

Good Ecological Status

Advancing the Ecology of Law

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Dissertation presented at Uppsala University to be publicly examined in Sal IV Universitetshuset, Uppsala, Wednesday, 13 May 2015 at 10:15 for the degree of Doctor of Laws. The examination will be conducted in Swedish. Faculty examiner: Docent Lena Gipperth (Göteborgs Universitet).

Abstract

Josefsson, H. 2015. Good Ecological Status. Advancing the Ecology of Law. 115 pp. Uppsala. ISBN 978-91-506-2450-2.

For a meaningful discussion of the effectiveness of ecological objectives and ecological quality standards, their terms and purposes must be examined and clarified. This study explores the terms and content of ecological quality objectives and ecological quality standards, based on the Water Framework Directive's legal conceptualization of 'ecological status'. This exploration is accomplished by analysing and describing the Water Framework Directive's 'ecological status' aspect from a legal-ecological perspective. The analysis of 'ecological status' and its main constructs forms the basis for a possible alternative form of regulation, which addresses the shortcomings identified in the analysis.

Keywords: EU Water Framework Directive, Environmental Regulations.

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ISBN 978-91-506-2450-2

urn:nbn:se:uu:diva-246561 (<http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-246561>)

Acknowledgements

I would like to thank the law faculty of Uppsala University, ‘Ragnar and Torsten Söderbergs Stiftelse’ and ‘Emil Hejnes Stiftelse’ in general, for allowing me the hours to think and produce this study, my teachers, colleagues, and friends (you know who you are), for their encouragement and support over the years, my supervisors, Charlotta Zetterberg and Gabriel Michanek for giving me the opportunity to roam free without losing direction (at least not too many times), and most of all, my family, for continuously reminding me of the meaning and value of being here and now.

List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

- I Josefsson, H., Baaner, L. (2011) The Water Framework Directive – A Directive for the Twenty-First Century?. *Journal of Environmental Law* 23(3) 463-486
- II Josefsson, H. (2012) Achieving Ecological Objectives. *Laws*, 1(1) 39-63
- III Josefsson, H. (2015) Assessing Aquatic Spaces of Regulation: Key Issues and Solutions. *Nordisk Miljörättslig Tidskrift (Nordic Environmental Law Journal)* 2014:3 23-44
- IV Josefsson, H. (2015) Ecological Status as a Legal Construct – Determining its Legal and Ecological Meaning. *Journal of Environmental Law* (in press)

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1. Introducing the Object of Study

1.1 Introduction

The history of modification and deterioration of ecosystems within Europe are considerable and over the past 20,000 years, river basins have been substantially changed in length, river basin area, and flow direction.¹ For example, today, European catchments are highly fragmented by over 6000 large dams, and the reservoirs behind these dams can store about 13 % of the mean annual water runoff in Europe, resulting in a rather unnatural land- and waterscape.² Within the modified, altered, and degraded European land- and waterscape there exist several major environmental problems (this summary is by no means complete):

- Habitat degradation and the creation of inhospitable habitat segments, initiated by dams and hydropower stations.
- Flow modification caused by dams, land-use changes, and water abstraction.
- Overexploitation by commercial interests, for example, recreation.
- Water pollution from agricultural runoff (nutrients, sediment, pesticides), toxic chemicals (including metals), organic compounds, and acidification caused by atmospheric deposition and mining.
- Species invasion that alters native species interactions and habitat conditions.
- Climate change that induces changes in the hydrological cycle and associated vegetation, affecting species ranges and ecosystem productivity.³

¹ See K Tockner and others, 'European Rivers' in Gene E Likens (ed), *River Ecosystem Ecology: a Global Perspective* (Elsevier 2010) 340.

² See *ibid* 340–342.

³ See R Abell and others, 'Conservation of Aquatic Ecosystems' in Gene E Likens (ed), *River Ecosystem Ecology: a Global Perspective* (Elsevier 2010) 282.

The aspiration of the Water Framework Directive⁴ (henceforth, ‘Directive’) is to provide the basis for a co-ordinated approach addressing most of these environmental problems found within EU river basins. The Directive is an overarching piece of legislation that aims to harmonize existing EU water legislation, and improve the ecological status of all river basins throughout the EU. One of the objectives of the Directive is ‘good ecological status’, and this objective is the focus of this study.

1.2 Purpose and Delimitation

In Article 192(1) TFEU (The Treaty on the Functioning of the European Union) it is specified that EU policies on the environment shall contribute to the preservation, protection, and improvement of the quality of the environment. The Directive is established on Article 175(1) TEC (Treaty establishing the European Community) (currently Art. 192(1) TFEU), and its objective for freshwater include the protection, enhancement, and restoration of all bodies of water, with the aim of achieving ‘good ecological status’ (Art. 4). The focus of this study is ‘good ecological status’ and the main aim is to understand and critically examine ‘good ecological status’ itself, its various underlying constructs, and provide suggestions for its improvement, with regard to the achievement of an improved ecosystem status within EU river basins. Contextualizing this aim in the tradition of environmental law methodology (see section 2.2), this study’s focus could be translated as: How well do current legal solutions manage to incorporate aquatic ecosystem conditions, and are there alternative ways to translate these conditions into substantive laws? In exploring this general question, four sub-questions appeared vital, and the four papers are based on these questions establishing the general framework of this study.

- 1) ‘Good ecological status’ and its main constructs: are they appropriately constructed with regard to a contemporary legal-ecological perspective?

The reason for asking this question comes from the ecological background of the Directive, which is rather conformist, and is based on the

⁴ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, OJ L 327/1 on 22 December 2000 (Water Framework Directive).

thinking of Karr and Dudley.⁵ The main idea that they established was the measurement of the ecological integrity of a body of water type, with reference to a body of water of the same type that comes close to, or is identical to, a pristine/undisturbed ecosystem status. This assessment system is closely tied to the idea that biotic communities in a specific site are in a good state when they conform to a type-specific evolutionary history.⁶ The central concept in this theory is ecological integrity, which they define as “the capability of supporting and maintaining a balanced, integrated, adaptive community of organisms, having a species composition, diversity, and functional organization comparable to that of natural habitat of the region”.⁷ They assume that “a system possessing integrity can withstand, and recover from, most pressure imposed by natural environmental processes, as well as many major degradations by man”.⁸ To assess the integrity of a body of water, three variable groups are defined: biological, chemical, and physical integrity.⁹ Biological integrity is often prioritized and three variable groups are used: (1) species richness and composition (total number of species, number and identity of selected species groups with similar ecological attributes); (2) trophic composition (percentage of individuals from different trophic groups); and (3) population density and condition of all organisms in the assessment area (total individual number, percentage of hybrids, and percentage of individuals with diseases, damage, or anomalies).¹⁰ The system is not species specific, but the species chosen are instead used as indicators of integrity.

It is rather clear that there are similarities between the constructs of ‘ecological integrity’ and ‘ecological status’, and their establishment through pristine/undisturbed ecosystem conditions.¹¹ We might think of

⁵ See James Karr and Daniel Dudley, ‘Ecological Perspective on Water Quality Goals’ (1981) 5 *Environmental Management* 55. Although, Karr is often given most of the credit for this theoretical position and development, owing to his continuous publication on the subject.

⁶ Paul L Angermeier and James R Karr, ‘Biological Integrity versus Biological Diversity as Policy Directives’ (1994) *BioScience* 690, 693.

⁷ Karr and Dudley (n 5) 56.

⁸ See *ibid.*

⁹ See Karr and Dudley (n 5); James R Karr, ‘Biological Integrity: A Long-Neglected Aspect of Water Resource Management’ (1991) *Ecological applications* 66.

¹⁰ See Karr (n 9) 74.

¹¹ However, integrity is not mentioned anywhere in the Directive. The ecological construct of ‘integrity’ is instead found in the Habitats Directives Article 6(3) ‘integrity of the site’. Legally, ‘integrity of the site’ is not intended to be a measure of how pristine a site is; instead, it refers to the impact to which a plan or project may give rise, and still be granted authorization. Even if a ‘site’, is a clearly differentiated geographical area, just as a ‘body of water’, the similarities between the constructs of ‘integrity of the site’ and ‘ecological integrity’ are only grammatical. In case law, ‘integrity’ has been defined as a state of long-term preservation of constitutive characteristics of a site, and ‘characteristics’ refers to the organisms or habitats that provided

‘ecological status’ as a legal interpretation/transposition of ‘ecological integrity’.¹² Thus, the main idea behind the Directive’s assessment and management regimes was established over thirty years ago. Since ecology is often described as an expanding scientific field, and the Directive is based on rather traditional ecological assessment systematization, there is cause to examine whether the Directive is a contemporary legal-ecological framework. This was my reason for starting to analyse and compare the Directive to other, more recent, ecological perspectives, and during the process of writing this article I started a fruitful collaboration with L Baaner. This article is a result of our joint effort.

- 2) Are the Directive’s main provisions sufficient, with regard to the establishment of ecological quality standards, as an instrument for achieving ‘good ecological status’ and an improved aquatic ecosystem status, or are there theoretical gaps with regard to both the Directive and environmental quality standards when it comes to establishing ecological quality standards, from a legal-ecological perspective?

The late S Westerlund emphasized the need for legal instruments that were adapted to the state of the environment, and not only specific activities; today, the instrument intended to supply this form of regulation is the environmental quality standard. This paper critically assesses the instrument and its theoretical basis, with regard to the achievement of ‘good ecological status’ and an improved aquatic ecosystem status, to determine what possible modifications are needed to establish ecological quality standards that are adapted to the status of aquatic ecosystems.

- 3) What kind of space of regulation is suited to the ecological and hydrological systems, and environmental problems of a river basin area?

One of the main constructs that allows for the assessment of ‘ecological status’ is the unit ‘body of water’, to which the obligation of ‘good ecological status’ applies. In article one and two, the ‘body of water’ construct was reflected upon only generally from two different perspectives, and this article provides a more profound reflection on the space

justification of the protection of the site. Since the designation of sites as protected areas is not connected to the whether or not a site is pristine, the conceptualization of ‘ecological integrity’, translated into ‘ecological status’ in the Directive, should not be mistaken as also referring to ‘integrity of the site’. See Case C-127/02 *Waddenzee* [2004] ECR I-7448, para 59, 61; Case C-258/11 *Sweetman* [2013] EU:C:2013:220, para 40.

¹² Also see Kurt Jax, *Ecosystem Functioning* (Cambridge University Press 2010) 161–168.

of regulation of the Directive and other legal acts, which have legal spaces that are intended to regulate the ecological and hydrological systems of a river basin area. The main reason to ask this third question is the rather extreme reductionism that underlies the differentiation of bodies of water in the Directive, which in turn raises the question of whether this kind of unit is consistent with other regulatory spaces and an aquatic ecosystem perspective, or whether there are any alternatives to the construct 'body of water'.

- 4) In the implementation of the Directive, there are indications of divergence from the normative definitions in Annex V. This divergence is linked to the 'common implementation strategy' and there not-legally-binding guidance documents. The purpose is to analyse the guidance documents legal status/effects and comprehend if they make substantive interpretations of the Directive?

Surrounding a somewhat complex Directive is a complex and unregulated governance arrangement called the 'common implementation strategy', the main purpose of which is the production of guidance documents related to the Directive. In ecological research concerned with the Directive, the standard citation references the guidance documents, and these not-legally-binding documents are very often presented as normative interpretations of the Directive. The fourth question is a response to the situation where soft law is used instead of the legally binding definitions and provisions found in the Directive. This paper critically evaluates the main guidance document, with regard to 'ecological status', to determine whether its guidance is true to the purpose of the Directive, or provides a non-legal statement of what 'good ecological status' means that should be disregarded by the Member States in their implementation of the Directive.

Each of the four questions delimits this study. A further delimitation is that this thesis focuses on freshwater (not groundwater, and occasionally discusses coastal waters), and 'ecological status' (not 'chemical status'). Thus, if the Directive is an appropriate framework for the achievement of a 'good chemical status', or not, is not considered in this study. A more specific delimitation than this is not provided, and neither the papers nor this introduction make any claim of referring to the entire quantity of legal and ecological articulations of theories that intersect the Directive, 'good ecological status', or any of its main or secondary constructs. This is due to the multi-discursive nature of the Directive, and the vast numbers of studies that indirectly or directly

focus on its constructs. Still, within this heterogeneous mass of different theoretical perspectives, choices need to be made: what line of ecological thinking is legally relevant? The priorities that have been used to order the ecological material are developed in section 2.3.

1.3 Outline

The subsequent section (chapter 2) develops a methodological position for studying an object of law, such as ‘ecological status’, which, even if it is clearly legal, provides a basis for thinking interdisciplinarily and differently from an intrafield perspective. This methodological section also positions the study with regard to the research tradition of environmental law methodology. The following section (chapter 3) provides a general background and overview of the Water Framework Directive and ‘ecological status’, the objective of ‘good ecological status’, and introduces the research fields that intersect this ecological objective. Chapter four provides a summary of the results of the four studies and synthesizes elements of the studies, and postulates a merged conclusion of the study as a whole. Chapter five contains a Swedish summary, followed by a bibliography and the four papers in the form they were published, except paper IV which are in the format before journal copyediting.

1.4 A Comment on Style and Format

In each of the four papers, the preferred footnote style of each journal has been used, and in this compilation thesis, OSCOLA is generally used, even if some divergences are found. When citing articles, the first page of the article is specified, and subsequent page numbers are given only if it is necessary to pinpoint a specific section of the article, a similar system is used for sections of anthologies. Judgements of the Court of Justice of the European Union (henceforth ‘Court of Justice’), and opinions of the Advocate General, reference the official report (ECR I-) when possible. When an ECR reference is unavailable, an ECLI (European case-law identifier) reference is used instead, a practice that diverges from the OSCOLA guidelines. Furthermore, the summaries of the papers are without references, for these see each paper.

2. Methodology – The Study of ‘Ecological Status’

In some respects at least, myths and science fulfil a similar function: they both provide human beings with a representation of the world and the forces that are supposed to govern it. They both fix the limits of what is considered as possible.

*Francois Jacob*¹³

2.1 Introduction

A legal construct such as ‘ecological status’ is a construct that may be explained, and coupled to both an ecological and a legal research point of view, as two examples. This legal construct may also be a possible point of convergence in the otherwise separate fields of legal and ecological discourse.

When the Directive was enacted and one of its main objectives were defined as ‘good ecological status’, it established a legal-ecological structure that provided the beginning of large amount of legal and ecological research. This chapter will specify the point of departure that has been used to study the mass of converging legal and ecological articulations of theories that, among other things, tries to fix, develop, and explain, ‘ecological status’. The point of departure that has been used to study ‘ecological status’ as an interdisciplinary object belonging principally to law, but also to ecology, consider ‘ecological status’ as an object that may be used to establish integrations of legal and ecological knowledge.

The foregoing theoretical position aims to complement the environmental law methodology developed by Westerlund, not only by specifying that natural sciences or ecological literature must be consulted when studying environmental problems coupled to the legal system, but

¹³ François Jacob, *The Possible and the Actual* (Pantheon 1982) 9.

also by describing a theoretical position that may be used to analyse both legal and ecological discourses. In the heterogeneous and conflicting mass of statements concerning ‘ecological status’, a method for reading and sorting is needed. That is, an environmental legal study in the tradition of Westerlund needs principles to sort out the relevant from the irrelevant, when ecological and legal articulation of ‘ecological status’ is studied. This chapter supplements the articles with the theoretical basis upon which they are based but is not clearly visible in the articles, as the extent and scope of the articles did not allow for this kind of discussion.

This chapter first provides an overview of ‘environmental law methodology’, and contextualizes and integrates its main features with regard to this study’s main object, ‘ecological status’. Second, based on this integration, a complementary position is developed, primarily based on a discourse analysis perspective, and contemporary methodological developments made by environmental law scholars other than Westerlund.

2.2 Environmental Law Methodology

‘Interdisciplinary’ was beginning to be more generally defined at the beginning of the 1970s,¹⁴ and today it is almost a buzzword, mentioned everywhere but not always specified in detail, which is a shortcoming. Even if this methodological shortcoming is also found in environmental law, in general,¹⁵ environmental law methodology has been emphasized as a methodological position that succeeds in tackling the difficulties with which a legal interdisciplinary study is faced.¹⁶ This methodological position, often labelled ‘strong sustainability’ or ‘radical environmental law’,¹⁷ does not merely aim to change or bring clarity to legal

¹⁴ See E Jantsch, ‘Towards Interdisciplinarity and Transdisciplinarity in Education and Innovation’ (1972) *Interdisciplinarity. Problems of Teaching and Research in Universities*. OECD, Paris 97.

¹⁵ E.g. Elizabeth Fisher and others, ‘Maturity and Methodology: Starting a Debate about Environmental Law Scholarship’ (2009) 21 *Journal of Environmental Law* 213.

¹⁶ See Aðalheiður Jóhannsdóttir, ‘The Value of Proactive Methodological Approaches for Understanding Environmental Law’ (2014) Vol. 59 *Scandinavian Studies in Law* 243.

¹⁷ This position is often based on the basis of the concept of sustainability, rather than using sustainable development, which is instead perceived as a variable, and not a higher-order social goal or fundamental property of human systems. E.g. Stephen Dovers and Robin Connor, ‘Institutions and Policy Change for Sustainability’ in Benjamin J Richardson and Stepan Wood (eds), *Environmental law for sustainability: a reader* (Hart 2006); Erkki Hollo, ‘Läran om naturlig miljö rätt – de primära miljö rättsprinciperna’ in Lena Gipperth and Charlotta Zetterberg

texts; its aim is to extensively provide for changes in the entire institutional and policy systems, in order to maintain a biosphere for future generations. Thus, environmental law methodology presents a theoretical position for radical environmental law scholarship.

Often, the foundation of a study based on environmental law methodology is an environmental problem to which the legal system somehow contributes or can help resolve.¹⁸ This implies that conducting environmental law research involves the task of seeking to legally solve environmental problems, echoing the Brundtland commission's call: Challenge the existing laws of man, in order to bring them into harmony with the laws of nature.¹⁹ To provide a good description of an environmental problem, a legal perspective is combined with an external (ecological, biological etc.) perspective that gives further descriptions and insights into the environmental problem.²⁰ The general assumption is that by using natural sciences research, and by including this external perspective in legal research, it is possible to reduce inconsistencies between the environment and the legal system and reduce the difficulties of achieving environmental objectives.²¹ The aim of this proactive methodological position (which may take the form of theoretical or empirical studies) is to develop instruments or legal texts that are more functional in achieving positive environmental objectives (such as 'good ecological status'), and provide for the reduction of negative environmental consequences.²² Thus, the protection, enhancement, and restoration/rehabilitation of the environment is the object of this type of environmental law, furnishing environmental law with the task of reducing inconsistencies in the relation between humanity and nature.²³

If a general research question for a study based on environmental law methodology would be formulated, it could be defined thus: How

(eds), *Miljörättsliga perspektiv och tankevändor: vänbok till Jan Darpö & Gabriel Michanek* (Iustus 2013).

¹⁸ E.g. John McEldowney and Sharron McEldowney, 'Science and Environmental Law: Collaboration across the Double Helix' (2011) 13 *Environmental Law Review* 169.

¹⁹ World Commission on Environment and Development, *Our Common Future* (Oxford University Press 1987), para 80. For an analysis of the legal concept 'sustainable development' and 'Our Common Future', see Sean Coyle and Karen Morrow, *The Philosophical Foundations of Environmental Law: Property, Rights, and Nature* (Hart 2004) 200–2015.

²⁰ Staffan Westerlund, *Miljörättsliga grundfrågor 2.0* (Institutet för miljö rätt (IMIR) 2003) 367–369, 379.

²¹ See Gabriel Michanek, 'Utvecklingen av miljö rätten i Sverige' in Gabriel Michanek and Ulla Björkman (Eds), *Miljö rätten i förändring: en antologi* (Iustus 2003).

²² Westerlund, *Miljörättsliga grundfrågor 2.0* (n 20) 33–39, 379.

²³ E.g. Andreas Philippopoulos-Mihalopoulos, *Absent Environments: Theorising Environmental Law and the City* (1st edn, Routledge-Cavendish 2007) 7; Klaus Bosselmann, 'Losing the Forest for the Trees: Environmental Reductionism in the Law' (2010) 2 *Sustainability* 2424.

should the legal system of controls and rules of conduct be constructed and function, to avoid depleting resources that are important to both society and ecosystems (the biosphere) cross-generationally? The answers to this question depend on the environmental context, but one general conclusion from studies based on environmental law methodology is that there is a need for rules that are linked to the status of the environment, to allow for the adaptation of legally sanctioned activities, for example.²⁴ With rules linked to the status of aquatic ecosystems, the assumption is that the actualization of an enhanced ecological status is more likely, and reduces the implementation deficit (the difference between an environmental objective and the actualized environmental result).²⁵ Based on this focus, two legal instruments are often discussed in studies based on environmental law methodology: environmental quality standards and (implementation) plans.²⁶ Environmental quality standards are used to specify the desirable environmental quality of a site, and the planning instrument is used when the standard is not actualized, and should provide the measures needed to attain the environmental quality standard, for example.²⁷ Other main features that are often emphasized as necessary to legally solve environmental problems are public participation, juridical reviews, environmental impact assessments, risk assessments etc.

A more specific research question for an environmental law methodology study that focuses on environmental quality standards or implementation plans might be: How can observed environmental reactions and condition be translated into substantive law (linear and enforceable) with persons as addressees?²⁸ Three elements need to be known to answer this question: first, the existing legal solution, second, the ecosystem conditions, and third, how the legal and ecosystem conditions should be combined. This study follows this established methodological perspective.

²⁴ See Westerlund, *Miljörättsliga grundfrågor 2.0* (n 20) 368, 371.

²⁵ Jóhannsdóttir (n 16).

²⁶ E.g. Lena Gipperth, *Miljökvalitetsnormer: en rättsvetenskaplig studie i regelteknik för operationalisering av miljömål* (Uppsala University 1999); Inga Carlman, 'Adaptiv miljöplanering nästa' in Gabriel Michanek and Ulla Björkman (eds), *Miljörätten i förändring: en antologi* (Iustus 2003).

²⁷ Staffan Westerlund, 'The Generic Environmental Act' (2009) *Nordic Environmental Law Journal* 105.

²⁸ *Ibid* 112.

2.3 Methodological Point of Departure – Combining Law and Ecology

The Water Framework Directive, together with other environmental directives (such as the Marine Strategy Directive²⁹), exemplifies a process by which elements of the environment are legally framed. This means that it is not necessary for a researcher in aquatic environmental law to transcend fields of discourse, to establish the environmental problem of the study, as the status of aquatic ecosystems is an already-specified legal concern.

The more interdisciplinary part of this study is prompted by the intent to understand what the legal construct of ‘ecological status’ means from a legal-ecological perspective. This may also be helpful when inquiring whether the construct of ‘good ecological status’ is adequate, if improved ecological status is to be achieved. Thus, to comprehend the intricacies of ‘ecological status’ both legal and ecological literature is studied. It is important to offer a legal perspective on the ecology of law, and not concern oneself with traditional legal elements only, leaving this aspect of law to other fields of expertise. Still, strictly speaking, non-legal perspectives are principally used to provide complementary viewpoints on the legal object of ‘ecological status’. This means that this study is based on a problem-oriented approach, similar to the general framework of environmental law methodology, and is supplied with its environmental problem through the legal objective of ‘good ecological status’.

2.3.1 Combining Legal and Ecological Discourses

One dimension of this study is the consideration of whether the Directive is a suitable piece of legislation for achieving improved ecosystem status of EU river basins. The other dimension of this study explores whether there are other, more appropriate, legal-ecological means for achieving this objective, that is, whether there are ecological or legal perspectives that were excepted or not considered in the enactment of the Directive, but could provide examples of alternative forms of regulation. When conducting such a legal inquiry into complementary legal and ecological perspectives, it also becomes possible to fur-

²⁹ Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008, establishing a framework for community action in the field of marine environmental policy, OJ L 164/19 on 25 May 2008 (Marine Strategy Framework Directive).

ther pinpoint the problems and possibilities of the legal construct of 'ecological status'.

Different perspectives may be used to evaluate the suitability of ecological elements that are incorporated into the legal system, such as operationalization or achievability, good legal and ecological quality of the legal act, legitimacy, sustainability, and so on. The point of departure underlying this study lies in the Convention on Biological Diversity: 'ecosystem' is a 'dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit' (Art. 2). To be suitable for solving a problem such as the deterioration of river basin ecosystems, a legal act should reflect this definition, and provide a dual focus on both biotic and abiotic elements of ecosystems. For successful enhancement and restoration of ecosystems, a longstanding principle is that both structure and function of ecosystems must be focused on, a principle upon which the construct of 'ecological status' is based (see section 3.3.1).³⁰ For this study, a dual focus on both ecosystem structures/functions and abiotic/biotic ecosystem elements is a requisite for a suitable solution to river basin environmental problems, and to provide a basis for the long-term function of ecosystems (see section 3.3, but also papers I and II). In other words, when evaluating the suitability of both current regulations and alternatives, the point of departure is whether or not they are focused on the whole ecosystem (and their structures and functions), and try to provide more holistic, not reductionist, regulation.

When analysing the Directive's systematization, the evaluation is based on a focus on the whole ecosystem, to determine whether the Directive can successfully solve the problem of deteriorating aquatic ecosystems. If there are indications that the enacted system cannot solve the problem, alternative perspectives, other legal-ecological ways of thinking about the environment, are suggested, to determine whether there are other, more suitable ways of solving the legally recognized problem. If other appropriate options are available, these elements are contextualized with respect to the Directive and the environmental legal system, to provide an alternative to current practices. This methodological approach is similar to Westerlund's environmental law methodology, as it aims to transform non-legal elements into substantive law, without being restricted by the ecological elements recognized by the law. One difference, in comparison to Westerlund's environmental law

³⁰ E.g. Eric S Higgs, 'What Is Good Ecological Restoration?' (1997) 11 *Conservation Biology* 338; Piet FM Verdonchot and others, 'A Comparative Review of Recovery Processes in Rivers, Lakes, Estuarine and Coastal Waters' (2013) 704 *Hydrobiologia* 453.

methodology, is that this study does not consider the question of effective legal implementation to the extent that Westerlund emphasizes. Instead of focusing on effective legal implementation, this study centres on providing a legal structure with the potential to solve the problem of deteriorating aquatic ecosystems.

A methodological position in which the science of ecology is assessed on the basis of a legal-ecological perspective, to determine what is legally appropriate, requires a theoretical basis to explain and evaluate conflicting ecological and legal proposals for the construction or improvement of 'good ecological status', for example. Treating all legal and ecological articulations of 'ecological status' as based on discursive assumptions and delimitations is one way to approach a position where legal and ecological statements may be combined into interdisciplinary theories.³¹

2.3.2 A Discourse Perspective

The establishment of the Directive offers a change in the fields of ecological and legal discourse. Since its enactment, both legal and ecological scholars have based their research on the Directive. That is, within both fields, the Directive has provoked an interest in explaining and discussing various aspects of 'ecological status', which has resulted in a web of relationships between the fields of law and ecology. However, most statements regarding 'ecological status' are intrafield, not interdisciplinary, and based on the reasoning or discourse perspective of either law or ecology. Some questions, such as the operationalization of 'good ecological status'³² are interdisciplinary, and an intrafield legal or ecological articulation of 'ecological status' cannot satisfactorily address them; instead, an interdisciplinary perspective is needed, to establish an interfield solution based on both law and ecology.³³ Here, an

³¹ E.g. David Howarth, *Discourse* (Open University Press 2000) 116.

³² Operationalization of 'good ecological status' here means, conducting an assessment that may be translated into substantial law, adapting activities affecting the 'ecological status' of bodies of water and actualizing an improved ecosystem status.

³³ For this reasoning, see Lindley Darden and Nancy Maull, 'Interfield Theories' (1977) 44 *Philosophy of Science* 43. För att inte förvirra den svenske läsaren vill jag här förklara på svenska vad denna typ av begreppsanvändning avser just på svenska. Begreppet 'interdisciplinary' eller interdisciplinär används inte med avseende på tvärvetenskap utan används istället som ett övergripande begrepp. Under detta övergripande begrepp finns olika metodbegrepp eller vägar där tvärvetenskap är en väg och ett annat metodperspektiv är mellanfältsteorier ('interfield theories'), vilket jag försöker förhålla mig till. Tvärvetenskap är som jag ser det forskning i flera vetenskaper vilket kräver stor teoretisk förståelse av flera ämnen alternativt förutsätter en forskargrupp med representanter från olika vetenskaper. Min metod innefattar ett fokus på både juridik och ekologi, så till vida att det finns en vilja att förstå och utveckla det

interfield theory emerges from a position that aims to provide answers to questions that arise within the field of law, but cannot be answered within this field alone.³⁴

To understand and analyse ‘ecological status’, intended as both a legal construct and the ecosystem status of an aquatic environment, the ecological meaning of ‘ecological status’ and its coupled constructs must be studied. Then, the question is one of how to determine whether an ecological study, with regard to ‘ecological status’, actually considers the legal construct’s wording, intended result, or purpose (see sections 3.2 and 3.3), and does not base its description or explanation of ‘ecological status’ on interpretations found in divergent guidance documents, or non-legal ecological theories. This study tries to resolve this problem by emphasizing that the content of the construct of ‘ecological status’ must be considered, for a statement – such as the conclusions of an ecologically focused study – to be legally relevant. If the construct’s content is not adequately considered, a knowledge gap between the statement and the construct of ‘ecological status’ is established, which, from a legal perspective, reduces the value of the ecological study (even if it may offer insights into an alternative ecological perspective).³⁵

The delimitation of ecological and legal statements regarding ‘ecological status’ involves understanding different systems of meaning and knowledge as discourses that exist within fields of discourse, such as law and ecology.³⁶ A discourse is not assumed to exist in a delimited form, ready for identification and representation, but is understood as a construct used to establish a framework for study.³⁷ The reason to use a

rättsekologiska begreppet ‘ekologisk status’. Nuvarande genomförande eller för den delen hur genomförandet skulle se ut om mina förslag blev verklighet behandlas endast ytligt. För att förstå och utveckla begreppet ‘ekologisk status’ kopplar jag i vissa sammanhang ihop det ekologiska diskursfältet med det rättsliga och för in ekologiska element i mina rättsliga diskussioner gällande begreppet ‘ekologisk status’ och de problem som målsättningen ‘god ekologisk status’ avser att få ordning på. De teoretiska konstruktioner som jag sedan bygger upp utifrån ‘ekologisk status’ begreppet och de ekologiska elementen definierar jag som mellanfältsteorier. See Johannes Persson and Nils-Eric Sahlin, *Vetenskapsteori för sanningssökare* (Fri tanke 2013) 231–238.

³⁴ Darden and Maull (n 33).

³⁵ See Howarth, *Discourse* (n 31) 122; Lena Wahlberg, *Legal Questions and Scientific Answers: Ontological Differences and Epistemic Gaps in the Assessment of Causal Relations* (Lund University 2010) 61, 151; Ole W Pedersen, ‘The Limits of Interdisciplinarity and the Practice of Environmental Law Scholarship’ (2014) 26 *Journal of Environmental Law* 423.

³⁶ This is a ‘light’ version of discourse theory; for a more comprehensive description, see Howarth, *Discourse* (n 31); Ernesto Laclau and Chantal Mouffe, *Hegemony and Socialist Strategy: Towards a Radical Democratic Politics* (Verso 2001); Marianne Winther Jørgensen and Louise Phillips, *Discourse Analysis as Theory and Method* (Sage 2002).

³⁷ See Winther Jørgensen and Phillips (n 36) 143–144.

discourse perspective as a theoretical basis is that it allows for the perception of the production of knowledge as a process of delimited systems that ascribe meaning to objects variously, owing to different assumptions. Therefore, a ‘discourse’ is a particular way of representing the world (or parts of the world). It also provides an explanation of why different ecological and legal articulations of theories related to ‘ecological status’ conflict, and defy comparison or reduction.³⁸

Inquiring into how different significant elements, such as restoration or ecosystems, are understood, may identify various discourses. When substantial differences are found, it may be assumed that this is due to fundamental differences between their framing of the significant elements, which may belong to two different discourses that compete to cover the same terrain, each in its own particular way.³⁹ As such, a discourse may be based on a certain view of a specific object, such as ‘ecological status’, and the articulation of a theory of the meaning of ‘good ecological status’ depends on the same discourse in its establishment.⁴⁰ The complex legal and ecological dualism of ‘ecological status’ makes it particularly vulnerable to different and diverging intrafield ascriptions of meaning. For example, the Directive is a partial representation, it frames and explains what ‘good ecological status’ means in one particular way, and thereby delineates other possible ways of representing what ‘good ecological status’ might be. In the process of enacting the Directive, quantitative water management elements, incorporating the natural flow of water, including dynamic elements such as seasonal variation and long-term natural fluctuation, were disregarded, owing to the unanimity required for measures affecting quantitative management of water resources (see Art. 192(2) TFEU).⁴¹ This resulted in an arrangement wherein the EU’s environmental legal focus is on freshwater quality, but not quantity. In the first three articles, various elements, and the consequences of this delimitation, are parts of the discussion that questions the appropriateness of the Directive’s assessment and management system. Even if quantitative water management elements were disregarded in the enactment of the Directive, these elements may still be brought into the field of legal discourse by establish-

³⁸ See Ernesto Laclau, *New Reflections on the Revolution of Our Time* (Verso 1990) 90.

³⁹ Laclau and Mouffe (n 36) 113; Winther Jørgensen and Phillips (n 36) 142–143.

⁴⁰ See Laclau and Mouffe (n 36) 105–114; Winther Jørgensen and Phillips (n 36) 28; Michel Foucault, *Vetandets arkeologi* (Arkiv 2011) 51, 140.

⁴¹ Also see David Aubin and Frédéric Varone, ‘The Evolution of European Water Policy: Towards Integrated Resource Management at EU Level’ in Stefan Kuks and Ingrid Kissling-Näf (Eds), *The Evolution of National Water Regimes in Europe: Transitions in Water Rights and Water Policies* (1st edn, Kluwer Academic 2005).

ing conflicting constructions of what ‘ecological status’ means in the legal research literature.

There is an excess of possibilities that have not been incorporated into the Directive’s assessment and management systems, and these possibilities exist primarily outside the field of legal discourse that the EU environmental law system represents.⁴² Comparing the ecological elements that are incorporated into the Marine Strategy Directive with those of the Water Framework Directive, the process of incorporating new ecological elements into law is appraisable, as ecological elements such as resilience are found in the Marine Strategy Directive, and not in the Water Framework Directive (see Marine Strategy Directive Art. 3(5)(a)). This process of delimitation and incorporation make what is deemed legal or ecological somewhat contingent, and varies from directive to directive.

When studying legal and ecological articulation of ‘ecological status’, I have sorted the divergent theoretical constructions that surface from competing discourses, based on how they refer to the content of the legal construct of ‘ecological status’, and the definition of ‘ecosystem’ in the Convention on Biological Diversity (see section 2.3.1). The legal content is reflected in the wording of the construct and purpose of the Directive (as outlined in chapter three). Thus, when determining established law, the methodology used in this study is based first upon the wording in the legal provisions. Where the wording is unclear, the systematization, and purpose/objectives of the Directive are examined and compared to the provisions. Second, relevant case law is considered, and then the legal material is compared to relevant ecological and legal research literature, to analyse the problems and possibilities, to achieve the purpose/objectives of the Directive. It should be noted that there has been no extensive inquiry into the preparatory works (see section 3.3.6 and paper IV for exemptions).⁴³ Furthermore, there exists very little relevant case law.⁴⁴ Thus, the perspective of this study is that

⁴² See Laclau and Mouffe (n 36) 105–114.

⁴³ For an example of the analysis of the process of enacting the Directive, see Giorgos Kallis and David Butler, ‘The EU Water Framework Directive: Measures and Implications’ (2001) 3 *Water Policy* 125; Maria Kaika and Ben Page, ‘The EU Water Framework Directive: Part 1. European Policy-Making and the Changing Topography of Lobbying’ (2003) 13 *European Environment* 314; Maria Kaika, ‘The Water Framework Directive: A New Directive for a Changing Social, Political and Economic European Framework’ (2003) 11 *European Planning Studies* 299.

⁴⁴ With regard to the low numbers of interesting or relevant cases, there are theories that imply that this could be a result of the Common Implementation Strategy (CIS) guidance documents (see paper IV). The theory is that the guidance documents have provided a way to coordinate the Member States’ implementation, and since the Commission (informally) facilitates the CIS,

the legality of ‘ecological status’ is fundamental to understanding the kind of obligation the Directive imposes on Member States, and must be adequately considered, when the obligations suitability is discussed, with regard to the possibility of achieving the intended/desired environmental outcomes, for example.⁴⁵ When an ecologically based theory concerns ‘ecological status’, it takes part in this legal system of meaning, and if this system is not considered adequately, the theory is considered ecological, without clear legal significance. Even if an articulation of ‘ecological status’ is considered inconsistent, it may provide insights into what ecological status might mean from another perspective, although not what it means legally. Thus, alternative, non-legal perspectives on ‘ecological status’ may be relevant points of departure when discussing the appropriateness of ‘ecological status’, but not the legal meaning.

The foregoing method has similarities to the method of interpretation often applied by the Court of Justice, its teleological method, which seeks to interpret a rule by taking into account the purpose, and objective pursued (another method of interpretation used is systematic interpretation).⁴⁶ The Court of Justice adopted a teleological method of interpretation of the Treaties and other Community texts at an early date, as a way to give priority to the Treaties’ proclaimed objectives.⁴⁷ It has been emphasized in the legal research literature that the teleological method of interpretation is an appropriate approach for the EU legal order, as a way to guarantee a uniform application of EU law at the national level.⁴⁸ Teleological interpretation has also been emphasized as an approach for preventing textual manipulation of EU regulations (also see paper IV and section 3.3.6).⁴⁹

the small number of cases could indicate that Member States have conformed to the Commission's informal view of how the implementation should be conducted, e.g. see Emilia Korkeaho, ‘Watering Down the Court of Justice? The Dynamics between Network Implementation and Article 258 TFEU Litigation’ (2014) 20 *European Law Journal* 649.

⁴⁵ The legal definitions of ‘ecological status’ and ‘ecosystem’ could be thought of as higher-level concepts that coordinate the scientific activity within these discourses. See Jantsch (n 14).

⁴⁶ E.g. Case 283/81 *Cilfit v Italian Ministry of Health*, [1982] ECR 03415, para 20; See also, e.g. Oreste Pollicino, ‘Legal Reasoning of the Court of Justice in the Context of the Principle of Equality Between Judicial Activism and Self-Restraint’ (2004) 5 *German Law Journal* 283; For teleological method in general see Per Olof Ekelöf, ‘Teleological Construction of Statutes’ (1957) 2 *Scandinavian Studies in Law* 75; Per Olof Ekelöf and Henrik Edlestam, *Rättegång. H. I* (8 Uppl. Norstedts juridik 2002) 79–95.

⁴⁷ Case 26/62 *Van Gend en Loos v Administratie der Belastingen* [1963] ECR 1; also see Nial Fennelly, ‘Legal Interpretation at the European Court of Justice’ (1996) 20 *Fordham International Law Journal* 656.

⁴⁸ See Miguel Poiares Maduro, ‘Interpreting European Law: Judicial Adjudication in a Context of Constitutional Pluralism’ (2007) 1 *European Journal of Legal Studies* 9.

⁴⁹ *Ibid* 10.

This is the theoretical basis of this study, a position that aims to attain an understanding of an object of study, explained and discussed from a multiplicity of discourse perspectives. The papers are based on this theoretical perspective, even if this methodological approach is not clearly discussed there.

2.3.3 The Ecological Law Approach

Today, environmental law incorporates many aspects, and some think that a development within the subject is a necessity for addressing the complexity that is present within both environmental and ecologically related law. Thus, it has been emphasized that the discourse of environmental law needs to be broadened or divided, and that we should speak of environmental and ecological law, or 'ecosystem' law.⁵⁰

Within EU law, this legal-ecological progress may be situated in the increasing number of legal rules that surround the assessment and management of living systems, which may be contrasted with the perception of organisms only as indicators of pollution, primarily with regard to human health or social prosperity, which was the general 'old' focus of environmental law. Owing to the difference between the negative provision of pollution control, and positive provisions aimed at achieving a different and improved ecosystem status it is emphasized that we are progressing towards ecological law, as different types of regulations are needed to achieve these kinds of rehabilitations of the landscape.⁵¹

It is also argued that the constant incorporation of new ecological objects into law needs a specific critical focus to examine the suitability of this process. One important question is whether this process merely provides a change in legal vocabulary or if this leads to new legal objects.⁵² Thus, there is a need for legal scholars who specifically study

⁵⁰ E.g. Richard Brooks, Ross Jones and Ross Virginia, *Law and Ecology: The Rise of the Ecosystem Regime* (Ashgate 2002) 1–48; William Howarth, 'The Progression towards Ecological Quality Standards' (2006) 18 *Journal of Environmental Law* 3, 4; Staffan Westerlund, 'Rätt och riktig rättsvetenskap' (2010) 1 *Nordic Environmental Law Journal* 3, 19; Andreas Philippopoulos-Mihalopoulos, 'Looking for the Space between Law and Ecology' in Andreas Philippopoulos-Mihalopoulos (ed), *Law and Ecology: New Environmental Foundations* (1st edn, Routledge 2011).

⁵¹ See William Howarth, 'Accommodation without Resolution-Emission Controls and Environmental Quality Objectives in the Proposed EC Water Framework Directive' (1999) 1 *Environmental Law Review* 6; Howarth, 'The Progression towards Ecological Quality Standards' (n 50).

⁵² A Dan Tarlock, 'Is There a There There in Environmental Law?' (2004) 19 *Florida State University Journal of Land Use and Environmental Law* 213; Philippopoulos-Mihalopoulos (n 50).

the incorporation of ecological elements into law, and how this process mutually informs both law and ecology in content and purpose.

If this separation is necessary, we might think of ecological law as environmental law, but with a specific focus on the living systems of the environment, contrasted with environmental law's focus on pollutants or human-induced stress as a measure of degradation. Ecological law could find its distinctive central point in, what is sometimes emphasized as a point of divergence between living and non-living systems, such as the ability to self-maintain (see Habitats Directive⁵³ Art. 1 (e)(i)), for example.

Another, discursive way of perceiving the potential separation between environmental law and ecological law is that environmental law could be understood as a field of discourse comprising different discourses, such as ecological law, pollution law, environmental justice, ecological justice and so on.⁵⁴ Whether ecological law should be separated from environmental law, or if ecological law fits within a possible discursive field of environmental law, with sustainability at its centre,⁵⁵ is not further addressed by this study. However, I do observe what many others already have observed: there is a need for methodological, interdisciplinary progression, and that the incorporation of new ecological elements into law demands new ways of thinking about the environment, legally.⁵⁶ Owing to this need, in two of the papers I have made the choice to categorize the analysis as corresponding to developments in ecological law, and thereby intend to offer an idea of the kind of thinking that I think might be needed, to apply an ecological law perspective.

⁵³ Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, OJ L 206/7 on 22 July 1992.

⁵⁴ Similar to the organizational scheme found in Michanek (n 21).

⁵⁵ A discursive field that, for example, could be focused on finding solutions to achieve environmental challenges and enhancing the resilience of society in coping with environmental and socio-economic disturbances and associated risks. See Marleen Van Rijswick, 'The Road to Sustainability: How Environmental Law Can Deal with Complexity and Flexibility' (2012) 8 Utrecht Law Review 1.

⁵⁶ E.g. Fisher and others (n 15); Philippopoulos-Mihalopoulos (n 50) or any other part of the anthology.

3. The Good Ecological Status Framework

3.1 Introduction

Within the multiplicity of ecological discourses, it is difficult to find a univocal definition of what the good ecological status is or should be; instead, what ‘good’ means depends on a variety of assumptions and perspectives.⁵⁷ When, in 2000, the EU legislator defined what a ‘good’ ecological status for (mostly freshwater) aquatic ecosystems should be, the legislator made a difficult value judgement, and provided a univocal legal definition of what ‘ecological status’ means, and what a good aquatic ecosystem status is, termed ‘good ecological status’.

As ‘good ecological status’ is clearly informed by elements from the ecological field of discourse, and since no univocal ‘good’ status may be found in ecology, the legal definition is based on a certain perspective, which is not necessarily supported by other discourse perspectives in ecology (see section 1.2). That is, how the legislator chose to regulate human activity, and the assumptions that underlie the regulation of activities, their ecological impact, and how the deterioration is to be mitigated, is based on a perspective that certain legally acknowledged, scientific lineages deemed correct at some point in time. At the same time, this informative process is reciprocal, because the univocal legal definition of what is regarded a good aquatic ecosystem status has informed ecological discourse with a delimitation and focus.⁵⁸ Thus, the incorporation of ecological elements into law has informed content and purpose of both law and ecology.

⁵⁷ E.g. Higgs (n 30); John L Stoddard and others, ‘Setting Expectations for the Ecological Conditions of Streams: The Concept of Reference Conditions’ (2006) 16 *Ecological Applications* 1267; JA Harris and others, ‘Ecological Restoration and Global Climate Change’ (2006) 14 *Restoration Ecology* 170.

⁵⁸ E.g. Brian Moss, ‘The Water Framework Directive: Total Environment or Political Compromise?’ (2008) 400 *Science of the Total Environment* 32; Peeter Nõges and others, ‘Assessment of the Ecological Status of European Surface Waters: A Work in Progress’ (2009) 633 *Hydrobiologia* 197; Daniel Hering and others, ‘The European Water Framework Directive at the Age of 10: A Critical Review of the Achievements with Recommendations for the Future’ (2010) 408 *Science of the Total Environment* 4007.

When ‘ecological status’ became the legal conceptualization of the status of aquatic ecosystems, a legal representation of the aquatic environment was established. This chapter aims to present that representation. For ‘ecological status’ to become a meaningful central concept in the management of aquatic ecosystems, it needs to be coupled with certain vital elements, such as ‘reference condition’, ‘plans of measure’, and a definition of what ‘good’ means, both as an ecosystem status and a Member State obligation. When describing the framework of the Directive, purpose is first described, followed by the environmental objectives. As ‘ecological’ refers to the relation of living organisms to one another, and their physical surrounding (ecosystem), and ‘status’ refers to the ability to classify the ‘ecological’, an assessment that provides the ‘ecological status’ is needed. The third section provides the assessment as it is specified in the Directive. Finally, the question of achieving ‘good ecological status’ is described.

The following section presents a general introduction to the Directive, and some of the provisions described are not part of the more thorough analysis found in the papers or synthesis, owing to the delimitation and focus described in chapter one. Although chapter three serves to introduce the Directive, it does not only provide a strict description of what the law says, without considering and analysing important legal-ecological questions, such as what kind of obligation is ‘good ecological status’, an obligation of best effort or a result-oriented obligation (see also paper IV). The question of whether ‘good ecological status’ is an obligation of best effort, or demands a result is important from another perspective: What type of obligation is suitable for the regulation of ecosystems? The arguments for interpreting ‘good ecological status’ as a best effort or result-orientated obligation are introduced in section 3.3.6, but first, the conceptualization of ‘ecological status’ is introduced.

3.2 Purpose

The purposes of the Directive is specified in Article 1 and are intended to provide the basis for a co-ordinated approach to addressing most of the problems emphasized in section 1.1. For this study, the most important elements of Article 1 are:

- Prevention and halt of further deterioration.

- Protection and enhancement of the status of aquatic ecosystems, terrestrial ecosystems (with regard to their water needs), and wetlands (directly dependent on aquatic ecosystems).
- Promotion of sustainable water use, based on long-term protection of available water resources.
- Enhanced protection and improvement of the aquatic environment through the progressive reduction of discharges and emissions of priority substances, and the cessation or phasing-out of discharges, emissions, and losses of the priority hazardous substances.

With regard to pollution, the protection and improvement of the aquatic environment is more specifically defined by the implementation of the environmental objectives of the ‘daughter’ directive, ‘Directive on environmental quality standards in the field of water policy (2008/105/EC)’. This directive concerns substances and specific pollution, and its purpose is the achievement of ‘good chemical status for surface water’, in compliance with the provisions and objectives in Article 4(1)(a)(iv) of the Water Framework Directive. Even if the regulation of these substances affects ‘ecological status’, the daughter directive is a traditional water pollution regulation, and not significantly connected to the ecosystem assessment and management that are the focus of this study, and the real innovations of the Water Framework Directive. Furthermore, meeting the specified quality requirement with regard to ‘good chemical status’ is not in itself enough to achieve ‘good ecological status’. Other measures are needed, such as enhancement/restoration of ecosystems (Art. 4(1)(a)(ii)). As stated in the delimitation in chapter one, ‘good chemical status’ is not the focus of this study.

Protection for sustainable use is further specified in Article 6 and Annex IV, and here, protection is explained as referring to areas intended to supply water for human consumption, protect economically significant aquatic species, bathing waters, nutrient-sensitive areas, and areas designated for the conservation of habitats and species protected under EU legislation (e.g. Habitats Directive), directly depending on water. Owing to the ecological focus of this study, only the last type of protected area is associated with this study (see paper III).

The more essential environmental objectives for this study are found in the first two specified purposes of the Directive: the prevention and halting of deterioration, and the protection and enhancement of aquatic

ecosystems. In the following section, these two objectives are specified in detail.

3.3 The Environmental Objectives

The purpose of preventing and halting deterioration, and protecting and enhancing aquatic ecosystems, is elaborated and conceptualized in Article 4, where the central environmental objectives and exemptions are found.

Even if both qualitative and quantitative aspects are equally important to water management, the Directive's objectives are focused on qualitative water management.⁵⁹ This depends on the unanimity required for measures affecting quantitative management of water resources (see Art. 192(2) TFEU). Unanimity within the Council is not needed for qualitative water management as this falls within the ordinary legislative procedure (see Art. 191(1), 192(1) TFEU), which is based on qualified majority (see Art. 289, 294(13) TFEU). If the Directive had been presented as a quantitative and qualitative water management directive (similar to the Commissions 1997 proposal), the whole legislative process could have been vetoed by one Member State.⁶⁰ Since several Member States were sceptical about implementing the quantitative water management element, the Directive has a qualitative focus (based on Art. 175(1) TEC, now 192(1)), and questions regarding quantitative water management are only indirectly part of what counts as 'ecological status'.⁶¹

⁵⁹ E.g. David Dudgeon and others, 'Freshwater Biodiversity: Importance, Threats, Status and Conservation Challenges' (2006) 81 *Biological Reviews* 163; Arturo Elosegi, Joserra Diez and Michael Mutz, 'Effects of Hydromorphological Integrity on Biodiversity and Functioning of River Ecosystems' (2010) 657 *Hydrobiologia* 199; Christian Feld and others, 'From Natural to Degraded Rivers and Back Again: A Test of Restoration Ecology Theory and Practice' (2011) 44 *Advances In Ecological Research* 119; Arturo Elosegi and Sergi Sabater, 'Effects of Hydromorphological Impacts on River Ecosystem Functioning: A Review and Suggestions for Assessing Ecological Impacts' (2013) 712 *Hydrobiologia* 129.

⁶⁰ See recital 17, 22, Art. 1, 2 (17), and Annex V (1)(ii) in European Commission, 'Proposal for a Council Directive Establishing a Framework for Community Action in the Field of Water Policy COM(97) 49 Final'.

⁶¹ See Aubin and Varone (n 41) As the Directive does not regulate quantitative water management elements, such as assessment and management measures aimed at increasing river continuity or adapting flow dynamics towards the site-specific hydrological circle. A Member State could, thereby, implement national legislation regarding quantitative water management, and as long as the quantitative management measures do not risk deterioration of bodies of water, a national legislative act would complement the Directives water quality focus. If there is risk for deterioration, the Directives exceptions in Article 4 must be considered, since the management measures affect the physical characteristics of bodies of water. Such an overlapping legal structure would be similar to the Commissions (1997) proposal.

Many perceive the Directive environmental objectives as complex or vague, and some of the complexity is due to how the objectives deterioration/enhancement combines both a static and dynamic obligation.⁶² To some extent, this conceptual dualism has informed the scientific discussion regarding whether the obligation of ‘good ecological status’ is an obligation of best effort, or whether Member States are obligated to achieve a certain environmental outcome in their implementation of management measures.

Another reason for the ambiguity is the framework form of the Directive and its ecological objectives (the chemical objectives are constructed in the ordinary directive form). Framework directives are not part of the official regulative instruments found in Article 288 TFEU and its definition is not clarified anywhere else in the Treaties.⁶³ The different EU framework directives have been established based on different reasons. For the Directive, the need for flexibility and not uniformity, with regard to the diversity of aquatic ecosystem and the achievement of ‘good ecological status’, is often emphasized as the main reason.⁶⁴ This means that the framework structure of the Directive correspond to the subsidiarity principle (see Art. 5(3) TEU (The Treaty on European Union)), as it allow for greater possibilities for experimentation with different approaches at the national or regional level than what an ordinary directive would allow.⁶⁵

3.3.1 Good Ecological Status⁶⁶

Article 4(1)(a)(ii) imposes an ambitious requirement on Member States: They are obligated to ‘aim to achieve’ good surface water status, comprising inland, coastal, and transitional waters, by the end of 2015,

⁶² See Case C-461/13 *Bund für Umwelt und Naturschutz Deutschland v Germany* [2014] EU:C:2014:2324, Opinion Advocate General Jääskinen, para 43.

⁶³ In the legal research literature different interpretation is found and a recent definition is: ‘a framework directive sets out the main objectives and applicable principles and establishes binding procedures (such as reporting, permitting); while the formulation of concrete measures occurs after legislation has been passed.’. See Korkea-aho (n 44).

⁶⁴ See Mireille Bogaart, ‘The Emergence of the Framework Directive in EU Environmental Policy: An Exploration of Its Function and Characteristics’ in Marjan Peeters and Rosa Uylenburg (eds), *EU environmental legislation: legal perspectives on regulatory strategies* (Elgar 2014).

⁶⁵ For discussions regarding this tendency E.g. Charles F Sabel and Jonathan Zeitlin, ‘Learning from Difference: The New Architecture of Experimentalist Governance in the EU’ (2008) 14 *European Law Journal* 271; Ingmar von Homeyer, ‘Emerging Experimentalism in EU Environmental Governance’ in Charles F Sabel and Jonathan Zeitlin (eds), *Experimentalist governance in the European Union : towards a new architecture* (Oxford University Press 2010).

⁶⁶ A similar recapture of the legislation is found in paper IV.

2021, or 2027 (see Art. 4(4), 4(4)(c)). Good surface water status comprises both ‘good chemical status’ and ‘good ecological status’. In Article 2(24), the chemical objective is specified as the requirements that are needed to achieve a chemical status of a body of water where the concentrations of pollutants does not exceed the established standards referred to in Annex IX, and in the ‘Directive on environmental quality standards in the field of water policy (2008/105/EC)’. As mentioned, this pollution focus is not the focal point of this study. However, in many general accounts of the Directive, the general objective is specified as ‘good surface water status’ but there are differences in the regulation concerning ‘good chemical status’ and ‘good ecological status’ and for clarity, the two objectives should be discussed separately. That is, there is a difference between regulating human activities to achieve acceptable water or air quality, with regard to specific substances, that humans use or exist within, and regulating these same substances with the aim of achieving a quality that is suitable for organisms that depend on the quality to self-maintain.⁶⁷ Measures of restoration, enhancement, or protection of ecosystems and single organisms cannot be squeezed into a pollution-control mechanism that is often part of traditional environmental law. That is, it cannot be guaranteed that improvements in water quality correspond to an enhanced ‘ecological status’, ecosystem status, or species population status.⁶⁸ Using the same rationale underlying the regulation of pollution and applying this towards ecosystems could result in standards that cannot be met, and the reason for not achieving the standards could remain unknown, owing to natural variability, for example. To achieve ‘good ecological status’, actions other than reducing human impact are needed, which demand a different type of reference condition and thinking then only focusing on progressive reduction of significant human pressures. Thus, there is a need for a specific type of regulation to manage ecosystems and organisms – ecological laws – and the rest of this section describes the ecological aspects of the obligation of ‘good surface water status’, that is, ‘good ecological status’.

Article 2(21) defines ‘ecological status’ as the ‘quality of the structure and functioning of aquatic ecosystems’, whereas Article 2(22) defines ‘good ecological status’ as ‘the status of a body of surface water,

⁶⁷ See Howarth, ‘The Progression towards Ecological Quality Standards’ (n 50).

⁶⁸ Nikolai Friberg and others, ‘Biomonitoring of Human Impacts in Freshwater Ecosystems: The Good, the Bad and the Ugly’ (2011) Volume 44 *Advances in Ecological Research* 1; Daniel Hering and others, ‘Assessment and Recovery of European Water Bodies: Key Messages from the WISER Project’ (2013) 704 *Hydrobiologia* 1.

so classified in accordance with Annex V'. 'Good ecological status' is the main provision to which the ecology-related environmental objectives in Article 4 refer, and there it is specified that 'Member States shall protect, enhance and restore all bodies of surface water', 'in accordance with the provisions laid down in Annex V' (see Art. 4 (1)(a)(ii)). This definition gives rise to four types of actions: prevention, protection, enhancement, and restoration of identified bodies of water. These four pathways provide for two types of regulative choices: negative provisions, such as emission controls, and positive provisions, such as protection of 'high ecological status' sites or restoration measures to re-establish the former 'good' condition of a body of water.⁶⁹ Thus, 'good ecological status' is an obligation that should not only result in the reduction of pollution (organic or not), but also lead to proactive measures, such as the active reduction of fragmentation, or restoration of riverine heterogeneity within bodies of water. It is important to recognize this dual aim, especially since previous water regulations mainly provided for the implementation of negative emission controls with regard to pollution and abiotic qualities of water, and the Directive is intended to broaden the scope of the regulation to include biotic quality and positive measures.⁷⁰

In both the definition of 'ecological status' in Article 2 and the ecological objectives in Article 4, it is emphasized that what 'good' and 'ecological status' mean is further specified in Annex V. A quite instructive ecological characterization is found in Annex V, which specifies the categories of 'ecological status', 'high', 'good', and 'moderate' (there are also 'poor' and 'bad', but they are not further defined). The definitions of 'good' and 'moderate' status are cross-referenced with 'high'; this status establishes the expectations and conditions to which assessment, classification, and management must refer, and is defined as:

High status:

There are no, or only very minor, anthropogenic alterations to the values of the physico-chemical and hydromorphological quality elements for the surface water body type from those normally associated with that type under undisturbed conditions.

The values of the biological quality elements for the surface water body reflect those normally associated with that type under undisturbed conditions, and show no, or only very minor, evidence of distortion.

⁶⁹ For a discussion, see Howarth, 'Accommodation without Resolution-Emission Controls and Environmental Quality Objectives in the Proposed EC Water Framework Directive' (n 51).

⁷⁰ E.g. Howarth, 'The Progression towards Ecological Quality Standards' (n 50); Marleen van Rijswijk and Herman Havekes, *European and Dutch Water Law* (Europa Law Publishing 2012) 295–306.

These are the type-specific conditions and communities.

The ‘high status’ definition’s first two sentences provide a general frame of reference for the Member States, when they develop or attune their assessment systems to the Directive, and the third sentence specifies that this general status definition should be applied to all types of bodies of water. Although ‘high ecological status’ sets the general reference conditions of the Directive, the environmental objectives in Article 4 are linked to the definition of ‘good ecological status’. The ‘high ecological status’ definition is still important, since it establishes the baseline for the type-specific conditions and communities. Although ‘high ecological status’ is the general reference condition for all bodies of water, and only broadly specified, the definition of ‘good ecological status’ is different. In Annex V 1.2.1, 1.2.2, 1.2.3, and so on, a detailed account of what is regarded as ‘good’ is elaborated for each general type of body of water: river, lake, transitional, coastal, heavily modified, and artificial (the last two types refer to Art. 2(23), and ‘good ecological potential’ (see section 3.3.3)). Within each type, there are three categories of assessment elements: biological quality elements, physico-chemical elements, and hydromorphological elements. The most important are the biological quality elements, and they should be assessed first; when the biological quality elements achieve ‘good’ status, the physico-chemical quality elements are measured, and the hydromorphological quality elements are assessed when the biological and physico-chemical quality elements are ‘good’, to determine whether the body of water is of ‘high ecological status’.

Even if Annex V 1.2 is only a starting point for Member States, and does not specify in detail the actual assessment and management of ‘ecological status’, it is the binding point of departure for the Member States as specification of the objectives to be achieved, or towards which to strive. It explains what the ecological objectives in Article 4 refer to, and provides certain flexibility with regard to the diversity and uniqueness of aquatic ecosystems. As emphasized in the Directives preamble, there are diverse conditions and needs in the EU that require different solutions (recital 13).

In summary, ‘ecological status’, as defined in Article 2, and further specified in Annex V, provides the starting point for the institutionalization of an ecosystem-based objective focused on ecosystem quality (in terms of ‘function’ and ‘structure’). The significant constructs that allow ‘ecological status’ to be identified as ‘good’, or ‘moderate’ are

the ‘high ecological status’ reference definition (which set the expectations), which specify that the general objective for all bodies of water is a status that is equivalent to one showing low levels of anthropogenic distortion/alteration.

3.3.2 Non-deterioration

Some might argue that this chapter’s arrangement, wherein ‘good ecological status’ is the first environmental objective described, is illogical, since the obligation of preventing deterioration is the objective that is given the first place in both Article 1 and Article 4. At the same time, ‘good ecological status’ remains the Directive’s key objective for aquatic ecosystems’. The objective of non-deterioration specifies that Member States must implement the measures necessary to prevent deterioration of the status of all bodies of surface water (see Art. 4(1)(a)(i)). Member States have differed in their implementation of this principle/objective, and its legal-ecological meaning is a debated topic.⁷¹ In a recent Opinion from the Advocate General Jääskinen, the non-deterioration principle was put forward as an obligation that requires Member States to establish measures that prevent deteriorations of the quality elements used to classify a body of water.⁷² Activities or projects should not be approved if they will result in deterioration of any of the quality elements used to classify a body of water, or risk the achievement of ‘good surface water status’.⁷³ Approval is only allowed if the activity falls within the exemptions (see section 3.3.4).

Compared to the specification of ‘good ecological status’, the non-deterioration principle has no further specification in Annex V. That the non-deterioration principle still refers to the quality elements found in Annex V is implicit, as the status of a body of water may be known following an assessment based on Annex V. Furthermore, no timetable is provided for when the obligation should enter into force. This gives

⁷¹ E.g. Yukina Uitenboogaart, *Dealing with Complexity and Policy Discretion: A Comparison of the Implementation Process of the European Water Framework Directive in Five Member States* (Sdu Uitgevers 2009) 222; Martina Ekelund-Entson and Lena Gipperth, ‘Mot samma mål? Implementeringen av EU:s ramdirektiv för vatten i skandinavien’ [2010] Juridiska institutionens skriftserie; M Fröberg and Ulf Bjällås, ‘Är målen i EU-direktiven som rör vatten genomförda på ett juridiskt korrekt sätt i svensk rätt och kan genomförandet anses funktionellt?’ (2013) Rapport till Miljömålsberedningen; Christina Olsen Lundh, ‘Miljökvalitetskrav eller miljökvalitetsnormer? Reflektioner med anledning av en rapport om Sveriges implementering av ramvattendirektivet’ (2014) 2 *Nordic Environmental Law Journal* 61.

⁷² *Advocate General Jääskinen* (n 62) para 111. The Court of Justice has not decided the case yet.

⁷³ *Ibid.*

reason to assume that the obligation is general (including natural, heavily modified, and artificial bodies of water (see sections 3.3.3 and 3.3.4)), and applicable to all bodies of water (regardless of current ecological status).⁷⁴ However, the generality of the obligation is restricted to bodies of water for which the ‘ecological status’ is known, otherwise, an activity or project that might negatively affect the status cannot be evaluated.⁷⁵ Thus, for the obligation to function properly, the relevant quality elements must have been assessed in accordance with the Directives Annex V, and implemented in a river basin management plan (see section 3.5.2). If these requirements have been met, the obligation of non-deterioration becomes applicable.⁷⁶ This means that non-deterioration comes into force not only when there is a risk that an activity will change the ‘ecological status’ from ‘good’ to ‘moderate’, for example, but is applicable within each ‘ecological status’ category.⁷⁷ However, owing to the ‘one-out-all-out’ principle, a change in status may nevertheless arise in the event of the status of the quality element falling below the level corresponding to the current ‘ecological status’ classification (see Art. 2(17) and Annex V 1.4.2 (i)) (see also paper I).⁷⁸ The one-out-all-out principle specifies that the ecological status of each body of water must be determined by the quality element having the lowest status.

The non-deterioration obligation is such that it may be hypothesised that failure to comply may result in infringement proceedings against a Member State, under Article 258 TFEU.⁷⁹ With regard to the discussion of the type of obligation ‘good ecological status’ presents, non-deterioration should be thought of as a threshold obligation, since it aims to secure the current ‘ecological status’ of bodies of water from deterioration, while taking natural changes into account.

3.3.3 Good Ecological Potential

Since extensive human influence has existed for a very long time in Europe, many bodies of water have been heavily modified in their

⁷⁴ Ibid para 69.

⁷⁵ Even if a precautionary approach, with regard to activities known to lead to deterioration of the aquatic environment, should still be applied (see Art. 191(2) TFEU and Water Framework Directive recital 11)).

⁷⁶ *Advocate General Jääskinen* (n 62).

⁷⁷ Ibid para 111.

⁷⁸ *Advocate General Jääskinen* (n 62) paras 98-111.

⁷⁹ See William Howarth, ‘Aspirations and Realities under the Water Framework Directive: Proceduralisation, Participation and Practicalities’ (2009) 21 *Journal of Environmental Law* 391, 410.

physical structure to serve various uses, including navigation, flood protection, hydropower, and agriculture. This means that not all bodies of water can achieve ‘good ecological status’, and that it is neither viable nor desirable from a socio-economic perspective to abandon the use of water for hydropower or agriculture, and remove the physical modifications of these uses in general. However, this does not mean that mitigation aimed to reduce the impact of these activities on the ‘ecological status’ of bodies of water should not be implemented.

Member States may classify modified, altered, or constructed bodies of water as ‘heavily modified’ or ‘artificial’, the environmental objective of which is ‘good ecological potential’ (Art. 4(1)(a)(iii)) and is exempt from the main objective of ‘good ecological status’. ‘Artificial’ bodies of water are those created by human activity, and ‘heavily modified’ ones have been modified, resulting in physical alterations and a substantially changed character, designated in accordance with the provisions in Article 4(3), Annex II and V (also see Art. 2(8)(9)(23)).

Water use that is worth protecting from a socio-economic perspective is specified in Article 4(3)(a), where it is also emphasized that the heavily modified exemption should only be applied if significant adverse effects are likely to follow for these activities, if ‘good ecological status’ were to be the objective. Furthermore, the benefits that these activities provide cannot be reasonably achievable by other means that are significantly better environmental options for reasons of technical feasibility or disproportionate costs, (Art. 4(3)(b)). It is also possible to use this exemption to protect the wider environment.

The activities in Article 4(3)(a) are:

- Navigation, including port facilities, or recreation.
- Activities for the purpose of which the water is stored, such as drinking water supply, power generation or irrigation.
- Water regulation, flood protection, land drainage.
- Other equally important, sustainable human development activities.

The critical point when classifying a body of water as ‘heavily modified’ is that ‘significant adverse effects’ would occur, if restoration or enhancement measures aiming for ‘good ecological status’ were implemented. Adverse effects could be the complete loss of use (e.g. water storage for drinking-water, hydropower, irrigation), significant reduction of use (e.g. bathing sites, loss in hydropower peak and base

load), and actual production losses (e.g. agriculture).⁸⁰ Classifying a body of water as ‘heavily modified’ must include an explanation and the reasons to why it cannot and/or should not be compared to a ‘high ecological status’ reference condition (see Art. 4(3)(b)). This process is not needed for artificial bodies of water, as this type refers to created bodies of water in a location where no body of water previously existed, and is not the result of alteration or modification.⁸¹ The following subsections principally discuss heavily modified bodies of water.

Even if a certain level of deterioration is allowed for these types of bodies of water, the objective of ‘good ecological potential’ specifies that Member States must protect and enhance all heavily modified (and artificial) bodies of water. The same timeframe established for ‘good ecological status’ (2015, 2021, 2027, see Art. 4(4)) is applicable, in accordance with the provisions laid down in Annex V (Art. 4(1)(a)(iii)). It should be noted that Member States shall only protect and enhance, and not restore ‘artificial’ and ‘heavily modified’ bodies of water’ as specified in the ‘good ecological status’ obligation.

I would like to emphasize that the obligation of ‘good ecological potential’ is not something that Member States should take lightly; it is only slightly less important than the general ‘ecological status’ objective, since a significant number of the bodies of water in the EU are designated as either ‘heavily modified’ or ‘artificial’.⁸² At times, it seems that this exemption is viewed as a failure since not all bodies of water will be affected by measures with the aim of achieving ‘good ecological status’.⁸³ However, there are still far-reaching ecological requirements connected to ‘good ecological potential’ and this exemption/objective makes the Directive enforceable. ‘Good ecological potential’ provides a path for Member States to implement the Directive within the human-dominated environment of which the EU consists.

⁸⁰ European Commission, ‘Commission Staff Working Document (European Overview (2/2) Accompanying the Documents Report Form the Commission to the European Parliament and the Council in the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans (Com(2012) 670 Final))’ 144.

⁸¹ ‘Common Implementation Strategy For The Water Framework Directive (2000/60/EC) Guidance Document No 4 Identification and Designation of Heavily Modified and Artificial Water Bodies’.

⁸² E.g. Andrea Keessen and others, ‘European River Basin Districts: Are They Swimming in the Same Implementation Pool?’ (2010) 22 *Journal of Environmental Law* 197, 204.

⁸³ E.g. Howarth, ‘Aspirations and Realities under the Water Framework Directive’ (n 79); Keessen and others (n 82).

3.3.4 Exemptions

Besides the already-mentioned exemption of heavily modified bodies of water from achieving ‘good ecological status’, several other approaches for reducing/changing the obligation of ‘good ecological status’ also exist.

As already hinted, Member States can allow the obligation of achieving ‘good ecological status’ to extend beyond 2015, as long as no further deterioration occurs. In Article 4(4), the following conditions are specified as reasons to postpone the obligation, if it would be unreasonable to expect to meet it by 2015:

- Improvement, due to technical feasibility, may only be achieved over a longer period.
- Improvements aimed at achieving ‘good ecological status’ by 2015 would be disproportionately expensive.
- The natural conditions of the body of water make improvements in status difficult.

There is a limit to the number of years for which the extension may be approved and by the end of the third cycle (2021–2027), all bodies of water must have achieved their objectives. Only the bodies of water where natural conditions have restrained necessary improvements in status is the achievement of the objective not necessary (see Art. 4(4)(e)). There is no clarification of what happens if ‘good ecological status’ is not achieved by 2027, and this may reduce the relevance of the Directive.⁸⁴ In the Commission’s evaluation of Member State implementation, it seems that natural conditions and technical infeasibility – rather than disproportionate costs – are the conditions most often cited, when delaying the achievement of the obligation, and technical infeasibility is more frequently given as a cause than are natural conditions.⁸⁵ The Member States will probably start using the exemption regarding natural conditions even more as it becomes increasingly clear that recovery of the biological quality elements cannot be achieved within the timeframe of the Directive.⁸⁶

Article 4(5) allows for the achievement of less stringent objectives overall, with regard to both ‘good ecological potential’ and ‘good ecological status’, if a body of water is so affected by human activity, or

⁸⁴ Ludwig Krämer, *EC Environmental Law* (Sweet & Maxwell 2007) 256.

⁸⁵ European Commission, ‘Commission Staff Working Document 2/2’ (n 80) 178.

⁸⁶ E.g. Hering and others (n 68); P Haase and others, ‘The Impact of Hydromorphological Restoration on River Ecological Status: A Comparison of Fish, Benthic Invertebrates, and Macrophytes’ (2013) 704 *Hydrobiologia* 475; Verdonschot and others (n 30).

the natural condition is such that it would be infeasible or disproportionately expensive to achieve either objective. However, the non-deterioration obligation is not part of this exemption. This exemption is rarely used by the Member States, according to the Commission. However, Sweden has extensively used this option for all bodies of water that fail to achieve good chemical status with regard to mercury pollution.⁸⁷

Temporary deterioration in ‘ecological status’ is allowed (Art. 4(6)), if this is the result of circumstances of natural origins or force majeure, which are exceptional or could not reasonably have been foreseen. There are several other conditions connected to this exemption, but it is of foremost importance that all practicable steps be taken to prevent further deterioration of impacted and adjacent bodies of water. The deterioration must be reviewed annually, and all practicable measures should be undertaken, with the aim of restoring the body of water to its status prior to the deterioration, as soon as reasonably possible. Four Member States have reported the use of Article 4(6) (Spain, Bulgaria, France, and Belgium) for reasons including extreme floods, prolonged droughts, accidents, and force majeure.⁸⁸

Article 4(7) sets out general conditions in which deterioration of status or failure to achieve the objectives may be permitted for new modifications to the physical characteristics of bodies of water. Several conditions are required if this exemption is to be used, foremost of which is that all practicable steps must be taken to mitigate the adverse impact on the status of the body of water. The modification must also be of overriding public interest. For reasons of technical feasibility or disproportionate cost, the benefits of the modifications or alterations must not be achievable by other means that are a significantly better environmental options. This article has been applied to exempt bodies of water with regard to flood protection, navigation, port development, and hydropower (and other electricity generating facilities).⁸⁹

The only accepted reason for the deterioration from ‘high’ to ‘good’ ecological status is also specified in Article 4(7), as ‘new, sustainable human development’. Two aspects should be noted: first, deterioration from ‘high’ to ‘good’ ecological status is not accepted based on overriding public interest, and the meaning of ‘new sustainable human development activities’ is not further specified. Article 4(7) complements the exemption of classifying bodies of water as ‘heavily modified’, as it

⁸⁷ European Commission, ‘Commission Staff Working Document 2/2’ (n 80) 180.

⁸⁸ *Ibid.*

⁸⁹ See *ibid* 181.

refers to new modifications, whereas ‘heavily modified bodies of water’ refers to existing modifications. Therefore, new modifications must be referred to Article 4(7).

Two delimitations of the exemptions found in Article 4 are found in Article 4(8) and 4(9). In 4(8) it is specified that the actualization of exemptions should not compromise the achievement of the environmental objectives in other bodies of water within the same river basin district (for river basin district, see section 3.5.1, also recitals 33 and 34). As the Directive builds on previous EU water legislation, and the intention is for the Directive to further the aims of previous legislative acts, it follows that the application of the exemptions should not undermine the level of protection provided by previous Community legislation, and this is specified in Article 4(9).

3.3.5 Direct Effect and Harmonization

It is clear that the Directive does not seek full coordination of national laws; instead, the overarching objective is to establish a framework for community action with regard to water policy.⁹⁰ The provisions where coordination and specific actions are needed can be divided into four different types of provisions, focused on the Community, the relationship between Member States and the Community, the relationship between Member States and the public, and assessment/management structures. Thus, there are provisions that impose obligations on Community institutions. For example, Article 16 calls for Community institutions to adopt Community measures in the fields of water policy, and the ‘Directive on environmental quality standards in the field of water policy (2008/105/EC)’ is a result of this provision. Under Article 3(8), it is demanded that Member States inform the Commission of who their competent authorities are, and under Article 24(2), how they have implemented the main provisions in national legislation. Article 14 obligates Member States to ensure the active involvement of all interested parties in the implementation of the Directive. However, the form of the involvement is not regulated.⁹¹ Annex II provide a specific system for a coordinated differentiation of bodies of water, which is tightly coupled to the obligation of non-deterioration, ‘good ecological status’, and the intercalibration (see sections 3.4.1 and 3.4.5). The intercalibration of

⁹⁰ Case C-32/05 *Commission v Luxembourg* [2006] ECR I-11323, para 41, 50; Case C-32/05 *Commission v Luxembourg* [2006] ECR I-11323, Opinion Advocate General Sharpston, para 50.

⁹¹ Also see Advocate General Sharpston *Commission v Luxembourg* (n 90), paras 51-55.

ecological status boundaries (see Art. 20 and Annex V 1.4) is intended to provide coordination of national ‘ecological status’ assessment and classification methods. The intercalibration aims to ensure that the requirement to enhance or restore a body of water with the aim of achieving ‘good ecological status’ (see Art. 4(1)(a)(ii)) is actualized at the same level of deterioration (see section 3.4.5 and paper IV).

The way in which the environmental objectives should be understood is not entirely clear. However, it is clear that ‘good ecological status’, ‘good ecological potential’, and non-deterioration impose obligations on the Member States, with respect to individuals, with or without direct effect, which requires implementation of the necessary measures to achieve these objectives.⁹² This does not mean that the Directive aims to harmonize the way in which Member States choose to achieve these obligations. Instead, the common principles and overarching framework for action that are laid down are to be further developed by the Member States.⁹³ Even if Member States are left with a margin of discretion regarding how to implement the intent of the Directive’s provisions, and the need for measures, they are obligated to develop systems of assessment and management plans for meeting the obligations (see e.g. Annex V and Article 11, and 13). For example, to ensure ‘good ecological status’, river basin management plans and a programme of measures are required. This is an unconditional obligation, but the obligation is unconditional only with regard to the composition of the plan and programme, and not what they contain. It is possible that the Court of Justice would grant an individual the right to draw up river basin management plans and programmes of measure, in order to be relied on by the concerned public. However, the course of action and the substance of the plans or programmes are of wide policy discretion, as long as the Member State is intent on achieving the objectives.⁹⁴ However, the discretion of the Member States are limited, as the selected measures must be effective and the implementation guaranteed, since the Directive is binding with regard to the result to be achieved (see Art. 288 TFEU).

⁹² Ibid para 53.

⁹³ Case C-525/12 *Commission v Germany* [2014] EU:C:2014:2202, para 52.

⁹⁴ See Case C-237/07 *Dieter Janecek v Freistaat Bayern* [2008] ECR I-06221, paras 39–42; *Commission v Germany* (n 93), para 52; also see Chris Backes and Marleen van Rijswijk, ‘Effective Environmental Protection: Towards a Better Understanding of Environmental Quality Standards in Environmental Legislation’ in Lena Gipperth and Charlotta Zetterberg (eds), *Miljörettsliga perspektiv och tankevänder: vänbok till Jan Darpö & Gabriel Michanek* (Iustus 2013).

Thus, Member States must establish plans and programmes, but the obligation of ‘ecological status’ does not have direct effect. As the substance of ‘ecological status’ should be developed by each Member State, and even if this process are based on the normative definition of ‘ecological status’ in Annex V the definitions are not intended to provide the actual content of the quality standard of each body of water. Instead, Annex V only gives Member States the appropriate directions for actualizing what ‘ecological status’ means for the specific conditions in each Member State. Thus, the obligations linked to ‘ecological status’ are dependent on the Member States’ assessment programmes, and are probably not a question of direct effect.

3.3.6 Best Effort or Result⁹⁵

One aspect of the Directive discussed by legal scholars is whether ‘good ecological status’, as an objective that Member States should ‘aim to achieve’, is a best effort or a result-oriented obligation. EU legislation, in the form of a directive, may impose different types of obligations on the Member States, which have different consequences for them, although all types of obligations aim to achieve the objective of the legislation (Art. 288 TFEU). The main difference between the two types of obligations discussed here is that for best effort obligations, all reasonable measures must be taken, but the objective does not need to be achieved, whereas for result-oriented obligations, the objective must actually be achieved. Failure to achieve the result is acceptable only if the failure fits the exemptions, or if it was an absolute, objective impossibility to achieve the result.⁹⁶ So far, the Court of Justice has not accepted appeals regarding absolute objectivity.⁹⁷ Furthermore, when an obligation is result-oriented, it should be possible to objectively determine whether the failure is due to the Member State’s actions, when the management cycles comes to an end.⁹⁸ If Member States are to make serious attempts to meet an obligation, the substance is often unquantifiable, whilst also allowing Member States a certain amount of discretion regarding the nature of the measures to be taken to achieve the ob-

⁹⁵ There is a similar discussion in paper IV, but even if there are similarities, the discussions complement each other.

⁹⁶ E.g. JJH van Kempen, ‘Countering the Obscurity of Obligations in European Environmental Law: An Analysis of Article 4 of the European Water Framework Directive’ (2012) 24 *Journal of Environmental Law* 499.

⁹⁷ See van Rijswick and Havekes (n 70) 294.

⁹⁸ Case C-60/01 *Commission v France* [2002] ECR I-05679, para 25–29.

jectives.⁹⁹ This question of best effort or result was discussed during the drafting of the Directive, and the result is a combination of result-oriented and best effort elements (as a compromise between the Commission and the Council).¹⁰⁰ Member States also differ in their implementation of the Directive, and some refer to ‘good ecological status’ as a matter of best effort, and some, as a matter of result.¹⁰¹

In the legal research literature, the type of obligation that ‘good ecological status’ is has been discussed. For example, Howarth¹⁰² argues, primarily on the basis of an evaluation of the Directive itself that, “Put bluntly, the timely achievement of good status is legally irrelevant. What is required is the taking of necessary actions, however ineffectual these may turn out to be”.¹⁰³ Another way of perceiving ‘good ecological status’ was put forward by Kempen,¹⁰⁴ who, referencing case law of the Court of Justice, disagrees with Howarth, and considers the obligation of ‘good ecological status’ to be a question of results.¹⁰⁵ Kempen’s conclusion is based primarily on ‘good ecological status’ being accompanied by a timeframe, with a number of exemptions that hint at the obligation being one of results. On the other hand, Advocate General Jääskinen recently expressed a different perspective and emphasized that in the preparatory works, it is relatively clear that the main objective of the Directive is not intended to be an obligation of results. Instead, the obligation concerns the establishment of plans and programmes that make it possible to achieve the objectives.¹⁰⁶

At its core, the discussion regarding best effort and result is not a question of which approach provides the best environmental outcome. Even if the main obligation of a directive is specified as a best effort objective, in my view it may still provide substantial environmental benefits. This is exemplified by the obligation found in Article 4(4) in the Wild Birds Directive,¹⁰⁷ where it is specified that all Member States must strive to achieve their objectives by taking appropriate steps. This

⁹⁹ Ibid.

¹⁰⁰ This has been discussed by Kaika and Page (n 43).

¹⁰¹ Uitenboogaart (n 71) 222.

¹⁰² Also see Krämer (n 84) 256; Fröberg and Bjällås (n 71).

¹⁰³ Howarth, ‘Aspirations and Realities under the Water Framework Directive’ (n 79) 412.

¹⁰⁴ Also see Lena Gipperth, ‘Ramdirektivet för vatten ett framsteg för skyddet av unionens vattenresurser?’ in Ellen Margrethe Basse, Jonas Ebbesson and Gabriel Michanek (eds), *Fågelperspektiv på rättsordningen: vänbok till Staffan Westerlund* (Iustus 2002); Olsen Lundh (n 71).

¹⁰⁵ Kempen (n 96) 526.

¹⁰⁶ Advocate General Jääskinen (n 62) para 62.

¹⁰⁷ Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds, OJ L 20/7 in 26 January 2010 (Wild Birds Directive).

does not mean that the implementation of a number of programmes and regulatory measures is sufficient effort. Instead, all reasonable measures to achieve the objective must be taken, which requires targeted actions.¹⁰⁸ On the other hand, an obligation of results would, in comparison to a best effort, also require the achievement of a certain environmental condition. The risk of a result-oriented objective that is inclusive towards the river basin environments as a whole, and combined with a type-specific objective, similar to that of the Directive, is that measures implemented are not adapted to the site in question.

When discussing the question of best effort and result, I think that the framework for assessment and management should affect the type of obligation to which ‘good ecological status’ might refer. In the Directives annexes is where innovation is found, and certain novel elements need to be considered, when discussing the type of obligation to which the Directive gives rise. The first novel element is the inclusiveness with regard to the diversity of aquatic environments. The second element is the definition of ‘ecological status’, and how it refers to both abiotic and biotic statuses, and ecosystem structure and function (see sections 3.3.1, 3.4.1).

The following section combines the legal and ecological elements of the Directive, and explores the kind of obligation ‘good ecological status’ is, based on the purpose and the objective pursued (see section 2.3.2 for method of interpretation). The general purpose is the prevention and halt of further deterioration, protection of aquatic ecosystems, and the enhancement of the status of these ecosystems (see Art. 1). With regard to the objectives, Member States are intended to ‘aim to achieve’ ‘good ecological status’ (see Art. 2(21), 4(1)(a)(ii)). Primarily, achieving ‘good ecological status’ means that each body of water should attain low levels of distortion of ecosystem structure and function, as assessed through the biological quality elements, and deviate only slightly from the type-specific reference body of waters with undisturbed conditions (see Annex V 1.2, Art. 2(21)). What low levels of distortion of the biological quality elements means is not quantified, but instead, is formulated in general and unquantifiable terms for both ecosystem structure (e.g. taxonomic composition, abundance) and ecosystem function (e.g. body size). Annex V 1.2 merely explains what the ecological objectives in Article 4 must refer to, without specifying it quantitatively: this task is to be accomplished by each Member State.

¹⁰⁸ Case C-418/04 *Commission v Ireland* [2007] ECR I-10947, para 190-191; Case C-418/04 *Commission v Ireland* [2007] ECR I-10947, Opinion of Advocate General Kokott, paras 111-112, 115.

This leaves Member States with the discretion to attune their objectives to national conditions. It is thereby the responsibility of the Member States to develop and quantify what ‘ecological status’ means, and when it is achieved (which is then intended to be intercalibrated, see section 3.4.5).

With regard to the unquantifiable specification of ‘ecological status’ in Annex V 1.2, ‘good ecological status’ appears to correspond to what the Court of Justice considered as an objective, where it is important to take the necessary measures to ensure that the objective is attained, which Kempen classifies as a best effort obligation.¹⁰⁹ Based on the specification of ‘good ecological status’ it does not appear to correspond to the other type of objective that the Court of Justice considered require that Member States obtain very precise and specific results, which Kempen classifies as a result-oriented obligation.¹¹⁰ Thus, the specification of ‘ecological status’ in Annex V 1.2 does not seem to provide the precision of specific results, as it provides only a normative starting point, which Member States are to adapt to their environmental conditions (and the intercalibration lacks the normative base to change this, see section 3.4.5 and paper IV).

Improved ‘ecological status’ is to be achieved through four types of actions: prevention, protection, enhancement, and restoration of differentiated bodies of water (see Art. 4(1)(a)(ii)). These four pathways provide for two types of regulative choices: negative provisions, such as emission controls or halting deterioration, and positive provisions, such as restoration measures aimed at re-establishing the former ‘good’ condition of bodies of water.¹¹¹ Thus, ‘good ecological status’ is an obligation that should result in not only the reduction of pollution (organic or not), but also lead to proactive measures, such as the active reduction of fragmentation, or restoration of riverine heterogeneity within bodies of water. If ‘good ecological status’ is a result-oriented obligation, the measures must result in the establishment of a status that deviates only slightly from the type-specific reference condition for each type of body of water. However, as the outcomes of proactive measures are uncertain, largely because of natural conditions, it is also questionable whether the establishment of a ‘good ecological status’ is possible within the Directive’s timeframe for bodies of water where the ‘ecological status’ is moderate or poor, for example (see section 3.3.1, papers II,

¹⁰⁹ See *Commission v France* (n 98) para 27; Kempen (n 96).

¹¹⁰ *Ibid* para 28; Kempen (n 96).

¹¹¹ For a discussion, see Howarth, ‘Accommodation without Resolution-Emission Controls and Environmental Quality Objectives in the Proposed EC Water Framework Directive’ (n 51).

III). This means that the exemptions will become increasingly important as we move towards 2027, if the obligation is one of results, especially the exemption emphasizing natural conditions (see Art. 4(4)(c)), as it may be difficult or impossible to determine whether a Member State or nature is responsible for the failure of the implemented measures aimed at achieving the objectives for 2027. This also means that the only objectives for which a result may definitely be achieved are those referred to as ‘negative provisions’.

If it is likely that numerous bodies of water will require measures of enhancement and restoration, the exemption referring to natural conditions would be very important, as it allows Member States the possibility of attributing failure to achieve the objective to natural conditions. However, the use of the exemption is conditional, as Member States would have to prove that there is no shortage of implemented measures, and the Member State has aimed to achieve the objective. Thus, if the objective is one of results, an increasingly important question for Member States and the Commission is to determine an adequate number of implemented measures, as the natural conditions exemption may be used only when these measures have been implemented. If the objective is one of best effort, all reasonable measures must be taken, and the exemption may be used by the Member States to explain why the reasonable measures have not resulted in enhancement or restoration of a body of water; that is, prove that the measures are still reasonable, and that the Member State has attempted to achieve the objective, even if the body of water status does not indicate this (see Art. 288 TFEU).

The demand for measures of enhancement and restoration in Article 4(1)(a)(ii), together with the natural conditions exemption of Article 4(4)(c), indicate that the obligation is one of best effort, as these kinds of measures are difficult to associate with a specific result, which is one of the characteristics of a result-oriented obligation. As mentioned above, the Directive is a mix of result-oriented and best effort elements. Thus, other elements could be discussed when determining what type of obligation ‘good ecological status’ is. However, it seems that the question of the positive provisions in Article 4(1)(a)(ii), the exemption in Article 4(4)(c), of natural conditions, and the definitions of the biological quality elements in Annex V, are three important elements that have not been discussed in the legal research literature, with regard to the discussion of best effort and result.

Based on the biological quality elements being defined as unquantifiable in Annex V 1.2, there are reasons to consider ‘good ecological status’ as a best effort obligation. There is also indication that the objec-

tive of ‘good ecological status’ is a best effort obligation with regard to the positive provisions and the natural condition exemption. This author’s belief is that it is preferable to consider the obligations of the ‘aim to achieve’ ‘good ecological status’ as a matter of best effort, owing to the above-mentioned aspects of the construct, if the Directive is to function, and its purposes striven for. Member States should respond to the obligation of ‘good ecological status’ by implementing recognized measures that may have positive effects on the ‘ecological status’ of bodies of water (even if the actual effects cannot be known), and reviewing these every 6th year. If this were to correspond to the case law of best effort obligations with regard to the Wild Birds Directive, Member States would need to implement measures that are unambiguously intended to achieve an improved ‘ecological status’.¹¹² The implementation of programmes and regulatory measures alone should not be considered sufficient effort for compliance with a best effort obligation. Instead, all reasonable measures to achieve the objective must be taken, which requires targeted actions.¹¹³ Member State implementation could then be evaluated based on the effectiveness of implemented measures, and not whether or not the objective is achieved.

3.4 Assessment

It is fundamental to the achievement of the environmental objectives that the Member States acquire a comprehensive representation of the status of their bodies of water, based on the predefined characteristics presented in Annex V. The Directive’s provisions, especially Annex V, provide the basis for a co-ordinated assessment of bodies of water among Member States. Still, co-ordination does not mean ‘harmonized’, as the conditions vary among Member States, and this must be considered in the assessment (see recital 13 and section 3.3.5).

Legally, water management was traditionally primarily concerned with abiotic elements and with the inclusion of biological quality elements as biotic indicators of the quality of the structure and function of aquatic ecosystems the Directive provides references for both biotic and abiotic statuses.

Karr and Dudley (see section 1.2), in their important paper on water quality goals, thought that ecological assessment of aquatic ecosystems

¹¹² See *Commission v Ireland*, paras 190-191; *Advocate General Kokott*, paras 111-112, 115 (n 108).

¹¹³ *Ibid.*

should concern four major classes of variables used to assess the ecological status of river basins. These are flow regime, water quality, habitat structure, and energy source, and in detail, the assessed variables include:

- Flow regime: the hydrological conditions necessary for a variety of organisms, including different age classes of the same species. For example, newly hatched specimens are found in the slowest waters, whereas juveniles and adults utilize faster waters. Finally, spawning fish require much higher flow rates.
- Water quality: light, temperature, dissolved oxygen, concentrations of soluble and insoluble organics, inorganic heavy metals, and a variety of toxic substances are components of special interest.
- Habitat structure: a mosaic of depth, current, and substrate conditions.
- Energy source: the energy contained in the chemical bonds of organic matter is the basic energy source for animals, fungi, and many bacteria. Measurements should be taken, to assess nutrient and sunlight availability.¹¹⁴

As these variable categories emphasize, the assessment and management of freshwater ecosystems are complex tasks that demand an understanding of the dynamics of both abiotic and biotic processes and structures. From a management perspective, a varied assessment that includes several of these aspects is preferable. In many river basins, a combination of water quality and habitat structure assessment are necessary, if management measures are to improve the ecological quality of both biotic and abiotic elements.¹¹⁵ Even if a combined assessment is preferable, the Directive does not provide such a holistic basis for assessment; instead, it has a limited focus, primarily on water and ecosystem quality (see recital 19). Ecosystem quality or ‘ecological status’ is defined as ‘an expression of the quality of the structure and function of aquatic ecosystems associated with surface waters’, and is assessed through biological quality elements that include phytoplankton, benthic flora, benthic invertebrate fauna, and fish. Water quality is represented

¹¹⁴ Karr and Dudley (n 5) 73.

¹¹⁵ Karr and Dudley (n 5); Hering and others (n 68); Feld and others (n 59); Armin W Lorenz and Christian K Feld, ‘Upstream River Morphology and Riparian Land Use Overrule Local Restoration Effects on Ecological Status Assessment’ (2013) 704 *Hydrobiologia* 489.

by the general physico-chemical profile (e.g. nutrients, organic matter, oxygen). Complementing these two assessment categories are the hydromorphological quality elements (see Annex V 1.1, 1.2), which are used to establish ‘high ecological status’ reference conditions.

The assessment is mainly specified in Annexes II and V. There, how the differentiation of regulative units should be conducted is specified first, then the reference condition for the assessment is defined, followed by the assessment variables, the quality elements, and last, the provision of the intercalibration of the biological quality elements. Section 3.4 follows this structure of the Directive, and ends with a discussion regarding quality standards and whether it is possible to provide a framework for a suitable assessment, if the assessment is to provide sufficient information for management under the Directive.

3.4.1 Differentiation of Assessment Units

The environmental objectives of ‘good ecological status’, ‘good ecological potential’, and non-deterioration apply to ‘bodies of surface water’ and ‘artificial and heavily modified bodies of water’ (Art. 4 (1)(a)(i)(ii)(iii)). Even if it is specified that the Directive have a river basin focus (recital 33), the environmental objectives apply to certain bodies of water, and not the river basin of which they are a part. This is consistent with Article 1, where it is specified that the purpose of the Directive concern the spatial units of inland surface water, transitional waters, and coastal waters.

What is included in the construct of ‘body of surface water’ is further specified in Article 2(10), and indicates a discrete and significant element of surface water such as a lake, reservoir, stream, river or canal, part of a stream, transitional water, or a stretch of coastal water. That is, the environmental objectives are applicable to discrete and significant elements of surface water (here referred to as ‘body of water’), such as a stream or a lake, and what is regarded as a discrete and significant element of surface water is further specified in Annex II, and is part of the characterization provision found in Article 5.

Annex II specifies that Member States must identify the location and boundaries of bodies of surface water. The first step in the differentiation consists of classifying parts of the river basin as falling within a number of categories, including rivers, lakes, and transitional or coastal waters, or as artificial or heavily modified bodies of water (Annex II 1.1 (i)). The next step consists of a differentiation of each category into types, using either what is called ‘system A’, or ‘system B’ (Annex II

1.1 (ii); identified in Annex II 1.2). The two differentiation systems are two ways of achieving the same resolution, as the use of system B does not allow for deviation from the degree of differentiation that follows from system A (Annex II 1.1 (iv)). Any deviation between the two systems should be avoided; as otherwise, it could be difficult to link the environmental objectives to the differentiated body of water. For artificial and heavily modified bodies of water, the differentiation should closely resemble the differentiation of a similar, natural body of water (Annex II 1.1 v).

To exemplify the foregoing, the differentiation of a body of water that has been categorized as a ‘river’ should, according to System A, be divided based on characteristics such as altitude, latitude, longitude, depth, geology, size, and so forth (see Annex II 1.2.1). For a body of water in the category of ‘lake’, a significant element of differentiation is depth, and whether a lake has a depth <3 m, 3 to 15 m, or >15 m; each area is designated as one of three different types of bodies of water, and each type is compared to a type-specific ‘high ecological status’ lake reference condition with the same depth (Annex II 1.2.2.).

Even if the Directive leaves the manner of achieving its objectives to Member State discretion, the differentiation process is not optional, but a material, procedural part of the Directive, and the obligation of non-deterioration and restoration, for example, are coupled to individual bodies of water, and not a multiple or conjoined bodies of water (see e.g. Art. 4 (1)(a)). The body of water is the unit to which the objectives of the Directive apply.

3.4.2 Reference Condition for ‘Good Ecological Status’

What is commonly known in ecology as a ‘reference condition’ is defined in Annex V as ‘Normative definitions of ecological status classifications’. As mentioned, the definitions in Annex V provide the starting point for Member States when they develop or attune their already existing assessment procedures to assessing their bodies of water and classifying them with any of the ‘ecological status’ definitions. The ‘high ecological status’ definition was introduced above in section 3.3.1, and in that definition, we find a dual focus on both abiotic (physico-chemical and hydromorphological quality elements) and biotic conditions (biological quality elements). The abiotic conditions that are normative and provide the reference condition for Member States identify a status in which only very minor anthropogenic alterations are found, with regard to the physico-chemical and hydromorphological

quality elements within a body of water, compared to what is normally associated with undisturbed conditions. The normative biotic conditions are found in bodies of water that reflect conditions typically associated with undisturbed conditions, and show only very minor evidence of distortion. That is, within a ‘high ecological status’ reference condition, the effects of human activity that either alter the abiotic conditions or distort the biotic conditions should not be found (often referred to as pristine). Thus, ‘alteration’ and ‘distortion’ are negative concepts that should be associated with the ‘ecological status’ definition, and the structure and function of ecosystems. Three methods may be used to establish reference conditions, to provide a sufficient level of confidence in the values of the reference conditions: predictive model or back-casting methods, historical, paleontological and other available data, and, as a last resort, expert judgement (Annex II 1.3(V)).

In general, the tradition of biological assessments that the Directive is following is often either directly or indirectly based on comparing existing condition to natural/pristine conditions. Natural conditions are then understood as the absence of human disturbance or alteration, and ‘absence’ is often understood as a pristine status that is unpolluted and without anthropogenic disturbance.¹¹⁶ In biological assessment, the term ‘reference condition’ is at times given different meanings, as the condition of ecosystems at some point in the past, the best of today’s existing conditions, the condition of systems in the absence of significant human disturbance, or the condition that today’s sites might achieve if they were better managed. These four different aspects of reference condition may be termed ‘historical condition’, ‘least disturbed condition’, ‘minimally disturbed condition’, and ‘best attainable condition’.¹¹⁷ If we categorize the ‘Normative definitions of ecological status classifications’ within any of these categories, its focus on equivalence to undisturbed or pristine conditions positions it under ‘minimally disturbed conditions’. The reason to classify the Directives reference definition in this category is that it refers to the absence of nearly all alterations and distortions of a body of water, while also recognizing that some natural variability may occur (see Annex II 1.3.3 (iv) and Annex V 1.3.4). A problem here is that in the ecological research literature ‘high ecological status’ is not defined as equivalent to the minimally disturbed conditions definition; instead, it has been referred to as ‘least disturbed conditions’, ‘historical conditions’ and as something similar to ‘minimally

¹¹⁶ For a discussion, see Stoddard and others (n 57).

¹¹⁷ Ibid.

disturbed conditions'.¹¹⁸ This confusion seems to be largely due to the normative changes that have been implemented through the CIS guidance documents, with regard to 'ecological status' (see paper IV).

The 'high ecological status' reference condition is normative for what is regarded as 'good', in the way that it determines what 'good ecological status' should refer to, if it is to become a legitimate management objective under the Directive. Therefore, any divergence from the Directive in the establishment of reference conditions has normative consequences for the legitimacy of management. That is, if the environment that is chosen to represent a 'high ecological status' does not represent this legal definition, there is the risk that the environmental outcomes linked to 'good ecological status' will not represent what was intended by the legislator, and the democratic legitimacy is thereby reduced (also see paper IV).

3.4.3 Reference Condition for 'Good Ecological Potential'

To apprehend what the 'good ecological potential' (see section 3.3.3) obligation means, Member States must establish a reference condition, and this reference condition is labelled 'maximum ecological potential' in Annex V 1.2.5. 'Maximum ecological potential' refers to the closest approximation to a natural aquatic ecosystem that could be achieved, given the hydromorphological characteristics that cannot be changed without significant adverse effects for the activity itself or the benefits of it. That is, the reference conditions is one in which the values of the biological quality elements as far as possible reflect a similar, natural body of water. 'Good ecological potential' is achieved when there are slight changes in the values of the relevant biological quality elements, compared to the values found at maximum ecological potential.

Although 'good ecological status' refers to natural conditions where human impact on the structure and function of ecosystems is relatively minimal, the reference conditions for 'good ecological potential' depend on an activity and its specific impact, which leaves Member States with an amount of discretion that is not found when natural bodies of water are in question. This discretion has also been used rather differ-

¹¹⁸ For different ecological views of what 'high ecological status' means e.g. Ibid; Moss (n 58); Hering and others (n 58); Sebastian Birk and others, 'Three Hundred Ways to Assess Europe's Surface Waters: An Almost Complete Overview of Biological Methods to Implement the Water Framework Directive' (2012) 18 *Ecological Indicators* 31; Isabel Pardo and others, 'The European Reference Condition Concept: A Scientific and Technical Approach to Identify Minimally-Impacted River Ecosystems' (2012) 420 *Science of The Total Environment* 33.

ently between the Member States, but also extensively.¹¹⁹ ‘Maximum ecological potential’ has been interpreted as being established when the measures that do not have a significant adverse effect on the heavily modifying water use are implemented (measures that are predicted to deliver only slight ecological improvement are excluded), and this scheme is called the ‘Prague method’, or ‘mitigation measures method’.¹²⁰ This is an interpretation based on part of the definition of ‘maximum ecological potential’, where it says that reference conditions should, as far as possible be similar to a natural body of water of the same type. The key difference from the approach specified in Annex V 1.2.5 is that ‘good ecological potential’ is achieved when certain mitigation measures have been implemented, and not implicitly from the specification and prediction of biological quality elements at ‘maximum ecological potential’ (which is called the ‘reference method’). Thus framed, ‘good ecological potential’ is clearly a best effort obligation, as the result of the obligation is not stemming from the ‘ecological status’ of the body of water.

So far, only a few Member States use the reference-based approach, as many base ‘good ecological potential’ on the mitigation-measures approach, and some have not made explicit which of the two approaches they use. The Commission has not found any clear information regarding whether the environmental result differs, depending on the method chosen.¹²¹ The reason for establishing alternative approaches seems to be the difficulty that Member States have had with regard to setting reference conditions for heavily modified bodies of water.¹²²

The problem with the mitigation measure approach is that ‘good ecological potential’ is intended to be a type-specific environmental status that is coupled to mitigation measures that are effective, with regard to the quality elements. If only certain measures are implemented, without a complementary assessment, there is the risk that the environmental change intended by the Directive will not be secured. That is, ‘good ecological potential’ is not a number of identified mitigation measures; it is mainly about the status of the biological quality elements. If Member States do not assess the relevant quality elements and

¹¹⁹ See Uitenboogaart (n 71) 223.

¹²⁰ See ‘Common Implementation Strategy For The Water Framework Directive (2000/60/EC) Guidance Document No 4 Identification and Designation of Heavily Modified and Artificial Water Bodies’ (n 81).

¹²¹ European Commission, ‘Commission Staff Working Document 2/2’ (n 80) 148–149.

¹²² See ‘Heavily Modified Water Bodies: “Information Exchange on Designation, Assessment of Ecological Potential, Objective Setting and Measures”’ (Common Implementation Strategy Workshop 2009).

compare them to the nearest comparable body of water, it is hard to see whether Member States actually meet the obligations of the Directive.

In light of the recent statement by the Advocate General Jääskinen regarding the necessary attributes for actualizing the non-deterioration objective, the current conduct of the majority of Member States is troubling (see section 3.3.2).¹²³ It is emphasized that for the non-deterioration objective to be actualized, an assessment corresponding to Annex V is needed. If Member States then choose to not assess their heavily modified bodies of water according to Annex V, but instead use the mitigation approach, the non-deterioration objective cannot be properly realized for these bodies of water. Since the objective does not give Member States a large amount of discretion, Member States could be in breach of their obligations, if this objective cannot be realized. Thus, contextualizing the mitigation-measure approach with regard to the systematization of the Directive it seems unlikely that it is in agreement with the Directive.

3.4.4 The Assessment Variables¹²⁴

The assessment variables are found in Annex V 1.2, which specifies a range of variables, which Member States should use when classifying each body of water (see also Annex V 1.1). As mentioned, the assessment variables are called ‘quality elements’, and are divided into three categories: biological, physico-chemical, and hydromorphological.

The systematization of the assessment requires that the relevant biological quality elements first be assessed, and if these are of ‘good’ status, the physico-chemical quality elements are assessed, and if these are also ‘good’, the hydromorphological quality elements are assessed, to determine whether the body of water is of ‘high’ status. There is no indication that Members do not need to develop assessment systems for all the quality elements, even if, in the actual monitoring, it is possible to choose the more sensitive quality element (see section 3.4.5).

For the biological quality elements, phytoplankton, macrophytes and phytobenthos, benthic invertebrate fauna, and fish (not for coastal water)¹²⁵ must be assessed (see Annex V 1.2.1), and each element be assigned a ‘high’, ‘good’, or ‘moderate’ definition. At ‘high ecological

¹²³ See *Advocate General Jääskinen* (n 62).

¹²⁴ A similar description is found in paper IV.

¹²⁵ For a discussion, see Gabriel Michanek and Anna Christiernsson, ‘Adaptive Management of EU Marine Ecosystems - About Time to Include Fisheries’ (2014) Vol. 59 *Scandinavian Studies in Law* 201.

status', they all should reflect the general definitions cited above (see section 3.3.1), and consequently, it is emphasized that, for example, taxonomic/species composition and abundance should correspond entirely or nearly entirely to undisturbed conditions. All disturbance-sensitive species/taxa are present, the diversity of invertebrate taxa shows no sign of alteration, the age structure of the fish communities shows few signs of anthropogenic disturbance, and reproductive failures are not found. It may be valuable to distinguish between the two ecological concepts of which 'ecological status' consists: 'structure' and 'functioning'. The taxonomic/species composition and abundance that are part of the definition of all biological quality elements describe a structural, biotic condition of a body of water, and age structure and reproduction of fish indicate the biotic 'functioning' of a body of water. In general, ecosystem 'structure' refers to composition, abundance, biomass, diversity, and sensitivity. Ecosystem 'functioning' refers to activity such as decomposition or nutrient cycling, which may be linked to indicators such as size (e.g. body size or body mass), reproduction or development of particular species, or age structure at individual, population, and community levels, and may indicate functioning ecosystems (see Annex V 1.2 and fish fauna).¹²⁶

'Good' structural conditions mean slight changes in the composition and abundance of the various quality elements, and different stressor-related symptoms of each quality element are described, such as plankton blooms. For 'moderate' status, the structural conditions may differ moderately from the type-specific communities, and are significantly more distorted than at 'good' status. 'Good' function of fish communities is achieved when there are signs of impact on physico-chemical or hydromorphological elements, which result in disturbance in age structure and reproduction or development of a particular species, to the extent that some age classes may be missing. At 'moderate' status, the age structure of the fish communities shows major signs of anthropogenic disturbance, to the extent that a moderate proportion of the type-specific species are absent or very scarce.

The foregoing systematization is consistent with the physico-chemical quality elements, and at 'high' status, it refers back to the reference condition definition of 'undisturbed conditions' and type-specific elements. At 'good' status, abiotic elements, such as temperature, oxygen balance, pH, acid neutralizing capacity, and salinity or

¹²⁶ E.g. Shahid Naeem, 'Biodiversity, Ecosystem Functioning, and Ecosystem Services' in Simon Levin (ed), *The Princeton Guide to Ecology* (Princeton University Press 2009).

nutrient conditions are within a range that does not threaten the functioning of type-specific ecosystems and/or the specified ‘structural’ or ‘functional’ conditions emphasized in the biological quality elements.

The hydromorphological quality elements are defined by three elements: hydrological regime, river continuity, and morphological conditions, which follow the foregoing systematization, and at ‘high status’ refer back to the ‘undisturbed conditions’ definition. Here, ‘undisturbed conditions’ mean undisturbed migration of aquatic organisms and sediment transport, and with a channel pattern, flow velocity, substrate conditions, and both structure and condition of the riparian zones, for example, correspond entirely or almost entirely to undisturbed conditions. No definition is provided for ‘good’ and ‘moderate’ classes, as the hydromorphological quality elements only support the establishment of ‘high ecological status’ bodies of water. As both the hydromorphological and the physico-chemical quality elements are connected to the status of the biological quality elements, a link between the assessment of these abiotic elements and the biotic elements must be made, as Annex V specifies.

The assessment variables for heavily modified bodies of water should, insofar as possible, reflect the nearest comparable type of body of water and the only impact allowed being that resulting from the artificial or heavily modified characteristics. This gives the Member states a certain degree of discretion in allowing the continuation of the activity that has caused the modification of the heavily modified body of water (see Annex V 1.2.5).

The idea reflected in this systematization is that an assessment of the elements listed in Annex V section 1.1, based on the guidelines in Annex V section 1.2, should make it possible to determine the ecosystem ‘structure’ and ‘function’ of a body of water, and thereby also classify them according to ‘ecological status’, such as ‘moderate’ or ‘high’.

3.4.5 The Intercalibration

To ensure comparable definitions of ‘ecological status’ across Europe, Member States are also obligated to intercalibrate the high/good and good/moderate ‘ecological status’ boundaries for each biological quality element in each water category with other Member States having common bodies of water categories. Intercalibration is a distinct obligation at EU level, in addition to the obligation to develop national ecological status methods, that is, the lack of success of intercalibration

does not exempt Member States from the obligation of developing assessment methods for all biological quality elements.¹²⁷

Thus, although there is no obligation to use a certain type of assessment or classification method, since this is left to Member States' discretion,¹²⁸ there is an obligation for Member States to participate in the intercalibration of 'ecological status' classes of 'high', 'good', and 'moderate' (see Art. 20, 21 and Annex V 1.4). The intercalibration aims to ensure that a Swedish body of water classified as having 'good ecological status', in accordance with the Swedish assessment method, would also be classified as having 'good ecological status' by another Member State's assessment method. If the classifications differed, the obligation to enhance or restore a body of water with the aim of achieving 'good ecological status' (see Art. 4(1)(a)(ii)) would be actualized at different statuses, within the Member States. The intercalibration uses an ecological quality ratio scale, as described in Annex V section 1.4.1(ii), to correlate Member States status classes. The ratio represents the relationship between the values of the biological quality elements observed for a type of body of water, and values for these variables in the reference conditions are applicable to that type of body of water. 'High' status is represented by values close to one, and 'bad' status by values close to zero.

The Commission facilitates the intercalibration, and the Directive provides the Commission with the option of adopting non-legislative acts complementing the Directive, with regard to the intercalibration (see Annex V 1.4.1 (iv)(ix)). The Commission has used this position to adopt two non-legislative acts in the form of decisions (see Art. 297(2) TFEU). The decisions were adopted pursuant to the delegation's findings in Annex V 1.4.1 (ix), which stipulate that within six months of completing the intercalibration exercise; the Commission must publish the results of the exercise (for a discussion regarding the legal status of the decision see paper IV).

The latest decision came in 2013, and declared that the intercalibration progressed but was still incomplete, that the aim is to complete the intercalibration by 2016, and that the results may be used in the third river basin planning cycle, 2021–2027 (the last one) (see Commission

¹²⁷ The Commission have allowed for divergences from Annex V at some instances. See European Commission, 'Commission Decision of 20 September 2013 Establishing, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, the Values of the Member State Monitoring System Classifications as a Result of the Intercalibration Exercise and Repealing Decision 2008/915/EC', recital 16.

¹²⁸ This has resulted in around 300 different methods. See Birk and others (n 118).

Decision recital 13).¹²⁹ The Commission perceived the intercalibration as a possible mean for establishing a EU-harmonized conception of ‘ecological status’ (see Commission Decision recital 2). The Commission has accepted that, in some instances, in the intercalibration there will be divergences from the prescribed procedure found in Annex V (see Commission Decision recital 16). It is also stated that the results of the intercalibration may also be used to derive ‘ecological potential’ classes (see Commission Decision recital 17). As is thoroughly discussed in Paper IV, even if the decision, which specify the Member State as its addressee, are binding according to Article 288 TFEU, whether or not the results of the intercalibration should be implemented by the Member States’ remain their decision as it is questionable that the decision actually is based upon the provisions of the Directive.

3.4.6 Quality Standards

When a body of water has been differentiated as a type of body of water connected to a type-specific reference condition, and the relevant quality elements have been assessed, the body of water may be classified under an ecological status. Based on this classification, an operationalization of the environmental objectives takes place through the establishment of a quality standard, which is the body of water’s type-specific conditions that management should try to achieve. As a legal instrument quality standards have been successful in reducing concentrations of toxic substances in bodies of water, for example, and quality standards may be useful for environmental problems relating to air and water quality that are linked to human health problems, for another example.¹³⁰

Several types of quality standards are found in the Directive. For example, there are standards based on concentrations of priority substances (Art. 16(7) and Annex IX), quality standards focused on drinking water (following previous regulations, but now part of the Directive see Annex VI), and quality standards based on the biological quality elements. In Article 2(35), an environmental quality standard is defined as

¹²⁹ European Commission, ‘Commission Decision of 20 September 2013’ (n 127).

¹³⁰ E.g. Nicolas de Sadeleer, *Environmental Principles: From Political Slogans to Legal Rules* (Oxford University Press 2002) 76 Still, the importance of quality standards, in general, have become reduced in comparison to emission limit values during the previous decade and today there seem to be a preference for emissions standards rather than quality standards. However, there is no doubt that the Water Framework Directive is founded on a combination of emission standards and quality objectives to allow for the definition of minimum common standards. See Aubin and Varone (n 39); Krämer (n 83) 293–294; Jan H Jans and Hans HB Vedder, *European Environmental Law: After Lisbon* (Europa Law Publishing 2012) 48–49, 391.

the concentration of a particular pollutant or group of pollutants in water, sediment, or biota that should not be exceeded, in order to protect human health and the environment. This definition refers to the first two categories of quality standards, whereas the third category refers principally to the status of the biological quality elements, which are responsive to other types of pressures besides pollution. The operationalization of ‘good ecological status’ through a body of water quality standard provides a standard that does not fit the definition of ‘environmental quality standard’. Therefore, it has become usual to refer to these quality standards as ‘ecological’.¹³¹ As the quality elements do not explicitly refer to the status of the ecosystem or biodiversity, but are used to measure human impact or pressure on the ecosystem, such as hydromorphological changes, this type of quality standard has been referred to as ‘pseudo ecological quality standards’.¹³²

It is this author’s belief that it is preferable to not speak only of environmental quality standards; instead, ‘quality standards’ could be the general conceptual term, with different sub-categories within it, such as:

- Water quality standard, with regard to drinking water.¹³³
- Environmental quality standards, with regard to priority substances (which Art. 10(3) and Art. 18 in the Industrial Emissions Directive¹³⁴ refer to).¹³⁵
- Ecological quality standards, with regard to the status of ecosystems, or ‘ecological status’.

Based on the reasoning above, regarding best effort or result (see section 3.3.6), the first two types of quality standards should in my view be result-oriented, whereas the ecological quality standards should be best effort oriented. The main reason not to define the ecological quality standard as a result-oriented objective is that it seems difficult to obtain an ecosystem definition that are precise and specific enough for the objective to be classified as a question of results.¹³⁶ A best effort standard should have target values, and a result-oriented quality standard, limit values.

¹³¹ E.g. van Rijswijk and Havekes (n 70) 301.

¹³² See Howarth, ‘The Progression towards Ecological Quality Standards’ (n 50) 11–12.

¹³³ For a similar discussion E.g. *Advocate General Sharpston* (n 90), para 75; Case C-43/10 *Nomarchiaki Aftodioikisi Aitoloakarnanias and Others* [2012] EU:C:2012:560, para 46.

¹³⁴ Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions, OJ L 334/17 on 17 December 2010 (Industrial Emissions Directive).

¹³⁵ See also Olsen Lundh (n 71).

¹³⁶ See *Commission v France* (n 98) paras 27-28.

3.4.7 When is the Assessment a Good Foundation for Management?

The intention is for the assessment to be a driver for management, by providing a clear picture of where measures should be implemented, and which kinds of measures are necessary to achieve ‘good ecological status’. One important question that was discussed above, with regard to the classification of heavily modified bodies of water and ‘good ecological potential’, is whether any provision provide requirements that suggest when the assessments have succeeded in providing management with a good ‘ecological status’ picture.¹³⁷

As stated, the definitions found in Annex V are normative, in the sense that they provide a point of departure for Member States when establishing or refining their national assessment and classification systems. If a Member State then chooses to measure only one biological quality element, or to not assess any biological quality element, or any quality element whatsoever, the question is whether this approach is consistent with the legal foundation and can provide management with a reliable estimation for determining which measures are suitable, and where these measures should be implemented.

How assessment and monitoring are to be advanced is based in Article 8, and Member States must ensure a coherent and comprehensive overview of the status of bodies of water. Article 8 is further developed in the subsequent part of Annex V. In section 1.3.2 of Annex V, three forms of monitoring are specified, the first of which is surveillance monitoring, which should be carried out to provide an overview of general surface water status within each river basin or sub-basin. The second form is operational monitoring, which should be undertaken for bodies of water that have been identified as being at risk of failing to meet their environmental objectives. The third form is investigative monitoring (see Annex V 1.3.3), which should be established when the reason for the low ‘ecological status’ is unknown. Thus, investigative monitoring should be implemented when surveillance monitoring indicates that the objectives set out in Article 4 are not likely to be achieved, and operational monitoring has not been established, in order to ascertain the causes of the deterioration. As operational monitoring is implemented for bodies of water that have been identified as being at risk of failure to meet their environmental objectives, this is the form of

¹³⁷ European Commission, ‘Commission Staff Working Document 2/2’ (n 80) 128.

monitoring which management measures are based, and therefore it will only be discussed further on.

The risk analysis that gives rise to operational monitoring is based on Annex II. In section 1.4, the identification of pressures is provided, and Member States must estimate and identify the type and magnitude of all significant anthropogenic pressures. Even if all significant impacts should be identified, a certain number of activities are predefined as significant, such as point source pollution, diffuse source pollution, hydromorphological pressures (water abstraction, water flow regulation, morphological alterations), and land use patterns. For all these pressures, besides land use patterns, it is stipulated how the operational monitoring should be conducted. Monitoring sites for point source pressure are needed for each body of water impacted, and if a body of water is subject to a number of pressures, monitoring points may be selected to assess the pressures as a whole. This is intended to provide a picture of the magnitude and impact of point source pollution. For diffuse source pressures and hydromorphological pressure, monitoring is not necessary within each body of water; it is sufficient that a selection of impacted bodies of water is monitored. For diffuse source pressures, the selection should be representative of the relative risks of the pressure, and of not meeting the environmental objectives. For hydromorphological pressure, the selection of bodies of water should be indicative of the overall impact to which the bodies of water are subject. It is important to see that there is a difference between the assessment obligation and the management obligation, as monitoring points may be selected based on the magnitude and impact of some of these pressures as a whole, and not for each body of water, whereas the environmental objectives apply to bodies of waters individually.

For operational monitoring, it is further specified (still under Annex V 1.3.2) that not all quality elements are necessary in the assessment of 'ecological status' deterioration or status, as long as the quality elements chosen are indicative of the actual pressures. As the biological quality elements are the most important elements for establishing 'good ecological status', Member States must monitor representative variables at the 'good' status level of these elements, or the quality elements that are most sensitive to the pressures. The crux is that, in the first place, the choice of variables and the frequency of monitoring must give rise to acceptable levels of confidence and precision, for the assessment to be a reliable basis for management measures. To establish acceptable levels, the Directive provides a specified assessment frequency. For example, for nutrient conditions (physico-chemical quality elements),

every third month is a suitable monitoring frequency, whereas for phytoplankton (a biological quality element), every sixth month is suitable, which may be contrasted with fish (also a biological quality element), for which every third year is a suitable frequency (see Annex V 1.3.4).

The Commission's evaluation of the Member States' implementation indicates that there are vague classifications, and that the assessment is not transparent, one reason being the use of expert judgement as the basis for the estimations.¹³⁸ This may mean that there is a risk of assessment failing to achieve the level of detail or complexity specified by the Directive. In Annex V 1.3.4, competent authorities are obligated to provide an estimation of their confidence in the precision attained by the monitoring system, and this must be published in the river basin management plan. The competent Swedish authorities (vattenmyndigheterna) have a system whereby they evaluate the status classification using categories: very good, good, moderate, and poor (mycket god, god, medel, låg). Two rivers that have been used as examples in the published papers are Ljungån and Vindelälven, and the authorities categorize the information provided with regard to 'ecological status' classification as 'moderate' for the lower section of Ljungån, and 'good', for the lower section of Vindelälven. The estimated classification of the lower part of Ljungån as only 'moderate' is perhaps not surprising, as it is a small body of water in the countryside (it does however incorporate hydromorphological pressure due to a hydropower station). Vindelälven, on the other hand, is one of the most, if not the most, studied river in Sweden, and therefore it is surprising that the classification is only estimated to be good and not very good. Just below the lower section of Vindelälven, there is also hydromorphological pressure from a hydropower station. Both river bodies of water are classified as of 'moderate ecological status' and to achieve 'good ecological status', measures are probably needed, and the information on which the classification is based must be reliable enough for an examination and review of any permits that affect the status of these two bodies of water (see Art. 11(5)). That is, for the review of an activity that provides water use that is useful to society, such as energy production, only classifying a body of water as of 'moderate ecological status' is not necessarily enough for the classification to be suitable as a basis for reviewing the water use activity, for example. The classification and information provided must be reliable enough, and the question is, when is this reliability achieved?

¹³⁸ Ibid 144–146.

Based on the Directive's provisions, a general picture of what a good assessment is may be specified. Assessment and monitoring should provide a coherent and comprehensive overview of the 'ecological status' of bodies of water (see Art. 8(1)). Summarizing the description above, a coherent and comprehensive overview is achieved by developing methods to assess all biological quality elements specified for each surface water category, and by linking the supporting quality elements to the biological quality elements (see e.g. Annex V 1.2, Annex V 1.4.1(i)). Then, a risk/pressure analysis must be conducted, which should identify the bodies of water that may not achieve the environmental objectives, and these bodies of water must be monitored individually or together, depending on the impact that is found. In monitoring the bodies of water, Member States may choose the relevant or sensitive quality elements for this type of impact/deterioration. However, to operationalize the objectives, quality standards adapted to bodies of water must be formulated.

To exemplify the foregoing, if a stretch of river is impacted by nutrient enrichment because of agriculture or forestry, the most relevant and sensitive quality element is phytobenthos (an algae biological quality element).¹³⁹ If, as the Commission reports, Member States do not in general assess phytobenthos in these bodies of water, it is questionable whether the assessment will provide a comprehensive and suitable basis for management measures.¹⁴⁰ In a similar manner, if there are hydromorphological pressures, such as hydropower stations, that affect bodies of water, a relevant quality element is fish.¹⁴¹ If, as the Commission reports, biological variables for major pressures other than organic pollution and eutrophication are mostly absent, and only experts or models are used to assess the status, it is questionable whether this limited implementation meets the requirements of the Directives assessment specifications.¹⁴² As ecosystem responses are context-dependent and not likewise pressure-dependent, it can be difficult to predict the responses of biota to management measures directed at a certain pressure, without

¹³⁹ For an evaluation see Martyn Kelly and others, 'A Comparison of National Approaches to Setting Ecological Status Boundaries in Phytobenthos Assessment for the European Water Framework Directive: Results of an Intercalibration Exercise' (2009) 621 *Hydrobiologia* 169.

¹⁴⁰ European Commission, 'Commission Staff Working Document 2/2' (n 80) 126.

¹⁴¹ It is important to recognize the difference between assessing hydromorphological pressures with the use of the biological quality elements for 'good ecological status' classes, and the hydromorphological quality elements. See also MC Acreman and AJD Ferguson, 'Environmental Flows and the European Water Framework Directive' (2010) 55 *Freshwater Biology* 32; Birk and others (n 118).

¹⁴² European Commission, 'Commission Staff Working Document 2/2' (n 80) 125.

also assessing the relevant quality elements.¹⁴³ The pressure analysis should be used as a guide to where relevant variable assessment should take place. Furthermore, in both its intercalibration decision and evaluation of Member State implementation, the Commission has emphasized that Member States have not completed the prescribed assessment of all quality elements. In its review of Member States, the Commission also found that in about 70 % of all bodies of water there is no connection between actual status and mitigation measures. Member States explain this by referring to insufficient information regarding the status of the bodies of water, which has resulted in using expert judgements and/or only the pressure assessments as the basis for the programmes of measures.¹⁴⁴

One could argue that the one-out-all-out principle provides Member States with a reason to assess only the quality elements that they think will give the lowest status class, as the one-out-all-out principle specifies that the ecological status of each body of water must be determined by the quality element having the lowest status (see section 3.3.2). One important question is what the necessary reliability and accuracy is for the ‘one-out-all-out’ principle to be applied. A possible benchmark could be that the assessment needs to be transparent and unbiased, with regard to the classification of ‘ecological status’, before it can be applied (see recital 18, 30, 31). With regard to the operationalization of the objectives as quality standards, a possible rule of thumb could be that the estimation should at least be good (in accordance with vattenmyndigheternas scheme of classification estimation).

Assessment and monitoring must provide the information required, and follow the stipulated form of monitoring, if they are to provide adequate information regarding where measures should be implemented, and the kinds of measures that are needed. As discussed above this is not always the case. Still, it may be argued that even if not all-necessary knowledge has been provided, it is still possible to apply precautionary measures to activities that are known to cause water quality deterioration. The question is how much confidence can be lacking in the knowledge provided (uncertainty) before both reference and precautionary-based measures start to have legitimacy problems. I think that even applying a precautionary-based approach can have legitimacy problems if there is both uncertainty with regard to the status of a body

¹⁴³ E.g. A Solimini, R Ptacnik and A Cardoso, ‘Towards Holistic Assessment of the Functioning of Ecosystems under the Water Framework Directive’ (2009) 28 *Trac-Trends in Analytical Chemistry* 143.

¹⁴⁴ European Commission, ‘Commission Staff Working Document 2/2’ (n 80) 185.

of water and a clear lack of actual knowledge of the measures needed and their effects with regard to ‘good ecological status’. As there seem to be a lack of knowledge of what measures that are needed to achieve restoration of a body of water, a good assessment and status classification seems fundamental for management legitimacy.¹⁴⁵ In my view this is the legal solution to this ecological problem. For a legitimate management of bodies of water the competent authorities should base their assessment and monitoring on the framework found in Annex V to be legally relevant and provide management with a suitable direction in the review of permits (see Art. 11(6)), for example.¹⁴⁶

3.5 Achievement

The aim of the Directive is to achieve the environmental objectives, and the assessment is intended to provide the basis for this achievement. Still, for this to happen, the assessment must be translated into management measures, such as permit reviews, which are administered by the competent authorities within the administrative areas of which they are in charge.

In comparison to the discretion connected to the assessment, the achievement of the environmental objectives is combined with rather detailed procedural requirements that centre on the differentiation of management units, the appointment of competent authorities, the establishment of river basin management plans and programme of measures, and facilitating public participation. These are the main instruments for achieving the environmental objectives. Several cases concerning the implementation of these procedural elements in national legislation, or failure to report correct progress, have been brought before the Court of Justice by the Commission.¹⁴⁷

3.5.1 The Differentiation of Management Units

The Directive requests Member States to organize their water management according to river basin districts, which is the main unit for management of river basins. River basin districts may be areas of both land

¹⁴⁵ E.g. Friberg and others (n 68); Feld and others (n 59).

¹⁴⁶ Also discussed by E.g. Martyn Kelly, ‘Simplicity Is the Ultimate Sophistication: Building Capacity to Meet the Challenges of the Water Framework Directive’ (2014) 36 *Ecological Indicators* 519.

¹⁴⁷ E.g. Case C-85/07 *Commission v Italy* [2007] ECR I-00194; Case C-516/07 *Commission v Spain* [2009] ECR I-00076; Case C-297/11 *Commission v Greece* [2012] EU:C:2012:228.

and sea that are made up of one or more river basins (Art. 2(15)). Thus, a river basin district may be confined to a river basin, ‘as an area of land from all surface run-off flows through a sequence of streams, rivers and, possibly, lakes into the sea at a single river mouth, estuary or delta’ (Art. 2(13)), or incorporate several river basins.

The competent authorities are responsible for river basin districts (see Art. 3(2), Annex I). Establishing river basin districts and its authorities is a strict obligation that follows from Article 3(1)(8), and its main idea is to adapt the administrative arrangement to the river basins, and not in accordance with traditional management or governmental structures. The management arrangement is intended to follow the water as it flows through the land, and not be based on geographical arrangements due to other considerations, such as traditional distribution of assessment and management authority. However, in Article 3(6) there is an exemption to adapting the administrative arrangement to the form of river basins, and Member States may rely on the co-ordination of arrangements existing within the Member State. Germany, for example, has made use of Article 3(6).¹⁴⁸

In Sweden, five new river basin district authorities, ‘vattenmyndigheterna’, were established within the ‘old’ county boards, whereas in other Member States, the main authority is the Ministry of the Environment. In most Member States, already-existing governmental structures have been allowed to handle the implementation of the Directive. For the distribution of authority, it seems that in most Member States the administrative arrangement allows one competent authority to handle the most important water management aspects.¹⁴⁹ As there is a need for consistency a main authority, such as the Ministry of the Environment, could be a reasonable organizational structure to secure coordination in the establishment of river basin management plans and programmes of measures.

With the river basin districts there are three different, but fundamental, units found in the Directive, which are used for different purposes:

¹⁴⁸ See Timothy Moss, ‘The Governance of Land Use in River Basins: Prospects for Overcoming Problems of Institutional Interplay with the EU Water Framework Directive’ (2004) 21 *Land Use Policy* 85, 86; European Commission, ‘Commission Staff Working Document (European Overview (1/2) Accompanying the Documents Report Form the Commission to the European Parliament and the Council in the Implementation of the Water Framework Directive (2000/60EC) River Basin Management Plans (Com(2012) 670 Final)’ 31.

¹⁴⁹ For an overview of these differences see, e.g. Uitenboogaart (n 71) 223; Ekelund-Entson and Gipperth (n 71); European Commission, ‘Commission Staff Working Document 1/2’ (n 148) 33.

- The body of water, to which the environmental objectives apply and point source pollution monitored.
- Multiple bodies of water, relating two or more bodies of water to each other allowing for monitoring diffuse pollution and hydromorphological pressures.
- River basin districts, is the geographical area of which the competent authorities are to establishing programmes of measures and river basin management plans for.

It is important to not combine these three different spatial perspectives incorrectly; for example, it might be rather easy to combine the more relaxed spatial perspective, used for monitoring hydromorphological pressures, with the environmental objectives. But to achieve the objectives, the body of water is the space of regulation, and measures taken to achieve the objectives should be implemented on this scale. The spatial scale of a body of water may conflict with the river basin district perspective, as decision-making operates on a geographically larger scale.¹⁵⁰ This is one reason that public participation is emphasized in the Directive (see section 3.5.4), but also, as all three spatial perspectives are scientifically informed, this may lead to alienation among those affected by the measures, for example.¹⁵¹ This does not mean that a central co-ordinating authority is unnecessary; by acting as a centre for information and evaluating programmes in light of new data or experience, the competent authorities may form the centre for adaptation at the core of the institutional arrangement.¹⁵²

3.5.2 River Basin Management Plans

The river basin management plan is intended to be a wide-ranging document that describes how the river basin authorities in the river basin

¹⁵⁰ This has somewhat been discussed by Duncan Liefferink, Mark Wiering and Yukina Uitenboogaart, 'The EU Water Framework Directive: A Multi-Dimensional Analysis of Implementation and Domestic Impact' (2011) 28 *Land Use Policy* 712.

¹⁵¹ E.g. Berit Junker, Mattias Buchecker and Ulrike Müller-Böker, 'Objectives of Public Participation: Which Actors Should Be Involved in the Decision Making for River Restorations?' (2007) 43 *Water Resources Research* W10438; Patrick Steyaert and Guillaume Ollivier, 'The European Water Framework Directive: How Ecological Assumptions Frame Technical and Social Change' (2007) 12 *Ecology and Society* Art. 25; S Valinia and others, 'Problems with the Reconciliation of Good Ecological Status and Public Participation in the Water Framework Directive' (2012) 433 *Science of The Total Environment* 482; Carly M Maynard, 'How Public Participation in River Management Improvements Is Affected by Scale' (2013) 45 *Area* 230.

¹⁵² See Bradley C Karkkainen, 'Managing Transboundary Aquatic Ecosystems: Lessons from the Great Lakes' (2006) 19 *Pacific McGeorge Global Business & Development Law Journal* 209.

districts intend to achieve their environmental objectives. This means that a river basin management plan must contain descriptions of many aspects, such as several general descriptions of the characteristics of the river basin district (see Art. 5 and Annex II). Necessary information are the location and boundaries of bodies of water, identification of reference conditions, a summary of the programmes of measures (significant pressures/impacts and mitigation measures), how public participation has been implemented, and how the administrative arrangement for achievement is co-ordinated (see Art. 11, 13(4), Annex VII).

To achieve the objectives of the Directive, one relevant aspect is the legal status of a river basin management plan.¹⁵³ Interpreting recent case law, Member States need to have a legal arrangement whereby issuing a permit does not compromise either the purpose of the Directive or the achievement of the objectives (c.f. Art. 11(3)(c)).¹⁵⁴ However, as many river basin management plans have been vague, and with bodies of water, specific measures are rare, the meaningfulness of river basin management plans to the public, the governmental authorities, or national courts may be questioned.¹⁵⁵

The Commission is given the authority to comment on Member States' river basin management plans, and to make suggestions for the improvement of the plans, according to Article 18(2)(c).

3.5.3 Programme of Measures

The main instrument for describing management measures and achieving the environmental objectives is the programme of measures. The first programmes were submitted in 2009, should have been operational since 2012, and include what the competent authorities see as necessary measures to achieve the environmental objectives. In Article 11, which primarily regulates the programme of measures, we find substantive requirements concerning the achievement of the environmental objectives.¹⁵⁶

There are three types of measures: basic, supplementary, and additional (Art. 11(2)(5)). Basic measures are the minimum requirements with which Member States must comply, and in this context, Article

¹⁵³ For the different approaches in the Nordic countries, see Ekelund-Entson and Gipperth (n 71) 115.

¹⁵⁴ See *Commission v Germany* (n 93), paras 56–58.

¹⁵⁵ See also European Commission, 'Commission Staff Working Document 1/2' (n 148) 43.

¹⁵⁶ For a discussion E.g. Lasse Baaner, 'The Programme of Measures of the Water Framework Directive-More than Just a Formal Compliance Tool' (2011) 8 *Journal for European Environmental and Planning Law*.

11(3)(c) is most important, as it provides Member States with the obligation to implement measures that promote ‘an efficient and sustainable water use in order to avoid compromising the achievement of the objectives specified in Article 4’. In Article 11(3)(e), this general obligation is further specified, as Member States must implement systems of control (registers of activities) and prior authorizations of extractions and impoundments of freshwater, whereas previous authorizations are periodically reviewed, and if necessary, updated.

In Article 11(4), supplementary measures are described as measures designed and implemented in addition to the basic measures, with the aim of achieving the environmental objectives. In Annex VI there is a non-exclusive list of supplementary measures, which provide Member States with a set of administrative obligations, such as explaining why certain environmental objectives have not been reached, and whether measures have been adapted under Article 11(5). The Commission has defined supplementary measures as additional legislative powers, economic measures, research, and educational campaigns.¹⁵⁷

During the first management cycle, 2009–2015, basic and supplementary measures were the two types of measures specified in the Directive, but as we now (2015) start the second of three management cycles, these two types of measures are supplemented by additional measures. According to Article 11(5), additional measures should be implemented if the established environmental objectives are not achieved, or are unlikely to be achieved after the implementation of the first river basin management plan. The Article provides a scheme for such circumstances: the causes of the failure must be examined, reviews of relevant permits/authorizations should be addressed, monitoring should be evaluated and adjusted, if it has affected the failure, and additional measures should be implemented, if this is likely to result in the achievement of the objectives. Reasonable explanations for not achieving the objectives are natural causes or force majeure (see Art. 4(6)). What Article 11(5) means is that if Member States fail to achieve the established environmental objectives, they should review the planning chain, from assessment to management, but it does not furnish any more concrete measures than already provided by Article 11(2), examination, and review of relevant permits/authorizations. Thus, what additional measures should be is left unstated; instead, the message to the Member States seems to be ‘try harder’.

¹⁵⁷ European Commission, ‘Commission Staff Working Document 2/2’ (n 80) 183.

In the second management cycle, the Commission has emphasized that Member States should try harder to comply with the Directive, and has found that Member State programmes of measures lack concreteness, measures are too vague, and there is little clarity regarding the extent of the measures.¹⁵⁸ This lack may be found in Sweden's first programmes of measures, as it first offers a description of the environmental problems of each river basin district, then provides various government authorities, the county boards and municipalities for example, with different assignments, such as information gathering and strategy development, which are not binding. Even if the different assignments are associated with the different environmental problems of each river basin district, a clear connection between measures and the bodies of water is absent from Sweden's first plans and programmes. It seems that the difficulty does not lie in describing the environmental problems; instead, it seems that the difficulty lies in interpreting the normative demands of the Directive, and relating them to practical circumstances.¹⁵⁹

3.5.4 Public Participation

One important part of the establishment of programme of measures is the adaptation of the programmes to the diverse conditions and needs of the Community (recital 13). One stipulated way to adapt the programmes of measures is to engage in providing the public with information and opportunities for consultation (see Art. 14). Member States must encourage the active involvement of all parties interested in the implementation of the Directive, particularly in the production, review, and updating of the river basin management plans. This obligation gives individuals and interested parties the right to be involved in decision-making.¹⁶⁰

It has been emphasized that 'encouraging active involvement' at the river-basin level of river basin districts might alienate the public and interested parties from decision-making, as broad participation is more likely when the context is on a smaller scale, to which the public and interested parties can more easily relate.¹⁶¹ It has also been highlighted

¹⁵⁸ Ibid 182–194.

¹⁵⁹ Also see Katja Sigel, Bernd Klauer and Claudia Pahl-Wostl, 'Conceptualising Uncertainty in Environmental Decision-Making: The Example of the EU Water Framework Directive' (2010) 69 *Ecological Economics* 502.

¹⁶⁰ *Advocate General Sharpston* (n 90) para 80.

¹⁶¹ Maria Lee, 'Law and Governance of Water Protection Policy' in Joanne Scott (ed), *Environmental Protection: European Law and Governance* (Oxford University Press 2009).

that for public participation to work, the process must be relevant to the public that is supposed to participate.¹⁶² It has been emphasized that this could lead to a situation where decision-making is framed as publically informed, but in reality is simply a way to mask the real distribution of influence in decision-making, where the most crucial decisions are ultimately made by a handful of decision makers.¹⁶³

¹⁶² See Dave Huitema and others, 'Adaptive Water Governance: Assessing the Institutional Prescriptions of Adaptive (Co-) Management from a Governance Perspective and Defining a Research Agenda' (2009) 14 *Ecology & Society*.

¹⁶³ Howarth, 'Aspirations and Realities under the Water Framework Directive' (n 79).

4. Main Findings

4.1 General Introduction

The main aim of this study is to understand and critically examine ‘ecological status’ and the objective ‘good ecological status’, its various underlying constructs, and provide suggestions for its improvement, with regard to the achievement of an improved ecosystem status within EU river basins. Contextualizing this aim in the tradition of environmental law methodology, this study’s aim was defined as: How well do current legal solutions manage to incorporate aquatic ecosystem conditions, and are there alternative ways to translate these conditions into substantive laws? The following section will discuss and analyse this main question based on the sub-questions defined in section 1.2.

The following sections are a summary of the discussions, and analysis that are found in the published papers. The parts that have been omitted are foremost introductions and descriptions of the Water Framework Directive and the reader are referred back to chapter three (or the actual papers) for further introduction to the concepts or constructs that are analysed/discussed. Instead of providing a full account of the discussions/analysis the focus is on presenting what I think are the main findings and strengths. I have also made smaller changes, such as consistently using body of water and not water body, which does not change neither intent nor meaning but make the chapters use of words consistent. The main findings are combined in the last section and provide a discussion regarding the construction of legal-ecological objectives and ecological quality standards.

4.2 Good Ecological Status and its Main Constructs: are they Appropriately Constructed with Regard to a Contemporary Legal-ecological Perspective? (Paper I)

4.2.1 Aim

The complex technical and ecological aspects of the Directive's legal provisions are known to be challenging. This paper takes up the challenge of examining these aspects, with regard to the legal norm of 'good ecological status' and its core legal concepts 'reference conditions', 'typology' of bodies of water, biological 'quality elements', and the 'one out – all out principle'.

The analysis will demonstrate that there is a need for a revision of the main legal concepts, with regard to the norm of 'good ecological status' to make the ambition in accordance with a more contemporary ecological perspective. To accomplish this, it is necessary to redefine the concept related to 'ecological status', and link the assessment of ecological status to applicable ecological variables. The ambition is to try to establish a base for the Directive that directs the assessment towards, foremost, ecosystem services.

4.2.2 Conclusions

There are several problems with all five legal concepts identified as important for 'ecological status', the problem does not lie in the legal norm of 'ecological status' itself, but in the legal and ecological specification of the norm in the Directive's Annexes, which turns the legal norm from a key provision of the Directive, into an inadequate ecological characterization.

Reference Conditions

Establishing reference conditions based on pristine or undisturbed conditions is controversial, because of the substantial difficulty in identifying such conditions, and because many variables in most river basins are fundamentally changed, owing to climate change, invasive species, and changes in landscape, when compared to historic states. For effective regulation, it is essential to incorporate the understanding that, when targeting long-term performance of ecosystems, the objective is the rehabilitation of the capacity or potential of a disturbed system, in terms of returning it to its former trajectory, and not to a particular condition, with respect to a specific time. This ecological understanding

seems to be poorly accounted for in the Directive's objectives, as set out in Article 4 and Annex V.

Typology

The differentiation of bodies of water according to type, by fixed factors such as depth, geology, size, and so forth, assume that there is a concordance among similar bodies of water, regardless of their individual ecological characteristics. However, there is no guarantee that type-specific objectives will reflect the status or potential of the ecosystems at the actual site. As an example, biological studies of eelgrass in six selected bodies of coastal water (Danish fjords) indicate that site-specific status classes differ markedly from more type-specific ones. In comparison, a site-specific classification was found to reduce misinterpretations of ecological status. On the other hand, a more detailed site-specific typology will consequently increase the number of types.

Biological Quality Elements

There are substantial and convincing criticisms of the breakdown of the general norm of 'good ecological status' into secondary features, such as 'quality elements', particularly concentrations of substances or lists of species. There are fundamental differences between an aquatic environment in a good ecological status, and the presence of single indicator species and other biological quality elements. If the 'quality elements' are inadequate, in terms achieving the objectives, the Directive, as a whole, will malfunction, regardless of how the other legal provisions are interpreted.

Furthermore, the hydromorphological quality elements are not considered primary elements (c.f. section 1.2 Annex V) and assessment of hydromorphological degradation (e.g. dams, impoundments and loss of riparian vegetation) are thereby made through the biological quality elements. The point is that bodies of water affected by anthropogenic induced flows should not be classified as achieving 'good ecological status' if they are highly affected by changed flow patterns and stream migrations problems, which for example are the case with the Swedish river Vindelälven. The omission of flow in the operationalization of the objectives reduces the importance of the legal objective.

The 'One Out – All Out' Principle

The 'one out – all out' principle is intended to reduce the likelihood of a body of water being classified as having 'good ecological status', when in reality, it falls below. The 'one-out, all-out' principle directs

management towards those ‘quality elements’ that are most vulnerable to the dominant pressures, but it has been criticized by several authors for not complying with the ecosystem approach the Directive pursue, as the quality of an ecosystem is not adequately determined by the relative absence of a single biological variable. The status of an ecosystem is not necessarily negative, simply because of the insufficient representation of a single indicator of one of the biological quality elements necessary for the criteria of ‘good ecological status’.

Reforming the Water Framework Directive

A promising first step to address these problems would be to redefine ‘high ecological status’ as a status wherein the ecosystems maintain themselves independently of management, which should be comparable to a resilient ecosystem with a high level of adaptive capacity, in which management is not needed for maintaining the complete array of ecosystem services. Incorporating an understanding of resilience into the provision would shift attention to the achievable and functional aim of rehabilitating stressed ecosystems. Thus, the baseline should be constructed based on the potential inherent in the ecosystems, in terms of ecosystem services. The identification of ecosystem services would be accomplished by identifying services in less-human-dominated bodies of water, and preferably river basins, that may be understood to uphold near-natural reference conditions. Thus, there is also a need for variables that may be used to indicate the statuses of the bodies of water, and infer the individual ecological characteristics and potential of each. A trait as a physiological, morphological, and ecological well-defined and measurable attribute of a species or other taxonomic entity can be used for this purpose. An assessment system based on traits would enhance the possibility of achieving the objective of ‘good ecological status’ since a trait, as a variable, would address the complexity we find in ecosystems, by focusing the assessment on the interaction between organisms and ecosystems. Traits are vital parts of the mechanism underlying fundamental ecosystem properties, while species are primarily results of these properties. The point is that (functional) traits, as they represent the life-history adaptations of species, are variables that are well suited to the construction of legal criteria, and would direct the management towards the aim of upholding ecosystem services. Thus, the approach suggested here is that measurable (functional) traits, which may be linked to valuable ecosystem services, constitute a logical development for legal assessment processes.

4.3 Environmental Quality Standards and Ecological Quality Standards – Theoretical Gaps and Differences (Paper II)

4.3.1 Aim

Through the institutionalization of ‘good ecological status’, as an ecosystem-based objective, Community water policy is intended to become functionally oriented towards sustainable development. To reach this objective, suitable legal instruments are needed, and quality standards have been discussed and emphasized as one legal instrument intended to improve and bring about an improved environmental status.

The Directive requires the assessment of the biological quality elements, as its main ecological variables, but emphasizes priority substances in the construction of quality standards. Still, legal standards established on ecological variables are needed to specify and determine what ‘ecological status’ mean for each body of water within the river basin. This article examines the possibility of constructing ecological quality standards based on the provisions in the Directive, by scrutinizing the essential theoretical assumptions of the Directive and quality standards, in the process proving an alternative interpretation to the development of ecological quality standards.

4.3.2 Conclusions

Quality Standards

Quality standards may be divided into several noticeably different standards, two important are: ecological quality standards and environmental quality standards. Environmental quality standards will for example, limit the maximum amount of a chemical that may be present in a body of water, and, in principle, are always achievable if enforced at the point where the chemical is introduced into the body of water by human activity. Taking regulatory action to prohibit or restrict this introduction will ensure that, eventually, the standard is met. Achieving a similarly constructed ecological quality standard would then require that a certain composition or abundance of particular species of flora and fauna be present in a body of water, for example. In comparison to environmental quality standards, this cannot be similarly guaranteed.

The advantage of a more traditional quality standard approach is that by directing a standard at some given, for example, toxic compounds, or oxygen or nitrogen levels, the approach may be applied to almost all

bodies of water. However, levels of sedimentation, nutrients, and other variables that are linked to ecosystem status vary within and among bodies of water, rivers, and river basins. Thus, the causality relationship underlying environmental quality standards and the mechanisms for their realization may not necessarily hold, insofar as ecological quality standards are concerned. This results in a legal instrument not constructed to address status changes in ecosystems, and it is therefore unsuited to accomplishing the legal objectives of ‘good ecological status’.

Baselines

The ecological aspirations of the Directive regard human activity as a source of disturbance, preventing bodies of surface water from coming close to ‘good ecological status’. This is based on an assumption that those environmental conditions that prevailed before the industrial period or even those that prevail in the contemporary environment represent a somewhat natural status, and are thus something that should be preserved or restored.

However, extensive human influence has occurred for a long time in all regions of the world with a long history of agriculture and industrial activity, such as Europe, and many of the natural and manmade changes have occurred over time scales of decades or centuries, making it difficult to observe the changes and distinguish them from non-human changes. As the status of an ecosystem can be a consequence of present, past or unknown disturbances, but also a result of intrinsic ecosystem processes, what the reason for the low ‘ecological status’ can be hard to determine. In addition, as ‘good ecological status’ is a type-specific threshold objective it is easy to overlook the fact that poor habitats with low status may occur naturally, and can be valuable on a river basin scale, owing to life-history patterns, for example.

The baseline problem becomes apparent for heavily modified or artificial bodies of water. In a regulated river, a common example of a heavily modified body of water is a reservoir, constructed by establishing dams and hydropower stations. In Sweden, rivers defined as heavily modified are, for example, staircases of lakes and reservoirs, linked by fragments stretches of river with hydropower stations. Hypothetically, if a reservoir is to be rehabilitated into a more ‘natural’ status, the improvement will involve assessment over decades. The necessary timeframe for these kinds of rehabilitative actions would exceed the timeframe of the Directive. For such manmade landscapes, undisturbed or pristine baselines are problematic. Furthermore, ecosystems may not be able to functionally recover from even smaller deteriorative activi-

ties, if the legacy of the damage is permanent, or because other river basin changes restrict the rehabilitation. The problems with ‘good ecological potential’ has been acknowledged in the implementation process and the objectives for these bodies of water are in general based on the mitigation-measures method (or Prague method) and only some Member states refer to type-specific conditions actually found in bodies of water.

In my view a more preferable approach, for all bodies of water, is to establish assessment systems that are site-specific, that do not lose the importance of place and time and see the importance of the unique cultural and ecological reality existing in every river basin. If such considerations are made it could be unwarranted to strictly and beforehand distinguish between natural, ‘heavily modified’, or ‘artificial’ bodies of water.

Adaptivity

The Directive attempts to acknowledge the non-deterministic aspects of ecosystems through three management cycles on six years, providing an adaptive element. The adaptive cycles, however, are founded on the environmental objectives of Article 4 based on the provisions in Annex V that directs the assessment and management and is not a component of the adaptive cycle. Since ecosystems change constantly both due to human and natural causes (e.g. climate change), and thresholds for large-scale changes are very hard to observe, the predefined quality elements are problematic. This also emphasizes a characteristic notion of environmental, ecological and other areas of law, as decisions require constant reconsideration. Future modification of the quality elements should therefore be intrinsic to the environmental regulation just as more rigorous or more relaxed legal provisions.

Temporality

The Directive contains high ecological ambitions, and it is functionally oriented towards sustainable development. Temporally, this emphasizes internalization and an acknowledgement of future generations. The legal timeframe for achieving ‘good ecological status’ is determined to be 15 years (2015) or, with exemptions, 21 or 27 years (2021 or 2027) (see Art. 4(1)(a)(ii), 4(c)). However, the recovery of a river basin takes many years, and more probably, decades, requiring long monitoring programmes over relatively large spatial scales to evaluate progress or regress.

Traditional, positivist legal theory is based on a specific conception of time: time as socially shared, homogeneous objective time, or as lived, experienced, time often considered as subjective. Time in Newtonian theory is a homogeneous quantity, an ahistorical entity that may be repeated and counted, a conceptualization used in legal theory and found in the Directive. Time as a homogeneous legal object may be grasped definitively, time is a linear, dynamic sequence of events, and the legal system is neutral in its assessment of it, and does not depend on the specific forms of life assessed. This can result in temporalities that overlook ecological timeframes.

The ecological timeframe for achieving a good ecosystem status could be approximated by analysing life history adaptations. An approximation could for example, be based on the adaptations found in each salmon generation or the time needed for riparian trees to develop. For both examples, the ecological timeframe is about 30-40 years. Another example could be the time needed for ecosystems to recover following a dam removal, which is considered to take multiple decades (perhaps centuries). This emphasizes the importance of encompassing life history adaptations (the ecological timeframe) of species when rehabilitating a river basin. With this time horizon for assessment and management, there would be a focus on scales generally neglected, such as the range of multiple decades. This would also force the assessment to evaluate the probable outcome of current global changes, such as climate change. This ecological timeframes differs from the legal timeframe of 'good ecological status'. If legal time and ecological time are inconsistent, a temporal problem appears. Is it possible to achieve the objective of 'good ecological status' within the timeframe of the Directive? Article 4(4)(c) is the legal time saver in this regard, since it allows for an extension of the necessary measures over an indefinite time period, if the natural conditions are such that the objective cannot be achieved within its legal timeframe.

Concluding Remarks

The Directive does not have a sound basic structure for the establishment of ecological quality standards. A different approach regarding element of assessment, baselines, and timeframes for achievement, for example, must be applied to allow for this kind of quality standard.

4.4 What Kind of Space of Regulation is Suitable for the Ecological and Hydrological systems, and Environmental Problems of a River Basin Area? (Paper III)

4.4.1 Aim

This article analyses the establishment of spaces of regulation¹⁶⁴ of areas where the expanse of freshwater ecosystem is a dominant feature. It, first, compare the Water Framework Directive and the Habitats Directive and examine if a large-scale regulation (general administrative provision aimed towards multiple bodies of water) is compatible with the Water Framework Directive's space of regulation that 'body of water' and the objective of 'good ecological status' actualizes. Secondly, the paper examines the spaces of regulation of the Environmental Liability Directive, and the schemes of differentiation found in the Landscape Convention to see if there are alternative spaces of regulation suitable for the management of ecological and hydrological systems of a river basin area.¹⁶⁵ Thirdly, based on the analyse and ecological reasoning, discussing different ecological spaces for the assessment and management of river basin environmental problems, an alternative scheme for differentiating spaces of regulating are suggested for the operationalization of aquatic legal-ecological objectives.

4.4.2 Conclusions

The Water Framework Directive and Habitats Directive

With the Water Framework Directive and Habitats Directive, we have two different ecological perspectives that, based on habitat types, and species requirements or water quality, give rise to two distinctive differentiation approaches with different spaces of regulation consequently. The difference between the spaces of regulation is due to the variables that direct the differentiation of the legal units. In the Habitats Directive, geographic, abiotic, and biotic features distinguish aquatic areas, a differentiation of units that seems to follow the Convention on Biological Diversity and its definition of 'ecosystem' as a 'dynamic

¹⁶⁴ 'Space/s of regulation' is used as an overarching concept used to converge the different legal schemes of differentiation that geographically delimit and operationalize the different environmental objectives of each directive.

¹⁶⁵ In paper III the Marine Strategy Directive was also considered. It is however not included in this summary since the conclusions of the paper is more connected to the other legal acts spaces of regulation.

complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit' (Art. 2). In the Water Framework Directive, only abiotic parameters, in much more detail, are specified, to differentiate bodies of water from one another (see Annex II 1.2). The body of water construct found in the Water Framework Directive is formed for discrete types of bodies of water, and not based on important site-specific elements of aquatic ecosystem, which can be included in the Habitats Directive space of regulation, where the interconnectedness between habitats of river section or sub-basin can be considered in the differentiation, for example.

Thus, there are significant differences between the spaces of regulation, and the small-scale space of a body of water seems contradictory to elements found in the Habitats Directive. For the Water Framework Directive this results in a relatively artificial set of bodies of water that is not always ecologically or legally relevant, in terms of the environmental problems facing a sub-basin or river section.

General Administrative Provisions under the Water Framework Directive

The idea behind a general administrative provision is quite simple: if multiple permitted activities considerably affect the ecological status of a river section and deteriorate the section in a similar manner, then instead of reviewing each permit, a general measure could be implemented. Issuing this kind of provision is intended to breach permit rights and change the circumstances of multiple, permitted activities within a sub-basin or river section, for example. It has been argued that this kind of provision is a prerequisite for achieving the Water Framework Directive's objective of 'good ecological status'. The space of regulation would then be on a large scale (including multiple bodies of water).

However, a precautionary approach is needed, owing to the lack of knowledge of the large-scale rehabilitation of aquatic ecosystems. Since the risk of ecological deterioration cannot be circumvented, due to lack of knowledge, and the obligation of 'good ecological status' does not allow interim 'ecological status' losses an administrative provision for multiple bodies of water must correspond to the Water Framework Directive deterioration exemptions. The exemptions must be consulted, as there can be no guarantee that management measures introducing new modification of the physical characteristics of bodies of water (such as water flow or temperature) do not result in deterioration within the targeted or adjacent bodies of water. Corresponding to the Water Framework Directive's exemptions for new modification of bodies of water

(Art. 4(7)(d)) it must also be clearly demonstrated that this is the best regulative option, in comparison to separate permit reviews of each activity, for the achievement of ‘good ecological status’ for each body of water affected by the provision.

The Environmental Liability Directive

The Liability Directive is concerned with damage to the environment. For damage affecting water, protected species, and natural habitats (land will not be discussed here), the aim is to restore the environment to its undamaged/pre-damage status (Art. 2(14), Annex II (1.1.1)). Damage remediation is achieved through measures intended to restore the baseline conditions through primary, complementary, and compensatory remediation (Art. 2(11), (15) and Annex II). The damaged natural resource or impaired services must achieve baseline conditions or be replaced by identical, similar, or equivalent natural resources or services at the site of the incident, or at an alternative site (Annex II 1.1.2).

The space of regulation of the Liability Directive is site-specific, with the main objective of preventing and remedying damage where it has occurred, or if necessary, at an alternative site. If one or more bodies of water are damaged, and neither primary nor complementary measures can remediate them, or compensate for the damage during recovery, compensatory remediation at another site than the damaged area would be implemented, to compensate for the damage. This may be compared to the Water Framework Directive, where water degradation results in the obligation to prevent further deterioration, and take all practicable measures to remediate the effects to the body of water, and not an alternative body of water (see e.g. Art. 4(6)(a)(c)(d).)

For the Liability Directive, the space of regulation is the damaged area, and if interim losses occur, complementary and/or compensatory remedial measures must be implemented even if this falls outside the damaged body of water. This creates a larger and more flexible space of regulation than the Water Framework Directive’s body of water. Remediation of water degradation may be transferred throughout the river basin and not be bound to the damaged body/bodies of water, through the obligations stated in the Liability Directive. The objective of the Water Framework Directive and Liability Directive may conflict, as interim ecological losses in one body of water cannot be compensated at another body of water during recovery, according to the Water Framework Directive. For compensatory remediation to be compatible with the Water Framework Directive, the Directive exemptions must be considered as it provide a new modification of a body/bodies of water,

such as no significantly better environmental option being available (see Art. 4(7)(a)(c)(d)).

The Landscape Convention

The Landscape Convention's definition of 'landscape' include freshwater and aquatic areas (Art. 2)), and is differentiated based on the interaction of natural and human elements, and how these elements are perceived by people (Art. 1(a)). Ideally, the public concerned differentiates landscapes from one another; in practice, experts in conjunction with local inhabitants probably accomplish this. The space of regulation somewhat follows what the eye of the observer considers logical or given. This scheme of differentiation can be compared to the Water Framework Directives where a lake that has a narrow neck should result in two bodies of water. It is further possible to classify one as 'heavily modified', but not the other, if the heavily modifying activity is located in one of the lakes bodies of water, although the environmental stress is the same, which for the public may not seem logical. Instead, within the space of regulation of a landscape natural and human elements are not necessarily separated, instead human-created elements in the landscape should be assessed and managed together with more natural elements. For example, by including both heavily modified and natural bodies of water within the same space of regulation, the intention is for assessment, management, and planning to address the entire landscape, and avoid dividing it into a number of component elements.

Ecological Perspectives

With regard to the Water Framework Directive, there is ecological research that emphasizes a more site-specific differentiation that focuses on ecological aspects important to each regulated site, instead of the Water Framework Directive's differentiation system. Without regard to the Water Framework Directive, a more macro-scale differentiation is possible where a river basin's hydrological-ecological network could be used to differentiate units, using site-specific flow-patterns, for example. Understanding the river basin based on these ecological elements emphasizes that the spaces of regulation within a river basin should allow for assessment and management of both small-scale and large-scale site-specific ecological patterns and processes, to be an appropriate space for an obligation of enhancement and protection of aquatic ecosystems.

Alternative Schemes of Differentiation

For the operationalization of aquatic legal-ecological objectives, the space of regulation should correspond to the legal and ecological complexity and environmental problems of the place of regulation. Within these spaces, it should be possible to consider enhancing ‘good status’ sites to attain ‘high status’ as way to further enhance and maintain aquatic biodiversity and not only focus on achieving ‘good ecological status’ for ‘moderate’ sites.

If it is possible to prioritize the parts of the unit to be targeted, and if ecological deterioration occurs, over either short or long time spans, the deterioration could then be compensated for by additional measures not only at the site of deterioration. This type of space of regulation could more easily incorporate any upstream or downstream (large-scale) effects of the deterioration (similar to the Liability Directive). The space of regulation would be more designed to meet specific legal and environmental needs if it were adapted to the environmental problems and characteristics of each river basin. A differentiation based on site-specific hydromorphological structures or site-specific flow-patterns could create a space of regulation that could allow for such management. Another type of differentiation could be based on certain organisms that indicate suitable site-specific spaces of regulation, as indicators of the hydrological-ecological network of the area.

4.5 Have the CIS Guidance Documents made Substantial Interpretations of the Directive? (Paper IV)

4.5.1 Aim

With the Water Framework Directives main definitions of ‘ecological status’, the EU legislator has provided the difficult value judgment that surrounds the establishment of reference conditions for bodies of water and freshwater ecosystems. Based on the definition found in Annex V Member States are required to develop and adapt its normative meaning towards national conditions. However, in the implementation of the Directive there are indications of divergence from the normative definitions in Annex V, and this gives rise to questions regarding whether the status boundaries provided by the EU legislator have also been altered during the implementation process. This possible post-regulative alteration is linked to the so-called ‘Common Implementation Strategy’

(henceforth, CIS), and the not-legally-binding guidance documents that have been produced under the CIS. The main aim is to analyse whether the CIS guidance documents make substantial interpretations of the Directive, and thereby alter the legal and ecological meanings of ‘ecological status’ and the status classes, of which ‘high’/‘good’ and ‘good’/‘moderate’ are the most important.

4.5.2 Conclusions

‘Ecological Status’ as a Soft Law Construct

In CIS guidance document number ten (most important for the definitions of ‘ecological status’) ‘high ecological status’ is defined as: ‘a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of physico-chemistry, hydromorphology and biology’.

In the guidance document, the establishment of ‘high ecological status’ sites should be undertaken by screening for pressure and impact and suitable bodies of water are assessed with regard to the physico-chemical, and hydromorphological quality elements. If a body of water equivalent the guidance documents reference definition, the biological quality elements may be measured to establish the reference conditions. Within the Directives, there is no hierarchy between the abiotic and biotic quality elements, but within the guidance document the biological quality elements are circumvented in the process of establishing reference conditions. It is emphasized in the guidance that it is uncertain if this allows anthropogenic pressures to become incorporated into the reference condition for bodies of water.

Soft law vs. Hard Law

There are two problems with the guidance document. The abiotic quality elements are made normative in the establishment of reference conditions, which does not comply with the Directive. Secondly, as human pressure is used to find reference conditions this translates into assessment of structural characteristics of a body of water and not ecosystem functioning. A reference condition for the second element of ‘ecological status’ ‘functioning’ refers to something other than low levels of pressure, and its establishment should be based on a reference that actually functions, which in effect are undisturbed. Human pressures may affect the ecosystem structures of a body of water, and ecosystems may still function or vice versa. To know if the ecosystem is functioning the

quality element characteristics that refer to ‘functioning’, and not ‘structure’ must be assessed in the initial establishment of reference sites.

If the legislator intended for ‘ecological status’ to refer only to emissions and other pressures and impact of human activity, and for ‘good ecological status’ to be achieved when pressure is only slightly assessable, ecosystem functioning would not have been part of the definition of ‘ecological status’; however, it is. Article 4 defines the objective of the Directive, and Member States ‘shall protect, enhance, and restore all bodies of surface water with the aim of achieving good surface water status’. Generally, this is a positive provision, where only ‘protect’ is negative, and refers to pressure and impact reduction or preservation; ‘enhance’ refers to an improvement in quality, ‘restore’ refers to the reestablishment of former conditions. ‘Good surface water status’ refers to both ecological and chemical status, and ‘ecological status’ refers to ‘the quality of the structure and functioning of aquatic ecosystem’, with reference to undisturbed conditions in Annex V 1.2. With reference to Article 4, 2 (18) (21) and Annex V 1.2, protection of bodies of water from pressure and impact are one element of what ‘good ecological status’ means. If the establishment of reference conditions is based on this element, it provides a focus on the characteristics of the biological quality elements that are stressor sensitive, and not indicative of the functioning of ecosystems. The risk is that with a focus on ‘structure’ and pressures, the functioning of the ecosystems is not assessed as stipulated by the Directive, and ‘good ecological status’ becomes something other than specified in the Directive.

The Responsibility of the Commission

In the Commission blueprint for water the CIS is emphasized as a valuable part of the governance structure in the implementation of the Directive and complement the Commissions enforcement role in securing that the Directives objectives are achieved. The Commission facilitate the CIS (informally) and the intercalibration of ‘ecological status’ between Member States (formally).

The informal co-operation under the CIS has probably made implementation easier for many administrative authorities. Still, the analysis raises questions regarding the legitimacy of interpretative elements found in the CIS guidance document, interpretations that seem to generally weaken the obligation of ‘good ecological status’. If knowledge that contradicts a legal objective and its normative elements is used for guidance, lowering the ambitions of the law, it should be perceived as

an interpretation without any legal status, and not as soft law, even if it is produced with the approval of the Commission and Member State representatives, as it falls outside the formal democratic procedures. If such non-legal documents still become normative in the implementation they could be understood as legal documents (hybrid documents) and therefore possible for the Court of Justice to review. The reasons to perceive CIS guidance document ten as a legal document is that the Commission and Member States representatives behaviour creates a legitimate expectation that the guidance document provide the benchmark that Member States implementation will be compared against.

Legitimacy of the Common Implementation Strategy (CIS)

The specified reasons for establishing the CIS, were the different confusing and demanding elements of which the Directive is composed, and the fear that the Court of Justice would disapprove of Member States' implementations.

The guidance documents produced under the CIS have its legitimacy in that the decision to publish a guidance document is based on a consensus vote by the Member States representatives. The CIS as a whole have its legitimacy based on the Directive, the organization exist owing to the Directives enactment and how its provisions where made both ambiguous and demanding. This puts the CIS in a difficult situation; it has taken on the task of reducing the ambiguity of the Directive and this demands a detailed understanding of the challenging legal provisions purpose, functions, wording, and interrelations. With regard to guidance document number ten, the CIS seem to have failed to achieve the necessary legal understanding of 'ecological status' before it tried to lessen the ambiguity of the 'ecological status' provisions. As it is the Directive itself that provide the base for CIS, moving away from that base means that the guidance do not reduce ambiguity but increases it and the organization itself loses the base for its legitimacy.

4.6 Reflections on the Papers

4.6.1 General Reflections

There are some conceptual differences between the papers; both 'body of water' and 'water body' are used, as one example. In terms of more material questions, I have changed my mind about the use of the term 'ecosystem functioning' and its usefulness (this is discussed in paper I).

That ecosystems or nature should ‘function’ or be ‘functioning’ is a general legal aim, today (e.g. Water Framework Directive, Marine Strategy Directive, and Environmental Liability Directive¹⁶⁷ speak of this). As a concept, ‘ecosystem functioning’ is useful, as it may incorporate both process and aim, which may also be a reason to avoid it, as it may cause confusion, and this is the main argument for its removal, in paper I. That ecosystems should function within a differentiated geographical area may be a suitable operationalized form of a legal-ecological objective (see section 4.7.7)

In papers I and II, the use of indicator species is criticized. The reason for this is that it appears that the biological quality elements are used to refer directly to the status of an ecosystem associated with a body of water. This study instead emphasizes the difference between a whole system and its parts (see paper II).¹⁶⁸ Thus, there exists an irreducible distance between the status of an indicator and the ecosystem it represents, a distance that cannot be reduced, but may be revealed, and give rise to changes in the assessment or management of ecosystems.¹⁶⁹ What is criticized is not the reduction of an irreducible environment to indicators, but how the constructs connected to ‘ecological status’ seem to fail to provide assessment and management that indicate both ecosystem structures and function, and a good abiotic and biotic status.

At the beginning of this study I was convinced that the ‘good ecological status’ obligation is constructed as a result-oriented obligation, and not a best effort obligation. When writing paper IV I changed my mind, and now think that the systematization of the Directive’s ecological aspects indicate a best effort obligation (for a more detailed discussion, see section 3.3.6 and paper IV).

¹⁶⁷ Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage, OJ L 143/56 on 30 April 2004 (Environmental Liability Directive).

¹⁶⁸ For this type of reasoning, also see, Isabelle Stengers, *Cosmopolitics I* (University of Minnesota Press 2010) 11.

¹⁶⁹ E.g. Isabelle Stengers, *Cosmopolitics II* (University of Minnesota Press 2011) 15.

4.7 Synthesis: Good Ecological Status – Reconstructed

There must be some principle to capture reality. I must have some simple rules to follow.

Alberto Giacometti¹⁷⁰

4.7.1 Introduction

In this study as a whole, the focus is on the ‘ecological status’ aspects of the Directive. It is likely that this side of the Directive can function as it is constructed (even without the CIS redefinitions), but it is this author’s belief that it is not appropriately constructed for assessing or managing river basin environmental problems, or restoring/rehabilitating aquatic ecosystems. The ‘ecological status’ aspects of the Directive would benefit from a reconstruction of the main constructs that actualize the objective of ‘good ecological status’: the reference conditions, the biological quality elements, the timeframe, and the body of water construct.

Generally, it is important to acknowledge that studying and discussing suitable constructions of a legal-ecological regulative framework and how the framework should be constructed to be manageable are two separate questions/discussions. I have discussed how a suitable regulative framework might look, if it aimed to improve ecosystem status, based on the assumptions found in section 2.3.1, but I have not discussed how a simple or manageable regulative framework should look. The second question relates to each Member State’s legal system, which may differ substantially, and generalizations may be difficult to establish. The second question might be studied on the basis of the same assumptions as this study, but with regard to a Member State’s national legal system, with the aim of providing suggestions for a simple and manageable system. Based on the results of such a study, a possible reconstruction of the Water Framework Directive could be discussed. Such study would more or less acknowledge the same problems as this study, but perhaps with different suggestions for solving the problems.

This section synthesizes the conclusions of section 4.5, and provides suggestions for a reconstruction. Complementing the reconstruction are

¹⁷⁰ Laurie Wilson, *Alberto Giacometti: Myth, Magic, and the Man* (Yale University Press 2003) 295.

suggestions for minor changes that I think would improve the Directive, without comprehensively changing its structure. I believe that both the major and minor suggestions would be an improvement on the current legal conditions, even if they do not provide a definitive answer to the resolution of the environmental problems of EU river basins.

4.7.2 The Space of Regulation

It was stated at the outset (see section 2.3.1) that this study is based on the general legal definition of an ecosystem, found in Article 2 of the Convention on Biological Diversity. In Article 2, the ecosystem is understood as a unit: ‘dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit’.

Instead of emphasizing the ecosystem as the differentiated space for improving the ecological status of river basins, a contrasting differentiated space was developed in paper III. I chose to not emphasize the ecosystem as the space of regulation, because it is not necessarily the differentiated space appropriate for the reduction of environmental problems connected to the ecosystems of a river basin (see papers I, II, and III). For an effective legal space aimed at reducing ecosystem problems and their enhancement/rehabilitation, paper III emphasizes that the differentiation may be based on flow patterns or hydrological-ecological networks. This space of regulation would be at more of a macro-scale, compared to the legal space of a body of water. It is suggested that, if assessment, management, and planning were to address larger sections of the river basin, the competent authorities could more easily address the ecosystem problems of a river basin. It is also discussed that, when addressing river basin ecosystem problems, the differentiation between modified and more natural bodies of water should not be applied (see papers II and III for a discussion). The reasons for this are that the differentiation in the Directive suggests that bodies of water that are not heavily modified are natural or neutral, when in reality, the line of differentiation does not signify a boundary between natural/modified ecosystems (see paper II). The differentiation of heavily modified bodies of water is a method for indicating that certain activities are exempted from some of some of the more stringent measures coupled to ‘good ecological status’. This type of exemption may be constructed in a different way, which may also allow for the space of regulation to be consistent with interdependencies of aquatic ecosystem (see paper I, also III, sections 3.4.1, 3.5.1).

In paper II and III it is suggested that a differentiation based on pre-defined types should be avoided, and instead, a more site-specific space of regulation is suggested, which may include multiple bodies of waters or ecosystems that suffer from the same or similar types of problem, for example. This suggested differentiation contrasts with the Directive's system A or B, and may be more difficult to implement. However, its intricacies are what make this alternative space of regulation more suitable than the body of water construct, as it is intended to meet the specific legal and environmental needs of each river basin. The Directive's systems A and B are intended to yield similar types of bodies of water, with which 'ecological status' may be intercalibrated, to ensure that the 'good ecological status' obligation is analogously applied by all Member States. It is a simpler system, but as discussed in papers I, II, and III, this system is not suitably constructed to solve the environmental problems of the river basin.

Even if a rather extensive reconstruction of the body of water construct is needed, steps may be taken to lessen the inconsistencies between the construct and the river basin environment. A first step to adapt the body of water construct to the environmental conditions, without leaving the context of the Directive, would be to allow for the hydromorphological pressure or diffuse pollution monitoring spaces, already established under the Directive, to become spaces of regulation to which the environmental objectives may apply (see section 3.5.1). As the intercalibration is based on water categories, and does not include all types of bodies of water, a more adaptive differentiation might be used, without making the intercalibration inoperable (see Annex II 1.1(ii), Annex V 1.4.1(i)). If the intercalibration is based on representative categories of bodies of water, these could be used to indicate what the 'ecological status' boundaries are, within a Member State, and how they stand in comparison to those of other Member States. Even if the results of the intercalibration may be difficult to implement in the spaces of regulation that incorporate multiple bodies of water, they would still be at least approximately indicative of what the ecological quality ratio should be.

4.7.3 The Reference Definition

In the Commission's general evaluation, it is stated that expert judgement is extensively used when classifying 'ecological status' sites.¹⁷¹

¹⁷¹ E.g. European Commission, 'Commission Staff Working Document 2/2' (n 80) 159, 193; see, also Pardo and others (n 118). Thus, the Directive setting reference conditions and body of

Why has expert judgement become such an important element for defining ‘ecological status’, and how it should be determined for each body of water? It seems rather difficult to define something ‘undisturbed’ or ‘natural’.¹⁷² There seem to be significant ecological complexities connected to using the reference definition in Annex V 1.2 as the normative basis for EU water management. These difficulties seem to have resulted in the use of hypothetical natural states as the basis for assessment and management; hypothetical in the sense that a mixture of observations, analogy, and speculation is used to establish reference conditions for assessment and management (also see paper II).¹⁷³ Whether a comprehensive reliance on such subjective criteria is suitable or desirable in the translation of assessment into management measures directed at important activities, such as agriculture, hydropower, or forestry (also see paper II) is open to discussion. The problem of defining when a reference site is undisturbed seems to be one of the reasons the CIS guidelines have adopted divergent definitions of what should be considered a ‘high ecological status’ site (see paper IV).

In papers I and II, the reference definition is discussed: it is emphasized that using past conditions as a reference should be avoided, and Annex V should be amended. The two papers also discussed whether the use of a reference system that is based on type-specific representations of something almost undisturbed is suitable for ecosystem management and their functioning. In the papers, no clear distinction is made between the recovery of the abiotic and biotic sides of ecosystems. It is possible for the recovery of past abiotic conditions, represented by the physico-chemical and hydromorphological quality elements, to be appropriately combined with a historical, type-specific reference definition. Less manmade rivers could indicate what the morphological conditions were before the major development of land- and waterscapes were achieved. The reason for not distinguishing between abiotic and biotic sides when discussing suitable reference definitions is that a dominant focus on abiotic attributes and their indications is not enough to establish functioning ecosystems, or achieve ‘good ecologi-

water quality standards with the use of subjective expert judgement is an acknowledged method (see Annex II 1.3 (iii)). With regard to the intercalibration of ‘ecological status’, the process of providing a EU benchmark for high/good and good/moderate class boundaries is also dependent on the subjective reference of expert judgement (see Annex V 1.4.1 (v)).

¹⁷² E.g. Kevin Bishop and others, ‘Nature as the “Natural” Goal for Water Management: A Conversation’ (2009) 38 *AMBIO: A Journal of the Human Environment* 209.

¹⁷³ E.g. Martyn Kelly, ‘The Semiotics of Slime: Visual Representation of Phytobenthos as an Aid to Understanding Ecological Status’ (2012) 5 *Freshwater Reviews* 105.

cal status' (see papers I, II, III).¹⁷⁴ It is this author's belief that for biotic systems, another type of reference should be used, and as the Directive makes no distinction between the abiotic and biotic sides, the 'ecological status' objectives are poorly adapted to the environments they should represent. In section 4.7.7 it is suggested that more suitable regulation would separate the abiotic from the biotic in the establishment of ecological quality standards.

Instead of the reference definition found in Annex V 1.2, it is suggested in paper I that a more appropriate reference definition would direct assessment and management towards the long-term functioning of ecosystems (in a different and more extensive manner than is possible under the Directive). The Directive's reference condition is redefined, to refer to a status wherein ecosystems maintain themselves independently of management. This should be comparable to a resilient ecosystem status with a high level of adaptive capacity, in which management is not needed to maintain the full array of ecosystem services.¹⁷⁵ This reference definition corresponds to neither a particular past condition nor a specific time; instead, it refers to the long-term functioning of ecosystems (see papers I and II). It is suggested that the identification of this type of reference condition may be found in less-human-dominated land- and waterscapes.

Following the foregoing redefinition, good ecological status is defined as that in which human activity results in low levels of distortion only, compared to the reference condition (see table 1 in paper I), and distortion refers to unwanted changes (see paper IV for a discussion of the Water Framework Directive's definitions). In connecting the good ecological status definition to distortion/unwanted changes, the intention is to perceive improved ecological status as a result of desired human modifications, and less disturbed ecosystem processes and structures. Thus, human involvement that is beneficial to ecosystems is acceptable at the good ecological status level.¹⁷⁶ This redefinition of the Water Framework Directive's main 'ecological status' definition is similar to the way in which the Marine Strategy Directive specifies its objective; here, human impact is accepted, if it is beneficial to the achievement of 'good environmental status' (Art. 3(5)(b)). Annex IV (2), also stipulates that the objective should be based on the definition of 'good environmental status' in relation to 'desired conditions'. The

¹⁷⁴ For a recent paper e.g. Haase and others (n 86).

¹⁷⁵ The reader should note that in paper I, the redefinition uses the body of water as the space of regulation.

¹⁷⁶ See MÖD 2012:56 for a recent Swedish example of such a situation.

Marine Strategy also emphasizes the capacity of ecosystems to respond to human-induced changes (resilience) (Art. 3(5), 1(3)).¹⁷⁷

The type of objective in which human modifications may be perceived as improvements seems to correspond to the measures needed to rehabilitate river basin ecosystems. Paper IV emphasizes that addressing environmental problems does not only correspond to pressure reduction or ecosystem preservation, which the Directive's 'good ecological status' definition emphasizes. Thus, even if pressures and impact are removed or reduced, other management measures are needed, if ecosystems are to recover their functionality. Regardless of how the objective of improved ecological status is framed – as an obligation to enhance, restore, or rehabilitate – good aquatic ecosystem quality demands that ecosystem structures and functions be improved through positive measures, which may take the form of modifications of the river basin. The reference redefinitions and space of regulation developed in this study are intended to acknowledge this rationale more extensively than was done within the Directive.

Even if I argue that a different reference definition is needed to properly refer to ecosystem functioning and the biotic side, compared to the definition used in both the Directive and the CIS guidance document, this does not mean that this type of reference condition is easily established. It may be just as difficult to establish reference conditions for the full array of ecosystem services and self-maintaining ecosystems, and to then translate them into reliable management measures as for the Directive's reference system in Annex V. It is also likely that the amount of expert judgement currently used would not be reduced. However, the necessary focus on ecosystem functioning, as a vital step in the achievement of improved ecosystem status, is emphasized more clearly than in the Directive. The reconstructions are based on this focus, and not on whether this is a simpler or more manageable system than is provided by the Directive.

Even without actualizing a more thorough reconstruction, smaller changes to current practices under the Directive may be accomplished, to achieve a regulation corresponding to the major suggestions. 'Ecological status' emphasizes the need for both 'good' ecosystem structures and functions, and even if it seems as though ecosystem functioning has not been prioritized in the implementation of the Directive, reference conditions may be established based on sites that are undisturbed by human intervention, but also functioning (see paper IV). If

¹⁷⁷ When I wrote paper I, I was not aware of the similarities.

Member States acknowledge this dual focus on the ‘ecological status’ construct; a more suitable management of aquatic ecosystems may follow (also see paper IV).

4.7.4 The Positive Provision

Achieving improved ecological status demands attention to what are called ‘positive provisions’. ‘Good ecological status’ is connected to both reduction of pressures (a negative provision) and enhancement and restoration (positive provisions) (e.g. paper IV). The biological quality elements are primarily indicative of pressures (or primarily used for this purpose, even if they refer to ecosystem functioning, see paper IV). The redefinition proposed in paper I is intended to provide a more extensive focus on positive measures, and not only the reduction of pressures. The focus developed in papers I and II, where a slightly distorted provision of ecosystem services is emphasized as a suitable objective, has similarities to the Environmental Liability Directive’s focus on service or resource equivalence, which is discussed in paper III.¹⁷⁸

The Liability Directive’s aim is to recover the conditions existing at the time of the damage to the natural resources and services, had the environmental damage not occurred, estimated on the basis of the best information available (Art. 2(14)). If resource or service equivalence is not possible, then alternative natural resources and/or services should be provided (see Annex II). With regard to service equivalence, it is important that ecosystems function, and that the services available in the area prior to the damage be recovered. As with the Liability Directive, it may be useful to distinguish between services or functions performed for the benefit of another natural resource, or for the public (see Art. 2(13)), and not refer to ‘ecosystem services’ only (cf. papers I and II). Functions that one natural resource provides for another resource (such as a species population), and provide value to the public only indirectly, may be called ‘ecological services’; functions that provide direct value to the public may be called ‘human’ or ‘cultural services’.¹⁷⁹

¹⁷⁸ I had not studied the Liability Directive when I wrote papers I and II, and this is the reason that no reference to the Liability Directive is found in either paper.

¹⁷⁹ The Millennium Ecosystem Assessment, for example, use different concepts but I have tried to follow the legal definitions in the Liability Directive. The Millennium Ecosystem Assessment use provisioning services such as food, water; regulating services that affect climate, floods, and water quality; cultural services that provide recreation, and aesthetic; and supporting services such as nutrient cycling. E.g. Carlos Corvalan, Simon Hales, and Anthony J. McMichael. *Ecosystems and human well-being: health synthesis*. (World health organization 2005)

To achieve service or resource equivalence, the Liability Directive has three different types of measures: primary, complementary, and compensatory measures (see Annex II and paper III). These three types of measures are based on what is called the 'mitigation hierarchy', focusing on (1) avoiding or preventing negative impact, (2) minimising and rehabilitating on-site effects of development/damage, if impact cannot be avoided, and (3) implementing offsetting/compensatory measures to reduce remaining adverse impact (on- or off-site).¹⁸⁰ In paper III, this scheme for mitigating damage is suggested as a suitable management strategy, compared to the management under the Water Framework Directive.

If the mitigation hierarchy found in the Liability Directive were connected to the developments described in papers I and II, both on-site and off-site measures might be considered, if the status of a space of regulation is negative. As it seems clear that not only comprehensive pressure reduction, with regard to bodies of water, will result in functioning ecosystems, an extensive focus on positive provisions must be considered (see papers I, II, III, and IV). Using the mitigation hierarchy with on- and off-site measures to achieve an objective seems a logical step in a possible development of the Directive, both with regard to the adjustment of the current framework, and the more thorough reconstruction suggested in this study. The suggestion above, to allow for spaces of regulation that include multiple bodies of water, when hydromorphological pressure or diffuse pollution indicates its suitability, could be combined with on- and off-site measures. The environmental problem of multiple bodies of water could then be connected to a lesser number of problematic bodies of water, and then the achievement of the 'ecological status' objectives would not be body-of-water specific, but problem specific. This is a change that I believe is possible in the current structure of the Directive, and would be a step in the right direction.

4.7.5 Timeframe

Owing to the combined uncertainty of both the effectiveness of implemented measures and ecosystem (biotic) responses, the timeframe for

12-15.

¹⁸⁰ See Richard W Dunford, Thomas C Ginn and William H Desvousges, 'The Use of Habitat Equivalency Analysis in Natural Resource Damage Assessments' (2004) 48 *Ecological Economics* 49.

achieving an objective such as ‘good ecological status’, or the objective developed here, is uncertain. If an unrealistic timeframe is set, such as the Directive’s timeframe, and Member States are forced to implement measures that must result in the achievement of the objective, such as a result-oriented ‘good ecological status’ obligation, it may yield adverse consequences, as the time for evaluating biotic responses is inadequate (see paper II). As long as the negative consequences arose owing to natural conditions, Member States would not be in breach of their obligations (if they had also made their best effort to achieve the objective), even if measures must be implemented to reduce the negative impact (see Art. 4(4)(c), 4(6)).

Instead of establishing a predefined timeframe for the achievement of an ecosystem-based objective, it seems more appropriate to use a variable timeframe that may be adapted as management measures are implemented and evaluated. Compared to that of the Directive, this would be a more extended timeframe; this would necessitate assessment and management to estimate the changing climatic conditions, as measures implemented would otherwise risk becoming unproductive. This type of timeframe is not ‘objective’ but ‘subjective’. In paper II, a long-term and variable timeframe is referred to as ‘subjective’, whereas an objective timeframe is coupled to a more end-state perspective.¹⁸¹ The establishment of a subjective timeframe may be based on the experience of ecosystem recovery, such as expert opinion based on experimental or observations, or other lived experience of the timeframe for deterioration recovery. Possible biotic timeframe references may be found in general or specific life-history adaptations of organisms (the ecological timeframe). This type of subjective timeframe may also be suitable for the more manmade EU land- and waterscapes. These land- and waterscapes probably require long timeframes for recovery (centuries, perhaps), and may not functionally recover, even from smaller deteriorative activities, if the legacy of the damage is irreversible, or because other river basin changes restrict recovery (see paper II). It would also be easier to implement more adaptive management measures targeting the long-term functioning of ecosystems (within both more natural and human-dominated areas), if there is time to evaluate biotic responses to implemented measures (see papers I and II).

¹⁸¹ Others have suggested political, biogeochemical, and ecological timeframes. See MDA Rounsevell, TP Dawson and PA Harrison, ‘A Conceptual Framework to Assess the Effects of Environmental Change on Ecosystem Services’ (2010) 19 *Biodiversity and Conservation* 2823, 2839.

With regard to the current structure of the Directive, it seems reasonable to increase the timeframe open-endedly at first, and as more knowledge is obtained, determine the timeframe for each body of water individually (just as Art. 4(4)(a)(iii) is used today). The reason to increase the timeframe is that it seems difficult to achieve the necessary recovery of the biological quality elements by 2027 (e.g. paper II and section 3.3.4). However, it seems reasonable to have fixed management cycles (e.g. six-year cycles, as the Directive specifies), as this allows for coordinated adaptivity and evaluation of measures implemented between river basin districts and Member States.

4.7.6 Biological Assessment Elements

Paper I and II criticize the reduction of ecosystems into predefined, biological quality elements. This criticism does not question whether or not the biological quality elements are suitable for measuring pressures. The question is whether the biological quality elements are suitable representations of aquatic ecosystem status, and whether such important elements of the Directive should be predefined without the possibility of adapting the elements during implementation, for example, with regard to climate change (see paper II).¹⁸²

Instead of predefining the biological assessment elements, the reduction of ecosystem complexity into assessment elements, used to indicate the ecological status of a space of regulation, should be designated, based on specific conditions. These conditions would be intended to ensure that the ecological functioning and the ecological/human or cultural services of a space of regulation are assessed. Based on the discussion in papers I, II, and III, two conditions seems most relevant, when selecting a biological ecosystem indicator: (1) at the organism level, it must be determined that it embodies traits that indicate ecosystem functioning, and (2) at the level of the organism's population, the same trait should indicate the population's tolerance of environmental change.¹⁸³ Thus, to be an indicator of the reconstructed ecological status of a space of regulation, population self-maintenance (paper III), and ecosystem functioning (papers I and II) are combined. As the organism's self-maintenance is assessed on the basis of organism population tolerance of environmental change, it also provides an indication of resilience

¹⁸² The Commission have allowed for smaller divergences, see (n 127).

¹⁸³ These conditions have similarities to the risk-assessment scheme provided by Sandra Díaz and others, 'Functional Traits, the Phylogeny of Function, and Ecosystem Service Vulnerability' (2013) 3 *Ecology and Evolution* 2958.

(see papers I and II). Applying these two conditions may provide a focus on organisms that affect the flow of both human/cultural and ecological services, while the maintenance of significant populations is made relevant.

In paper I, it is suggested that functional traits,¹⁸⁴ rather than taxonomically focused biological quality elements, may be used to measure the status of ecosystems and their functioning. The main point behind emphasizing functional traits is to circumvent type-specific (historical) taxonomical lists of species as a measure of a good ecosystem status. It seems essential to ensure that ecosystems function, and not that certain species, based on a type-specific reference point, may be found in a certain abundance and distribution. If abundance and distribution of species are used as a specification of the assessment element, it must indicate ecosystem functioning.

In paper I, body size distribution (balance of feeding guilds of invertebrates or fish species) is suggested as a structural, ecosystem indication of a functional ecosystem, which should also indicate tolerance to changes in environmental conditions (resilience). Another example is phytoplankton, which instead of being taxonomically assessed, may be assessed based on attributes that indicate their tolerance and/or sensitivity to changes in environmental conditions and ecosystem functioning, such as the ability to fix nitrogen.¹⁸⁵ The trait-service associations found indicate whether the ecosystems function within the space of regulation (see paper I).

It is likely that type-specific taxonomic lists, with defined distributions and abundances, provide a more straightforward assessment system. The question is, what do these kinds of lists say about the functioning of ecosystems, and, based on the problems of the body of water construct, what should be done to recover a desirable 'ecological status'?

Even if the larger reconstruction suggested here is not actualized, smaller changes to the Directive may be applied, which, together with the other changes suggested above, may provide a stepping-stone to a more ecosystem-adapted Directive. What is considered a biological quality element may be made approximate, less rigid than it currently is, which would allow the development of assessment elements that

¹⁸⁴ A functional trait is a feature of an organism that has a demonstrable connection to the roles of the organisms in the ecosystem and their functioning.

¹⁸⁵ E.g. Guntram Weithoff, 'The Concepts of "plant Functional Types" and "functional Diversity" in Lake Phytoplankton – a New Understanding of Phytoplankton Ecology?' (2003) 48 *Freshwater Biology* 1669.

diverge from the Directives definition to be considered and both assessment and management may be improved by such developments.

4.7.7 Ecological Quality Standards

Based on the suggested reconstruction of ‘good ecological status’, it is possible that the conceptual separation between different quality standards made in section 3.4.6 could be further developed. It may be preferable to consider three different categories of quality standards, and two sub-categories, such as:

- Water quality standards, with regard to drinking water.
- Environmental quality standards, with regard to priority substances (and pollution in general).
- Ecological quality standards
 - Abiotic quality standards, with regard to the abiotic structures of ecosystems.
 - Biotic quality standards, with regard to ecosystem functioning.

The aim of the abiotic quality standard would be to secure good abiotic structures, and ‘structures’ refers to morphological conditions, hydrological regime, or conditions such as temperature, nutrients, light, and so on, (defined as hydromorphological and physico-chemical quality elements in the Directive). Legally, this type of standard could be result-oriented, with a clear timeframe for achieving a good abiotic structure within the space of regulation. A type-specific reference system focused on less-human-dominated land- and waterscapes may be used for this standard, to give an idea of what the structural heterogeneity within a river basin might be without human intervention. Providing good abiotic conditions for the biotic communities may be a first step towards achieving improved ecosystem status. It should be acknowledged that this is a first step, since it is not clear that abiotic structures/measures actually result in desirable biotic responses. Still, the legal appeal of an abiotic quality standard is that it would be achievable within a short timeframe, and provide a template for the more difficult achievement of good biotic status. Exemptions, similar to the Directive’s exemption with regard to natural conditions, would still be needed, as lower levels of nutrients do not necessarily follow a decrease in phosphorus or nitrogen input, for example. An abiotic quality standard could be defined as a scientifically formulated and numerically expressed specification of the maximum or minimum levels of abiotic

elements that are legally permissible in a defined part of the physical environment.

To formulate a biotic complement to the abiotic quality standard, a biotic quality standard could be defined as a statement of the minimum acceptable ecosystem functioning of a defined part of the physical environment, with a corresponding legal obligation to prohibit any deterioration below that limit.¹⁸⁶ The aim of a biotic quality standard would be to secure ecosystem functioning. A generic baseline for the minimal level of ecosystem functioning would be defined as slight changes to (indicator) organism population self-maintenance, and the services provided by functioning ecosystems.¹⁸⁷ Thus, for a biotic quality standard, it would not be necessary for specific species of flora and fauna to be present within a space of regulation (see paper II). Instead, certain indicative organisms important for ecosystem functioning, for example, those that regulate ecosystem function through the fixation of nitrogen, would be required to be present. This type of regulative instrument would be best effort oriented, with a subjective timeframe, and with reference conditions that need to be functional or in a state of self-maintenance, which are not necessarily equal to something undisturbed (see paper IV).

Even if Member States still need to make a best effort to achieve a result-oriented obligation, the result may stand in the way of developing process-oriented management, where the effectiveness of implemented measures provides an indication of whether or not the obligation has been met. Effective programmes of measures would be needed in each management cycle, to meet the objective and the quality standards, without necessarily achieving the objective. But if the general objective of good ecological status consists of two sub-objectives, the choice of best effort or result may be applied variously for each sub-objective, as suggested above.

The dual focus fits with the larger reconstruction suggested here, but it may also be used to develop the Directive in its current form. As it seems increasingly clear that it will be difficult to achieve ‘good ecological status’, with regard to the biological quality elements, a distinction between the hydromorphological and physico-chemical and biological quality elements might be considered. The abiotic quality elements may provide a result-oriented obligation, and the biological quality el-

¹⁸⁶ Also see the Convention on Biological Diversity Article 5, and 6: ecosystems must be managed within the limits of their functioning.

¹⁸⁷ Also see Gerd Winter, ‘Perspectives for Environmental Law—Struggling for Sustained Humanity’ (2008) 20 *Journal of Environmental Law* 11.

ements, a best effort obligation. Management could begin by ensuring that the physico-chemical quality element status is ‘good’, and if this does not yield a ‘good’ biological quality element status, targeted actions would be needed, but no quantified result is required to be achieved.

4.7.8 Implementation

I can only speculate on how the reconstructed ‘good ecological status’ obligation would work in a full-scale, EU legislative context. There are numerous difficult questions that I have not considered when outlining the reconstruction. However, I have some general thoughts regarding how it may be implemented.

The full array of services reference in paper I may be benchmarked on the EU level for each eco-region (see Annex IX), which would provide the starting point in the specification of the objective for each space of regulation (divergences would need to be explained).¹⁸⁸ The biological assessment elements that are used to assess the status of the spaces of regulations are left to Member State discretion, but each element must be consistent with the two conditions suggested above. When the service/ecosystem function status of each space of regulation is known, Member State implementation of measures could be estimated by the relative effectiveness of these measures. The estimation of measures may be based on a EU administrated database, where the current knowledge of enhancement of functioning ecosystems could be gathered and synthesized. The measures that show a relative success in enhancing the function of ecosystems could provide the basis for evaluating the effectiveness of Member States’ management plans and implemented measures.¹⁸⁹

The types of exemptions that would be needed to make the reconstructed objective functional have not been discussed. Exemptions are probably needed to protect important infrastructures, such as hydro-power. In the Directive, the heavily modified exemption (see section 3.3.3) is used for these kinds of activities, but for the space of regulation suggested here, these kinds of activities are not differentiated from adjacent areas of water (see paper III, section 4.7.2). This means that

¹⁸⁸ This type of overall assessment is already underway; on a global level, the Millennium Ecosystem Assessment provided such an initiative (<http://www.millenniumassessment.org>). The EU research project, Rubicode, provides another example of such an initiative (<http://www.rubicode.net/>).

¹⁸⁹ This type of EU database already exists with regard to the Water Framework Directive; see the EU Commission CIRCABC database.

within the reconstructed framework, an operator is still not obligated to remove a important socioeconomic activity, but accountability for negative effects is geographically expanded. This is an important difference to the Directive's body of water and heavily modified constructs.

There has been no inquiry into how to establish a causal relationship between an activity and negative status. Ideally, for an operator to be liable for the negative status of a space of regulation, a plausible biological explanation of how the activity caused the negative status of the assessment elements must be established (this is similar to the Liability Directive's biological causation scheme).¹⁹⁰ Thus, the activities' effects on the assessment elements should be biologically concrete and quantifiable (by quantitative or qualitative methods). If there is a lack of causal relationship between negative status and activities, this should not be a reason for doing nothing. Instead, estimates must be made. First, all possible activities that are known to be likely causes of deterioration should be identified, to avoid the risk of favouring one particular cause without actually knowing that it is the main cause.¹⁹¹ All relevant information should be considered, such as site observation (expert/local), regional monitoring studies, environmental manipulation, laboratory experiments, and models.¹⁹² As information is assembled, some possible causes may be eliminated, the remaining possible activities analysed, and a list of the most likely causes of the negative status established.¹⁹³ The authorities can then focus their management measures on the activity most likely to cause the negative status. This type of estimation may be regarded as legal-ecological risk assessment, a legal form for addressing indeterminism by seeking the simplest and most likely explanation of unwanted changes in the functioning of ecosystems.¹⁹⁴

There are many questions that I have not considered in this study, which would affect the implementation of a reconstructed 'good eco-

¹⁹⁰ See Lucas Bergkamp and Anke van Bergeijk, 'Scope of the ELD Regime', in Lucas Bergkamp and Barbara Goldsmith (eds), *The EU Environmental Liability Directive: A Commentary* (Oxford University Press 2013) 57.

¹⁹¹ Susan Braen Norton and others, 'Minimizing Cognitive Errors in Site-Specific Causal Assessments' (2003) 9 *Human and Ecological Risk Assessment: An International Journal* 213.

¹⁹² See Glenn W Suter, Susan B Norton and Susan M Cormier, 'The Science and Philosophy of a Method for Assessing Environmental Causes' (2010) 16 *Human and Ecological Risk Assessment: An International Journal* 19.

¹⁹³ *Ibid.*

¹⁹⁴ E.g. Philippopoulos-Mihalopoulos (n 23) 127–128.

logical status', but something is always left unsaid, and may provide a position from which to critically review what has been said.¹⁹⁵

4.7.9 Conclusions

For a meaningful discussion of the effectiveness of legal-ecological objectives and ecological quality standards, their terms, purposes, and achievement must be discussed and clarified. Based on the legal conceptualization of 'ecological status', this study attempts to shed light on both the flaws and possibilities of 'ecological status'. In the process of studying 'ecological status', a suggestion for a different type of regulation has been provided.

¹⁹⁵ See Niklas Luhmann, 'Deconstruction as Second-Order Observing' (1993) *New Literary History* 763, 769.

5. Sammanfattning

Fokus för studien är ramvattendirektivets målsättning om "god ekologisk status". Huvudsyftet är att förstå och kritiskt granska denna övergripande vattenrättsliga målsättning tillsammans med dess underliggande konstruktioner. Utifrån problem eller brister som uppdagas är avsikten att ge förslag på förbättringar med alternativa konstruktioner. Kapitel ett beskriver syftet och avgränsningar för studien. Fyra delfrågor bedöms som relevanta och är grunden till de fyra artiklar som avhandlingen, tillsammans med kappan, består av. Delfrågorna formuleras enligt följande:

- 1) God ekologisk status och dess ramverk, är det lämpligt konstruerat i jämförelse med ett mer modernt rättsekologiskt perspektiv?
- 2) Utifrån ramvattendirektivets centrala bestämmelser, går det att konstruera ekologiska kvalitetsstandarder som ett instrument för att uppnå en förbättrad status för akvatiska ekosystem? Eller finns det, utifrån ett rättsekologiskt perspektiv, teoretiska luckor i både ramvattendirektivet och kvalitetsstandardinstrumentet avseende fastställandet av ekologiska kvalitetsstandarder?
- 3) Vilken typ av rättslig avgränsning av ett geografiskt område är mest lämpligt för att hantera både miljöproblemen och det ekologiska, hydrologiska systemet i ett avrinningsområde?
- 4) Genomförandet av direktivet har underbyggts av den gemensamma genomförandestrategin (CIS) och dess icke-rättsligt bindande vägledningar (som kommissionen inofficiellt står bakom), men är dessa vägledningar i linje med ramvattendirektivets definitioner om en "god ekologisk status"?

Kapitel två diskuterar metodfrågor och beskriver det metodologiska förhållningssätt som studien anammat. Centralt för kapitlet är att beskriva hur en rättslig konstruktion såsom "ekologisk status", kan förklaras och utvecklas från såväl ett ekologiskt som ett rättsligt perspektiv. Rättsliga och ekologiska förklaringar, omformuleringar etc. av "god ekologisk status" analyseras mot bakgrund av hur "ekologisk status" är konstruerad i sig och vikten av att inkludera abiotisk och biotisk status

(med utgångspunkt i konventionen om biologisk mångfald). Begreppet ”ekologisk status” har analyserats mot bakgrund av ordalydelser, systematisk utformning och syfte/målsättning samt relevanta avgöranden från EU domstolen.

Kapitel tre innehåller en beskrivning och analys av relevanta delar i ramvattendirektivet. Kapitel utgör dels en bakgrund till artiklarna i avhandlingen och dels förs fördjupande diskussioner kring genomförandet av ”god ekologisk potential”, icke-försämringsmålet och vad ”god ekologisk status” är för typ av mål och vad det kräver av medlemsstaterna.

Kapitel fyra sammanfattar de fyra artiklarna i avhandlingen. Den sammanlagda slutsatsen av artiklarna är att ramvattendirektivet borde göras om. Framförallt bör en omformulering göras av direktivets krav om referenspunkt, tidsramen för genomförande, och den geografiska avgränsning som varje vattenförekomst baseras på. Frågan om CIS vägledning är i linje med ramvattendirektivets bestämmelser om ”god ekologisk status” analyseras. Kommissionen och representanterna från de olika medlemsstaterna har ställt sig bakom tolkningar/förändringar av ramvattendirektivets kärna och använt dess förändringar i interkalibreringen av ”ekologisk status”. Som en konsekvens av det avser kommissionens interkalibreringsbeslut och CIS vägledning om ”god ekologisk status” något annat än vad ramvattendirektivet beskriver som en god ekologisk status.

Kapitel fyra avslutas med en syntes som binder samman artiklarna och presenterar förslag på förändringar av direktivets krav om referenspunkt, tidsramen för genomförande, och den geografiska avgränsning som är viktiga delar av den ekologiska sidan av ramvattendirektivet. Bland annat lämnas ett förslag på en omformulering där abiotiska och biotiska kvalitetsstandarder åtskiljs.

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