pollution Agency), which is a directorate under the Ministry of Climate and the Environment.[47] The Act provides the authorities with a wide margin of discretion when deciding to grant the permit and the conditions to be attached:

> When the pollution control authority decides whether a permit should be granted and lays down conditions pursuant to Article 16, it shall pay particular attention to the nuisance arising from the pollution of the project, as compared with *any other advantages and disadvantages of the project*.

Obviously, this provision provides decision-making authorities with a wide margin of discretion. Other objectives than environmental protection may be decisive for a decision. This flexibility in the Act has been criticized. Bugge states that:

45 Bugge (1999), 80.

46 Ibid.

47 Administratively, pollution control policy and legislation fall mainly under the authority of the Ministry of Climate and the Environment. The ministry defines the main lines of policy, prepares matters for the government and Stortinget, and issues general regulations. The ministry also decides important cases of appeal on decisions taken by subordinate bodies, such as pollution permits according to the Pollution Control Act. The main subordinate body to the ministry in this field is the Norwegian Environment Agency. It decides amongst others applications for pollution permits according to the Pollution Control Act. See also Bugge (2014), 69.

> It thus requires that a trade-off is made between environmental considerations and other social needs and objectives. This makes the Act a very flexible took for the development and implementation of environmental policy. But this type of legislation may be criticized for being too lax and leaving the task of environmental protection to the political priorities at any given time.[48]

On the same issue Backer states that:

> This weighing between the environment and the economy is often subject to disagreement, particularly in the case of ongoing businesses, and the decision [on whether to grant a permit and on which conditions] will in reality often depend on the public opinion on the environmental considerations.[49]

The Pollution Control Act is thus rather flexible. The main objective is, of course, to prevent pollution and protect the environment, but it shall be implemented with due regard to other interests, economic interests in particular. It thus requires that a trade-off is made between environmental considerations and other social needs and objectives. Notwithstanding this flexibility, the references to an ecosystem's productivity and its capacity for self-renewal in Article 1 have to be kept in mind as part of the overall aim of the Act.

What is of interest is that both the Petroleum Act and the Pollution Control Act generally require trade-offs between environmental considerations, and economic and other social objectives. The valuation of ecosystem services in this sector could have an important potential of elucidating the relation between the status of ecosystem services and the production of (long-term) wealth to Norwegian society. Rather than promoting intensive petroleum production at the expense of some features of the ecosystem's capacity, these two concerns could go hand in hand. This requires, however, a sufficient knowledge base providing information about the status of the ecosystem (its productivity and resilience) and how the activity will affect this status. The Pollution Control Act clearly enables due consideration to be given to these ecosystem aspects, and in combination with the capital approach to sustainable development that is promoted in the Petroleum Act it would have been rather logical to carry out decision making by setting a monetary value on the environmental effects.

To what extent ecosystem integrity will be maintained by the petroleum sector is questionable and appears to be subject to arbitrary political priorities and decisions. In this respect, it might be interesting to assess whether the Nature Diversity Act, as the third act that applies to petroleum activities,

48 Bugge (2014), 72–73.
49 Backer (2012), 326.

can actually ascertain a stronger consideration to be given to the maintenance of ecosystem integrity.

7.2.3 The Nature Diversity Act

The Nature Diversity Act (NDA) of 2009 is the most important Act for the protection of nature in Norway.[50] This act replaces the former Nature Conservation Act and parts of the Wildlife Act[51] and the Act relating to salmon and freshwater fish,[52] but it has a considerably wider scope than classical nature conservation. The Act also includes provisions on access to genetic material, on alien species and on principles for sustainable use, both in general terms and more specifically as they relate to species and habitat types.[53] The purpose of this Act is to 'protect biological, geological and landscape diversity and ecological processes through conservation and sustainable use, and in such a way that the environment provides a basis for human activity, culture, health and well-being, now or in the future, including a basis for Sami culture'.[54]

The Act applies fully to nature on Norwegian land territory, including river systems, and in Norwegian territorial waters. Outside the territorial waters, on the continental shelf and in Norway's 200-mile exclusive economic zone (EEZ), only a few of the articles apply, to the extent they are appropriate. These are in particular the provisions setting out the purposes and management objectives of the Act and most of the principles for public decision making including the precautionary principle and the ecosystem approach and cumulative effects.[55]

In fact, in the Commission Report on the NDA[56] it was proposed that the Act would, subject to the limitations proposed by international law, apply to Norwegian land territory, the territorial sea, the Norwegian continental shelf and the economic zone of Norway, including the fisheries protection zone

50 Act of 19 June 2009 no. 100 relating to the Management of Biological, Geological and Landscape Diversity [Nature Diversity Act].
51 Act of 29 May 1981 no. 38 relating to wildlife and wildlife habitats [Wildlife Act].
52 Act of 15 May 1992 no. 47 relating to salmonids and freshwater fish, etc. [Salmon and Freshwater Fish Act].
53 NOU [Official Norwegian Report] 2004:28 Lov om bevaring av natur, landskap og biologisk mangfold (Naturmangfoldloven) [The Act relating to the Management of Biological, Geological and Landscape Diversity (Nature Diversity Act)], 46.
54 Article 1 of the Nature Diversity Act.
55 Article 2, third paragraph, states that Articles 1, 3 to 5, 7 to 10, 14 to 16, 57 and 58 apply on the continental shelf and the economic zone of Norway to the extent they are appropriate.
56 NOU [Official Norwegian Report] 2004:28 Lov om bevaring av natur, landskap og biologisk mangfold (Naturmangfoldloven) [The Act relating to the Management of Biological, Geological and Landscape Diversity (Nature Diversity Act)].

and the economic zone outside Svalbard's territorial sea. The grounds for proposing this territorial scope were that the objective of safeguarding biological diversity is equally important in all these areas. The commission argued that there is a genuine need to apply key principles of environmental law and general rules for species management, land use management and access to genetic resources to both terrestrial and aquatic organisms and habitat types.[57]

To what extent the Act should apply to the continental shelf and the EEZ appeared to be a controversial issue, however. The commission emphasized that from an ecological point of view the 12-mile boundary of the territorial zone was artificial, and that there was a need to apply the instruments of the Act to the remaining area as well. This has not been followed up. Backer underlines that in particular the petroleum sector wished to avoid being bound by the rules of the NDA.[58] As a result of the disagreement, only a number of the provisions of the Act apply to the EEZ and on the continental shelf 'to the extent they are appropriate'.[59]

The NDA has important harmonizing potential. The management objectives of the Act as well as the principles for decision making apply to the protection of biodiversity in pursuance of the NDA as well as to the authorization of human activities and interventions in nature under other acts. The NDA has namely a cross-sectoral act. The general provisions of the Act[60] complement sector legislation and they will influence the construction of other statutes and affect the exercise of discretionary powers. The environmental law principles, or principles for sustainable use[61] 'shall serve as guidelines for the exercise of public authority regardless of the sector legislation that applies to the case'.[62]

Rules in sector legislation that go further in meeting the management aims of the NDA will prevail over or complement the provisions of the NDA. Since the NDA has not been accorded superior status to other statutory acts, clear provisions in sector legislation may also deviate from it by setting lower standards of protection.[63] In such a case, the preparatory works to newer acts adopted after the adoption of the NDA explicitly need to authorize such deviation. With regard to older acts adopted before the adoption of the NDA, the latter will normally prevail as being the newer act (*Lex Posterior*).[64] In general, however, when a particular provision from sector legislation contains a margin of discretion, for example discretion provided

57 Ibid., 46.
58 Backer (2009), 188.
59 Article 2, paragraph 3, of the NDA.
60 Article 1 and 4 to 13 of the NDA.
61 Articles 8–12 of the NDA.
62 Article 7 of the NDA.
63 Backer (2010).
64 NOU [Official Norwegian Report] 2004:28 Lov om bevaring av natur, landskap og biologisk mangfold (Naturmangfoldloven) [The Act relating to the Management of Biological, Geological and Landscape Diversity (Nature Diversity Act)], 182.

to pollution control authorities to decide on whether to issue a permit for an activity that may lead to pollution, the NDA will supplement that legislation by its rules embedded in the general provisions.[65]

In practice, the cross-sectoral effect of the NDA entails that public authorities themselves implement the rules of the Act in conjunction with their own sector legislation.[66] Pursuant to Article 7, the public authorities shall demonstrate how the principles of the NDA have been taken into consideration.

This part of the chapter contains a discussion of the applicable provisions of chapters I and II of the NDA which are relevant for this particular case study. These are in particular the overall purposes of the Act as embedded in Article 1; the management objective pursuant to Article 4; and the principles for public decision making as laid down in Articles 7 to 10. Of importance is also Article 14 which concerns the weighing of other public interests.

The overall purpose

In accordance with Article 1, the overall purpose of the NDA is:

> To protect biological, geological and landscape diversity and ecological processes through conservation and sustainable use, and in such a way that the environment provides a basis for human activity, culture, health and well-being, now and in the future, including a basis for Sami culture.

The essence of the Act is the protection of natural diversity, which includes biological, landscape and geological diversity. Furthermore, the Act aims to protect ecological processes. The dynamics within nature are at least as important as the static diversity. Protecting ecological processes will contribute to maintaining nature's productivity (in accordance with Article 112 of the Constitution of Norway) and ecosystem services.[67] As instruments to achieve this overall purpose, Article 1 refers to sustainable use and conservation. This indicates that the Act not only regulates the conservation and protection of nature, but also its use.[68]

Backer clarifies that 'sustainable use' refers to ecological sustainable use which meets the general management objectives for habitat types, ecosystems and species as referred to in Articles 4 and 5 of the NDA.[69] So use of the ecosystem should occur within the boundaries of its productivity and capacity for self-renewal. The long-term perspective embedded in the

65 Backer (2010), 11.
66 Ibid.
67 Backer (2010), 47.
68 Ibid.
69 Ibid., 21.

provision gives expression to the understanding that maintaining natural diversity is both a short-term and long-term aim.

The overall purpose of the act promotes an ecosystem approach to the extent that the Act also aims to protect ecological processes. Furthermore, it implicitly promotes the understanding that the ecosystem and its services provide a basis for human activity, culture, health and well-being. This recognition, even though it lacks a reference to wealth and the economy in general, seems to be a step forward to promoting an ecosystem services approach to environmental governance in Norway.

Of importance with respect to concrete situations is that when decisions have to be made also other considerations than those mentioned in Article 1 can be taken into account. Therefore, Article 1 is to be considered non-exhaustive. This also follows explicitly from Article 14, paragraph 1:

> Measures under this Act shall be weighed against other important public interests.

Article 14 only applies to decisions taken in accordance with the NDA and not to decisions based on any other legislation.[70] As shown above, however, in sections 7.2.1 and 7.2.2, the Petroleum Act and the Pollution Control Act also contain provisions that allow the weighing of divergent public interests. So, in practice, the overall objective of the NDA will often be subject to a weighing and balancing assessment.

In a legal sense, Article 1 in itself does not entail any legal duties or rights. Yet the purposes laid down are of importance to how the other provisions of the Act should be understood and applied. So, Article 1 affects the interpretation of the other provisions and the way discretion should be used by administrative bodies. Given the cross-sectoral character of the NDA, the overall purposes also play a role when applying discretionary provisions from other sectoral legislation. More specifically, the requirement to give due consideration to natural diversity becomes an additional aspect to be considered in the exercise of administrative discretion pursuant to other legislation.[71]

The management objectives

Chapter II of the Act is entitled 'general provisions on sustainable use'. These provisions are of particular relevance for the implementation of other sector legislation. The objectives in Article 4 and 5 aim to promote an ecologically sustainable use ensuring that natural diversity is maintained. The

70 Backer (2010), 66.

71 Ot.prp. nr. 52 (2008–2009) [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om forvaltning av naturens mangfold (naturmangfoldloven) [Concerning the Nature Diversity Act], 57; Backer (2010), 44–45.

rules and provisions outside chapter II and within other legislation have to be understood and applied in light of these general provisions.[72]

What is interesting in light of this thesis is that the NDA contains a general provision that aims to maintain ecosystem structure, functioning and productivity. What exactly lies in this wording? Article 4 states:

> The objective is to maintain the diversity of habitat types within their natural range and the species diversity and the ecological processes that are characteristic of each habitat type. The objective is also to maintain ecosystem structure, functioning and productivity to the extent this is considered to be reasonable.

The concept of an ecosystem has been defined in Article 3, letter t, which states that an ecosystem is a relatively well delimited, homogeneous natural system where plant, animal, fungus and micro-organism communities interact with one another and with the non-living environment.

The management aim to maintain ecosystem structure, functioning and productivity is an expression of the ecosystem approach. This is opposed to an approach that addresses primarily single species and specific elements within an ecosystem. The functions of ecosystems are being described as the contribution an ecosystem provides to the interactions within nature.[73] Several examples are being given in Article 3, letter r, which defines the concept of areas with specific ecological functions. The concept of 'ecosystem structure' refers to the construction of an ecosystem: the species that live within the ecosystem, their internal relationship, and the relationship between biotic and abiotic elements within the ecosystem. Ecosystem productivity refers to the produced biomass per unit area.[74]

This management aim does not apply to every single ecosystem. The second sentence contains a reasonableness criterion, which can restrict the extent to which the structure, functioning and productivity of a particular ecosystem should be maintained. It is not necessary to safeguard all ecosystems.[75] The management objective for ecosystems is based on a proportionality assessment that is expressed in a reasonableness criterion. This implies that the costs of any measures to achieve this management objective should not be too high in relation to what is being obtained.[76]

The management aim mentioned in Article 4 generally applies on an overarching level; they do not apply directly to single decisions and

72 Backer (2010), 67.
73 Ot.prp. nr. 52 (2008–2009) [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om forvaltning av naturens mangfold (naturmangfoldloven) [Concerning the Nature Diversity Act], 375.
74 Ibid.; and Backer (2010), 73.
75 Ibid.
76 Backer (2010), 73–74.

actions.[77] So, this management aim does not provide a direct legal duty. It is of importance for the interpretation and the exercise of administrative discretion pursuant to the NDA and other legal acts.[78] Administrative bodies should in principle not take decisions that would complicate achieving the overall management aim.[79]

More specifically, the interpretation and application of provisions in sector legislation have to be carried out keeping in mind the management objectives for habitat types, ecosystems and species.[80] However, other objectives that follow from the sector legislation itself may be decisive in specific decisions. These decisions should, however, not make it more difficult to achieve the management objectives of the NDA.[81] To ensure this, decisions taken under other sector legislation have to be based on the principles laid down in Articles 8 to 12 of the NDA.

Principles for public decision making

Articles 8 to 12 contain principles for public decision making. Article 7 stipulates that:

> The principles set out in articles 8–12 shall serve as guidelines for the exercise of public authority, including when an administrative agency allocates grants, and for the management of real property. Decisions shall state how these principles have been applied in an assessment under the first sentence.

The particular decision-making authority decides on the weight to be given to the principles of the NDA and the extent to which these principles are to affect the outcome of the decision. The fact that the principles in Articles 8–12 are being defined as guidelines implies that these principles do not determine a particular outcome of decisions; however, they serve as 'considerations or ways of consideration' that need to be applied by public authorities. They will affect the balancing assessment that takes place before a decision pursuant to other legislation. The principles will in particular affect the exercise of administrative discretion, but they can also be relevant when interpreting law. Other concerns and arguments, however, can be decisive for decisions.[82] Different authorities may consider and weigh the principles of the NDA differently. To illustrate, in the application of the Petroleum Act and the Pollution Control Act, both responsible authorities have discretion to

77 Backer (2009), 189.
78 Ot.prp. nr. 52 (2008–2009) [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om forvaltning av naturens mangfold (naturmangfoldloven) [Concerning the Nature Diversity Act], 81 and 373.
79 Backer (2010), 71.
80 Ibid., 69.
81 Ibid.
82 Ibid., 85.

decide on the weight to be given to the principles of the NDA.[83] Article 7 requires that decisions explicitly state how these principles have affected the outcome of the decision.

Principles of particular relevance in the context of this thesis are the precautionary principle and the ecosystem approach, Articles 9 and 10 of the NDA. These also apply to activities carried out on the continental shelf and within the EEZ. Besides the principles embedded in Articles 9 and 10, Article 8 also contains an important principle. Article 8, first paragraph, which also applies to the continental shelf and the EEZ, requires that:

> Official decisions that affect biological, geological and landscape diversity shall, as far as is reasonable, be based on scientific knowledge of the population status of species, the range and ecological status of habitat types, and the impacts of environmental pressures. The knowledge required shall be in reasonable proportion to the nature of the case and the risk of damage to biological, geological and landscape diversity.

The precautionary principle

This requirement of a knowledge base is of particular importance with regard to the precautionary principle, laid down in Article 9:

> When a decision is made in the absence of adequate information on the impacts it may have on the natural environment, the aim shall be to avoid possible significant damage to biological, geological or landscape diversity. If there is a risk of serious or irreversible damage to biological, geological or landscape diversity, lack of knowledge shall not be used as a reason for postponing or not introducing management measures.

The first sentence of Article 9 of the NDA primarily focuses on measures that are taken to serve purposes other than environmental protection, but which may cause a risk to the environment. Article 9 requires that in those situations where the scientific knowledge base of the population status of species, the range and ecological status of habitat types, and the impacts of environmental pressures do not meet the requirements of Article 8 of the NDA, the aim shall be to avoid possible significant damage to the natural diversity. In practice this requirement can be met through limitations in the permit, requiring mitigating measures, or for instance by refusing a permit. Whether the particular damage can be classified as 'significant' will depend on several factors: to what extent the ecosystem will be changed, how

83 In the context of the Petroleum Act, the Norwegian Petroleum Directorate is the decision-making authority. This directorate falls under the Ministry of Petroleum and Energy. In the context of the Pollution Control Act, the Norwegian Environment Agency is the decision-making authority. This is a directorate that falls under the Ministry of Climate and the Environment.

permanent the changes will be, and whether threatened or vulnerable species will be affected.[84] The preparatory work to the NDA clarifies that the concept 'significant' shall be understood in accordance with the criterion of 'serious or irreversible damage' in the second sentence of Article 9.[85]

The second sentence of Article 9 reflects the more general understanding of the precautionary principle, namely that the principle aims to prevent that scientific uncertainty or a lack of knowledge refrain states from taking environmental measures. The principle then aims to ensure that environmental measures are being taken when there is a risk of serious or irreversible damage. Uncertainty about the causes or future trends may not be a reason for postponing such environmental measures.[86] Exactly this part of Article 9 reflects the understanding of the precautionary principle as expressed in Article 15 of the Rio Declaration. According to Sadeleer:

> Precaution means that the absence of scientific certainty as to the existence or the extent of a risk should henceforth no longer delay the adoption of preventive measures to protect the environment.[87]

Whether 'damage' in Article 9, second sentence, can be classified as 'serious or irreversible' depends, amongst other things, on whether the effects will be permanent, long term or short term, and whether the damage will significantly complicate achieving the management objectives in Articles 4 and 5 of the NDA.[88] The concept of 'risk' in the second sentence of Article 9 is to be understood in a more narrow sense than normal. It refers to a certain probability; there must be a real possibility for such damages.[89]

If the scientific knowledge base is sufficient pursuant to Article 8, the precautionary principle will not apply even though the consequences might be severe. In that case a balancing assessment will take place in the light of the overall objective of the NDA, Article 112 of Norway's Constitution, and the management objectives in Articles 4 and 5 of the NDA. Within the territorial sea, the general duty of care laid down in Article 6 of the NDA would also apply.[90]

84 Backer (2010), 96–97.
85 Ot.prp. nr. 52 (2008–2009) [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om forvaltning av naturens mangfold (naturmangfoldloven) [Concerning the Nature Diversity Act], 103.
86 Backer (2010), 98–99.
87 De Sadeleer (2007), 4. See also De Sadeleer (2002) which discussed the precautionary principle thoroughly.
88 Ot.prp. nr. 52 (2008–2009) [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om forvaltning av naturens mangfold (naturmangfoldloven) [Concerning the Nature Diversity Act], 103 and 381; Backer (2009), 99.
89 Ot.prp. nr. 52 (2008–2009) [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om forvaltning av naturens mangfold (naturmangfoldloven) [Concerning the Nature Diversity Act], 381.
90 Backer (2009), 98.

Given the fact that the precautionary principle only serves as a guideline for the exercise of public authority (pursuant to Article 7), the principle is not absolute or invariable. In accordance to the wording of Article 9, measures or activities that will cause significant damage to the natural diversity can, however, only be carried out when there is sufficient knowledge about the risks connected to these measures. This ensures that environmental degradation occurs with 'open eyes'.[91]

The ecosystem approach and cumulative environmental effects

Another important principle of the NDA is Article 10 entitled 'Ecosystem approach and cumulative environmental effects':

> Any pressure on an ecosystem shall be assessed on the basis of the cumulative environmental effects on the ecosystem now or in the future.

Despite the heading of the article, it focuses more on cumulative effects than on the ecosystem approach. Pursuant to the wording, the cumulative effects on ecosystems in particular will need to be considered. Initially, however, the committee's proposal to this Act was based on the idea that this principle would apply to all decisions affecting nature diversity, also including effects on particular species or habitats. Backer underlines that it would be fair to adhere to this idea. He explains that the reformulation in the bill draft is probably caused by a desire to emphasize the ecosystem approach, not by a desire to restrict its scope.[92]

What does Article 10 then exactly say about the ecosystem approach? Article 10 states that when the effect on an ecosystem is assessed, this is to be assessed based on the cumulative effects on the ecosystem. Based on the emphasis on the ecosystem approach in this article and the overall purpose and management objectives of the NDA, measures that affect a particular species or habitat (*landskapselement*) will not only be assessed based on the effects on this species or habitat but also based on how the surrounding ecosystem, the species that live in it or the habitat of which it is a part, will be affected. In reality, however, knowledge about the effects on the ecosystem may be more limited than knowledge about the effects on particular affected species.[93] In those cases it may be challenging to implement an ecosystem approach.[94]

The requirement to assess cumulative effects has two sides. Cumulative effects comprise, first, the sum of existing effects, and second, the sum of

91 Ibid., 97–98.
92 Ibid., 100.
93 Ibid., 100–101.
94 For a more general discussion of the effects of the codification of the precautionary principle and the ecosystem approach for marine resource management in Norway, see Jakobsen and Henriksen (2012), 227–248.

current and future effects. Single effects may be small and insignificant but considered against the background of already executed measures or interventions the overall load may pass a particular critical limit. Assessing the cumulative effects of measures may also prevent the gradual degradation of the environment because single measures in themselves would probably not have been halted when assessed in isolation. Measures also need to be assessed in the light of future impacts. This helps to make the precautionary principle more effective. These future impacts may stem from official decisions, but also all other impacts could be taken into consideration. Future impacts cannot be merely hypothetical to be relevant. To what extent this principle can be determinative for decisions depends on the uncertainty surrounding those future impacts and on the weight of other interests that are relevant.[95]

The Ministry of Climate and Environment has published a guiding document for the application of chapter II of the NDA.[96] From the guidance on Article 10, it appears that the focus is more on cumulative effects than on the ecosystem approach. Moreover, it approaches landscapes, ecosystems, nature types and habitat types in a similar manner. The 'checklist' that was written for public officials who are assessing Article 10 clarifies that the following should be considered, amongst other things:

- Which existing measures or use will affect landscape, ecosystems, nature types and species?
- Which future measures and use within the landscape or ecosystem can affect nature types and species?
- Do we lack knowledge about the effects of the plan's cumulative load for landscape, ecosystems, nature types and species? In that case Article 9 must be given considerable weight.

Some remarks on the ecosystem approach in the NDA

Despite the fact that this guidance aims to facilitate the application of Article 10, this guidance clearly overlooks the uniqueness of ecosystems as complex adaptive systems. This feature clearly distinguishes them from any other subject of environmental law, such as species, habitats, landscapes, etc. To remember, an ecosystem is the overarching concept wherein the habitats, species or landscapes are interconnected elements of an ecosystem. Together, the interactions between these elements produce new features that are the characteristics of the ecosystem. From this understanding it appears not to

95 Read in conjunction with Article14 NDA. See Backer (2010), 101–104.

96 Miljøverndepartementet [Ministry of the Environment], *Veileder Naturmangfoldloven kapittel II. Alminnelige bestemmelser om bærekraftig bruk – en praktisk innføring* [Guidelines to the Nature Diversity Act. Chapter II General Provisions on Sustainable Use – a practical introduction] (January 2012), 40.

be in accordance with the ecosystem approach to consider effects on ecosystems merely on the same footing as effects on landscapes, nature types or species. Instead, the ecosystem approach requires the assessment to go a step farther. Rather than merely questioning whether future use within the ecosystem can affect nature types and species, the effects of cumulative impacts on the structure and functioning of the ecosystem in its own geographical scope, or at least the Norwegian part of the North Sea ought to be assessed. How will the overall ecosystem's functioning and structure change as a result of the effects on these species and habitats? Is this change acceptable in the light of the management objective for ecosystems in Article 4? Out of the commentary on the NDA, it follows that this, however, was not the intention behind the emphasis on the ecosystem approach in Article 10.[97] It could reasonably be argued that the understanding of this provision does not entirely support an ecosystem approach, even though its heading pretends otherwise.

Since the NDA appears to underscore the concept of ecosystem services, the possible valuation of those services in decision-making procedures requires some words here. Interestingly, the valuation of ecosystem services has deliberately not been directly mentioned in the NDA.[98] In the committee proposal, it was explicitly discussed whether the term 'ecosystem services' ought to be mentioned in the final text of the Act. The committee proposed the term not to be included in the text for two reasons. First, the committee reasoned that the text of the Act already sufficiently covers the protection of ecosystem services. Second, the committee thought it inappropriate to base biodiversity management solely on the ecosystem services one knows or values. Notwithstanding, the concept can be useful when implementing the Act. It provides a tool for a more conscious management in terms of clarifying the values biodiversity has, who contributes to the protection of ecosystem services and who benefits from the services. By not including the concept of ecosystem services in the legal text explicitly, the committee also aimed to ensure that biodiversity is conserved independent of its value for humans. This is important because nature has a value in itself, and the various utility values of a particular resource are not always entirely known to people.[99]

97 Backer (2010), 100.

98 Barton (2010), 9.

99 Ot.prp. nr. 52 (2008–2009) [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om forvaltning av naturens mangfold (naturmangfoldloven) [Concerning the Nature Diversity Act], section 6.6.2. Recently a comprehensive study has been carried out which assessed the values of ecosystem services in Norway. This study could be very useful if ecosystems services valuation were to be applied as a tool to implement the ecosystem approach in Norway. NOU [Official Norwegian Report] 2013:10 Summary 'Natural benefits – on the values of ecosystem services. Report from an expert commission appointed by the Norwegian Government to the Ministry of the Environment on 29 August 2013'.

Though ecosystem services or the economic values of biodiversity have not been explicitly mentioned in the NDA, it appears that the application of the Act will give rise to a number of trade-offs between different interests. These may arise in particular in the application of Article 4 (management objectives for nature types and ecosystems), Article 9 (precautionary principle), Article 11 (user-pays principle), Article 12 (environmentally sound techniques and methods of operation), and Article 14 (weighing of other public interests and Sami interests). The valuation of ecosystem services and the use of CBA could assist in the weighing assessments to be made pursuant to these sections.[100] Though the NDA does not require the valuation of ecosystems services, neither does it exclude it.[101]

Moreover, as the preparatory works clarified that the 'reasonableness criterion' in Article 4 of the Act implies that the costs of any measures to achieve this management objective should not be too high in relation to what is being obtained,[102] it could certainly be helpful to express also the 'ecosystem costs' in monetary terms. The management objective in the NDA appears rather important for the conservation of ecosystems in Norway. It might be questionable how sustainable decisions could be made as long as the costs in terms of ecosystem degradation are 'hidden' and not incorporated in any cost-benefit assessment.

7.2.4 The combined effects of the three legal acts

Just as environmental impacts might be more severe when assessed cumulatively than when assessed individually, the strength of the overall legal framework (in terms of ecosystem protection) may be weaker than the strength of each of the single acts. This is particularly the case when a broad spectrum of objectives is pursued and the protection of the ecosystem is subject to a considerable degree of discretion. The cross-sectoral effect of the NDA certainly has the advantage of making key ecological principles applicable to sectoral activities (and thus facilitating the idea of environmental policy integration). However, on the other hand, the cross-sectoral effect also allows deviation from its ecosystem ambitions not only by discretion in the NDA itself, but also by the weighing and balancing of different concerns, which is required pursuant to other legal acts. Several challenges have already been discussed in relation to the separate legal acts. Here, some overarching issues will shortly be touched upon.

Due to the fragmentation of environmental law and the fact that an ecosystem is subject to various pieces of legislation, the overall strength of the

100 Barton (2010), 15.
101 Ibid., 10.
102 Ot.prp. nr. 52 (2008–2009) [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om forvaltning av naturens mangfold (naturmangfoldloven) [Concerning the Nature Diversity Act], 57.

legal system may diminish. One important issue may be the difference in approaches to ecosystem conservation. As shown above, the NDA requires the maintenance of ecosystem structure, functioning and productivity 'to the extent reasonable'. In conjunction with the overall purpose of the Act which requires the protection of 'biological, geological and landscape diversity and ecological processes through conservation and sustainable use, and in such a way that the environment provides a basis for human activity, culture, health and well-being, now and in the future, including a basis for Sami culture', it could be concluded that the Act recognizes the idea that ecosystem services provide the basis for human well-being and that therefore ecological processes are worth conserving for current and future generations. This implies that even though a balancing assessment is required and other public interests are being taken into consideration, there will be limits on what exactly can be traded-off. This understanding of Article 1 in conjunction with Article 4 is in line with the Malawi Principles numbers 5 and 10.[103]

In contradiction, the Petroleum Act is silent with regard to the question whether, for instance, ecosystem degradation may be compensated for by an increase in economic wealth. In accordance with the capital approach, the five assets of sustainability are substitutable as long as the national wealth per capita does not decline. It is uncertain whether the Petroleum Act ensures the conservation of ecosystems by posing limits on what can be traded-off or whether the objectives mentioned in Articles 1-2, 3-1, 4-1 and 10-1 are equally important. Due to the cross-sectoral effect of the NDA, the approach of the NDA probably also applies to the petroleum sector in cases where the Petroleum Act applies. However, the discretion embedded in the Petroleum Act does enable public officials to give less weight to that understanding, as long as they would not complicate the achievement of the NDA's management objectives on the long term. How exactly it will be assessed in practice whether a concrete decision complicates the achievement of the management objectives in the long term is unclear. As indicated above, the application of Article 10 on the ecosystem approach and cumulative effects will in practice probably be more concerned with assessing cumulative effects than with conserving important ecosystems. In this manner, the conservation of ecosystems will be subject to political preferences and discretion rather than being the result of legal rules.

One overarching issue that is striking from a rule of law point of view is the degree of uncertainty as to what the legal acts actually aim to achieve. What is the overall objective of the legal system applicable to petroleum activities? All three acts discussed above serve a variety of objectives and require the weighing and balancing of divergent objectives. Is the conservation of ecosystem integrity actually protected by this legal framework? The provisions of the NDA are merely supplemental to sector legislation and the principles only serve as guidelines for public decision making; they can be

103 For these Malawi Principles see Chapter 2.

deviated from by discretion embedded in sectoral legislation. This uncertainty as to what the legal system actually prohibits and allows is clearly undesirable from the perspective of environmental protection.

Finally, some words on the valuation of ecosystem services. Read in conjunction, the legal acts open up for the valuation of ecosystem services without requiring this explicitly. The NDA clearly acknowledges the concept of ecosystem services and the Petroleum Act promotes the capital approach to sustainable development. A monetization of ecosystem services would be a logical step in the decision-making processes. Truly, not all ecosystem services are known by people and not all of them can be expressed in monetary terms. Yet since all three acts require weighing and balancing assessments that include ecosystem considerations, the valuation of these ecosystem considerations could ensure the actual incorporation of them in the weighing and balancing assessment, or at least make the assessment and decision-making process more transparent.

The next section will present the decision-making process with regard to the activity of oil exploitation in a particularly valuable area, as described in 7.1. The discussion primarily focuses on the degree of consistency between the objectives of the legal acts and the attainment of those objectives in this concrete situation.

7.3 Balancing values in the decision-making process

This section describes the decision-making process with regard to the application for a licence pursuant to the Pollution Control Act. Both the decision by the Norwegian Environment Agency and the appeal decision by the Ministry of Climate and the Environment will be analysed. Before that, however, some words will be used to review the PDO, which is required pursuant to the Petroleum Act.

As described above, the area was opened for petroleum activities in 1965. In 1985, the production licence for the Stjerne Field was awarded in the ninth licensing round. At that time, no specific reference was made to the protection of the sandeel within the general conditions of the licence for the protection of the environment and fisheries.[104] The PDO was approved by Royal Decree on 16 September 2011 in accordance with Article 4.2, first paragraph, of the Petroleum Act.[105]

104 Regjeringen, 'Felt under utbygging' [Fields in development], www.regjeringen.no/upload/kilde/oed/rap/2000/0005/ddd/pdfv/109135-fakta_kap_15.pdf (accessed 20 September 2015).

105 Kongen i Statsråd [King in Council of State], Kongelig Resolusjon [Royal Decree] 'Utbygging og Drift av Stjerne' [Development and Operation of Stjerne Field] (13 September 2011).

7.3.1 The Plan for Development and Operation

The PDO for the Stjerne Field has been approved, taking into account the existing 2006 Regional Environmental Impact Assessment (EIA) for the North Sea, in addition to the material provided by Statoil.[106] The Regional EIA for the North Sea surprisingly often refers to the effects on the ecosystem and also mentions explicitly that sandeel population has significantly declined during recent years. This decline affects the ecosystem such that a next link in the food chain may be impacted. In fact, in the case of a decline of the sandeel population, seabirds are strongly affected.[107] For the Stjerne Field, there has not been carried out a field-specific EIA.[108]

Taking into account the Regional EIA for the North Sea and some other internal documents provided by the operator, the Ministry of Petroleum and Energy in relation to the approval of the PDO considered the requirement to carry out an environmental impact assessment to be fulfilled.[109] Worth mentioning is that the 'Guidelines for PDO of petroleum resources' provided by the Norwegian Petroleum Directorate[110] stresses that the provisions and principles of the NDA have to be taken into consideration under the preparation for the assessment programme and the EIA itself.[111] While the Regional EIA North Sea dates from 2006, the PDO was approved in 2011, two years after the entering into force of the NDA. One would expect that the Norwegian Petroleum Directorate and the Ministry of Petroleum and Energy, being sectoral authorities, were bound by the provisions and principles of the NDA that apply to the continental shelf and the EEZ, but the decision on the PDO does not contain any references to the NDA.

7.3.2 The licence pursuant to the Pollution Control Act

In the context of the application for a licence pursuant to the Pollution Control Act, a risk assessment has been carried out by The Norwegian Veritas. This organization assessed the risks with regard to seabirds, marine

106 Ibid., 5.

107 RKU-Nordsjøen, 'Oppdatering av regional konsekvensutredning for Petroleumvirksomhet i Nordsjøen' (December 2006), 188, www.norskoljeoggass.no/PageFiles/6615/RKU%20Nordsj%c3%b8en%20-%20hovedrapport.pdf (accessed 20 September 2015).

108 Kongen i Statsråd [King in Council of State], Kongelig Resolusjon [Royal Decree] 'Utbygging og Drift av Stjerne' [Development and Operation of Stjerne Field] (13 September 2011), 8.

109 Ibid.

110 Oljedirektoratet [Norwegian Oil Directorate], 'Veiledning til plan for utbygging og drift av en petroleumsforekomst (PUD) og plan for anlegg og drift av innretninger for transport og for utnyttelse av petroleum (PAD)' [Guidelines for plan for development and operation of a petroleum deposit (PDO) and plan for installation and operation of facilities for transport and utilisation of petroleum (PIO)].

111 Ibid., 11.

mammals and beach habitats. Also the risks with regard to sandeel have been assessed.[112] The assessment concluded that based on previous experiences from similar operations, the proposed drilling and completion of the activity will only have marginal impact on the local fauna and negligible impact on the marine environment. With the chemical choices made, the generally strong focus on zero harmful emissions, and the measures described in the application, it was considered that the drilling and completion could be carried out without significant negative environmental impacts on the site and the ocean in general.[113]

By a letter dated 16 March 2012, the Norwegian Climate and Pollution Agency (NCPA, now the 'Norwegian Environment Agency') issued the licence in accordance with the Pollution Control Act in connection with the drilling of two production wells and two water injection wells in the Stjerne Field (licence 104 in block 30/9). Statoil had been given permission to use and discharge drilling chemicals, discharges to the marine environment of oil and naturally occurring substances, and air emissions associated with power generation from the drilling rig. Several conditions were set. Most importantly, to move the discharge point to 100 metres outside the sandeel habitat, and to avoid noise and disturbances during the spawning period of the sandeel.

In its decision, the NCPA emphasized that Vikingbanken is a particularly vulnerable area, that the sandeel is a key species within that area, and that therefore the habitat of the sandeel is regarded as important for the state of the North Sea ecosystem.[114] Furthermore, the NCPA acknowledged that the discharge of cuttings in a sandeel habitat is not desirable. Cuttings will cover the seabed to a certain extent and this part of the seabed will be unsuitable for sandeel for several years. Little is known about whether sandeel population could re-establish themselves nearby or if it would disappear. The Marine Research Institute, the Directorate of Fisheries, the Norwegian Fisheries Board and the Norwegian Fishing Vessel Owners' Association all emphasized the risk of adversely affecting a sandeel population that is currently in a

112 Det Norske Veritas, *Miljørisikoanalyse for utbygging av Stjernefeltet i Nordsjøen, 2011. Rapport nr. 2011–1276* (2011) [Environmental risk analysis for the development of the Stjerne Field in the North Sea].

113 Statoil, Søknad om tillatelse til virksomhet etter forurensningsloven ved boring av 30/9-M-11 H, 30/9-M-12 H, 30/9-M-13 H, and 30/9-M-14 H på Stjernefeltet (AU-EPN D&W DWS-00180) [Application in accordance with the Pollution Control Act for permission to carry out drilling-activity in the Stjerne Field] (2011), 18.

114 Klima- og forurensningsdirektoratet [Norwegian Environment Agency], *Boring av produksjonsbrønner på Stjernefeltet, lisens 104, blokk 30/9* [Drilling of the production wells in the Stjerne Field, licence 104 block 30/9], 16 March 2012, 4–5. In fact in order to maintain and increase the sandeel population, Vikingbanken has been closed for any fishing activities since the 1990s. See www.offshore.no/sak/35030_reagerer_p229_boretillatelse_p229_vikingbanken (accessed 20 September 2015).

phase of recovery. These institutes required the NCPA to set stringent conditions.[115]

Against that background the NCPA asked Statoil to consider alternative methods of discharging the cuttings. Statoil has accordingly proposed to transport the cuttings from the borehole circa 600 metres to the north-east in the direction of Oseberg with the help of a Cuttings Transport System (CTS). According to Statoil, the discharge point will now be 100 metres outside the sandeel area. Spreading calculations that SINTEF had performed for Statoil based on the original discharge point, showed that the cuttings and drilling fluid particles can be dispersed in size (radius) of 0.5–1 kilometre from the release point. Although cuttings are now being transported to 100 metres outside the sandeel area, emissions could still cover parts of the sandeel area, but a significantly smaller share than that on which the application was based.[116]

The NCPA further required that the second phase of drilling, which would take place in the autumn of 2012, is planned such that disturbances in the form of noise and vibrations in the spawning period for sandeel will be avoided, and that they conduct surveillance to document environmental effects and increase knowledge of sandeel in the area. There are also special requirements for acute pollution. This would meet any concerns about the possible impacts of noise and disturbance on the sandeel population.

In the decision the NCPA takes as starting point that it has been decided that the area should be developed, and that the only means the NCPA has available is to set conditions that minimize environmental risk.[117] Furthermore, the NCPA states that it underscores the precautionary principle and explains that it has undertaken a comprehensive assessment of the advantages and disadvantages of drilling, particularly with regard to the risk of environmental damage, the petroleum industry's interests and fisheries interests.

The fact that the NCPA will only set conditions to minimize environmental risks is interesting, since the Pollution Control Act in itself gives full discretion to the NCPA to weigh and balance divergent interests. While the understanding of the precautionary principle in this Act actually allows the authorities (though does not prescribe them) to refuse granting a licence, in practice the precautionary principle is not given this effect. In practice, giving consideration to the precautionary principle will be reflected in the stringency of the conditions attached to the licence, but a licence for the activity will be given. The fact that the NCPA can only minimize the (risk of) pollution and not prevent any pollution from happening is probably a result of the combined effect of the Petroleum Act, the Pollution Control Act and the relation between the executive authorities. The NCPA assumes that

115 Ibid.
116 Ibid., 8–9.
117 Ibid., 6.

ecosystem considerations have been taken into account when the petroleum authorities decided to open an area for petroleum activities.[118]

Two conclusions can be drawn at this stage. First, it could be argued that the decision-making process on licences pursuant to the Pollution Control Act is to some extent a 'locked' process, since the NCPA does not use its administrative freedom to reject licences in practice. Second, from a legal perspective, this somewhat 'locked' decision-making process allows for substantive inconsistency. While the law enables refusing a licence based on the application of the precautionary principle, in practice licences will not be refused; instead, licences will be granted with a number of stringent conditions.

7.3.3 The appeal against the licence

The licence given by NCPA was appealed by the Fishing Vessel Owners' Association by a letter dated 21 March 2012. The association argued that parts of the decision given by the NCPA are not in conformity with the precautionary principle.[119] They argued that any interventions within this particularly vulnerable area should be at a minimum so that the remainder of the sandeel population is not impaired or their habitat degraded.[120]

The appeal body (the Ministry of Climate and the Environment) in its decision, before discussing the substance of the case, first makes some general remarks about the applicable legislation and the effects of the NDA. The ministry states that licences in accordance with the Pollution Control Act also need to be considered against the background of Articles 8–10 of the NDA, concerning the knowledge base, the precautionary principle, the ecosystem approach and the requirement to assess cumulative effects. The NCPA has to take these principles into account when issuing permits. In addition, the management objectives that are laid down in Articles 4 and 5 of the NDA also need to be taken into consideration. The environmental impacts of the activity need to be considered in a holistic and long-term

118 Yet it is questionable whether this is the case. A large part of the North Sea was opened for petroleum activities in 1985. Since that year, the knowledge base on the functioning and productivity of the North Sea certainly has become more comprehensive.

119 Det kongelige Miljøverndepartement [Ministry of the Environment], *Avgjørelse i klagesak – tillatelse etter forurensningsloven i forbindelse med Statoil ASAs boring av produksjonsbrønner på Stjernefeltet i Nordsjøen* [Decision by the administrative appeal body concerning Statoil ASA's permission pursuant to the Pollution Control Act regarding the drilling of production wells in the Stjerne Field, the North Sea], 11 March 2012 (201201198-/AE), 2.

120 Klima- og forurensningsdirektoratet [Norwegian Environment Agency], *Boring av produksjonsbrønner på Stjernefeltet, lisens 104, blokk 30/9* [Drilling of the production wells in the Stjerne Field, licence 104 block 30/9], 16 March 2012, 4.

perspective, where the objectives of the activity are being balanced against any loss or deterioration of biodiversity.[121]

The ministry also states that human activities generally have a great impact on the North Sea ecosystem. These impacts result from shipping, fishing, petroleum activities, sand extraction, and the graveling and dumping of mud. With regard to the sandeel population, the major pressure comes from the fishing industry. Even though certain measures already have been taken to ensure a sustainable governance of the sandeel, the fishing of the sandeel in the North Sea still affects the population significantly and should therefore be taken into account.[122]

The ministry reasons that the cumulative impacts on the sandeel, besides the impacts mentioned above, also will consist of the discharge of chemicals, cuttings and oil into the sea, the risk of accidental discharges, any impacts from noise and disturbances, and changes to the sea bottom. It appears from the assessments carried out by the NCPA that the discharge of chemicals is not being expected to cause any damage to the marine environment, and the environmental risks associated with the discharge of drill cuttings is low. There is, however, a lack of knowledge about the vulnerability of the sandeel to a possible accidental discharge, and there is little knowledge about how exactly the sandeel population would be affected by noise and disturbances. Even though pressures on the population have decreased, it is still important to protect the sandeel's habitat. The size of the population still requires precaution. Additional impacts on the population or its habitat should be minimized.[123]

With regard to the discharge of drill cuttings, the ministry states that there have been set stringent conditions in the licence in order to avoid any negative impacts on the sandeel population. The drill cuttings are going to be transported 600 metres away from the original discharge point by the use of CTS technology, so that the actual discharge point will be 100 metres outside the sandeel habitat.[124] According to dispersion calculations performed by SINTEF, the drill cuttings and fluid could be dispersed in a radius of 500–1,000 metres from the discharge point with a thickness of 1 millimetre. The ministry noticed, however, that these calculations do not take into account that the fluid may not contain any particles of barite and bentonite, as one of the conditions in the licence prescribed. This condition means that the discharge of cuttings and debris that contribute to sediment will be

121 Det kongelige Miljøverndepartement [Ministry of the Environment], *Avgjørelse i klagesak – tillatelse etter forurensningsloven i forbindelse med Statoil ASAs boring av produksjonsbrønner på Stjernefeltet i Nordsjøen* [Decision by the administrative appeal body concerning Statoil ASA's permission pursuant to the Pollution Control Act regarding the drilling of production wells in the Stjerne Field, the North Sea] 11 March 2012 (201201198-/AE), 3.

122 Ibid., 6.

123 Ibid.

124 Ibid., 5.

reduced by 25 per cent and be spread over a smaller area than calculated in the dispersion model.[125]

The ministry also noted that it is not aware of any available technologies to handle the drill cuttings from the top hole without any dispersion of cuttings into the marine environment. Transporting the cuttings 600 metres away from the drilling well is regarded as the maximum of what the current pumps can achieve. Production fields generate a significant amount of cuttings in comparison to exploration fields, and there are both technological and security challenges connected with handling large amounts of drill cuttings.[126]

With regard to the second condition set by the NCPA which required Statoil to avoid noise and disturbances during the spawning period, the ministry argues that this condition is somewhat unclear. The ministry required the NCPA to reassess this issue and to clarify this condition. As a response, NCPA requested Statoil to assess how much noise drilling operations in the Stjerne Field will generate, and propose mitigation measures to avoid disturbances in the sandeel's spawning period. On behalf of Statoil, the Norwegian Veritas (DNV) has conducted a study about noise within the Stjerne Field, the so-called Stjerne Field Noise Impact on Marine Organisms. The DNV has in its report identified the main noise sources that may result from the planned activities and has also identified other noise sources within the area. The main conclusion from the report is that there will be little noise from the planned drilling operations. The dominant noise source will be from the service vessels within the field and other nearby vessels and fields.[127]

Taking into account the conclusion from this report, the conditions attached to the licence, and the requirement of a monitoring programme to gain more knowledge, the ministry upheld the licence provided to Statoil.

7.3.4 Final remarks

Two matters need to be emphasized at this stage. First, this application of Article 10 of the NDA is in line with its intention – namely, to assess cumulative effects of different activities and effects on the sandeel population. However, this methodology does not entirely promote an ecosystem approach. The mere statement that human activities generally have a great impact on the North Sea ecosystem and that these impacts result from shipping, fishing, petroleum activities, sand extraction, and the graveling and dumping of mud is not equal to the application of an ecosystem approach. In addition to assessing the cumulative effects of different activities on the

125 Ibid.
126 Ibid.
127 Det Norske Veritas, *Technical Report. Stjerne Field Noise Impact on Marine Organisms Report No. 2012–1382* (15 October 2012), 7.

sandeel population, it needs to be assessed how this affects the ecosystem's structure, functioning and productivity also outside the sandeel habitat. The requirement to transpose the discharge point for the drill cuttings from 500 metres within the sandeel habitat to 100 metres outside the habitat clearly demonstrates an emphasis on the geographical boundaries of the sandeel habitat rather than the ecological boundaries of the ecosystem.

Second, notwithstanding the mitigating conditions attached to the licence, the ministry acknowledges that there is a lack of knowledge and that the population of the sandeel requires precaution. Then why did the application of the precautionary principle not reject the licence to extract oil in this particularly valuable area? Even though all three legal acts allow for the use of CBA and the valuation of ecosystem services, it is not clear whether any of the interests have been weighed explicitly and whether the different weights have been subject to a balancing assessment. Obviously the authorities ascribed the extraction of petroleum a heavier weight than the impacts on the sandeel population and its habitat, but how exactly these impacts have been weighed and balanced is unclear.

Although the Ministry of Climate and the Environment could have refused this activity with reference to the precautionary principle, this did not happen. As explained above, the NCPA will generally not refuse the granting of a licence since the area has already been opened for petroleum activities. Yet the appeal body could have refused this activity, applying the precautionary principle against the background of the management objectives for ecosystems as described in the NDA. An important aspect is that the area had been opened for petroleum activities a long time ago. New scientific knowledge and new legislation have emerged after the opening of the area. However, the 'locked-in' decision-making process hampers, to some extent, an impartial consideration of the objectives and principles of the NDA.

It appears that the pursued activity will be allowed as long as the risks have been minimized through conditions set in the licence and when the best available techniques are being applied. If this is decisive for allowing or refusing a particular activity, this seems to hinder a fair weighing and balancing assessment that gives due consideration to all impacts of the activity including the ecological impacts.

This case is not a unique one. A similar dispute arose in the Ulvetanna case from 2011, which concerned an application for a permit in accordance with the Pollution Control Act for the exploration of oil in a different Sandeel habitat.[128] In 2011 the NCPA had issued a permit that was appealed

128 Det Kongelige Miljøverndepartement [Ministry of the Environment], *Avgjørelse i klagesak – tillatelse etter forurensningsloven i forbindelse med Det norske oljeselskap ASAs boring av letebrønn 3/4–2S Ulvetanna i Nordsjøen*, [Decision by the administrative appeal body concerning a licence pursuant to the Pollution Control Act regarding drilling of well 3/4–2S Ulvetanna in the North Sea, Det norske oljeselskap ASA] 28 October 2011 (reference: 201102785-/AE).

by the Fisheries Vessel Owners' Association. The Ministry of Climate and the Environment gave its final decision. Interestingly, the ministry indicated that the scientific uncertainty in combination with the precautionary principle in principle should lead to the refusal of the licence. However, taking into account other interests in accordance with Article 11 of the Pollution Act, the permit could nevertheless be upheld.[129]

These rulings demonstrate an important issue: though the licence could have been refused on the grounds of the precautionary principle, the discretion embedded in Article 11 of the Pollution Control Act allows the NCPA to give decisive weight to other interests. In the light of the ecosystem approach it is questionable how, then, ecosystem integrity is maintained since the NCPA will in principle not refuse any licences based on the fact that areas already have been opened for petroleum activities in accordance with the Petroleum Act.

This also raises a more general concern: ecosystem protection in Norway does not depend on the mere strength of nature protection legislation. Instead, ecosystem protection depends to a large extent on the strength of sectoral legislation and on the relations between the various acts that apply to the same activity. The wider the margin of discretion within sectoral legislation, the more room for lawful substantive inconsistencies. Lawful substantive inconsistencies are inconsistencies between the environmental objectives of the acts and the attainment of these objectives in particular situations allowed through a degree of discretion embedded in the acts to weigh and balance the various interests. As discretion in law allows decisive weight to be given to other concerns, ecosystem degradation can lawfully occur. Even when nature conservation legislation would have been stringent and explicit, discretionary provisions in sector legislation could be used to depart from it since the management objectives of the NDA only have a cross-sectoral effect as guideline rather than a binding legal effect, and the principles merely serve as guidelines. How and by which means ecosystem integrity then will be ensured remains an important question.

Through the interrelations between the NDA, Petroleum Act and Pollution Control Act it appears that the decision to open up an area for petroleum activities in accordance with the Petroleum Act is the most important decision in the light of ecosystem conservation. When an area has been opened and a PDO has been approved, a licence pursuant to the Pollution Control Act will normally be granted. Does the Petroleum Act sufficiently allow ecosystem considerations to be taken into account when deciding on the opening or not of an area or approving such a plan? Not only will the assessment of environmental risks often be delimited to particular species, populations or habitats, but the weight to be given to this assessment is ultimately determined by the authority taking the decision. The manner and

129 Ibid., 8.

the extent to which the principles of the NDA affect decision making may vary from one authority to the other and from one decision to the other.

In fact, both the approval of the PDO in accordance with the Petroleum Act and the licence provided in accordance with the Pollution Control Act are decisions taken by sectoral authorities. The provisions of the NDA discussed above should in principle have the same effect on these two public decisions. However, this case study has shown that this is not the case. The Ministry of Petroleum and Energy, in its decision approving the PDO, did not even mention the NDA, let alone demonstrate how the principles of the NDA have been applied.

Overall, this case study has shown that the legal framework applicable to petroleum activities, in itself, will hardly enable the implementation of an ecosystem approach. The administrative discretion embedded in the three acts entails that the maintenance of ecosystem integrity becomes subject to political priorities rather than being the result of specific legal rules. In addition, the interpretation of the NDA takes place in the context of the application of sectoral legislation by a variety of sectoral authorities. Through its cross-sectoral effect, the strength of nature protection legislation is diminished through discretionary provisions in sectoral legislation.

7.4 Conclusion

This case study has provided an assessment of the legal framework and the decision-making process in relation to the exploitation of oil resources within a particularly vulnerable ecological area. The legal acts have been assessed in light of the ecosystem approach and the issues of formal consistency and coherence. This case study has also provided insight into the effects of administrative discretion in legal acts and the possibility for substantive inconsistencies between the aims of the legal acts and the attainment of these aims in practice.

In this case, three main legal acts applied to the exploitation of petroleum resources in this ecological area: the Petroleum Act, the Pollution Control Act, and the NDA. The case study has demonstrated that the strength of nature conservation legislation diminishes when a broad spectrum of objectives is pursued by the various applicable acts and when the protection of the ecosystem is subject to a considerable degree of administrative discretion.

Ironically, though the cross-sectoral effect of the NDA would actually facilitate the idea of environmental policy integration, this case study has shown that it has an undesirable side-effect: the cross-sectoral effect also allows deviating from the ecosystem ambitions not only by discretion in the NDA itself, but also by the weighing and balancing of different concerns which is required pursuant to other legal acts. Of importance is that the weight to be given to ecological values is ultimately determined by the authority taking the decision. The manner and the extent to which the principles of the NDA affect decision making and the manner in which ecological values are being weighed and balanced in decision-making procedures may

vary from one authority to the other and from one decision to the other. The cross-sectoral effect of the NDA may thus in practice result in a considerable degree of inconsistency in the way ecological values are being weighed and balanced.

The problem is not only that the weighing and balancing of ecological or ecosystem values and their integration in decision-making procedures may be very inconsistent; the problem is also that, without any critical thresholds in place, ecosystem degradation can lawfully occur. The legal framework contains a degree of uncertainty and ambiguity with regard to the overarching objective of this framework. The applicable legal acts serve a variety of objectives and require the weighing and balancing of divergent objectives. It is questionable how the maintenance of ecosystem integrity would be ensured by this legal framework.

The relationship between the various sectors and public authorities involved also seems to matter. The case study in fact revealed the somehow 'locked-in' decision-making process, where decisions are being taken and principles are being applied not with a blank slate but instead taking into consideration decisions taken by other involved authorities. As such, an impartial consideration of the objectives and principles of the NDA is being hampered.

Another remarkable finding of the case study is that the assessment of the ecological impacts has hardly been founded on an ecosystem approach. The assessment focused to a large extent on the sandeel (habitat) without considering further how the effects on the sandeel and its habitat would impact the ecosystem's structure, functioning and productivity also outside the sandeel habitat. The assessment could, for instance, have considered effects on the food chain in the North Sea, which again could have triggered effects on other vulnerable species and habitats in the North Sea.

Ecosystem protection in Norway does not depend on the mere strength of nature protection legislation. Instead, this protection depends to a large extent on the strength of sectoral legislation and on the relations between the various acts that apply to the same activity. When sectoral legislation contains a wide margin of discretion to weigh and balance divergent values, there is considerable room for substantive inconsistencies and the maintenance of ecosystem integrity is not necessarily ensured.

Overall, this case study has thus shown that the legal framework applicable to petroleum activities, in itself, will hardly enable the implementation of an ecosystem approach. The administrative discretion embedded in the three acts entails that the maintenance of ecosystem integrity becomes subject to political priorities rather than being the result of specific legal rules.

7.5 References

Backer, I.L., 'Naturmangfoldloven' (2009) 3 *Tidsskrift for Eiendomsrett* 182.

Backer, I.L., *Naturmangfoldloven: lov 19. juni 2009 nr. 100 om forvaltning av naturens mangfold* [Commentary to the Nature Diversity Act] (Kommentarutgave, Universitetsforlaget, 2010).

Backer, I.L., *Innføring i naturressurs og miljørett* (5th edn, Gyldendal akademisk, 2012).
Barton, D.N., 'Økosystemtjenestebegrepet over tid og anvendelse under Naturmangfoldloven: noen spørsmål', *i Barton DN et al., Okosystemtjenester – fra begrep til praksis? NINA Rapport* 673(2010).
Bugge, H.C., *Forurensningsansvaret: det økonomiske ansvaret for å forebygge, reparere og erstatte skade ved forurensning* (Tano Aschehoug, 1999).
Bugge, H.C., *Environmental Law in Norway* (2nd, edn Kluwer Law International, 2014).
De Sadeleer, N., *Environmental Principles: From Political Slogans to Legal Rules* (Oxford University Press, 2002).
De Sadeleer, N., *Implementing the Precautionary Principle: Approaches from the Nordic Countries, EU and USA* (Earthscan, 2007).
Hammer, U. *et al.*, *Petroleumsloven* (Universitetsforlaget, 2009).
Jakobsen, I.U. and Henriksen, T., 'Prinsippene om føre var og økosystemtilnærming – hvilken betydning har lovfestingen for marin ressursforvaltning?' in Voigt, C., Backer, I.L. and Fauchald, O.K. (eds) *Pro natura: festskrift til Hans Christian Bugge på 70-årsdagen 2. mars 2012* (Universitetsforlaget, 2012).
OSPAR Commission, *Assessment of Impacts of Offshore Oil and Gas Activities* (OSPAR Commission, 2009). qsr2010.ospar.org/media/assessments/p00453_OA3-BA5_ASSESS MENT.pdf (accessed 20 September 2015).
UN *et al.*, *Handbook of National Accounting: Integrated Environmental and Economic Accounting* (United Nations, 2003).
Wang, Ø., *Forurensningsloven: med kommentarer* (Gyldendal akademisk, 2005).

7.5.1 Legislation

Nature Diversity Act of 19 June 2009 No. 100 relating to the management of biological, geological and landscape diversity.
Petroleum Act of 29 November 1996 no. 72 relating to petroleum activities.
Petroleum Regulation of 27 June 1997 no. 653 relating to refunding of expenses in connection with regulatory supervision of safety, working environment and resource management in the petroleum activities.
Pollution Control Act of 13 March 1981 no. 6 concerning protection against pollution and concerning waste.
Salmonids and Freshwater Fish Act of 15 May 1992 no. 47 relating to salmonids and freshwater fish and related matters.
Wildlife Act of 29 May 1981 no. 38 relating to wildlife and wildlife habitats.

7.5.2 Decisions and official documents

Det Kongelige Miljøverndepartement [Ministry of the Environment], Avgjørelse i klagesak – tillatelse etter forurensningsloven i forbindelse med Det norske oljeselskap ASAs boring av letebrønn 3/4-2S Ulvetanna i Nordsjøen [Decision by the administrative appeal body concerning a licence pursuant to the Pollution Control Act regarding drilling of well 3/4-2S Ulvetanna in the North Sea, Det norske oljeselskap ASA], 28 October 2011 (reference: 201102785-/AE).
Det Kongelige Miljøverndepartement [Ministry of the Environment], Avgjørelse i klagesak – tillatelse etter forurensningsloven i forbindelse med Statoil ASAs boring av produksjonsbrønner på Stjernefeltet i Nordsjøen [Decision by the administrative

appeal body concerning Statoil ASA's permission pursuant to the Pollution Control Act regarding the drilling of production wells in the Stjerne Field, the North Sea], 11 March 2012 (201201198-/AE).

Det Norske Veritas, Miljørisikoanalyse for utbygging av Stjernefeltet i Nordsjøen, 2011. Rapport nr. 2011–1276 (2011) [Environmental risk analysis for the development of the Stjerne Field in the North Sea].

Det Norske Veritas, Technical Report. Stjerne Field Noise Impact on Marine Organisms Report No. 2012-1382 (15 October 2012).

Klima- og forurensningsdirektoratet [Norwegian Environment Agency], Boring av produksjonsbrønner på Stjernefeltet, lisens 104, blokk 30/9 [Drilling of the production wells in the Stjerne Field, licence 104 block 30/9], 16 March 2012.

Kongen i Statsråd [King in Council of State], Kongelig Resolusjon [Royal Decree] 'Utbygging og Drift av Stjerne' [Development and Operation of Stjerne Field] (13 September 2011).

Miljøverndepartementet [Ministry of the Environment], Veileder Naturmangfoldloven kapittel II. Alminnelige bestemmelser om bærekraftig bruk – en praktisk innføring [Guidelines, The Nature Diversity Act. Chapter II General Provisions on Sustainable Use – a practical introduction] (January 2012).

Norwegian Ministry of Petroleum and Energy, 'Concerning an Act on Offshore Renewable Energy Production (The Offshore Energy Act). Summary in English: Proposition No. 107 (2008–2009) to the Storting'.

NOU [Official Norwegian Report] 2004:28 Lov om bevaring av natur, landskap og biologisk mangfold (Naturmangfoldloven) [The Act Relating to the Management of Biological, Geological and Landscape Diversity (Nature Diversity Act)].

NOU [Official Norwegian Report] 2013:10 Summary 'Natural benefits – on the values of ecosystem services. Report from an expert commission appointed by the Norwegian Government to the Ministry of the Environment on 29 August 2013.

Oljedirektoratet [Norwegian Oil Directorate], 'Veiledning til plan for utbygging og drift av en petroleumsforekomst (PUD) og plan for anlegg og drift av innretninger for transport og for utnyttelse av petroleum (PAD)' [Guidelines for plan for development and operation of a petroleum deposit (PDO) and plan for installation and operation of facilities for transport and utilisation of petroleum (PIO)].

Oljedirektoratet [Norwegian Petroleum Directorate], 'Guidelines for plan for development and operation of a petroleum deposit (PDO) and plan for installation and operation of facilities for transport and utilisation of petroleum (PIO) 4 February 2010', www.npd.no/Global/Engelsk/5%20- %20Rules%20and%20regulations/Guidelines/PDO-PIO-guidelines_2010.pdf (accessed 20 September 2015).

Ot.prp. nr.43 [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om petroleumsvirksomhet [Concerning the Act relating to Petroleum Activities] (1995–1996).

Ot.prp. nr. 52 [Preparatory works; Proposition to the Odelsting; bill draft] Om lov om forvaltning av naturens mangfold (naturmangfoldloven) [Concerning the management of the nature diversity (the Nature Diversity Act)] (2008–2009).

RKU-Nordsjøen, 'Oppdatering av regional konsekvensutredning for Petroleumvirksomhet i Nordsjøen' (December 2006) 188, www.norskoljeoggass.no/PageFiles/6615/RKU%20Nordsj%c3%b8en%20-%20hovedrapport.pdf (accessed 20 September 2015)

Statoil, Søknad om tillatelse til virksomhet etter forurensningsloven ved boring av 30/9-M-11 H, 30/9-M-12 H, 30/9-M-13 H, and 30/9-M-14 H på Stjernefeltet (AU-EPN

D&W DWS-00180) [Application in accordance with the Pollution Control Act for permission to carry out drilling activity in the Stjerne Field] (2011).

Stortingsmelding nr. 28 [Storting White Paper 28] (2010–2011) En næring for framtida – om petroleumsvirksomheten [An industry for the future – Norway's petroleum activities].

Stortingsmelding nr. 37 [Storting White Paper nr. 37] Helhetlig forvaltning av det marine miljø i Nordsjøen og Skagerrak (forvaltningsplan) [Integrated Management of the Marine Environment in the North Sea and Skagerak (Management Plan)] (2012–2013).

8 Towards consistency, coherence and a stronger rule of law

As the previous chapter has illustrated, administrative discretion in environmental law may jeopardize ensuring the maintenance of ecosystem integrity. For sure, this is not caused by discretion in isolation. Rather, the combination of discretion with fragmented structures of law and governance, in addition to the difficulties of weighing and balancing very divergent values in decision-making procedures, and the unpredictability and complexity of ecosystem functioning, all contribute to the challenge of governing ecosystems sustainably. These difficulties are interrelated and in conjunction they may lead to ecosystem degradation rather than to the maintenance of ecosystem integrity.

For that reason, the role of environmental law for the protection of our ecosystems needs to be reconsidered. Frankly, much broader attention should be given to the role of substantive rules in environmental law – rules which actually protect the ecosystem against excessive human impacts. Moreover, as legal and governance structures are fragmented, it is important that environmental law functions as a system containing a degree of consistency and coherence across the different legislative acts. Finally, this body of law also needs to adhere to a stronger rule of law ensuring the protection of ecosystems and the maintenance of ecosystem integrity by law.

This final chapter explores more thoroughly the concepts of consistency, coherence and the rule of law, and suggests various forms of consistency that are deemed necessary in environmental law for facilitating the implementation of an ecosystem approach.

8.1 Inconsistency as undesirable

Inconsistencies that may arise out of the fragmented structures of environmental law and governance are not unique for Norwegian environmental law. They inevitably easily arise where legal and governance structures are fragmented and where various decision-making authorities become involved in the governance of particular ecosystems. The problem of inconsistency has, for example, been discussed in the area of EU environmental legislation. The Network of Heads of European Protection Agencies recognized that

'[t]he way in which EU legislation has evolved has resulted in a complex picture of partly overlapping and inconsistent requirements'.[1] Farmer also underscored that:

> An individual piece of EU law might be clear and easily understood in itself. However, it might be inconsistent with other EU laws. Inconsistency and lack of coherence between legislation is a problem for the environmental *acquis*. [2]

To illustrate, there may be found varying definitions among the directives, such as the concept of *biomass*, which has been defined differently in the EU emissions trading scheme and waste incineration directives.[3] Also unclear definitions appear in EU legislation, such as *heavily modified water body* in the Water Framework Directive, or *risk* as used in many directives (among which the Water Framework Directive[4] and the Groundwater Directive[5]). The degree of consistency among EU directives varies, however. There has been considerable effort to ensure consistency of approach between the Floods Directive[6] and the Water Framework Directive. Yet there are inconsistencies between the latter directive and the Marine Strategy Framework Directive[7] as described in Chapter 2. [8]

Inconsistency becomes particularly problematic in the case of larger ecosystems and extensive regulatory frameworks. In these circumstances, integrated governance approaches may be difficult to achieve. Rose and Milligan illustrated this by analysing the variety of overlapping or conflicting national and international legal frameworks that have developed in a fragmented manner in response to specific political concerns over marine living resources in Antarctic waters.[9] They have attempted to identify the extent to which the norms from different treaty frameworks applicable to marine living resources in Antarctic waters interact with each other and whether they

1 Network of Heads of European Protection Agencies (2008), 3.
2 Farmer (2008), 13.
3 Council Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emissions allowance trading within the Community [2003] OJ L 275/32; Council Directive 2000/76/EC of 4 December 2000 on the incineration of waste [2000] OJ L 332/91.
4 Council Directive 2000/60/EC of 22 December 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive) [2000] OJ L 327/1.
5 Council Directive 2006/118/EC of 12 December 2006 on the protection of groundwater against pollution and deterioration [2006] OJ L 372/19.
6 Council Directive 2007/60/EC of 23 October 2007 on the assessment and management of flood risks [2007] OJ L 288/27.
7 Council Directive 2008/56/EC of 17 June 2008 establishing a framework for community action in the field of marine environmental policy [2008] OJ L 164/19.
8 Farmer (2008), 11 and 14.
9 Rose and Milligan (2009), 41.

enable inconsistency between institutional actors by failing to specify explicitly their relationship with one another and, importantly, whether they are directly inconsistent by requiring or expressly permitting incompatible management practices.[10] They distinguished between three regulatory frameworks that apply to the governance of Antarctic waters: the Antarctic Treaty System, including the Antarctic Treaty,[11] the CCAMLR[12] and the Madrid Protocol[13]; international fisheries law; and multilateral environmental agreements, including the CBD[14] and CITES.[15] The legal instruments within these frameworks may overlap in subject matter jurisdiction by addressing common management concerns.[16]

They concluded that the various legal instruments do not ostensibly provide a coherent framework for the integrated governance of Antarctic marine living resources. There is, for instance, potential for normative conflict between the obligations of CITES that prohibit the harvesting of marine living resources on the high seas in Antarctic waters and international fisheries law instruments that expressly permit such exploitation.[17] Rose and Milligan also identified inconsistencies among the norms articulated in the frameworks concerning ecosystem-based management and the precautionary principle. These inconsistencies pose challenges to integrated governance in Antarctic waters.[18]

An additional difficulty arises when there are spatial inconsistencies among the relevant acts of legal frameworks. The pieces of legislation applicable to the governance of Norwegian marine ecosystems, for instance, not only contain different management objectives, but also differ in spatial application which further complicates integrated governance. Bugge argues that outside 1 nautical mile, we face a very fragmented set of sectoral laws without any clear connections. There are no formal mechanisms for coordination, nor are there any established procedures or substantive guidelines for the resolution of conflicts of interests. Notwithstanding the requirement of the Nature Diversity Act to apply certain principles, such as the ecosystem approach, as guidelines for the exercise of public authority, in practice the

10 Ibid., 42.
11 The Antarctic Treaty (opened for signature 1 December 1959, entered into force 23 June 1961) 401 UNTS 71.
12 Convention on the Conservation of Antarctic Marine Living Resources (adopted 20 May 1980, entered into force 7 April 1982) 1329 UNTS 48.
13 Protocol to the Antarctic Treaty on Environmental Protection (4 October 1991) 30 ILM 1445 (1991).
14 The Convention on Biological Diversity (adopted 22 May 1992, entered into force 29 December 1993) 1760 UNTS 79.
15 Convention on International Trade in Endangered Species of Wild Fauna and Flora (opened for signature 3 March 1973, entered into force 1 July 1975) 983 UNTS 243.
16 Rose and Milligan (2009), 48.
17 Ibid., 68.
18 Ibid., 69–70.

sectoral authorities themselves apply these principles within the context of the relevant sectoral legislation. One important piece of legislation, the Planning and Building Act, does not even apply outside 1 nautical mile.[19]

One practical problem that arises from the differences in spatial application of the legislation is that the protection and conservation of an ecologically important area that crosses jurisdictional boundaries must be regulated by different legal acts. These acts may use different definitions and may contain different rules and norms with regard to the conservation and management of nature.[20] These spatial inconsistencies also arise within Antarctic waters. Indeed, with regard to the Antarctic waters, parts of these waters are subject to jurisdictional claims by states, while others are not subject to any claim. All Antarctic waters fall within the geographical applications of several treaties, yet there are gaps in coordination of subject matter governance between these treaties.[21]

Inconsistencies may also arise when certain parts of the ecosystems are regulated while others are not, ignoring the 'wholeness' of ecosystems. This may be illustrated by the forest policies and conservation strategies for California's forests which failed to recognize the natural continuum between conifer and hardwood types of forests. Whereas the removal of oak woodlands was not directly regulated by the state, and the oak woodlands were not afforded protection under the Forest Practice Rules, the state strongly oversaw tree removal and regeneration on conifer-dominated sites.[22] Sometimes a continuum may exist with conifer-dominated mountainous forests transforming into oak-dominated types of drier or lower-elevation sites within the same watershed, making the division between conifer and hardwood forest types arbitrary when assessing the impacts on watersheds, migratory species and ecosystem integrity. California's north coast case of anadromous fish and their biological dependence on oak-dominated forest landscapes convincingly illustrated the need for consistent environmental protective measures regardless of forest types.[23]

Inconsistencies in environmental law do thus complicate integrated governance of ecosystems and may lead to the ignorance of the complex adaptive nature of ecosystems. Without exploring these examples further, it may reasonably be argued that consistency and coherence are desirable features of law – and not least of environmental law. The next section will further explore the concept of consistency. The concept will be further unravelled, and its relation to the concept of coherence and the rule of law will be further clarified.

19 Bugge (2013b), 79–80.
20 Ibid.
21 Rose and Milligan (2009), 44.
22 Giusti and Merenlender (2002), 474.
23 Ibid., 478 and 480.

8.2 Towards consistency in environmental law

Given the complex ecological relationships within ecosystems, consistency and coherence within and among the legal frameworks that apply to the governance of a particular ecosystem is an imperative requirement. For this and other reasons, consistency and coherence in environmental law and governance have become important ambitions of governments around the world. Within Europe, Faure clarifies that:

> From an environmental scientific point of view at least the need was felt to integrate the decision-making with respect to all environmental issues related to one particular installation or entity. In addition it was felt that the whole body of detailed sectoral environmental legislation had become so complex that the citizen who had to follow the legal rules could hardly recognize the contents of his legal duties. This brought about a demand for the 'harmonisation' of environmental law in many European countries, which resulted in various more or less all-encompassing environmental protection acts in many countries, or at least legislative proposals in that direction.[24]

8.2.1 Conceptual introduction

Before turning to the concept of consistency and coherence, it needs to be shortly mentioned that a number of concepts are being used which all refer to a certain degree of harmonization. The term 'harmonization' itself usually refers to a legislative process whereby various pieces of environmental legislation are either brought together in one new document, or are at least coordinated. In the latter case, the different sectoral acts, licences or procedures remain in existence. In the case of codification, which goes further, the legislature decides to bring together all existing environmental legislation in one legislative document.[25]

Codification is the ultimate form of harmonization and serves a number of goals. Kloepfer indicates the following goals: ecological progress; harmonisation and clarification; improvement of implementation; and more consistency in environmental legislation.[26] More specifically, Kloepfer claims that 'a further ecological development of environmental law should be attained by devising a holistic concept of overcoming the present situation of specific policies for the various parts of the environment'. Moreover, 'the unification of environmental law should achieve a consolidation of environmental law regulations, in order to create an environmental law as a unified whole'.[27]

24 Faure (2000), 174.
25 Ibid., 176.
26 Kloepfer (1996), 91.
27 Ibid.

Rehbinder also acknowledges these benefits of codification. He states that:

> From a legal perspective, the codification of environmental law offers the chance of internal harmonisation of the fragmented body of existing law with its inconsistencies, overlaps and gaps that absorb too much administrative and legal capacity […] Codification could to a certain degree also overcome the traditional but – at least partly – dysfunctional, sectoral approach by adopting a new transsectoral concept of environmental regulation. Most environmental laws do not apply to the environment as a whole but rather to specific environmental sectors, specific sources of pollution or specific substances; in particular, they do not normally adequately consider a transfer of pollution from one sector to another, nor do they consider total pollution burdens. An ecological development of environmental law through codification using stronger holistic elements could improve the steering capacity of environmental law. Although it does not appear to be possible to entirely renounce sectoral regulation, codification could at least overcome the traditional fragmentation of environmental law and reconcile transsectoral and sectoral approaches to environmental regulation.[28]

Rather than using terms such as harmonization, coordination, integration or codification, here we simply use the term 'consistency' to refer to a degree of non-contradiction among a set of rules and norms, irrespective of whether these norms and rules derive from one piece of legislation or instead from a large number of legal acts. Consistency challenges may appear both within one piece of legislation, and within a set of legal acts, both sectoral and environmental, that apply to the same activity within the same area. Of crucial importance is that these rules and norms do not clash with or negate each other and are mutually supportive in terms of the maintenance of ecosystem integrity. Whether harmonized or still fragmented, a degree of consistency is required for the implementation of an ecosystem approach.

8.2.2 Relationship to the concept of coherence

Within legal theory, consistency has been given a narrow and a broader understanding. In its narrow understanding, the term 'consistency' simply refers to the absence of contradictions within a set of, for example, two or more propositions, principles or sentences.[29] In its broader understanding, it is required that these provisions together 'make sense'. This broader understanding of consistency is often referred to as coherence. More precisely, as explained by Franklin, consistency in a broader sense means that:

28 Rehbinder (1996), 159.
29 Franklin (2010), 122.

> Something is organized so that each part of it agrees with all other parts; a condition in which a given subject matter coheres so as to stand together. Taken in this sense, consistency would appear somewhat synonymous with a broader notion of coherence as this term is usually understood in the English language. If something is coherent, its parts fit together well so that it is clear and easy to understand. Boiled down to the simplest of understandings, if something is coherent it just makes sense.[30]

Law is thus coherent when it 'hangs or fits together, if its parts are mutually supportive, if it is intelligible'.[31] A legal system is also coherent when it 'just makes sense'.[32] Obviously there may be some overlap between consistency and coherence. Consistency may be considered an *element* of the more comprehensive concept of coherence. The *Oxford English Dictionary* describes 'coherence' as 'consistency in reasoning, or relating, so that one part of the discourse does not destroy or contradict the rest (J.); harmonious connexion of the several parts, so that the whole "hangs together"'.

Several jurisprudential writers, such as Dworkin,[33] Raz[34] or MacCormick,[35] call attention to the link between the concepts of consistency and coherence as consistency being capable of leading to coherence in law. Kress also identified consistency as one of several 'candidate requirements necessary for coherence'. He claims, however, that although consistency may enhance coherence, it is not generally required for it.[36]

According to Kress, coherence implies that the various fragments hang or fit together, that they are mutually supportive, and that they flow from or express a single unified viewpoint. He argues that coherence has seven important properties: consistency, completeness, comprehensiveness, unity, monism, articulateness, and justified.[37] While some degree of monism or unity is a necessary property for coherence, the other properties have been

30 Ibid., 122–123.
31 Kress (2010), 533.
32 MacCormick (1994), 235 and 238. See also Bix (2004), 34.
33 In particular *Law's Empire* (Harvard University Press, 1986), where Dworkin described the role of coherence in his theory of law as integrity, has been an influential piece of work for further coherence theories in law.
34 Raz (1995). Raz has taken the view that the more unified the set of principles underlying court decisions and legislative acts that make up the law, the more coherent the law is (pp. 274–275).
35 MacCormick (1994). Like Raz, MacCormick appears to share the view of coherence in terms of unity of principle in a legal system, with the former contending that the coherence of a set of legal norms consists in their being related to either in being the realization of some common value or values, or by fulfilling some common principle or principles.
36 Kress (2010), 533.
37 Ibid.

identified as only enhancing coherence. The more of these properties are present, together with monism or unity, the more coherent a system is.

Kress states that *consistency* as a property of coherence means that the principles and propositions of different policy sectors are logically consistent. Consistency requires an absence of contradictions within a set of, for example, two or more propositions, principles or sentences. While coherence is thus when a bunch of rules all make sense in accordance with some overriding explanatory/justificatory principle, consistency is where no rules contradict one another. Coherence in environmental law thus requires that the various rules and principles do support an overriding principle, such as the aim of ecosystem integrity.

Two provisions from different pieces of environmental legislation may be consistent as non-contradictory in its literal understanding; however, they may not be supportive to the overall principle or objective of, for instance, the maintenance of ecosystem integrity. As an example, the legal framework on mining activities may pursue the goal of wealth creation for the particular state by the production and exportation of oil and gas, while the legal framework regulating fisheries within the same ecosystem may pursue similar objectives of wealth creation through the catching and exportation of fish. These objectives may be consistent and non-contradictory, yet lead to the degradation of the particular ecosystem. Therefore, in order for these provisions to be deemed coherent, they also ought to support the overall objective of, for instance, maintaining ecosystem integrity.

8.2.3 Consistency as an element of the rule of law

Consistency and coherence are not merely desirable assets of law from a pragmatic point of view; consistency and coherence are also important elements of the broader notion of the rule of law. The traditional meaning of the rule of law is a system of governance based upon generally applicable abstract rules and limited state discretion, in which the government is subject to the same law as individual citizens.[38]

> Stripped of all technicalities, [the rule of law] means that government in all its [activities] is bound by rules fixed and announced beforehand – rules which make it possible to foresee with fair certainty how the authority will use its coercive powers in given circumstances and to plan one's individual affairs on the basis of his knowledge.[39]

As expressed by the United Nations Security Council, the rule of law requires 'measures to ensure adherence to the principles of supremacy of law, equality before the law, accountability to the law, fairness in the

38 Pardy (2009), 69.
39 Hayek (1944), 80.

application of the law, separation of powers, participation in decision-making, legal certainty, avoidance of arbitrariness, and procedural and legal transparency'.[40] Likewise, Tamanaha states that, at its core, the rule of law requires that government officials and citizens are bound by and act consistent with the law. This basic requirement entails a set of minimal characteristics: law must be set forth in advance (be prospective), be made public, be general, be clear, be stable and certain, and be applied to everyone according to its terms. In the absence of these characteristics, the rule of law cannot be satisfied.[41] Probably the best known aspects of the rule of law are the eight formal principles of Lon Fuller's 'inner morality of law'. Fuller's account of the rule of law requires that the state should do whatever it wants to do in an orderly, predictable way, giving us plenty of advance notice by publicizing the general norms on which its actions will be based, and that it should then stick to those norms and not arbitrarily depart from them even if it seems politically advantageous to do so.[42] More specifically, Fuller suggested the following principles:

1 Generality: Legal prescriptions must be issued at some level of generality. No legal system can function by addressing its prescriptions to individuals, one by one, or by addressing each particular act separately.
2 Promulgation: For the law to be able to guide human conduct, it must be promulgated to its subjects. People can only be guided by rules or prescriptions if they know about the existence of the rule or prescription.
3 No retroactive rules: For the law to be able to guide human conduct, it must prescribe modes of behaviour prospectively. Retroactive rules, which purport to affect behaviour which had already occurred prior to the rule's promulgation, cannot achieve the purpose of actually guiding human conduct.
4 Clarity: Rules or prescriptions can only guide human conduct if the subjects understand what the rule requires. Promulgation is not enough. A certain level of understanding of the rule is essential for rule following.
5 No contradictory rules: For similar reasons, if the rule prescribes one thing and at the same time prescribes a contradictory rule, people cannot follow it. Or if people are prescribed to do X by one rule and not X by another rule, then there is no way in which they are able to follow both.
6 No impossible prescriptions: A rule or prescription may be comprehensible and not inconsistent but, in practice, impossible to follow. A

40 United Nations Security Council (2004).
41 Tamanaha (2008), 3. This is the 'formal' or 'thin' definition of the rule of law: more substantive or 'thicker' definitions of the rule of law also exist, which include reference to fundamental rights, democracy and/or criteria of justice or right.
42 Waldron (2010), 6; See further Fuller (1977), 46–90.

rule that people cannot follow is a rule that cannot guide human conduct, even if it is understood perfectly well. To guide human conduct, rules must require conduct that is possible for the rule subjects to perform.

7 Stability: It is generally assumed that some level of stability over time is essential for the law to achieve its purposes, whatever they are. The law can change of course, but the assumption is that if changes are too frequent, people cannot follow the law. This stems partly from the fact that many of our actions which the law purports to regulate require advance planning, preparation, and a certain level of guaranteed expectations about the future normative environment.

8 Consistent application: For the law to be able to guide human conduct, it must maintain considerable congruence between the rules promulgated and their actual application to specific cases. In other words, the law could not guide human conduct if actual deviations from it are not treated as such, namely as deviations from the rule. This is actually a very complex requirement which entails a whole range of principles and practices. Generally speaking, it requires that the agencies dealing with the enforcement and application of law to specific cases actually apply those rules promulgated by the law.

In short, the rule of law thus requires that laws be publicly promulgated, be reasonably clear and not self-contradictory, and have general and prospective application; that the application of laws be administered by impartial and independent courts which are reasonably accessible to all; that people be given adequate opportunities to comply with the law; that laws not be changed too frequently; and other, similar principles.[43] An important benefit of the rule of law is that it restricts discretion of government officials, reducing wilfulness and arbitrariness.[44]

The concept of consistency is closely linked to the notion of the rule of law. This concerns in particular consistency in legal definitions and terminology, which generally contributes to the clarity of rules and legal frameworks. Consistency among the rules of one or more statutes may contribute to the aim of non-contradictory rules; and consistency between the rules promulgated and their application contributes to the aim of consistent application. This will be further illustrated below.

Besides these more procedural aspects, the rule of law also contains a substantial content. In the context of environmental law and ecosystem degradation, the rule of law may be particularly important for the conservation of nature and the maintenance of ecosystem integrity. Bugge explains that:

43 Marmor (2008), 1.
44 Waldron (2008), 9.

> The rule of law for nature even means a better legal protection of nature from human activities that may threaten or damage nature. Substantially it aims at the integrity and security of nature. It means that nature and natural values are protected by law from encroachments, deterioration and destruction in fundamentally the same way as citizens are protected by law. Of course, this does not mean that it shall be protected at any price and regardless of any other conflicting goal or interests. But these goals or interests must be strong enough to justify the environmental damage, and there must be procedural rules that ensure that the trade-off is made with due regard to nature's value and all other relevant facts. Rule of law for nature means predictability, security and the absence of arbitrariness and bias in decisions that affect nature and the full accounting of environmental values in decision-making – be it by private or public authorities.[45]

In the field of environmental law, there is thus a need for a 'rule of law for nature'. This refers to a 'system of governance in which all persons, institutions and entities, public and private, including the state itself, are accountable to laws that aim at protecting the health, integrity and security of the environment'.[46] A legal system would not adhere to the rule of law when it fails to prevent people from destroying the functioning of ecosystems.[47] The substantive dimension of the rule of law is thus more concerned with the content and purpose of the law. Besides Bugge, other scholars have also contributed with interesting views on this substantive dimension, especially in the context of the rule of law for the protection of nature. Louis Kotzé, for example, argues that:

> The substantive dimensions of the rule of law for nature is the extent to which it could be used to create, maintain, improve and/or protect the substantive 'goodness' of environmental law and thus environmental interests. In this sense, rule of law for nature must be understood in terms of the broader issue of environmental constitutionalism, which is a value-laden concept that exudes numerous characteristics that could legitimize, dignify and improve a legal order.[48]

Bosselmann notices that '[r]relating the rule of law to the ecological challenge is very timely'. He argues that 'law has been complicit in a sense of legitimizing and legalizing excessive growth and environmental destruction' and that it has been argued that 'domestic and international law have been widely ignorant of ecological realities'.[49] The substantive dimension of the rule of

45 Bugge (2013b), 7–8.
46 Ibid., 5.
47 Cullinan (2013), 100.
48 Kotzé (2013), 135–136.
49 Bosselmann (2013), 76.

law would thus ensure that the integrity of nature or ecosystems is maintained. In more abstract terms, Cormac Cullinan reasons that:

> It is now abundantly clear that a legal system cannot provide the conditions necessary or conducive to social harmony and the enhancement of human potential unless it also prevents human beings from undermining the relationships that are necessary to maintaining the fundamental conditions required for human well-being [...] A legal system that fails to prevent people from destroying the functioning of ecosystems that provide the water that it requires also fails to create the conditions necessary for social harmony, enhanced well-being and human rights. In other words, it is deficient in that it is ineffective in achieving its desired purpose.[50]

In addition to the understandings of the 'rule of law for nature', another variation to the rule of law has been provided by Geoffrey Garver, presented as 'the rule of ecological law'. His concern that 'the global community's *de facto* governance structure lacks legal and policy regimes that would allow hard ecological truths to carry determinative weight' led to his idea that 'systems-based ecological boundaries that promote the flourishing of life systems provide the base of a structure of ecological law (in the legal sense) that must be respected and enforced to fend off catastrophe and enhance the capacity of life'.[51] He thus endorses a systems-based legal and institutional structure that is built on the foundation of ecological law under an expanded notion of the rule of law.[52] He recognizes that the system-based mechanisms in contemporary environmental law are generally weak, limited or subservient to economic and political interests, and proposes ten core features of the rule of ecological law.[53]

The suggestions described above on the 'rule of law for nature' and the 'rule of ecological law' are very interesting and demonstrate a development within environmental law research towards more system-based approaches that underscore the primacy of ecological integrity. At the same time, however, it may also be noticed that the ideas and suggestions are still rather abstract. What does this exactly require of the design of environmental law in a particular country? In addition, the suggestions, especially Garver's ten features of the rule of ecological law, may require such a transformation of contemporary environmental law that it might be questioned whether this is practically attainable within a reasonable period of time. As pointed out by

50 Cullinan (2013), 100.
51 Garver (2013), 317.
52 Ibid., 318.
53 He mentions the example of environmental impact assessment laws that require an analysis of the effects of economic activity on ecosystems. These are mainly procedural, promoting awareness; they are rarely binding and do not necessitate concrete action to protect ecosystems. Ibid., 321.

the fifth *Global Biodiversity Outlook*, '[a]s human pressures on the Earth System accelerate, several critical global, regional and local thresholds are close or have been exceeded. Once these have been passed, abrupt and possibly irreversible changes to the life-support functions of the planet are likely to occur, with significant adverse implications for human well-being'.[54] A degree of urgency is thus required.

The next section will propose certain forms of consistency in environmental law that are deemed necessary for facilitating an ecosystem approach in environmental governance. Rather than aiming at a radical transformation of the content and architecture of environmental law, it might be more effective (and realistic) to move towards the accomplishment of these forms of consistency. As will be shown, these forms of consistency will also contribute to the substantive dimension of the rule of law. In other words, these forms of consistency will increase the probability that the system of environmental law ensures the maintenance of ecosystem integrity.

8.3 Forms of consistency necessary in environmental law

Three forms of consistency will now be identified that are deemed essential for the implementation of the ecosystem approach and the maintenance of ecosystem integrity. These forms of consistency aim to offset the challenges in environmental law and governance in light of an ecosystem approach, especially the challenges of fragmentation, discretion and valuation. Three forms will be distinguished: formal consistency and coherence, substantive consistency, and consistency in procedure and balancing. Formal consistency refers to consistency with regard to the 'environmental objectives' among the legal acts that apply to a specific activity. Are the objectives of the various legal acts consistent with each other, and are they coherent with regard to the aim of maintaining ecosystem integrity? This form of consistency also concerns consistency in terminology and definitions. A second form of consistency is consistency in procedure and weighing and balancing. This form requires consistency in the manner in which different interests and concerns are weighed and balanced. This involves that the various mechanisms and principles of weighing and balancing that are applied by administrative bodies when appreciating the value of the ecosystem are applied with a degree of consistency. This also requires that the ecosystem services or values are being ascribed a consistent weight irrespective of the legal framework that applies or the decision-making authority that carries out the weighing and balancing assessment. Finally, substantive consistency requires consistency between the 'environmental objectives' of the act on the one hand, and the attainment of those objectives in concrete cases on the other hand. As will be argued, the larger the degree of discretion in a legal act, the more room for substantive inconsistencies.

54 UNEP (2012), 6.

8.3.1 Formal consistency and coherence

Formal consistency refers to consistency between legal rules, norms or principles of the legal acts of one legal framework or instead from a number of legal frameworks together, which apply to the governance of the same ecosystem. This may be either legal frameworks existing within one national jurisdiction, or in the case of transboundary ecosystems, legal frameworks deriving from various national jurisdictions.

Consistent terminology

Formal consistency requires consistency as regards the terminology and definitions used across the legal acts. Similar terminology should be used to refer to the same concepts and vague terms should be understood in similar manners. Variations in terminology such as 'environmentally justifiable' and 'environmentally defensible' may be confusing and are undesirable in environmental law. The use and meaning of the concept 'sustainable' should be consistent across the various acts that apply to a particular ecosystem.

Consistency in terminology contributes to the aim of clarity, as part of the rule of law. It is important that the rules are understandable in order to be followed. This requires clear and consistent terminology and use of definitions. The requirement of consistent terminology has been addressed by the EU in the *Joint Practical Guide of the European Parliament, the Council and the Commission for Persons Involved in the Drafting of Legislation within the Community Institutions*. [55] The guide stresses that the terminology used in a given act shall be consistent both internally and with acts already in force, especially in the same field. Identical concepts shall be expressed in the same terms, as far as possible without departing from their meaning in ordinary, legal or technical language. The aim is to leave no ambiguities, contradictions or doubts as to the meaning of a term. Any given term is therefore to be used in a uniform manner to refer to the same thing and another term must be chosen to express a different concept. Thus, in order to aid comprehension and interpretation of a legislative act, the text must be consistent.[56]

This applies not only to the provisions of a single act, including the annexes, but also to provisions of related acts, in particular implementing acts and all other acts in the same area. This is especially relevant within environmental law, where activities are regulated by a variety of legal acts that apply to various parts of the ecosystem. These kinds of inconsistencies easily arise when there are multiple legislators involved.[57]

An example that demonstrates the importance of consistent terminology may be found in the context of REDD+ (Reducing Emissions from

55 European Communities (2003).
56 Ibid.
57 Engel (2006), 225.

Deforestation and Forest Degradation).[58] In this context, there is a strong need to harmonize REDD+ terminology such as (natural) forests, forest conservation, trees, deforestation, ecosystem services and land degradation.[59] A recent study on the implementation of REDD+ recognized that in the negotiations on reducing emissions from forests and other aspects of land use, there appeared to have been an assumption that 'forest' is a clear concept that could be used in negotiated agreements for the post-Kyoto period. However, the lessons from the implementation of afforestation/reforestation in the Clean Development Mechanism of the Kyoto Protocol show that the definition that was agreed under the Marrakesh Accords and has been used to date does not always correspond to what individual countries consider to be forests or non-forests.[60] In many countries, forest loss or conversion might not be officially counted as deforestation. Clarity and consistency with regard to key concepts used in the context of REDD+ has been recognized as a prerequisite for successful implementation on the ground.[61]

This need for clarity and consistency was an important drive behind the legislative reforms that were passed in Mexico City on 24 April 2012. These reforms position Mexico as one of the first countries to legislate in support of efforts to reduce emissions from deforestation and forest degradation. Recognizing the need to reform environmental laws and harmonize legal inconsistencies for REDD+ implementation, the Mexican Congress advanced a set of legal reforms to the country's Environmental Law and Forest Sustainable Development Law. The amendments to these laws were, among others, focusing on harmonizing definitions of key terms such as forest degradation and deforestation.[62]

Non-contradictory aims

Furthermore, formal consistency requires that the overall aims and objectives of the legal acts do not contradict each other. Legal acts that have divergent and contradictory aims and objectives, or a legal act that in itself pursues contradictory objectives, will not be in accordance with the requirement of formal consistency.

The requirement of non-contradictory laws specifies an important dimension of consistency, namely the absence of contradictions within a legal framework. One of the accepted principles for dealing with apparent

58 REDD+ is a global mechanism designed to offer positive incentives to reduce emissions from deforestation and forest degradation and to promote the conservation and sustainable management of forests, and enhancement of forest carbon stocks in developing countries.
59 Robles (2013), 7.
60 Ibid.
61 Ibid., 15.
62 Ibid., 8.

contradictions in the law is to see whether there is any way of reconciling the seemingly inconsistent provisions, preferably by using logic.[63]

Marmor specifies this type of consistency further and clarifies that the law can manifest consistency/coherence in at least three ways: logically, pragmatically and morally. Suppose that the law prescribes that all Fs should X under circumstances C, and, at the same time, that all Fs should not X under circumstances C. In this case the law is simply inconsistent in a straightforward logical way: it requires its subjects to do one thing and its exact opposite under the same circumstances. Therefore, it does not allow for any way in which people can comply with one of the law's requirements without necessarily violating another. This kind of inconsistency is both a functional and a moral failure in that it undermines the law's ability actually to guide conduct.[64]

Besides logical inconsistency, law might be pragmatically and morally inconsistent. Marmor states that compared with logical inconsistency, *pragmatic inconsistency* of the law is a much more frequent and familiar occurrence. The law is pragmatically inconsistent when it actually promotes aims, policies or patterns of conduct that practically conflict.[65] In the governance of ecosystems which involves various administrative sectors or even national jurisdictions, one often faces legislation that promotes conflicting objectives.

Most obviously, a legal framework that applies to the governance of a particular ecosystem often contains laws that regulate the exploitation of natural resources at the same time as it contains laws that aim at the conservation of the same ecosystem. Furthermore, the ecosystem may be governed by different norms deriving from different pieces of legislation. These norms may not be consistent as in the case of the law applicable to the management of the Antarctic waters as referred to above. More specifically, with regard to 'ecosystem-based management', norms articulated in the Antarctic Treaty System and the multilateral environmental treaties set comprehensive standards that are inconsistent with those of the international fisheries conventions. Rose and Milligan argue that the CCAMLR requires the maintenance of ecological relationships and the prevention of changes in the marine ecosystems that are not potentially reversible in two or three decades. The CBD's articulation of an ecosystem as a 'dynamic complex of plant, animal and microorganism communities and their non-living environment' fully integrates biotic with inanimate factors. In contrast, UNCLOS[66] requires merely that rare fragile ecosystems and habitat be protected, possibly only from marine pollution as the norm is placed in the context of general obligations

63 Fuller (1977), 65–70.
64 Marmor (2003), 34. See also Hage (2000), 219.
65 Marmor (2003), 35.
66 United Nations Convention on the Law of the Sea (opened for signature on 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3.

to prevent, reduce and control pollution of the marine environment. Together with the Fish Stocks Agreement, it also requires that individual species associated with harvested stocks should be maintained above levels at which they could be seriously threatened, which is a standard well below the maintenance of ecosystem relationships.[67]

Finally, and perhaps most problematically, the law can be *morally incoherent*. The law is morally incoherent if its various prescriptions and their underlying justifications cannot be subsumed under one coherent moral theory. Or, we could say that in such cases there is not a conceivable single rational moral agent whose point of view could justify the entire set of prescriptions under consideration.

Indeed, an ecosystem approach requires also formal coherence in environmental law. Formal coherence refers to the idea that the legal acts not only pursue non-contradictory objectives, but the overarching aims and objectives make sense in light of the ecosystem approach; they should promote rather than impede the maintenance of ecosystem integrity. So while formal consistency may ensure that legal behaviour should, in general, be based on the same principles across sectors and specific problems, formal coherence, going further, entails that legal rules produce socially desirable consequences. Formal coherence in light of the ecosystem approach requires that the legal rules promote the maintenance of ecosystem integrity and do not work against that overall objective.

Currently, in environmental law, this type of inconsistency may be rather difficult to detect due to problems of vague and broad overarching principles such as the maintenance of ecosystem integrity and sustainable development. The precise understanding of these overarching concepts is subject to disagreement and is value laden, which means that different groups of people may accord different values to these concepts. Agreement and clarity across the involved actors is required with regard to the interpretation of common overarching aims and objectives.

Consistency required at several levels

With regard to the governance of a particular ecosystem, formal consistency and coherence is required at three different levels. First and foremost, there ought to be consistency within the legal framework that applies to a particular activity within an ecosystem, such as mining, offshore wind energy production, sand extraction, shipping, recreation. Due to the fragmentation of environmental law, there are often a number of legal acts that apply to the regulation of these activities. Formal consistency with regard to terminology and pursued objectives should be attained *within* these separate legal frameworks.

67 Rose and Milligan (2009), 69.

Furthermore, larger ecosystems, such as marine ecosystems, are often places for a variety of activities. All these activities have their own effect on the integrity of the ecosystem. For that reason there ought to be formal consistency and coherence *among* the legal frameworks that regulate activities within that particular ecosystem. It might be the case that the legislation on fishing and aquaculture contains different management principles from the legislation on mining or mineral extraction. Formal consistency and coherence requires that the variety of principles and rules of the various legal frameworks are non-contradictory and support the maintenance of ecosystem integrity.

Formal consistency and coherence may also contain a *transnational* dimension. In particular our marine ecosystems may cross over several national jurisdictional zones. In such a situation, it would be desirable that the legal framework regulating a particular activity in country X would be consistent with the legal framework regulating the same activity in country Y. The integrity and performance of an ecosystem as a whole is affected by the interrelationships between the various parts or components of the system. The sustainable governance of, for example, fishing resources within the marine area of country X may be offset by unsustainable governance of fishing resources in country Y.

To make it even more complicated, as the performance of an ecosystem depends on interactions between the elements, certain change within one of these elements may affect other elements across time and space. Therefore, promoting an ecosystem approach in environmental law and governance in one country may be undermined when another country is actually degrading its part of the marine ecosystem. There is thus a need for a consistent approach across governmental sectors and countries that share ecosystems. Formal consistency and coherence thus does not only include a national dimension, but also a transnational dimension.

8.3.2 Consistency in procedure and balancing

A second form of consistency that is essential for the implementation of an ecosystem approach is consistency in procedure, and weighing and balancing. This form of consistency refers to consistency in weighing and balancing procedures across sectors. As indicated above, fragmentation of law and administrative discretion involves that decision making requires the weighing and balancing of divergent values. These weighing and balancing assessments are carried out by a variety of public officials under different and political constraints on various parts of the same ecosystem. In order to ensure that ecosystem values are not assessed and integrated in a partial and fragmented manner, these decision-making principles and methodologies need to be consistent across sectors. In addition, it is important that the ecosystem or ecosystem services are being ascribed a consistent value across decisions.

One of the challenges in environmental governance is the appropriate valuation of ecosystem services and the integration of these values into decision-making procedures. Discretion in the legal system and the absence of concrete rules on this valuation and integration task may entail that ecosystem values are being appreciated in an arbitrary manner depending on the particular sector responsible for the decision. Different sectors may have different priorities and traditions, and the law itself may remain silent on which interests need to be prioritized. The fragmentation of environmental law and governance, in combination with the challenges embedded in weighing and balancing of highly divergent values, may result in only a partial valuation of the ecosystem.

This contradicts the ideology behind the ecosystem approach; the ecosystem is one, all its elements are interconnected, and therefore one part of the ecosystem cannot be assessed in isolation of the other parts. Divergences in the weighing and balancing of ecosystem values across governmental sectors may lead to a fragmented approach whereby all the different elements of the ecosystems are assessed individually, ignoring the value of the *system* itself. The value of the *system* can only be made transparent by coordinating weighing and balancing assessments across the various sectors. It is only when the pieces of the puzzle come together that we can assess and evaluate the *integrity* of the entire *system*.

This type of consistency thus involves that the value of the ecosystem is appreciated consistently when weighing and balancing mechanisms and principles are applied by administrative bodies, and that they develop a comprehensive approach to ensure that all relevant interests and values are taken into account and given proper weight in a consistent manner across sectors and throughout time.

8.3.3 Substantive consistency

Facilitating the implementation of an ecosystem approach also requires substantive consistency in environmental law. Substantive consistency refers to consistency between the objectives and rules of the legal acts and the accomplishments of these objectives and rules in practice. This concerns in particular the implementation and interpretation of rules, norms and principles, and is related to the principle of legal certainty and predictability, as described above as important elements of the rule of law.

For the actual protection of ecosystems, much depends on how the particular rules are interpreted and applied. They should result in desirable consequences which means that they should not lead to the degradation of our ecosystems. Basically, applying a general, abstract rule to a more specific, contextual case is a rather discretionary exercise. Every method inevitably entails a personal decision by the authority entrusted with applying rules. In addition, the vaguer the applicable legal rule is, the more diverse its application will be. As long as the legislator has not provided the legal system with

concrete exercises in balancing competing concerns, these decisions have to be taken by the individual decision maker.[68]

In general, the more administrative sectors and decision-making authorities are involved in the application of unclear rules, the more likely it is that inconsistencies will arise. Substantive consistency, however, requires that the application of legal rules and principles are in concordance with the overall objectives of the legal frameworks. It is expected that a large degree of discretion within legislation provides more room for substantive inconsistencies in practice.

In fact, the general idea is that for the law to function properly, its promulgated rules must be the rules that are actually applied to specific cases by the various law enforcement agencies. It is not the law on the books that measures the law's success in guiding human conduct, but its application in practice. Not only is the judiciary an important actor in this game; there are also countless officials, including within the executive branch, whose job is to determine, in various domains, how the law is applied in practice.[69]

Consistent application becomes more difficult when the law contains unclear provisions and vague terminology. Inconsistencies are also more likely to appear through the use of principles above rules. Substantive principles often require the public authority to strike the appropriate balance between competing normative concerns. It is obvious that this methodology makes rule application much less predictable and entails a risk for inconsistencies. The principle of legitimate expectation and legal certainty is of particular importance here. Legal certainty is an important part of legitimate expectation as it aims to preserve expectations that an individual might have acted upon in certain cases.[70] Without these aspects of clarity and legal certainty in place, considerable slippage may be expected. According to Pardy, rule of law norms 'facilitate achievement of the law's objectives by limiting slippage between statutory objectives and results in particular cases'.[71] These norms are thus important in order to ensure that the environmental rules are being complied with.

Substantive consistency can be identified in the case of different applications of the same rule. Suppose there is one rule, inconsistency may arise when this rule is interpreted in different ways. Two instances of applying the same rule generate two different effective rules. Inconsistency consists here of the fact that applying the rule to these two cases should have resulted in one and the same effective rule.[72] Inconsistencies in the application of the same rule can also arise over time. Inter-temporal consistency concerns the relationship between the past and the present legal decisions, rights or norms.[73]

68 Engel (2006), 227–230.
69 Marmor (2003), 42–43.
70 Ibid., 617–618.
71 Pardy (2008), 344. See also Farber (1999), 297.
72 Ibid., 233.
73 Stavang (2009), 2.

Substantive inconsistency may also arise when a public authority interprets a rule in a normatively unacceptable way. In this case, there has been an 'ideal rule' constructed, and the inconsistency consists of a normatively unacceptable difference between the effective rule and the ideal rule.[74]

Substantive inconsistency may thus arise in different forms. For the protection of ecosystems, however, it is important that the environmental objectives or the levels of environmental protection established by law are also attained in practice. This presupposes, however, that the objectives or standards set by the legislation are capable of maintaining the integrity of ecosystems, by containing a degree of formal coherence as explained above.

8.4 Appropriate level of consistency to be pursued?

Notwithstanding the desirability of consistency and coherence in a legal system, within certain areas of law this may not be easy to accomplish or maintain. This might be particularly true in areas of law that have been expanding extensively, where the legal system is composed of numerous legal acts regulating a variety of activities and where numerous public officials are involved, such as in the area of environmental law. Law is never entirely coherent. If only because so many agents are involved in creating, developing and modifying the law that it can hardly be expected that the entire body of law, even in a particular legal domain, will manifest a coherent set of norms. Often, 'the law is not an unambiguous system of rules promulgated at a particular moment by one authority, but a collection of diverse rules and decisions which have been devised by several authorities over time'.[75]

In addition, vagueness and flexibility may have been built into the law on purpose. According to Marmor, clarity is not always a virtue: the clearer the law, the more rigid it is, and rigidity is often a deficiency in the law. In other words, it is partly because the law is sometimes obscure that courts and other law application agencies have the discretion they need to adjust the law to particular needs and circumstances. Marmor argues that flexibility in the application of the law is also a rule of law virtue, as it may contribute to reasonableness in specific cases. In addition, we should also bear in mind that the law is often obscure not simply because the legislators have made a mistake in its drafting. In a pluralistic democratic society, legislation is often a result of a delicate compromise between conflicting views and purposes. Sometimes, the only way to achieve a compromise is by foregoing maximum clarity. Parties to a dispute may find it easier to agree on a formula that is

74 Engel (2006), 233.

75 Habermas (1996), 198: 'An existing law is the product of an opaque web of past decisions by the legislature and the judiciary and it can include traditions of customary law as well'.

not entirely clear, hoping that further interpretation will favour their stance.[76]

Similar to Marmor, Engel also recognizes that inconsistency may serve a number of important purposes and that there is an impressive list of normative concerns that make it advisable to tolerate, if not generate, a good deal of inconsistency in the law. He introduces the concept of 'soft consistency' which incorporates the principle of proportionality. Engel admits that consistency is in principle desirable for the law, but that there are reasons that call for accepting some inconsistency in some situations. Soft consistency calls for a balancing exercise and requires that the concrete consistency problem must be investigated. This is what the taxonomy of consistency in the law has been developed for. Not all of the dimensions of consistency are present in every case. More importantly, not all of them must be sacrificed if one of the reasons for ignoring consistency prevails.[77]

Yet, to remember, ecosystems are usually not regulated be one legal framework in particular. Often various legal frameworks apply, regulating different human activities at different levels of governance within different jurisdictional zones. While some degree of inconsistency in a legal framework could probably be overcome, it becomes much more difficult to establish consistent and coherent approaches when the number of legal frameworks increases and when inconsistencies become more complex and difficult to detect.

In addition, inconsistencies may violate the rule of law because leaving statutes or regulation too general or vague, it is claimed, undermines law's function in guiding conduct. Marmor, contemplating Fuller's requirement of generality, argues that:

> It may be worth keeping in mind that there is a distinction between the generality of a norm-act and its vagueness [...] Most legal standards, however, are both general and vague. In the context of the rule of law, both generality and vagueness raise the same kind of concern [...] [T]here are commentators who claim that over-generality, or vagueness, of legal norms is a serious deficiency, and one which violates the rule of law virtues: the law's purpose is to guide human conduct, and if the legislature purports to guide conduct, it must do so in fairly specific manner, so that we can understand what the law actually requires and follow it.[78]

There is a level of consistency and coherence that the law must have in order to function properly in guiding its subjects' conduct, but it is equally clear

76 Marmor (2003), 33.
77 Engel (2006), 261.
78 Marmor (2003), 16–17.

that from a functional perspective, the law can tolerate a considerable amount of inconsistency. In fact, a degree of inconsistency is inherent in any legal system and is not intolerable.[79] Legal norms are rarely left in their very general, or vague, form; ultimately, some institution must specify in greater detail what the norm requires, and the question is basically one of institutional choice.[80] Marmor raises the question with respect to the *desired* level of congruence between the law and its application to specific cases: should we necessarily aspire to a perfect match?

For sure, the question surrounding the appropriate level of consistency and coherence in a legal system cannot be answered in an abstract manner. The specific area of law has to be examined, as well as the causes and motivations behind inconsistency within that area. In addition, the threats and benefits of the inconsistencies need to be appraised. Both consistency and coherence are related to the rule of law and may have, in addition, important practical benefits possibly enabling a holistic approach towards an ecosystem regardless of the fragmentation of environmental law and governance.

8.5 Conclusion: future role of environmental law

Given the challenges that fragmentation, discretion and ecological complexities provide to sustainable ecosystem governance, the role of environmental law needs to be reconsidered. In fact, a much broader attention should be given to the role of substantive rules in environmental law – rules which actually protect the ecosystem against excessive human impacts. Moreover, as legal and governance structures are fragmented, it is important that environmental law functions as a system containing a degree of consistency and coherence across the different acts. Finally, this body of law also needs to adhere to a strong rule of law ensuring the protection of ecosystems and the maintenance of ecosystem integrity by law.

As Pardy mentioned, '[l]aw needs to operate as a system; it must be internally coherent. Every rule and principle should be connected'.[81] Environmental law as a system thus mainly refers to the requirement that rules should hang together and that these rules overall support the aim of maintaining ecosystem integrity. Different parts of the legal system need to be consistent and overall the system needs to be coherent.

Frankly, we do not necessarily require complex and difficult legal systems to protect ecosystems effectively. In fact, the more complex the picture becomes and the more flexibility would be involved in every part of it, the more difficult will it be to establish and maintain consistency and coherence in that legal system. Systemic environmental law is essential in order to protect ecosystems from being degraded. When law is designed as a

79 Kaufmann-Kohler (2008).
80 Marmor (2003), 17.
81 Pardy (2009), 83.

system, predictability and consistency increase while complexity and discretion decrease.

A strong rule of law is an essential feature of environmental law in light of an ecosystem approach and the maintenance of ecosystem integrity. Indeed, for the maintenance of ecosystem integrity, it is not sufficient that substantive ecosystem-protective rules merely are in place; they have to be applied and complied with in order to ensure that the appropriate level of protection is attained in practice. Adhering to the rule of law is important in this respect as it generates clarity, legal certainty and predictability. It is essential that the legal rules of environmental law that aim at the protection of ecosystems are formulated so clearly that the level of protection is regulated and ensured by law rather than that the level of protection is to be decided upon in the process of weighing and balancing highly divergent interests and values.

8.6 References

Bix, B., *Dictionary of Legal Theory* (Oxford University Press, 2004).

Bosselmann, K., 'Grounding the Rule of Law', in Voigt, C. (ed.) *Rule of Law for Nature. New Dimensions and Ideas in Environmental Law* (Cambridge University Press, 2013).

Bugge, H.C., 'Har vi de rettslige redskapene som trengs for en god forvaltning av våre havområder', in Graver, H.P., Hjort Kraby, I. and Stub, M. (eds) *Forsker og Formidler. Festskrift til Erik Magnus Boe på 70-årsdagen 17. april 2013* (Universitetsforlaget, 2013a).

Bugge, H.C., 'Twelve Fundamental Challenges in Environmental Law', in Voigt, C. (ed.) *Rule of Law for Nature. New Dimensions and Ideas in Environmental Law* (Cambridge University Press, 2013b).

Cullinan, C., 'The Rule of Nature's Law', in Voigt, C. (ed.) *Rule of Law for Nature. New Dimensions and Ideas of Environmental Law* (Cambridge University Press, 2013).

Dworkin, R., *Law's Empire* (Harvard University Press, 1986).

Engel, C., 'Inconsistency in the Law: In Search of a Balanced Norm', in Engel, C. and Daston, L. (eds) *Is there Value in Inconsistency?* (Nomos Publishers, 2006).

European Communities, *Joint Practical Guide of the European Parliament, the Council and the Commission for Persons Involved in the Drafting of Legislation within the Community Institutions* (Office for Official Publications of the European Communities, 2003).

Farber, D.A., 'Taking Slippage Seriously: Noncompliance and Creative Compliance in Environmental Law' (1999) 23 *Harvard Environmental Law Review* 297.

Farmer, A., 'Simplifying EU Environmental Policy', Study for the European Parliament's Committee on Environment, Public Health and Food Safety (2008) IP/A/ENVI/FWC/2006–2172/C1/SC4.

Faure, M.G., 'The Harmonization, Codification, and Integration of Environmental Law: A Search for Definitions' (2000) *European Environmental Law Review* 174.

Franklin, C., *Consistency in EC External Relations Law* (PhD dissertation, University of Bergen, 2010).

Fuller, L., *The Morality of Law* (Yale University Press, 1977).
Garver, G., 'The Rule of Ecological Law: The Legal Complement to Degrowth Economics' (2013) 5 *Sustainability* 316.
Giusti, G.A. and Merenlender, A.M., 'Inconsistent Application of Environmental Laws and Policies to California's Oak Woodlands' (2002) *USDA Forest Service General Technical Report PSW- GTR-184*.
Habermas, J., *Between Facts and Norms* (Suhrkamp, 1996).
Hage, J., 'Consistency of Rules and Norms' (2000) 9(3) *Information & Communications Technology* 219.
Hayek, F.A., *The Road to Serfdom* (University of Chicago Press, 1944).
Kaufmann-Kohler, G., 'Is Consistency a Myth?' in Gaillard, E. and Banifatemi, Y. (eds) *Precedent in International Arbitration* (JurisNet, 2008).
Kloepfer, M., 'On the Codification of German Environmental Law', in Bocken, H. and Ryckbost, D. (eds) *The Codification of Environmental Law: Proceedings of the International Conference in Ghent, February 21 and 22, 1995* (Kluwer International Law, 1996).
Kotzé, L., 'Sustainable Development and the Rule of Law for Nature', in Voigt, C. (ed.) *Rule of Law for Nature. New Dimensions and Ideas in Environmental Law* (Cambridge University Press, 2013).
Kress, K., 'Coherence', in Patterson, D. (ed.) *A Companion to Philosophy of Law and Legal Theory* (2nd, edn Wiley-Blackwell, 2010).
MacCormick, N., 'Natural Law and the Separation of Law and Morals', in George, R.P. (ed.) *Natural Law Theory: Modern Essays* (Oxford University Press, 1994).
Marmor, A., 'The Rule of Law and its Limits' (2003) *USC Public Policy Research Paper* No. 03-16.
Marmor, A., 'The Ideal of the Rule of Law' (2008) *USC Legal Studies Research Paper* No. 08-06.
Network of Heads of European Protection Agencies, 'Improving the Effectiveness of EU Environmental Regulation – A Future Vision' (10 July 2008).
Pardy, B., 'The Pardy-Ruhl Dialogue on Ecosystem Management Part V: Discretion, Complex- Adaptive Problem Solving and the Rule of Law' (2008) 25(2) *Pace Environmental Law Review* 341.
Pardy, B., 'The Hand is Invisible, Nature Knows Best, and Justice is Blind: Markets, Ecosystems, Legal Instrumentalism, and the Natural Law of Systems' (2009) 44 *Tulsa Law Review* 67.
Raz, J.P., 'The Relevance of Coherence', in *Ethics in the Public Domain: Essays in the Morality of Law and Politics* (Clarendon Press, 1995).
Rehbinder, E., 'Points of Reference for a Codification of National Environmental Law', in Bocken, H. and Ryckbost, D. (eds) *The Codification of Environmental Law: Proceedings of the International Conference in Ghent, February 21 and 22, 1995* (Kluwer International Law, 1996).
Robles, F.F., *Legal Analysis of Cross-cutting Issues for REDD+ Implementation. Lessons Learned from Mexico, Vietnam and Zambia* (FAO, 2013).
Rose, G. and Milligan, B., 'Law for the Management of Antarctic Marine Living Resources: From Normative Conflicts towards Integrated Governance' (2009) 20(1) *Yearbook of International Environmental Law* 41.
Stavang, E., 'Types and Forms of In/consistency in Law – with Particular Reference to Natural Resources', preliminary version for 'the Grill' at the university of Oslo, 12 October 2009. www.jus.uio.no/ifp/for-ansatte/kompetanse/forum-for-tekstkritikk/Artikler/Stavang_CONSISTENCY_240809.pdf.

Tamanaha, B., 'A Concise Guide to the Rule of Law', in Walker, N. and Gianluggi, Palombella (eds) *Florence Workshop on the Rule of Law* (Hart Publishing, 2008).
United Nations Environment Programme (UNEP), *Global Environment Outlook GEO-5, Summary for Policy Makers* (UNEP, 2012).
United Nations Security Council, *The Rule of Law and Transitional Justice in Conflict and Post-Conflict Societies: Report of the Secretary General, document no. S/2004/616* (United Nations, 2004).
Waldron, J., 'The Concept of and the Rule of Law' (2008) *Public Law & Legal Theory Research Paper Series Working Papers* No. 08-50.
Waldron, J., 'The Rule of Law and the Importance of Procedure' (2010) *Public Law & Legal Theory Research Paper Series Working Papers* No. 10-73.

8.6.1 Legislation

Antarctic Protocol to the Antarctic Treaty on Environmental Protection (4 October 1991) 30 ILM 1445 (1991).
Antarctic Treaty. The Antarctic Treaty (opened for signature 1 December 1959, entered into force 23 June 1961) 401 UNTS 71.
CBD. The Convention on Biological Diversity (adopted 22 May 1992, entered into force 29 December 1993) 1760 UNTS 79.
CCAMLR. Convention on the Conservation of Antarctic Marine Living Resources (adopted 20 May 1980, entered into force 7 April 1982) 1329 UNTS 48.
CITES. Convention on International Trade in Endangered Species of Wild Fauna and Flora (opened for signature 3 March 1973, entered into force 1 July 1975) 983 UNTS 243.
Flood Risk Directive. Council Directive 2007/60/EC of 23 October 2007 on the Assessment and Management of Flood Risks [2007] OJ L 288/27.
GHG Directive. Council Directive 2003/87/EC of 13 October 2003 Establishing a Scheme for Greenhouse Gas Emissions Allowance Trading within the Community [2003] OJ L 275/32.
Groundwater Directive. Council Directive 2006/118/EC of 12 December 2006 on the Protection of Groundwater Against Pollution and Deterioration [2006] OJ L 372/19.
Marine Strategy Framework. Council Directive 2008/56/EC of 17 June 2008 Establishing a Framework for Community Action in the Field of Marine Environmental Policy [2008] OJ L 164/19.
UNCLOS. United Nations Convention on the Law of the Sea (opened for signature on 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3.
Waste Directive. Council Directive 2000/76/EC of 4 December 2000 on the Incineration of Waste [2000] OJ L 332/91.
Water Framework Directive. Council Directive 2000/60/EC of 22 December 2000 Establishing a Framework for Community Action in the Field of Water Policy [2000] OJ L 327/1

9 Conclusion

The implementation of an ecosystem approach in environmental governance has become a highly timely necessity by now. Yet we are facing a paradox: while the application of an ecosystem approach is widely encouraged in international legal (and political) instruments, its implementation is complicated by the nature and design of national environmental law.

9.1 The ecosystem approach

The ecosystem approach requires a governance approach that focuses on the structure and functioning of the ecosystem within its own ecological boundaries, with the objectives of sustainable use and the maintenance of ecosystem integrity. The appropriate balancing between these objectives has remained one of the main challenges of the ecosystem approach. It is not only difficult to weigh and balance highly divergent objectives and values; it is also difficult to understand what exactly constitutes the integrity of a particular ecosystem.

9.2 Ecosystem integrity and economic valuation of ecosystem services

Frankly, the objective of ecosystem integrity is rather abstract. The valuation of ecosystem services could serve as a method to make the objective of ecosystem integrity more concrete. The valuation of ecosystem services provides insight into the quantity and quality of the services provided by the ecosystem and may therefore give an indication of its integrity. In addition, the valuation of ecosystem services may also make the weighing and balancing assessment more transparent and may possibly ensure that the value of ecosystem services is given proper weight throughout decision-making procedures. At the same time, however, various limitations have also been identified which concerned in particular their usefulness in cases with high degrees of scientific uncertainty. Notwithstanding these limitations and other technical difficulties that are embedded in the valuation methods, the

valuation of ecosystem services serves as a practical tool in the context of the ecosystem approach.

9.3 Weighing, balancing and integration

Besides the potential of ecosystem services valuation, what is of more importance is *how* the values of ecosystem services are actually integrated and used in decision-making processes. Whether or not ecosystem integrity is truly maintained depends on the balancing assessments where the value of the ecosystem services, whether expressed in monetary terms or not, is weighed and balanced against the other values that are at stake in a particular situation. How should the balancing assessment take place and how may the value of ecosystem services be weighed when other concerns are deemed more important? In the absence of systematic and transparent approaches, these issues are expected to be regulated in the legal framework that applies to those particular situations. The role of law would be to ensure that particular overriding concerns of public interest are protected. The conservation of our ecosystems and the maintenance of their integrity would be one of these concerns.

9.4 Need for consistency

Given the fact that many ecosystems around the world are shared by various countries, consistency or at least coordination would be essential to facilitate approaching shared ecosystems 'as a whole' within their own ecological boundaries. Different approaches to the governance and regulation of shared ecosystems may render the realization of the holistic element of the ecosystem approach difficult.

Different national situations, through differences with regard to the demography, geography, ecology, politics and the economy of a particular country, may involve that particular approaches to the marine environment be rather context related. This may suggest that different 'ecosystem approaches' developed within the littoral countries may be difficult to align in essence. Yet, the ideology behind the ecosystem approach and the necessity of addressing ecosystem structures and processes, urge countries to look beyond jurisdictional boundaries and contextual matters that initially may seem to vindicate specific domestic approaches to the governance of shared ecosystems.

9.5 Effects of fragmentation

Fragmentation of both environmental law and governance causes difficulties for decision makers and sectoral authorities that are involved in decisions that may affect different parts of the same ecosystem. An important consequence of this fragmentation is that ecological interlinkages between the

various parts of the ecosystem may be neglected; rather than approaching the ecosystem as a whole, the separate parts of the ecosystem can be governed in isolation without considering the structures and processes of the ecosystem as a whole.

This challenge appears most clearly in the context of shared transboundary ecosystems. However, also within the respective 'jurisdictional' parts of those ecosystems, national environmental law may be rather fragmented. The various uses of the ecosystem and the aims of conservation are often regulated by different legal acts that differ in geographical application. Some of them apply to the EEZ, some of them to the territorial zone, and some of them only to 1 nautical mile. As a consequence, approaches within the various 'jurisdictional parts' of shared ecosystems may not always focus on ecosystem structures and processes either. Fragmentation in environmental law thus challenges the *holistic* element of the ecosystem approach.

Fragmentation in environmental law also complicates the *integrative* element of the ecosystem approach. This is particularly true when the weighing and balancing of divergent values takes place in the context of different legal frameworks and where these assessments are carried out by different public authorities. To ensure that the maintenance of ecosystem integrity is not being outweighed by other interests, the effect of the nature conservation legislation plays an important role. Indeed, in the case of fragmentation, the rules and requirements of nature conservation legislation need to be 'strong' enough to withstand other competing interests in the weighing and balancing assessments. The case study carried out in Chapter 7 has demonstrated that it is desirable to apply separate assessment frameworks rather than to integrate the aspect of nature conservation and environmental protection in sectoral legislation to be applied by various sectoral authorities. Integrating environmental considerations into sectoral policies requires direct weighing and balancing assessments of very divergent values carried out by many different authorities. This may easily lead to inconsistencies and may stand in the way of ensuring the maintenance of ecosystem integrity on a congregate level.

It is worth mentioning here, however, that the particular approach applied to the governance of the North Sea ecosystem may either amplify or reduce the challenges of fragmentation in environmental law. More specifically, fragmented governance approaches in combination with fragmented legal frameworks may significantly complicate the realization of an ecosystem approach to the marine environment. To illustrate, the cross-sectoral effect of the Norwegian Nature Diversity Act entails that all sectoral authorities need to take into consideration the decision-making principles of chapter II of the Act. In principle, a coordinated application of these principles across all sectors could lead to a more harmonized approach to the ecosystem. However, in a fragmented governance system, the decision-making principles are applied and taken into consideration by sectoral authorities in accordance with their respective traditions, interests and priorities. As the main interests and priorities may differ widely across sectors, the application of, for instance,

the principle on the ecosystem and cumulative effects may be rather inconsistent. An integrated governance approach, on the other hand, could facilitate the realization of an ecosystem approach despite a certain degree of fragmentation in environmental law.

The fact that different parts of the same ecosystem are regulated by different regulatory regimes and that different legal frameworks apply to activities taking place in a particular ecosystem, impedes the implementation of the ecosystem approach. Both the holistic element as well as the integrative element of the ecosystem approach is strongly affected by fragmentation of environmental law. The effects of fragmentation on the implementation of the ecosystem approach may be intensified when the legislation contains a large degree of administrative discretion.

9.6 Effects of administrative discretion

Administrative discretion entails room for public officials to weigh and balance divergent values in the decision-making process. While the rationale behind a certain degree of discretion in environmental law is explicable, it is also crucial to comprehend the hazards of discretion in light of the overall aim of the ecosystem approach, which is the maintenance of ecosystem integrity. More importantly, administrative discretion may lead to a level of protection that fails to maintain the integrity of the ecosystem. In addition, it leads to unpredictability in environmental decision making. Unpredictability in a large number of decisions taken with regard to different parts of the same ecosystem by different public authorities that apply different legal frameworks causes uncertainty and unawareness as to whether overall ecosystem integrity is actually maintained. This is clearly undesirable in light of an ecosystem approach.

9.7 Reconsidering the role of environmental law: towards consistency

Because of the severity of the challenges described above, it is high time to reconsider the role of environmental law itself. Indeed, the nature and design of environmental law affects the implementation of the ecosystem approach to such a degree that the role of environmental law can no longer be left unaddressed.

Given the degree of fragmentation and the existence of administrative discretion, consistency and coherence play an important role. In the final chapter, three forms of consistency were identified which were deemed essential for the implementation of the ecosystem approach. Consistency involves first of all that applicable legal acts have a consistent objective. In addition, their aims and objectives need to support the overarching aim of the ecosystem approach, which is the maintenance of ecosystem integrity (formal consistency and coherence). Second, legal acts require consistency as

to how ecosystem services or ecological values are to be valued and how these values are to be balanced against other concerns. Much depends on how the ecosystem is valued and weighed when decisions are being made. When different laws lay down different principles and balancing mechanisms, the ecosystem may be appreciated inconsistently. Good practice under one applicable law, but neglecting the ecosystem's value under another applicable law may lead to unsustainable development and a possible deterioration in the ecosystem's performance and its ability to provide services. It is thus required that the ecosystem is appreciated consistently when various weighing and balancing mechanisms and principles are applied and when discretion is used by administrative bodies (consistency in procedure and weighing and balancing). Third, there is a need for a degree of substantive consistency, involving that the environmental objectives of legal acts are as far as possible being attained in practical situations.

Frankly, consistency and coherence in environmental law certainly is not *the* solution to the problem of ecosystem degradation and will not lead to the maintenance of ecosystem integrity in itself, although it will be an important step and will considerably facilitate the implementation of an ecosystem approach in environmental governance. Various challenges that we face today in the sustainable governance of our ecosystems, such as complexities, uncertainties and value-laden decisions, will be reduced by consistency in environmental law. Particularly in combination with strong substantive ecosystem-protective rules and a high degree of clarity and legal certainty, as proposed, environmental law may play an important role in ensuring an appropriate balance (on the aggregate level of the ecosystem as a whole) between the sustainable use of ecosystem services and the maintenance of ecosystem integrity.

To sum up, the ecosystem approach, as endorsed in many legal instruments on the international, European and national levels, was initially developed as a strategy to halt the degradation of our ecosystems. Vague environmental legislation and levels of environmental protection that are the result of the use of discretionary powers by decision makers instead of being the result of strong legal rules, are not in conformity with the ideology of an ecosystem approach and will arguably not safeguard our ecosystems. A stronger rule of law in environmental law, whereby the maintenance of ecosystem integrity is legally ensured, is urgently needed. This involves not only clear rules as to which human activities in the ecosystem are allowed and on which conditions. It is also important that the interrelationships between various legal acts and executing public authorities do not cause possibilities to undermine these rules. For the protection of our ecosystems and the maintenance of ecosystem integrity, it may be concluded that the *system* of environmental law (and governance) is of overriding importance, not the beauty of the language of nature conservation legislation in itself.

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