European Commission DG Environment

Scoping study on the requirements for economic assessment in the Marine Strategy Framework Directive

Final report

June 2010

COWI

COWI A/S

Parallelvej 2
DK-2800 Kongens Lyngby
Denmark

Tel +45 45 97 22 11
Fax +45 45 97 22 12
www.cowi.com

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1 Executive summary

This report presents the analyses and conclusions of the scoping study on the requirements for economic assessment in the Marine Strategy Framework Directive (MSFD).

Purpose

The purpose of this scoping study of the economic elements of the MSFD was to identify the relevant requirements in the Directive, to assess the possible role that economic analysis can play in implementation and identify possible available tools to meet these requirements. The results of the study should be used to inform discussions within the MSFD Common Implementation Strategy (CIS) between the EU Commission, Member States and stakeholders regarding the economic elements of the Directive. ***Therefore the purpose of this report is not to provide a definitive definition or interpretation of aspects of the MSFD. It provides an initial scoping of the economic elements of the MSFD. Future discussions within the MSFD CIS will provide further information and clarification regarding these elements as experience of MSFD implementation is gained.***

Approach

The objective of the study was to provide a holistic view of the economic requirements of the Directive. This was done by firstly identifying the explicit and implicit requirements for economic assessment within the Directive. A distinction has been made between *explicit* and *implicit* requirements. The former consists of paragraphs and preambles where there is an explicit mentioning of economic concepts or assessments to be undertaken, whereas the latter is where economic concepts or analysis may be helpful in meeting these requirements although it is not a prerequisite in the MFSD.

For each of the identified requirements, the study identifies the context and possible relevant concepts. In many cases, the requirements are drafted in a way that provides room for a certain degree of interpretation or are concepts for which a common, agreed definition is not available. Where this is the case, an initial assessment of possible interpretation options has been undertaken. In addition, the study identifies possible analytical tools, methodology, data etc that is needed. The study also provides an initial assessment of how the different parts of the Directive identified in this study relate to each other, and it also describes other relevant policy areas and the institutions and organisations closely linked to the implementation of the economic requirements of the MSFD. Last, the study has identified some relevant literature with the purpose of identifying relevant methodological approaches and research activities that could be used to inform the implementation of the economic elements of the Directive.

Economic requirements

The below table provides an overview of the relevant **explicit economic requirements** of the Directive that have been identified in this study:

Table 1-1 Explicit economic requirements

Context	Concepts
Initial assessment of marine waters (preamble no. 24, art. 8 par. 1c)	Economic and social analysis of the use of those marine waters
	Economic and social analysis of the cost of degradation to the marine environment
Programmes of measures (art. 13 par. 3)	Economic impacts of the measures
	Cost-effective measures
	Cost-benefit analysis of measures
Member States' exceptions[1] (preamble no 11, art. 14 par. 4)	Costs would be disproportionate
Establishment of environmental targets (Annex IV no. 9)	Economic concerns

The below table provides an overview of the relevant **implicit economic requirements** of the Directive that have been identified in this study:

Table 1-2 Implicit economic requirements

Context	Concepts
Implementation of programmes of measures (preamble no 27)	Polluter should pay
Exceptions (preamble. no. 30 and 32, art. 14 par. 1d)	Overriding public interest which outweigh the negative impact on the environment
Community financing (financing of measures) (art. 22 par. 1 and 2)	Community financial instruments
Programmes of measures (Annex VI, no. 6)	Economic incentives

Literature study

It was not possible as part of this study to identify all relevant literature associated with all of the requirements identified in the study. A non-comprehensive list of relevant literature was identified. The study focussed on identifying literature that included information (e.g. data) that could be used in the various assessments identified in this study. The literature study shows that there are valuable information, inputs and concrete data for the *"economic analysis of the use of those waters"*, especially when it comes to putting values on the benefits of the use of marine waters by specific economic sectors (e.g. the fishery sector, offshore oil and gas sectors, tourism etc).

[1] The word exception is used since it is the word applied in article 14 of the MSFD *"Exceptions"*.

On the other hand, it shows that there is a lack of studies reporting monetary values of the wider benefits of the goods and services provided by the marine waters. There are a number of studies available which assess the value of the benefits of coastal and inland waters, which is not the focus of the MSFD. The literature contains valuable information, inputs and data for carrying out the *"cost-effectiveness analysis of the programme of measures"*. However, the information, inputs and data represent mainly measures to reduce nutrients and eutrophication in marine waters, whereas there are no cost-effectiveness analyses of measures that are relevant for the other 10 descriptors of a good environmental status in the MSFD. Therefore more work is needed also in this field.

Relevant policies and institutions

The policies and institutions that are closely linked to the economic requirements of the MSFD are identified and listed. Each policy is described and assessed in terms of its links to the economic aspects of the MSFD. Further, the need for co-ordination with these institutions/organisations is assessed and described. The policies and institutions are divided into three categories:

1. EU policies/directives
2. Conventions on protection of specific Seas (Baltic sea, North East Atlantic, Black Sea, Mediterranean Sea)
3. International/global conventions of the seas.

Recommended areas for further clarification

The study has identified the following points relating to the economic aspects of the Directive which require further clarification:

- **The time perspective in "cost of degradation"**: The time horizon that should be taken for the assessment of the "cost of degradation" in the initial assessment (Art.8). It is necessary to clarify the reference year and time horizon that should be used as this will influence the scale of degradation and therefore the value of the costs associated with that degradation.

- **The role of economic analysis (ie cost-effectiveness analysis and cost benefit analysis – both mentioned in article 13) in the development of the programme of measures**: It is necessary to consider the relevant methodology in terms of the overall purpose of the article in relation to identifying the best possible measures to fulfil the environmental targets. Cost-effectiveness analysis is a suitable methodology when the objective is established as the analysis focuses on the best way to meet the target. This seems to be the relevant methodology in article 13, where the objectives have already been established. In contrast, cost-benefit analysis is more suitable when the targets have not been set yet, as it can be used to determine if the benefits of the possible targets are higher than the costs, thereby informing what the target should be. Clarity regarding the purpose of the article including the specification of the decision that is to be informed by the economic assessment is needed to determine the appropriate methodology.

- **The impact assessment of the programme of measures (Art.13)**: It is not clear how the text in the Directive relating MS carrying out impact assessment prior to the introduction of any new measure fits into the process of developing and implementing the programme of measures.

- **Common understanding of the exception possibilities in the Directive (Art.14).** This would ensure a coherent and consistent approach is to be taken when applying the exception options and also clarify the need for supporting economic assessment and documentation.

- **There is a lack of studies reporting on the monetary values of benefits of the marine waters.** The examples of monetary values found in the literature overview of benefits mostly consist of use values, such as the fisheries sector and oil and gas extracted etc. which are based on market prices and therefore most accessible. However, only to a limited degree have monetary estimates been obtained of the values for other goods and services of the marine water. Therefore, there is a need for further work in this area such as an in-depth literature study to look further into this issue andthe initiation of new pilot studies to estimate benefit values that can be used in the next cycle of MSFD's economic analyses.

2 Introduction

DG-Environment has commissioned COWI A/S to carry out the study "*Scoping study on understanding the requirements for economic assessment in the Marine Strategy Framework Directive"*. The study was carried out from November 2009 to April 2010.

Background

The Marine Strategy Framework Directive[2] (MSFD) aims to effectively protect the marine environment across Europe. It aims to achieve good environmental status of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend.

Overall objective

The overall objective of this study is to provide an overview of the economic requirements and demands for economic analysis in the MSFD. The study will be used as input to the discussions within the MSFD Common Implementation Strategy (CIS) which includes the EU Commission, Member States and stakeholders on issues relating to the implementation of the MSFD.

Specific objectives

The specific objective of this study is to identify the economic requirements of the MSFD and to describe the role that economic analysis can play to meet these requirements.

The specific objectives of the study are to identify economic requirements in the MSFD. This includes explicit requirements as well as areas where the need for economics is implicit. Explicit requirements are those where economic analysis is clearly demanded. Implicit requirements are those where economic analysis may be beneficial in meeting the requirements, although it is nota prerequisite in the MFSD.

For some of the identified economic requirements in MSFD, there is often no common interpretation and therefore the purpose is to present and discuss possible different options. For example there are different types of economic analysis that could be used to meet the requirement of the MSFD. Each of these types of analysis will produce different kinds of results reflecting the amount of information they include and the context in which it is used.

Another purpose is to identify possible analytical and methodological approaches that can be used to carry out the economic analysis required by the MSFD and the data needed for this purpose. The study includes an overview of the advantages and disadvantages of possible analytical and methodological approach.

[2] Dir 2008/56/EC.

In addition, the study identified the relevant institutions involved in the implementation of the economic aspects of the MSFD and related policy areas. A non-comprehensive list of relevant literature and research was also identified and an assessment undertaken of the potential synergies with and inspiration from related these policy areas and literature have been identified.

Results

This study provides an overview of the economic aspects of f the MSFD. There are often no common definition or interpretation of each of the economic requirements. The purpose of this study is not to produce a final recommendation for how to interpret each of the identified economic requirements. Future discussions in the MSFD CIS will provide further information and clarification of these elements as experience of MSFD implementation is gained. Hence, this study does not deliver a detailed implementation plan or definitive interpretation of the Directive, but rather an initial assessment to identify some possible options to inform future discussions.

Structure of report

Chapter 1 presents an executive summary of the report.

Chapter 3 provides an explanation of some of the terms that are used in this report, in particular this chapter sets out the difference between an economic analysis and a financial analysis. These terms are used when analysing and assessing each of the economic requirements in the MSFD (chapters 5 and 6).

Chapter 4 provides an overview of the economic requirements of the MSFD. This includes both the explicit requirements as well as the implicit requirements.

Chapter 5 presents the results of the screening and assessment of each of the explicit economic requirements, and chapter 6 presents the results of the screening and assessment the implicit economic requirements.

Chapter 7 identifies the policy areas that are closely linked to each of the economic requirements of the MSFD. The related policy areas are characterised and assessed and the most important policy areas are described in more detail. Chapter 7 also identifies the institutions and organisations closely linked to the implementation of the economic requirements of the MSFD. The need for coordination with these institutions/organisations is assessed and described. The list of related policy areas is presented in Annex 2.

Chapter 8 outlines the main findings from the identification of some relevant literature in this field. The brief scan of each literature is focused on assessing whether the literature/study/project has any relevance to the economic requirements and the economic concepts identified in chapters 5 and 6[3]. The main focus in this study has been to make a list of relevant literature, and this is the key output of this exercise. The list of identified literature is presented in Annex 3.

Finally chapter 9 sums up the discussions and findings on the list of other issues related to the economic aspects of the MSFD.

[3] The literature findings and conclusions are **not** based on a detailed literature review, but on a brief scan of each source to identify whether it contains valuable information, inputs and data for the specific economic requirements in MSFD.

3 Definitions and terminology

The following definitions of economic concepts will be used throughout the report. This applies in particular to the description of the analytical approaches that can be used to address the specific economic requirements of the MSFD. An important concept that relates to economic assessment is the need to distinguish between an economic assessment and a financial assessment.

Economic analysis covers all impacts from the point of view of the society at large. In other words, the purpose of an economic assessment is to estimate the impacts on social welfare or human well-being including positive impacts where welfare is increased (i.e. benefits) and negative impacts which lead to a loss of welfare (i.e. costs). These impacts can be financial (e.g. monetary such as loss of income etc), environmental (e.g. welfare loss due to environmental damage) and social impacts (e.g. health or employment impacts). Any impact that affects human welfare should be included in an economic assessment. This includes impacts that cannot be valued by observed market prices (such as the recreational value of the marine water).

Financial analysis focuses on the financial impacts from the perspectives of specific economic sectors (eg industry, households etc). As financial analysis provides information relating to the financial impacts, it is part of a full economic analysis, and it provides important inputs and data to the full economic analysis.

The two types of analyses are explained more below.

Economic analysis

The economic analysis appraises the contribution of a project/policy/measures to the social welfare. An important aspect of economic analysis is to determine the geographical area, e.g. a region or country as this provides information about whose costs and benefits should be included in the analysis. It is prepared from the perspective of the society at large rather than from the perspectives of the owners and users of a particular good or service.

In the case of the marine environment, an economic analysis would include all economic effects of the marine water in a defined geographical area:

1 Costs and benefits for those sectors that financially benefit directly from the use of the marine waters such as commercial fisheries sector (including aquaculture), the oil and gas sector, the energy sector, the transport sector (water-based), the tourism sector.

2 Costs and benefits for the users of the marine waters who do not benefit financially such as leisure-time fishermen, anglers, recreational yachtsmen etc.

3 Costs and benefits for the non-users of the marine waters such as those who place a value on the marine environment even though they do not use marine waters.

The third bullet represents the non-use values of marine water which reflect the value associated with the knowledge that marine environment continues to exist and is available for others to use currently or in the future.

Financial analysis

Financial analysis focuses on the financial consequences from the perspectives of the users (ie the first bullet point above). It is based on financial data, such as investment costs, operating costs and revenues, financial return on investments and cash flow analysis.

In the case of the MSFD, a financial analysis shows the effects on the users/sectors financially benefiting from the use of the marine water. It shows how the net returns/turnovers of these sectors will be affected by changes in the marine environment. It can therefore be used to analyse the present economic dependence of each user of the water resource, in terms of for example the yearly earnings/turnover/net returns in each sector. Compared to the full economic analysis, this is only a subset of the full economic effects on society, which for example include effects on all users of the marine water such as those users who do not benefit financially from the use of marine water but do accrue benefits from its use (e.g leisure-time fishermen, anglers, recreational yachtsmen etc.) and non-use value of the marine waters. See also Figure 3-1 that illustrates the interaction between the financial analysis and the economic analysis.

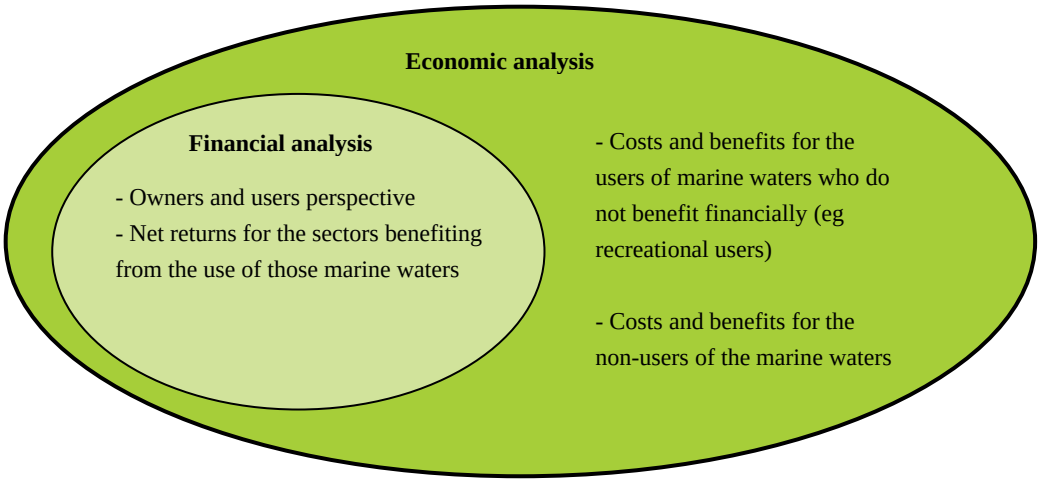
Time perspective

The time perspective is an important issues to raise when designing an analysis. The time consideration is equally important in the two types of analysis, the economic, and the financial analysis. In the financial analysis it is often more obvious which time perspective is the right to choose, as e.g. an infrastructure investment has a certain lifetime, and that is often the most likely time perspective to choose. In the economic analysis, one should take into account that the time perspective is chosen so that the impact of e.g. measures is included. That means that in many case will the time perspective be longer then the lifetime of the investment as many environmental effect are only visual/measurable after a long time.

Aggregation level of results

Both the economic analysis and the financial analysis may include geographical aspects and distributional aspects. The results can be divided into subgroups, such as specific geographic areas or specific groups affected (sectors, users, owners, public administrations etc.).

Figure 3-1 Illustration of economic analysis



4 Overview of identified economic requirements

One of the purposes of this study was to identify the economic requirements included in the MSFD. For the purposes of this study, explicit and implicit requirements were identified. The explicit requirements are those where using economic analysis is a stated requirement of the MSFD and mentioned specifically (explicit requirement), whereas the implicit requirements are those where economic analysis may be beneficial for the decision-making process when implementing the MFSD (implicit requirement).

The explicit economic requirements in the MSFD are shown in Table 4-1, and Table 4-2 shows the implicit economic requirements where economic analysis may have a role to play.

Some preambles and articles cover the same economic requirements, and they are grouped together in the two tables. For example, preamble no. 24 and article 8 both cover *"economic and social analysis of the use of those waters and of the cost of degradation to the marine environment"* and as a result, they are treated collectively in Table 4-1.

The second column in Table 4-1 and Table 4-2 shows the overall context of each specific requirement, e.g. preamble no. 24 *[..] an economic and social analysis of their use and of the cost of degradation of the marine environment* is part of the overall article 8 (initial assessment of marine waters) and has to be seen in this context. The third column presents the economic concepts mentioned in the formulation oaf each economic requirement.

In chapters 5 and 6, each requirement will be discussed in detail, including deliberations on the context, the economic concepts and the different types of economic analysis and/or possible methodologies that could be used to meet these requirements.

Table 4-1 ***Explicit*** *economic requirements of the MSFD.*

Economic requirement	Context	Concepts
Preamble no. 24 *[..] an economic and social analysis of their use and of the cost of degradation of the marine environment.*	Initial assessment of marine waters	Economic and social analysis of the use of those waters
Art. 8, paragraph 1c *[..]an economic and social analysis of the* ***use of those waters and of the cost of degradation*** *to the marine environment*		Economic and social analysis of the cost of degradation to the marine environment
Art. 13, paragraph 3 *[..] Member states shall give due consideration to sustainable development and, in particular, to the social and* ***economic impacts*** *of the measures envisaged.* *[..] Member states shall ensure that the measures are* ***cost-effective*** *and technically feasible, and shall carry out impact assessments, including* ***cost-benefit analysis*** *prior to the introduction of any new measures.*	Programmes of measures	Economic impacts of the measures Cost-effective measures Cost-benefit analysis of measures
Preamble no. 11 *[..] However, Member States should not be required to take specific steps where there is no significant risk to the marine environment, or where the* ***costs would be disproportionate*** *taking account of the risks to the marine environment, provided that any decision not to take action is properly justified.*	Member State exceptions[4]	Costs would be disproportionate
Art. 14, paragraph 4 *[..] but shall not be required, ….., to take specific steps where the* ***costs would be disproportionate*** *taking account of the risks to the marine environment, and provided that there is not further deterioration.*		
Annex IV, no (9) *Due consideration of* ***social and economic concerns*** *in the setting of targets.*	Article 10, establishment of environmental targets	Social and economic concerns

[4] The term exception is used as it is the term applied in article 14 of MSFD *"Exceptions"*.

Table 4-2 ***Implicit*** *requirements of the MSFD - where economic analysis may have a role to play.*

Economic requirement	Context	Concepts
Preamble no. 27 *[..] Those measures should be devised on the basis of the precautionary principle and the principles of preventive action should be taken, that environmental damage should, as a priority, be rectified at source and that the* ***polluter should pay.***	Implementation of programmes of measures	Polluter should pay
Preamble no. 30 *[..] or because actions which that Member State has itself taken for reasons of* ***overriding public interest which outweigh the negative impact on the environment.***	Exceptions	Overriding public interest which outweighs the negative impact on the environment
Preamble no. 32 *[..] actions taken for* ***overriding reasons of public interest,*** *the Commission should assess whether modifications or alterations made to the marine environment as a consequence do not permanently preclude or compromise the achievement of good environmental status in the marine region.*		
Art. 14, paragraph 1d *[..] modifications or alterations to the physical characteristics of marine waters brought about by actions taken for reasons of* ***overriding public interest which outweigh the negative impact*** *on the environment.*		
Article 22, paragraph 1 *[..] the implementation of this Directive shall be supported by existing* ***Community financial instruments*** *in accordance with applicable rules and conditions.*	Community financing (financing of measures)	Community financial instruments
Article 22, paragraph 2 *The programmes drawn up by the Member States shall be* ***co-financed by the EU*** *in accordance with existing financial instruments.*		
Annex VI, no (6) *[..]* ***Economic incentives****, ….., in the economic interest of those using the marine ecosystems to act in ways which help to achieve the good environmental status objective.*	Programmes of measures	Economic incentives

5 Explicit economic requirements

This chapter contains the results of screening and assessment of each of the explicit economic requirements. Explicit requirements are those requirements where economic analysis is clearly required.

Table 5-1 provides an overview of the identified possible interpretation options and analytical approaches to each of the explicit economic requirements. These interpretation options and analytical approaches will be described and discussed in detail for each of the economic requirements in sections 5.1 to 5.5. Please note that some of the options identified in the following section are not necessarily mutually exclusive as in some cases they represent analytical frameworks rather than specific methodological approaches.

As previously stated, this study represents an initial scoping of the economic elements of the MSFD. Future discussions within the MSFD CIS will provide further information and clarification regarding these elements as experience of MSFD implementation is gained. The options identified in this study therefore should not be considered to be the only possible options nor should they be considered as providing a definitive interpretation of the MSFD requirements. Additional options may be identified as part of future discussions on MSFD implementation.

Table 5-1 Relevant Economic concepts and possible interpretation options for each requirement.

Economic requirement	Concept	Possible interpretation options	Possible approaches
Initial Assessment (Preamble no. 24 and Art. 8, par. 1c)	*Economic and social analysis of the use of those waters*	Value of the economic benefits of using the goods and services that the marine waters provide. Welfare gains that the specific marine water generates to society. Value of the economic benefits of on sectors (direct users) benefitting financially from the use of the marine waters	Estimate economic value of uses of the marine waters including the welfare gains of all users and non-users. This requires the calculation of use and non-use values. Estimate the value that is generated by direct users benefiting financially from the use. For example by assessing each users/sectors economic dependence of the particular water resource via indicators such as economic turnover of sectors, gross income, employment etc. Describe the socio-economic profile of those waters .
	Economic and social analysis of the cost of degradation	Welfare loss from the business as usual scenario (costs of no action) Welfare loss due to degradation of the marine environment Financial costs for sectors accruing financial benefits from the use of the marine waters due to degradation of the marine environment	Estimate the change in the value of the marine water fdue to reduced provision of marine goods and services Estimate the financial costs associated with the degradation of the marine environment for the relevant sectors
Programmes of measures (Art. 13, par. 3)	*Cost-effective measures*	Identify the most cost-effective combination of measures	Identify the measures and estimate the costs, effects and cost effectiveness of the measures
	Economic impacts of the measures (social and economic impacts)	Assess the social and economic impacts of measures	Cost benefit analysis of measures to assess all impacts of measures
	Cost-Benefit analysis (carry out impact assessments, including cost-benefit analysis prior to the introduction of any new measure)	Ex-ante assessment of the impacts of measures i.e. expected change in welfare due to the introduction of a measure Comparison of costs and benefits	Ex-ante cost-benefit analysis of measures
MS exceptions (Preamble no. 11 and Art. 14, par. 4)	*Costs would be disproportionate*	Compare the "costs of taking measures to achieve good environmental status" with the benefits of the measures Compare the "costs of taking measures to achieve good environmental status" with the ability to pay of those affected by the measures Compare the "costs of taking measures to achieve good environmental status" in one marine water with the	Analyse the Cost -benefit ratio Make affordability analysis (distribution of costs) Analyse the financial burden on sectors/actors paying for the implementation of the measures Identify financial instruments used 1) Compare the cost -benefit ratio of implementing the same measures in two

		costs of implementing the same measures in comparable marine waters.	comparable waters or 2) Compare the costs of implementing the same measures in two comparable waters
Environmental targets (Annex IV, no 9)	*Social and economic concerns*	Taking into consideration the users that are most economically dependent on the water resource and consequently those that are affected by the severity of environmental targets	- analyse existing targets and measures and their economic impact on the users/sectors in the existing situation - analyse also possible long-term positive economic benefits in these sectors of environmental targets

5.1 Initial Assessment of marine waters (Art. 8, 1c)

The economic requirements in the initial assessment of marine waters are:

Economic requirement	Concepts
Preamble no. 24 *[..] an economic and social analysis of their use and of the cost of degradation of the marine environment.*	1) Economic and social analysis of the **use of those waters** 2) Economic and social analysis of the **cost of degradation** to the marine environment
Art. 8, paragraph 1c *[..]an economic and social analysis of the **use of those waters and of the cost of degradation** to the marine environment*	

Context

The economic requirement of article 8 must be viewed in close connection with the other parts of article 8. Article 8 requires Member States to make an initial assessment of their marine waters. The assessment includes three steps:

*1a) An analysis of the essential **features and characteristics, and the current environmental status of those waters**, based on the indicative list of elements set out in Table 1 of Annex III, and covering the physical and chemical features, the habitat types, the biological features and the hydro-morphology;*

*1b) An analysis of the **predominant pressures and impacts**, including human activity on the environmental status of those waters [..]*

*1c) An **economic** and social analysis of the use of those waters and of the cost of degradation of the marine environment.*

These three steps are closely interconnected. The framing of each step and its outputs must thus be coordinated since each step provides important inputs to the other steps, especially steps 1a) and 1b) provide valuable data for the economic analysis in 1c). This connection will be further explained in the next sections.

DPSIR

The DPSIR (Driving forces-Pressure-State-Impacts-Responses) framework could be a very useful framework for fulfilling the requirements in a consistent way. The DSPIR is an approach that can be used to secure a consistent way of gathering data or information. The outcome of such an analysis would provide optimal input to 1c) the economic analysis. It is therefore important to be aware of how the result of one step feeds into the next in order to optimise the time spent on fulfilling the requirements.

Concepts

There are two economic concepts in article 8, paragraph 1c, and they will be discussed one at a time:

*1) Economic and social analysis of **the use of those waters***
*2) Economic and social analysis of **the cost of degradatio**n to the marine environment*

5.1.1 Economic and social analysis of the use of those waters

Interpretation of concepts

The relevant concept is 'the use of those waters'.

One possible **option** is to look at the economic benefits of using the marine waters and the goods and services the marine waters provide. This will identify the welfare gains of the specific marine water to society.

Another possible **option** is to focus on sectors (direct user) benefitting financially from the use of the marine waters and the goods and services they provide.

Another possible option would be to look for interpretational inspiration in the Water Framework Directive (WFD). The WFD has an almost similar requirement (Art. 5, 1: *Each Member State shall ensure that for each river basin district or* […]: *an economic analysis of the water use is undertaken according to* […]).Guidance has been published under the WFD Common Implementation Strategy on this issue *"Economics and the Environment - guidance document no. 1"*[5]. The guidance suggests that the economic analyses should be interpreted as giving information on *how important water is for the economy and social-economic development of the river basin and to pave the way for the assessment of significant water uses and analysis of disproportionate costs.*

For example, it is suggested that the economic analysis of water uses is made by *collecting information for significant water uses and their gross income, turnover […]etc.* Furthermore, it is recommended to focus on significant water uses, such as those giving rise to significant pressures on water resources or on specific economic sectors/sub-sectors.

[5] European Commission. 2003. *Common Implementation Strategy for the WFD (2000/60/EC) - Guidance document no. 1 - Economics and the environment.* Produced by Working Group 2.6 - WATECO, page 29.

If applying the approach taken in the relevant WFD CIS guidance to the MSFD initial assessment, some work would be needed to determine which aspects of the approach were relevant to the marine environment for example in terms of the sectors and how they use the marine water. E.g. the WFD (until 1 nautical mile (nm), from land, but for contaminants 12 nm from land)) is focussing on land-based pressures and the MSFD (from 1 nautical mile from land for those elements covered by the WFD (e.g. eutrophication), and from land for the elements not covered by the WFD (e.g. marine litter) mainly covers offshore pressures (fishing, offshore activities: oil and gas, wind mills, pipelines etc, extracting resources, sailing transport) as well as indirect effects of land-based pressures.

Social analysis

As described in chapter 3, economic assessment attempts to measure all impacts that affect social (or human) welfare regardless of whether this impacts are 'market' impacts (e.g. decrease in revenue, increase in production costs) or non-market impacts such as environmental impacts. Therefore, so-called social impacts (such as employment impacts etc) are included in an economic assessment to the extent that they affect social welfare.

If the term social analysis is interpreted as assessment of 'social impacts' (e.g. impacts on certain groups, job losses), then in the context of an economic analysis, the social analysis is already included, since economic analysis provides the possibility of analysing *distributional aspects* of the economic results. It might be that some regions or sectors suffer more from the costs of degradation than other sectors (tourism industry in some specific regions, fishing industry in some regions etc.). Some countries/regions and sectors might be able to reduce the social implications since they are more able to adjust to the situation.

However, there are other non-economic assessment tools and methodologies that may be relevant in this context. However, consideration of these methodologies is outside the scope of this study which focuses on economic assessment.

No experiences of interpretation of social analysis can be drawn from the WFD, since it only says "*economic analysis of water use*". This being so, it is difficult to make any experience-based suggestions for interpretations.

Analytical approaches

As mentioned in the "interpretation of the concept" section, **one option** is to estimate the overall welfare gains (benefits) to society of the specific marine water. Such estimation requires a full **economic analysis** (as defined in chapter 3) which can be made by estimating the total economic value (TEV) of the marine water. This includes estimating the economic value to those sectors/users receiving financial benefits from using the water resource, non-profiting users (such as leisure time fishermen and recreational yachtsmen) as well as assessing non-users' valuation of the marine water and the goods and services it provides (such as existence value). These non-use values can be considerable.

The economic analysis of the use of those waters can give useful answers in the overall context of the initial assessment process. It shows the economic value connected to the use of the marine water in a base year situation with the existing environmental status and the existing pressures and impacts (human activity). In the existing situation, it shows the economic benefits (welfare gains) to society of a specific marine water. If economic analysis results are generated for each of the marine waters, the politicians/decision-makers can compare the existing eco-

nomic benefits of each marine water and their contribution to the welfare of society. It gives the politicians an overview of which marine water or sub waters that generates the highest economic benefit to society in the existing situation. And it is thereby helpful in prioritising focus between marine areas.

However, as mentioned in chapter 3, it is often difficult to carry out a full economic analysis due to lack of data, time and resources to carry out valuation estimates.

As mentioned in the section on "interpretation of the concept" , another **option** is to focus on the sectors benefitting financially from the use of the marine waters and the goods and services they provide. This is a so-called **financial analysis**, and it is often the first step of carrying out a full economic analysis. The financial analysis will provide an overview of the economic dependence of each user of a particular water resource (magnitude of economic importance[6] for the fisheries industry (including aquaculture), shipping, tourism/cruise, oil and gas industry, subcontractor industries, public sector[7], etc.). The results of the financial analysis will provide important answers on the financial benefits gained from the use of the marine waters, and it will generate important initial results that can feed into the full economic analysis of the marine water.

The methodology to carry out the **financial analysis** (second option) will be an assessment with focus on net returns from users of those waters, often distributed by relevant sectors. Either by collecting net returns data directly from specialised sector statistics or by calculating them based on costs and incomes for each sector, all based on observable market prices (investment per year, maintenance costs per year, earnings/turnover per year, etc.)

A third option would be to apply the approach taken in WFD implementation in relation to the article 5 analysis given the similarities in the requirements as set out above. This focuses on describing the socio-economic profile of the different uses, in this case of marine waters, via indicators such as turnover of sectors, income levels, employment etc. This approach will result in a more qualitative description, however, it can include a number of indicators.

It is advisable to include the time perspective in this analysis and already here determine the baseline. It would require that the result of the analysis of those waters at a certain time is combined with projections of the state in the included variables.

Methodological approaches

To adopt the **economic analysis** approach described above, a benefit analysis is necessary to obtain an estimate of the TEV of the marine water, including both use and non-use values. Marketed goods and services can be valued by market

[6] Measured as each sectors earnings/turnover/net returns from existing activities in the marine region.

[7] Such as public sector expenditure on planning, monitoring and construction & operation and maintenance. Monitoring of the environmental status and the changes in the status for various indicators can be very costly. The public costs of compensating transfers to the private sector can also be considerable, such as compensation to the fishing industry due to regulation of production.

prices[8]. Non-marketed goods and services can be estimated by undertaking a new valuation study of the benefits of the specific marine water, or by using relevant existing benefit estimates from other marine waters (benefit transfer).

Since the economic analysis in article 8 is an analysis of the baseline situation, it is relevant to undertake a total valuation of the marine waters. Article 8 does not imply an analysis of measures/policies and this is why marginal valuation is not relevant in this context. This is problematic as the concept of marginality is central to economic analysis including non-market valuation which in order to produce meaningful results needs to value small, incremental changes in the good and/or service that is being valued.

Available data/tools

Data can be available from:

- National Statistics and databases (National Statistical Bureau).
  For each relevant sector, key economic data can be found in each countries National Statistical Bureau, such as net-returns for each sector. Detailed information about net-returns divided by sub-sectors or geographical regions may also be available in some cases.
- Eurostat
- Data from existing studies in the marine region
- Webpages on marine conventions that include on-going data collection.
- WISE webpage
- Data on tourism can be obtained from the WTO (World Tourism organisation) and Euromonitor.
- Data on use (leisure-time fishermen, recreational yachtsmen) and non-use values (option and existence value) can be generated for this purpose or benefit transfer from other relevant studies can be used.
- National guidelines for carrying out economic analysis (socio-economic analysis) can provide key figures for adjusting the results of the financial analysis to the right prices etc (discount rates, factor/market prices).

There are different ways of generating data on the estimates of the benefits. As mentioned above, market prices can be used for the marketed goods and services[9], but valuation methods would have to be used in order to produce monetised estimates for the non-market goods and services. Valuation studies can be generated for the purpose, or benefit transfer from other relevant studies can be used. Generating a new benefit result requires experienced experts in the field of economic valuation in the water sector. Initially, the valuation study is designed, including choice of valuation methodology (contingent valuation, hedonic pricing, travel cost, choice-experiment etc.) and choice of the amount of data and sources (interviews, questionnaires etc.).

[8] However, market prices are only reasonable estimates of value if they are based on competitive market conditions. If there is a lack of competition, then market prices will not provide a good reflection of opportunity cost. Also market prices would need to be adjusted for taxes and other distortions.

[9] However, market prices are only reasonable estimates of value if they are based on competitive market conditions. Also market prices would need to be adjusted for taxes and other distortions.

When it comes to using benefit transfers from other studies, time is needed for searching for the relevant, existing valuation studies (literature study and contact persons, network etc.) and afterwards to have an expert to evaluate the validity and robustness of the result and devise how to transfer it to the specific location (adjustment of values etc.).

When it comes to monetising the non-market goods and services (benefits) it is also an option to assess them qualitatively and quantitatively. The process of monetising benefits is often at three step approach 1) Identify and describe the benefits, 2) Try to quantify them (changes in tons, kilo, hectare of the goods and services), 3) monetise the changes that are possible to quantify in step 2. However there is also the option to carry out step 3 as a qualitative discussion and assessment of the identified and quantified benefits. One option is to develop some kind of scoring point system that expresses the expected change in benefit values (for example from -- to ++). Often the benefit assessment will be a combination of monetised benefits and qualitative assessments since it is often not possible to monetise all the identified benefits in step 1.

Advantages and disadvantages

It is an advantage of the **economic analysis** that it includes the value of all users - including those that do not generate financial net returns from using the water (leisure-time fishermen, passenger transport on water, recreational yachtsmen) - as well as non-use values.

The economic analysis generates an overall economic value of the use of each of the marine waters that can be valuable to politicians and decision-makers. It also enables decision-makers to compare the existing economic value of a specific marine water with other marine waters. In this way it will be visible for decision-makers which marine waters that are the most valuable in their country or region. At the same time, it indicates where degradation of the marine waters has the highest price, which, in turn, points to areas/sectors where it is most important to implement measures/actions to avoid loss of economic benefits. The use of economic benefits is associated with uncertainties, especially when assessing totals. It is advisable to avoid estimating totals but to design the analysis so that it focuses on the marginal changes.

Naturally, the full economic analysis of the marine waters carries the disadvantage of being time-consuming, especially when it comes to estimating the non-priced use values, such as recreational values and non-use values. Furthermore it might be problematic to make an estimation of the *total* value of the recreational user values and non-use values) in a certain year (2010) since non-market valuation methodologies value marginal, *incremental* changes in the good and/or service that is being valued. It is only possible to make a total valuation of the benefiting sectors direct use of the marine waters since it is based on market priced goods and services.

The **second option** is to start with the **financial analysis**. Its advantage is that it focuses on financial net return results that are generated in a market and thus understandable by a broad range of stakeholders, since it focuses on loss of financial net returns in the sectors using the marine waters.

The financial analysis gives an overview of the users with net returns from using the water - and this knowledge could be used later in the process of identifying

measures to reduce pressures and impacts (programme of measures). Furthermore - in combination with the results from article 8, 1a and 1b - the results of the financial analysis can help identify the most cost-effective measures for the programme (since the loss of net returns is an important cost of measure, e.g. restrictions on activity/quota).

However, it is a disadvantage of the financial analysis compared to a full economic analysis that it does not include the economic value for recreational users of those waters, such as anglers (leisure-time fishermen) since it only covers users that generate economic returns by using the water resource. Therefore, the politicians and decision-makers should be very **careful when comparing the existing values of different marine waters based solely on financial analysis results**. The financial net returns might be lowest in the marine water where the TEV are highest and vice versa.

The **third option** the **socio-economic profile** has the advantage that less data are needed, and most of all that they do not have to be consistent. The result of this analysis will be a description of the use of those waters including selected relevant indicators.

Links to literature

Among the identified, relevant literature in chapter 8, there are many studies and reports that contain valuable information, inputs and concrete data on the *"economic analysis of the use of those waters"*. There are many examples of monetary values of the benefits that the main sectors/users obtain from using the marine resources, such as revenues/earnings in the fisheries sector, offshore oil and gas sectors, tourism sector etc. See also chapter 8 and Annex 3.

5.1.2 Economic and social analysis of the cost of degradation to the marine environment

Interpretation of concepts

The relevant concept is the 'degradation' of the marine environment and its associated costs i.e. to assess the welfare loss associated with the degradation of the marine environment. This is related to the concept of 'costs of no action' which refer to the negative impacts if no actions are taken to improve the quality of the marine environment. The whole initial assessment is focused on describing the baseline situation and baseline development. When it comes to the economic analysis of the baseline development (Art. 8, 1c) it corresponds to analysing the business as usual scenario (costs of no-action).

An **option** is to interpret it as an analysis of the welfare loss in the business as usual scenario, which in terms of economic analysis is the same as estimating the costs of no action. This will show the loss of welfare to society due to degradation of the marine environment.

Another **option** is to adopt a more narrow focus on the impacts t in the sectors directly benefitting financially from the use of the marine waters and the goods and services they provide.

An additional option would be to not attempt to monetize the costs of degradation but to assess them qualitatively and quantitatively.

Analytical approaches

One option is to interpret cost of degradation as the development in benefits from using those waters in the period 2010 to 2020 (the baseline development). The terms "costs" and "degradation" implies the hypothesis that this development can only be negative in the baseline situation in each of the marine waters (that is reduced benefits from 2010 to 2020).

However, it is not clear from the MSFD wording what time horizon should be used for this assessment. One option is to look at the period 2010 to 2020 because 2020 is the year to maintain good environmental status (article 1, no. 1). Using this time period the economic analysis of costs of degradation will correspond to the time horizon for the economic analysis of the "Programme of measures" in article 13, since it is an economic analysis of measures implemented to reach the target of good environmental status in 2020.

This is an important area where further clarity is needed as the time horizon directly affects the level (or amount) of degradation and therefore the value (i.e. cost) associated with that level of degradation. In the rest of this section 2010 to 2020 is used as an example of time horizon for carrying out the cost of degradation analysis.

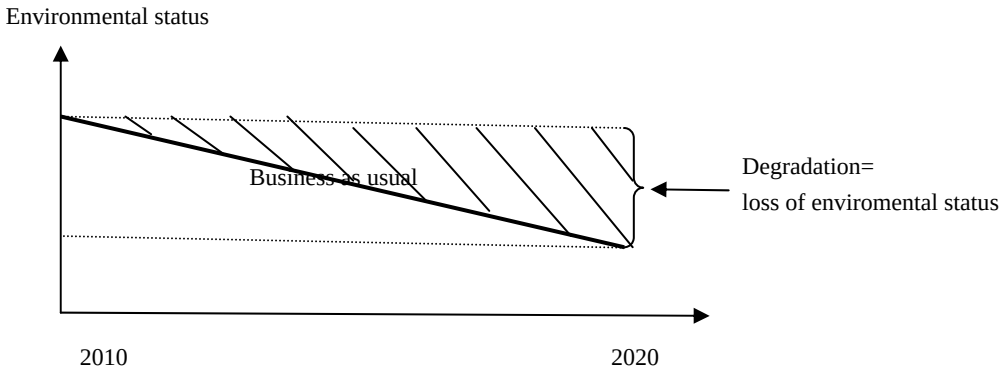
Following the **first option** of interpretation of the cost of degradation described above, the analytical approach will be to estimate the change in total economic value (TEV) of the marine water for a time period due to reduced provisions of marine services and goods. This will include the change in economic values for all users (profiting and non-profiting) as well as non-users (existence value). This analysis could be used by policy and decision-makers as an estimate of the welfare loss to society if no actions are taken (costs of inaction).

Compared with the economic analysis of the "use of those waters", this analysis estimates marginal changes in economic values over time instead of total valuation of benefits in a certain year (base year).

The challenge of the concept "cost of degradation" is to estimate the expected change in the provision of marine goods and services from 2010 to 2020. Therefore, the economic analysis of "cost of degradation" requires very tangible results on the baseline from the first two steps of the initial assessment (article 8, 1a and 1b). It is necessary that scientists involved in these two steps deliver results along the lines of the projected change in marine goods and services within a time period; such as tons of reduced supply of each type of fish species, species that will disappear, new species etc. Only with tangible results of this type will it be possible to measure the degradation in monetary terms.

In many cases, the inter-annual variation in the environmental status makes it very difficult to estimate the "loss of environmental status". One way to mitigate that is to look at trends towards a long-time goal, instead of short-term goals or estimations from a certain year.

Figure 5-1 Simplified illustration of cost of degradation



As mentioned in the "interpretation of the concept", the **second option** is to focus on the sectors benefitting financially from the use of the marine waters and the goods and services they provide. The financial analysis can be used to estimate a subset of the full costs of degradation by looking at the loss of profit[10] - for the sectors benefitting financially from the use of the water- occurring due to the degradation of the marine waters. This could be done by summing up the financial net return losses in the relevant sectors using the marine water. It will generate important first step results to be used in a later full economic analysis of the marine water.

However, the financial analysis will face some of the same challenges as mentioned above, as it requires the same tangible results from the first two steps of the initial assessment, such as the projected change in marine goods and services in the chosen timeframe (e.g. tons of reduced supply of each type of fish species, species that will disappear, new species etc.). Only with tangible results of this type will it be possible to estimate the change in financial net returns for the time period for each sector.

Methodological approaches

The methodology to carry out the **economic analysis** is to estimate the loss of welfare/benefits due to the degradation of the marine environment. It is necessary to analyse the change in benefits or the change in the TEV of the marine water from for a time period, including changes in both use and non-use values. Goods and services traded in a market can be valued by market prices if these can be collected and connected to how the water quality influences the market price, e.g. data on marine tourism. Non-marketed goods and services can be estimated by conducting a new valuation study of the benefits of the specific marine water, or by using relevant existing benefit estimates from other marine waters (benefit transfer).

The first step of this exercise is to concretize the expected marginal or incremental changes for the time period in each type of services and goods from the marine waters. This demands close cooperation between the scientists and experts responsible for steps 1a) and 1b) in article 8 and the economists responsible for step 1c) in article 8. The economists can undertake valuation exercises based on assumptions about the marine quality improvements/degradations for the time period, but to do this properly, the economists need information about the marginal change (degradation) in the marine goods and services from the experts re-

[10] Loss of financial net returns.

sponsible for articles 1a) and 1b). They must at least provide results for those goods and services being identified as the most important for the economic valuation. For this valuation, both market prices and benefit transfers can be used, but again the outcome of article 8, 1a and 1b, is needed as an input for these assessments.

The methodology applied for the **financial analysis** will be an assessment focusing on net returns from users of those waters, often distributed on relevant sectors. This is done either by collecting net return data directly from specialised sector statistics or by calculating them based on costs and income in each sector, all based on observable market prices (investment per year, maintenance costs per year, earnings/turnover per year, etc.).

However, compared to the financial analysis carried out in the "economic analysis of the use of those waters" - where the existing financial net returns were used - there is an additional challenge involved in this exercise, since it is necessary to estimate the change in the financial net returns for a time period due to the marine environment degradation. This demands a projection of the financial net returns for the time period based on a quantitative relationship between change in environmental status (parameters/descriptors) and marine goods and services and the resulting change in financial net returns (for example the relation between reduced fish stocks and financial net returns in the fisheries sector).

An additional approach would be to not attempt to monetize the costs of degradation but to assess them qualitatively and quantitatively. This is not a separate approach but can be done as well in the economic as in the financial analysis. It can also be a combination of monetized values and other assessments due to the lack of reliable data and valuation estimates.

Available data/tools

As stated above, the key data required for the assessment of the costs of degradation is the scientific information regarding the impacts of degradation (results from article 8, 1a) and 1b)). Once this is available, it is possible to undertake a economic assessment of the value of those impacts.

Furthermore data can be available from:

- National Statistics and databases (National Statistical Bureau).
  For each relevant sector, key economic data can be found in each country's National Statistical Bureau, such as net-returns for each sector. Detailed information about net-returns divided by sub-sectors or geographical regions may also be available in some cases.
- Eurostat
- Data from existing studies in the marine region
- Webpages on marine conventions that include on-going data collection.
- WISE webpage
- Data on tourism can be obtained from the WTO (World Tourism organisation) and Euromonitor.
- Data on use (leisure-time fishermen, recreational yachtsmen) and non-use values (option and existence value) can be generated for this purpose or benefit transfer from other relevant studies can be used.

- National guidelines for carrying out economic analysis (socio-economic analysis) can provide key figures for adjusting the results from the financial analysis to the right prices etc (discount rates, factor/market prices).
- Information about tax payments to the public sector from the sectors generating financial net return (company tax rate, tax distortion rate).

The availability of benefit data for estimating the loss of TEV is described more in the below section "links to literature", which indicates that it might be difficult to find existing studies that can be used for benefit transfer of the assessments of the benefits of the marine waters.

Advantages and disadvantages

It is an advantage of the full economic analysis that it gives the full picture of the overall loss of welfare in a certain period due to degradation of the marine water. Furthermore - if the economic analysis is made for all marine waters - it is possible to compare the results across marine waters. This clearly illustrates to decision-makers which of the marine waters that will experience the highest welfare loss due to degradation and which groups that will be affected the most. This might indicate where it is most important to implement measures/actions to avoid loss of welfare (loss of existing benefits).

When it comes to estimating the financial impacts of degradation, it is important to note that it might be difficult to determine the change in financial net returns from for example 2010 to 2020 due to the reduced environmental status (the degradation). As mentioned above under "Methodological approaches", it requires an estimate of the quantitative relationship between changes in environmental status, change in marine goods and services and the resulting change in financial net returns.

As a financial analysis does not include an assessment of all the impacts of degradation (i.e. does not include an assessment of the non-market impacts e.g. recreational use and environmental impacts), consideration of the results of a financial analysis as opposed to a economic analysis could result in non-optimal decisions being made. For example the loss of financial net returns due to marine water degradation might be lowest in the marine water where the loss of total economic welfare is highest - for example if a certain water has very high recreational values.

Links to literature

When it comes to the economic analysis of the concept *"the cost of degradation of those waters"*, the results of assessments of benefits through valuation of market and non-market services and goods are important. There are practically no studies reporting monetary values of benefits of the marine waters. This is mainly due to the limited knowledge of the causal relationship between the marine waters' biodiversity, ecosystem functioning and the provision of goods and services. This limits the capacity to ascribe monetary values on ecosystems and their marine goods and services of interest.

However, several of the sources in the literature show that much effort have been devoted to identifying the existing goods and services of ecosystems and categorising them into four categories[11]. This is an excellent platform for moving to-

[11] 1) Supporting services (e.g. nutrient cycling, soil formations etc.), 2) Regulating functions (e.g. climate regulation, flood regulation, water purification), 3) Provisioning services (e.g.

wards a more operational classification system that links changes in ecosystem services to changes in human welfare.

The examples of monetary values of benefits mostly consist of use values, such as the fisheries sector and oil and gas extracted etc. since they are based on market prices, and therefore most accessible. However, to a limited degree monetary estimates have been obtained of the values for other goods and services of the marine water. However, for the other goods and services there are many studies available of recreational benefits of beaches and benefit values from coastal areas, which are not the focus area of the MSFD. Only very few studies were directed to value benefits of the open sea. See also chapter 8 and Annex 3.

5.2 Programmes of measures (Art. 13, 3)

The economic requirements in article 13 are:

Economic requirement	Concepts
Art. 13, paragraph 3 *[..] Member states shall give due consideration to sustainable development and, in particular, to the social and* ***economic impacts*** *of the measures envisaged.* *[..] Member states shall ensure that the measures are* ***cost-effective*** *and technically feasible, and shall carry out impact assessments, including* ***cost-benefit analysis*** *prior to the introduction of any new measures.*	Economic impacts of the measures Cost-effective Cost-benefit analysis

Context

The economic requirements of article 13 should be seen in close connection with the overall purpose of article 13, which requires the Member States to make a programme of measures in order to achieve good environmental status in their marine waters:

Article 13 - ***Programmes of measures***

1) Member States shall, in respect of each marine region or subregion concerned, identify the measures which need to be taken in order to achieve or maintain good environmental status, as determined [..]

2) Member States shall integrate the measures devised pursuant to paragraph 1 into a programme of measures […]

3) When drawing up the programme of measures pursuant to paragraph 2, Member States shall give due consideration….in particular to the social and ***economic impacts*** *of the measures [..] Member states shall ensure that measures are* ***cost-effective*** *[..], and shall carry out impact assessments, including* ***cost-benefit analysis*** *prior to the introduction of any new measure.*

food, fresh water), 4) Cultural services (e.g. aesthetic, spiritual, recreational and other non-material benefits).

There are several steps of carrying out the programmes of measures. The first step is to identify relevant measures to close the gap in those of the 11 descriptors where a gap is identified. The next step is to estimate the costs and effects of each measure. All these steps are closely linked to the ecological and scientific analysis results, especially from the initial assessment (article 8). The identification of relevant measures depends on the results of impacts and pressures on each of the marine waters (including human activities) in the baseline (article 8).

Therefore a close dialogue between scientific experts, marine experts, sector experts and economists is needed to make the programme of measures. This will include a dialogue about costs of measures and expected effects of each measure on each descriptor. This interconnection will be explained in more detail below.

Concepts

There are three economic concepts in article 13, paragraph 3:

1) Economic impacts of the measures
2) Cost-effectiveness
3) Cost-Benefit analysis.

Interpretation of concepts

There are three different economic requirements related to optimising the programme of measures, 1) Economic impacts, 2) Cost-effectiveness and 3) Cost-Benefit analysis.

In the WFD, it is a requirement that the Member States identify the most *cost-effective* combination of measures to be included in the programme of measures.

However, it is not clear from the text of the MSFD how the impact assessment and especially the *cost-benefit analysis* fit into the development of the programme of measures. It is necessary to consider the relevant methodology in terms of the overall purpose of the article, which must be to identify the best possible measures to fulfil the environmental targets. Cost-effectiveness is a suitable methodology when the starting point is a set of operational environmental targets (the descriptors) that need to be fulfilled by certain measures. In contrast, a cost-benefit analysis is more suitable when the targets have not yet been set and where it is used to determine if benefits of the possible targets are higher than the costs. However, in article 13, the targets are already defined, and the value added from making a cost-benefit analysis is uncertain. Therefore, it may be necessary to discuss and clarify this aspect through the CIS process.

One added value of making a cost benefit analysis is that it enables inclusion of side effects, e.g. reduction in climate gas emissions along with the improvement of the marine environment. However, certain side effects will often be a natural part of the cost-effectiveness analysis since they are valued and added to or deducted from the costs of the measures, depending on the type of costs included in the cost-effectiveness analysis.

Another value added from using cost-benefit analysis is the ability of and basis for prioritisation between regions and over time: where is the welfare gain highest? However, this is linked to the economic analysis of "cost of degradation" (article 8, paragraph 1c) in that the loss of TEV of each marine water, if no actions are taken, corresponds closely to the value of implementing the programmes of measures to avoid the same loss of TEV. However, a successful full

economic analysis of the cost of degradation provides this information, and it is not necessary to carry out cost-benefit analysis mentioned in article 13, 3.

Given the above, it is not clear how the *impact assessment, including cost-benefit analysis, prior to the introduction of any new measures* fits into the process of making the programme of measures. Given the reference to 'prior to the introduction' in the MSFD text this suggest the ex-ante CBA of measures. There is a need to clarify this in more detail, e.g. what is the purpose and when should it be carried out? For example, at the end of the process when the most cost-effective programmes of measures have been identified and are pending approval by the national parliaments? or earlier in the process.

Focus in the next sections will be on cost-effectiveness analysis. The relevant type of economic analysis for this is the economic analysis, since it covers all costs of the measures, including externality costs (e.g. externalities from increased fuel consumption by commercial fishing boats due to increased distances to catch the same amount of fish - due to e.g. quotas and area restrictions).

Analytical approaches

Article 13, paragraph 1 stipulates that the measures should be devised based on the result of the initial assessment. The financial analysis as well as the other results on pressures and impacts from of the initial assessment can be used to identify measures necessary to eliminate the gap identified in the initial assessment.

The cost effectiveness analysis should be made for each measure. This will result in one cost-effective result for each measure (cost per reduction of one unit of pressure/impact). The environmental targets will be translated into more operational, quantitative targets, and the challenge is to find the most cost-effective combination of the measures to fulfil the target.

Methodological approaches

It is important to be aware of the overall target of reaching good environmental status in 2020 which is the sum of complying with the 11 descriptors of good environmental status in Annex 1, and there are many links between the different descriptors. It will therefore not be enough to comply with each of the 11 descriptors separately; it is the combination of the descriptors that should be fulfilled. Some measures will have effects on several descriptors.

A cost-effective analysis of each measure and the combination of measures could be done by identifying relevant measures that have a positive effect on the environmental status. For each of the measures, the costs and the environmental potential should be identified. This will result in a cost per unit of environmental improvement. Based on such costs per unit for each measure, it will be possible to construct the optimal set of measures to fulfil each descriptor.

This cost-effectiveness analysis should be made to fulfil each descriptor isolated as well as for the combination of the descriptors that ensures the overall target of good environmental status. The integrated cost-effectiveness analysis that ensures simultaneous compliance with all descriptors will be a challenge. It requires that all measures' effects on all descriptors are taken into account at the same time. If one measure has its main effect on descriptor X, but also has a positive side effect on descriptor Y, it lessens the demand for other measures to comply with descriptor Y. Only when these side effects and synergetic effects

are taken into account will it be possible to draw up the most cost-effective programme of measures.

In practice, it might be difficult to produce the cost per unit for each relevant measure. First, it may be difficult to identify relevant measures for each descriptor. Mainly because there is a lack of knowledge about the direct relationship between the measure and the environmental effect in quantitative units. For example when it comes to measures' ability to fulfil descriptor 8 "Concentrations of contaminants …[..]. There are many contaminants, and for each of these, there are many sources that lead to contamination. This makes it complex to find the right set of measures since each contaminant requires specific actions - it is not possible to identify a general measure for the whole group of contaminants. Furthermore, it is difficult to find alternative measures (more than one measure) to reduce each contaminant, which means that there is no possibility of choosing between measures. Many contaminants origins from land based sources and are included in the program of measures for the WFD. Developing cost effective measures for the MSFD thus have to be coordinated with the WFD. Further, if programs of measures are regionally developed and agreed, it might be more cost-effective to support measures in another country in the region to reach good environmental status in the regional sea. All these examples make it difficult to produce unit costs of measures in the area of marine waters.

Available data/tools

When it comes to the costs of measures, it might be useful to apply the results from the financial analysis in article 8, paragraph 1c (the use of those waters) since they provide an overview of users and their net returns from the use of the water (that probably also will be the ones facing measures). This information can be used in the process of identifying measures to reduce pressures and impacts. The loss of financial net returns is an important cost of measures, e.g. restrictions on activity/quota. Additional data on the costs of measures and effects can be found in:

- Catalogue of measures and their related costs and environmental effects within sectors such as water, agriculture, provided by national ministries. These catalogues were made to support the implementation of the WFD.

  Experience from Denmark shows that the fisheries sector and the offshore sector are the sectors causing most problems when it comes to fulfilling the most problematic descriptors. Therefore - in the case of Denmark - the measures related to the implementation of the MSFD are most likely to appear in these two sectors.

  Data can be found in the ministries regulating these sectors or their business associations.
- Eurostat, but the data are probably not sufficiently detailed
- Data from existing studies in the marine region
- Data on webpages on marine conventions that include on-going data collection.

Experience from the WFD shows that without common, specified guidelines, Member States will make very different analyses, which renders it difficult to make cross-country comparisons.

Advantages and disadvantages

The cost-effectiveness results give the optimal solution towards achieving the targets. It provides an overview of possible measures, and it provides the possibility of integrating distributional concerns into the decisions.

This method has the disadvantage that it can be very difficult to find data on costs combined with the expected effect.

The Danish analysis found that the number of suitable measures is rather limited. However, there might be countries where more descriptors are not fulfilled and therefore more measures need to be taken. Furthermore, the Danish analysis also found difficulties of relating the cost data of the measure with the possible marine environment effect of that measure.

Links to literature

Among the identified relevant literature in chapter 8, there are many studies and reports with valuable information, inputs and concrete data on the *"Cost effectiveness analysis of the programmes of measures"*. They present good, concrete and quantitative results on the cost effectiveness of measures for reducing nutrients and eutrophication in the Baltic Sea and Southern North Sea. On the other hand, there are no cost-effectiveness analyses of measures that are relevant to the other 10 descriptors of good environmental status in the MSFD (annex 1). There is a need to identify relevant measures targeting the other descriptors and to carry out cost-effectiveness analyses of measures to obtain good status of these descriptors. See also chapter 8 and Annex 3.

5.3 Member States exceptions (Art. 14, 4)

The economic requirements of article 14 are:

Economic requirement	Concepts
Preamble no. 11 *[..] However, Member States should not be required to take specific steps where there is no significant risk to the marine environment, or where the **costs would be disproportionate** taking account of the risks to the marine environment, provided that any decision not to take action is properly justified.*	Costs would be disproportionate
Art. 14, paragraph 4 *[..] but shall not be required, ….., to take specific steps where the **costs would be disproportionate** taking account of the risks to the marine environment, and provided that there is not further deterioration.*	

Context

The economic requirement of article 14 considers Member States' possibilities to have an exception from the obligation to take measures to achieve good environmental status. Member States can become exempt if the costs of these measures are disproportionate. The situation of disproportionate costs of measures is one of several options for Member States' exceptions.

It follows from Article 14 - Exceptions - that:

1) A Member State may identify instances within its marine waters where, for any of the reasons listed under points (a) to (d), the environmental status cannot be achieved in every aspect through measures taken by that Member State, or, for reason referred to under point (e), they cannot be achieved within the time schedule concerned:
(a) action or inaction for which the Member State concerned is not responsible
(b) natural causes
(c) force majeure
(d) modifications or alterations to the physical characteristics of marine waters brought about by actions taken for reasons of overriding public interest which outweigh the negative impact on the environment [..]
(e) natural conditions which do not allow timely improvement in the status of the marine waters concerned.

4) Member States shall develop and implement all elements of the marine strategies [..], but shall not be required [..] to take specific steps where there is no significant risk to the marine environment, or where the ***costs would be disproportionate*** *taking account of the risks to the marine environment, and provided that there is no further deterioration.*

Where for either of these reasons, a Member State does not take any steps, it shall provide the Commission with the necessary justification to substantiate its decision […]

Concepts

Costs would be disproportionate

Interpretation of concepts

A definition of disproportionate cost is not included in the MSFD. The term 'disproportionate' indicates that there must be a proportionate relationship (ie ratio) between costs of taking measures to achieve good environmental status and some comparator. It also follows that there is a range of values for this ratio or comparison which could be deemed appropriate ie proportionate. Disporportionality would occur when the relevant limit on this range of values is exceeded

There are a number of different options of comparators. It is not possible to provide an exhaustive list of all possible comparators, however some possible comparators include:

1 Benefits of the measures.
An option is to compare the "costs of taking measures to achieve good environmental status" with the benefits of implementing these measures. This will show whether there is a net-benefit (welfare gain) to society of implementing the measures and the magnitude of such net benefit. This comparison reflects the concept of economic efficiency.

2 Resources available for those that have to pay for MSFD implementation.
Another option is to compare the "costs of taking measures to achieve good environmental status" with the "ability to pay of those affected by the measures".

3 Costs of comparable measures in other locations.
Another option could be to compare the "costs of taking measures to achieve good environmental status" in one marine water with the costs of implementing the same measures in comparable marine waters or other comparable locations. This will show whether there are some specific conditions in this certain marine water that make the implementation of MSFD especially costly.

In the Water Framework Directive (WFD), the issue of disproportionate costs is also a possibility for exception (called exemptions in WFD). The issue of disproportionate costs was addressed briefly in the WATECO guidance. More detailed consideration of this issue is included in a recent guidance document developed under the WFD CIS process has been produced on this issue *"Common Implementation Strategy for the Water Framework Directive - Guidance Document on Exemptions to the environmental Objectives"*[12]. This document sets out that the disproportionate cost concept is based on a comparison of costs and benefits.

Analytical approaches

As mentioned in the interpretation of the concept, **a first option** is to compare the "costs of taking measures to achieve good environmental status" with the benefits of implementing these measures. This can only be done by carrying out an analysis of the economic benefits of implementing the measures.

This analytical approach can be inspired by the recent WFD guideline. According to this guideline, an analysis of the costs and benefits of the measures is necessary to enable judgement of the 'disproportionality exemption'. The text box shows some of the recommendations from the recent WFD guideline on exemptions:

Disproportionate costs

…given the uncertainty around estimates of costs and benefits one should bear in mind that,

- *Disproportionality should not begin at the point where measured costs simply exceed quantifiable benefits;*
- *The assessment of costs and benefits will have to include qualitative costs and benefits as well as quantitative;*
- *The margin by which costs exceed benefits should be appreciable and have a high level of confidence;*
- *In the context of disproportionality the decision-maker may also want to take into consideration the ability to pay of those affected by the measures and some information of this may be required*

Source: European Commission. 2009. *Common Implementation Strategy for the Water Framework Directive - Guidance Document on Exemptions to the environmental Objectives, page 13.*

The disproportionality issue can be analysed by looking at the cost benefit ratio (C/B) or the calculated Net Present Value (NPV). Following the WFD guideline, the C/B ratio should be considerably above 1 before exemptions should be

[12] European Commission. 2009. *Common Implementation Strategy for the Water Framework Directive (2000/60/EC) - Guidance Document No. 20 - Guidance Document on Exemptions to the environmental Objectives.* Technical Report 2009- 027.

granted. And qualitative benefits not considered in the valuation of the benefits should be considered as well.

The margin by which costs exceed benefits should be **appreciable** and have a high level of confidence[13], but the question is how much higher than one the C/B ratio should be to be appreciable. One interpretation is that in a situation where there is much uncertainty about the benefits or the costs, this margin should be of considerable magnitude to encompass this uncertainty, reflecting precautionary considerations, but if there is a smaller uncertainty on benefits and costs, this margin can be smaller.

As mentioned in the interpretation of the concept, **a second option** is to compare the "costs of taking measures to achieve good environmental status" with the "ability to pay of those affected by the measures". This analytical approach is also a possible interpretation option in the recent WFD guideline (see the last bullet in the above text box) *"the decision-maker may also want to take into consideration the ability to pay of those affected by the measures and some information of this may be required"*. An affordability analysis is closely connected to the results from the cost-effectiveness analysis of the programmes of measures (article 13, paragraph 3). It provides a lot of the information required to carry out the affordability analysis both when it comes to the costs of the measures and the choice of financial instruments. The choice of financial instruments matters for the distribution of the costs between the polluters. See also the list of required information in the section below "available data/tools".

The affordability analysis focuses on the direct financial burden that the implementation of the measures will give rise to, such as the percentage increase in the yearly operating costs of those that bear the financial burdens.

If the actors that pay for the measures experience a very high percentage increase in expenditures/prices, it might indicate disproportionate costs. The actors paying for the measures can be the agricultural sector, the fisheries sector, the oil sector, and certain public institutions all of whom may pass on expenditures to the consumers by tax increases or price increases.

The affordability issue can be solved by revision of the financial instruments to obtain another distribution of the costs. This can, on the other hand, be contrary to the polluter-pays principle.

For example, if the programme of measures for a certain marine water shows affordability problems because certain actors cannot afford expenditure increases, it may be useful to analyse the possibilities of spreading the costs of implementation or investigate alternative financing mechanisms[14].

[13] Page 13 in *Common Implementation Strategy for the Water Framework Directive (2000/60/EC) - Guidance Document No. 20 - Guidance Document on Exemptions to the environmental Objectives*. Technical Report 2009- 027. European Commission. 2009.

[14] Page 14 in *Common Implementation Strategy for the Water Framework Directive (2000/60/EC) - Guidance Document No. 20 - Guidance Document on Exemptions to the environmental Objectives*. Technical Report 2009- 027. European Commission. 2009.

As mentioned in the interpretation of the concept, **a third option** is to compare the "costs of taking measures to achieve good environmental status" with the costs of implementing the same measures in comparable marine waters or other comparable locations. However this approach is problematic as it does not include consideration of the benefits of the measures. High benefit values can outweigh high costs in one marine area. Without consideration of the benefits of measures, a measure could be deemed 'disproportionate' where it may be socially optimal to implement the measure as the benefits exceed the costs. If benefits were also included in this approach, then this option consists of using the first option in two different marine areas, and of comparing the NPV or C/B ratios in these two areas. If the government has to prioritise due to restrictions on the financial capacity (affordability), the ranking of the NPV or the C/B ratio can be used for prioritisation between two areas.

Methodological approaches

The **first interpretation option** - comparing costs with benefits:
The overall methodology is to analyse the cost-benefit ratio of the measures to protect the marine water (costs divided by benefits). It can only be carried out with a full economic analysis of both costs and benefits. The cost of the measures was estimated as a part of the cost-effectiveness analysis of the programmes of measures (article 13, paragraph 3). To compare the costs to the benefits of the measures, it is necessary to estimate the benefits of achieving good environmental status in the marine water, including both use and non-use values, as well as both market and non-marketed goods.

The **second interpretation option** - comparing costs with affordability of those paying for the measures:
The overall methodology is to use a financial analysis since it focuses on expenditures and net-returns of the sectors using the marine waters and on how they are affected financially by the implementation of the measures to fulfil the environmental targets. However, it is not enough to obtain aggregated costs of each measure in each sector, it is necessary to know which groups of society will ultimately incur the costs associated with the measure (ie will the costs be passed on?).

An affordability analysis of the measures requires information about:

1 The costs of measures

2 The financing instruments of measures (for example a measure is financed 90% by the fisheries sector and 10 % by Member States because of a subsidy)
3 The existing yearly expenditures in relevant sectors (fisheries, offshore, regional authorities, state level). For example, existing average expenditures per year in the fisheries sector (investments and operating costs). It is necessary to estimate how the costs of measures will increase the yearly expenditures of each actor.
4 A comparator to relate the expenditure increase to (for example the existing profit margin in the fisheries sector). This makes it possible to relate the expenditure increase and its effects on the yearly profit to this margin.
5 The possibilities of passing on expenditures/costs to other payers - such as consumers. The ability to do this depends on several issues (e.g. market structure, regulatory environment, competitiveness etc.)

The **third interpretation option** - comparing C/B ratios with the C/B ratios of implementing the same measures in comparable marine waters or other comparable locations. This assessment can be made using the same type of information as described in the first interpretation option above. It is important to compare with a marine area with similar characteristics when it comes to pressures, sectors, users, marine environment, or in other words areas where similar measures are relevant.

Available data/tools

The **first interpretation option** - comparing costs with benefits:
Data are needed to estimate the costs and benefits of fulfilling the environmental targets of the marine water.

The costs are available from the cost-effectiveness analysis of the programme of measures (article 13, paragraph 3). It might be necessary to adjust the cost data if they are calculated based on a financial analysis. The adjustment can encompass the relationship between market/factor prices and discount rates etc.

As mentioned above - in the section about *Economic analysis of the use of those waters* under "Available data/tools" - there are three ways of generating data for the estimates of the benefits. The three ways and the availability of data for each are described in more detail in that section.

The **second interpretation option** - comparing costs with the affordability of those paying for the measures:
Some of the data needed for the analysis of the affordability (ability to pay) for those affected by the measures are available from the cost-effectiveness analysis of the programme of measures (article 13, paragraph 3), such as the costs of each measure. Depending on the level of detail in the cost-effectiveness analysis, it might also include information about the financing of the measures. If not, it is necessary to collect information about how each measure will typically be financed in each sector to calculate how the cost are distributed on different groups (such as fisheries sector and state level - if subsidy). Furthermore, it is necessary to identify whether it is possible to pass on the costs to other payers, such as consumers (increased fish prices, oil and gas prices etc.), or whether the industry/sector has to bear costs alone due to the competitive situation. This is necessary in order to identify who will pay the final bill.

The **third interpretation option** - comparing costs with the costs of implementing the same measures in comparable marine waters or other comparable locations.

The same data are needed as those described under the first interpretation option, as well as information about the characteristics of the marine area for purposes of comparison. If only costs are compared, cost estimates from the cost-effectiveness analysis (article 13) can be used, but as mentioned above, this is a biased comparison, since benefits can vary accordingly and outweigh costs.

Advantages and disadvantages

It is an advantage of the **first interpretation option** ("cost-benefit ratio") that it, by being based on the concept of economic efficiency, will maximise social welfare (ie deliver socially optimal outcomes). Furthermore it is transparent when it comes to proving the disproportionate costs, and the directive highlights the im-

portance of robust documentation from the Member State using this exception *[..] provided that any decision not to take action is properly justified.* (Preamble 11) and it continues in article 14, paragraph 4 *"Where for either of these reasons, a Member State does not take any steps, it shall provide the Commission with the necessary justification to substantiate its decision, while…."*

It is a disadvantage that it is time-consuming and therefore expensive to carry out benefit estimations (values of improved water quality in a certain marine water).

It is a disadvantage that there is no clear guidance on how high the C/B ratio should be in order to document disproportionate costs. The recent WFD guideline only states that *the margin by which costs exceed benefits should be **appreciable** and have a high level of confidence. As mentioned this margin depends on the certainty of the benefits and costs.*

It is an advantage of the **second interpretation option** (affordability approach) that it may be easier to perform than the first interpretation option (cost-benefit analysis) since it only focuses on the costs of the measures and their impact on certain groups (sectors, public sector etc.). Most of the data are probably available from the cost-effectiveness analysis of the programme of measures (article 13, paragraph 3). However, as mentioned above, it might be necessary to supplement data with additional information and analyses of the financial instruments used to finance the costs of the measures and of how they might be passed on to other groups of payers.

On the other hand, it is a disadvantage of the affordability analysis that it lacks information about the benefits of the measures. This may mean that measures that are socially optimal ie benefits exceed costs are deemed to be 'disproportionate' and are not taken.

The affordability results may provide relevant information to decision-makers to take into consideration in the discussions about disproportionality.

The advantage of the **third interpretation option** is, if C/B or NPVs are compared across marine areas, that the resources used can be prioritised to the areas where the net benefits are highest. The disadvantage is that this has similar time and resource implications as the first option considered. If the comparison is done on cost data, the only advantage is that it is rather easy to collect data and that these data are collected for the cost-effectiveness analysis. The disadvantage is that inclusion of the benefits could change the ranking of areas considerably.

Links to literature

When it comes to the economic analysis of the concept *"disproportionate costs"*, the results of assessments of benefits through valuation of market and non-market services and goods are important. There is a lack of studies reporting monetary values of benefits of the marine waters. This is mainly due the limited knowledge of the causal relationship between the marine waters' biodiversity, ecosystem functioning and the provision of goods and services. This limits the capacity to assign monetary values to ecosystems and their marine goods and services of interest. Valuation is a rather new discipline, and this is also a cause for the lack of such results available for benefit transfers.

However, several of the sources in the literature show that much efforts have been devoted to identifying the existing goods and services of ecosystems and categorising them into four categories[15]. This is an excellent platform for moving towards a more operational classification system that links changes in ecosystem services to changes in human welfare.

The examples of monetary values of benefits mostly consist of use values such as the fishery sector and oil and gas extracted etc. since they are based on market prices, and therefore most accessible. However, to a limited degree monetary estimates have been obtained of the values for other goods and services of the marine water. However, in the case of the other goods and services, there is overrepresentation of recreational benefits of beaches and benefit values from coastal areas, which is not the focus of the MSFD. Only very few studies were directed towards value benefits of the open sea. See also chapter 8 and Annex 3.

5.4 Establishment of environmental targets (Art. 10)

The economic requirement in Annex IV is:

Economic requirement	Concepts
Annex IV, no (9) *Due consideration of **social and economic concerns** in the setting of targets.*	Social and economic concerns

Context

The economic requirement of Annex IV is very closely connected to the implementation of article 10 on the establishment of environmental targets. Annex IV consists of an *Indicative list of characteristics to be taken into account for setting environmental targets* (title of Annex IV). The list has 12 items that have to be taken into account when setting the environmental targets, and the economic requirement is only one of these 12 points.

The list in Annex IV has to be used in Article 10, paragraph 1 that reads as follows:

*On the basis of the initial assessment made pursuant to Article 8(1), Member States shall, in respect of each marine region or subregion, establish a comprehensive set of environmental targets and associated indicators for their marine waters so as to guide progress towards achieving good environmental status in the marine environment, **taking into account** the indicative lists of pressures and impacts set out in Table 2 of Annex III, and of **characteristics set out in Annex IV**.*

Concepts

Social and economic concerns

[15] 1) Supporting services (e.g. nutrient cycling, soil formations etc.), 2) Regulating functions (e.g. climate regulation, flood regulation, water purification), 3) Provisioning services (e.g. food, fresh water), 4) Cultural services (e.g. aesthetic, spiritual, recreational and other non-material benefits).

Interpretation of concepts	The annex lists a number of characteristics that should be taken into account when setting the environmental targets. One of the characteristics is that social and economic concerns should be taken into account when setting the targets. The sum of the listed characteristics can be seen as a design guide for the targets. They are not just meant to apply to each target in isolation but to the sum/combination of targets. One option is to interpret the social and economic concerns as taking into consideration the lessons learned from the economic analysis in the initial assessment (article 8 (1c)) when setting the environmental targets. The economic analysis of the "use of those waters" provides important results about the users that are most economic dependent on the water resource. These users are consequently those that are most affected by the severity of the environmental targets being set. These sectors correspond to those that exert high pressures on the marine water and the ones that will have to implement the new MSFD measures to reduce pressures. However, it should be noted that these sectors might also experience economic benefits from the environmental targets in the long run (for example if the fisheries sector is rewarded by increasing fish stocks in the long run).
Analytical approaches	The consideration of meeting social and economic concerns can for example be taken into account by analysing the following issues in the target setting process: • Existing targets, national as well as European • Existing measures, national as well as European. • The existing requirements (targets and measures) and their economic impact on the sectors affected • Impact on users economically and socially. Analysing these aspects, from a shorter as well as a longer perspective, will ensure that the environmental targets are discussed and set based on full awareness of the economic pressures already facing the important users/sectors in the initial situation.
Methodological approaches	The methodological approach could be to make a checklist as the one above, including economic questions for consideration in setting the environmental targets, such as existing requirements and the economic and social impacts they have on certain sectors.
Available data/tools	Existing national analyses and knowledge of relevant ministries on these sectors (for example Ministry of Fisheries, Ministry of Tourism, Ministry of Energy etc.).
Advantages and disadvantages	It is advantageous to consider the economic and social consequences of environmental targets (and their severity) might have on certain sectors in shorter and longer time perspective respectively. It is an advantage to be aware of the interdependence between the severity of the environmental targets and the economic situation of certain sectors or groups.

5.5 Links between requirements

This section illustrates some of the identified links and correlations between each of the explicit economic requirements in the MSFD and explains how the economic analysis in each of the requirements provides data and information for each other.

Figure 5-2 illustrates examples of how the economic analyses related to each explicit requirement can be used as input to other requirements. The figure illustrates examples of links between the economic requirements described in this chapter. It gives examples of where it is beneficial to carry out a thorough analysis because the results can be used as input to the other economic analyses.

The first column refers to the context in the directive of the explicit requirements.

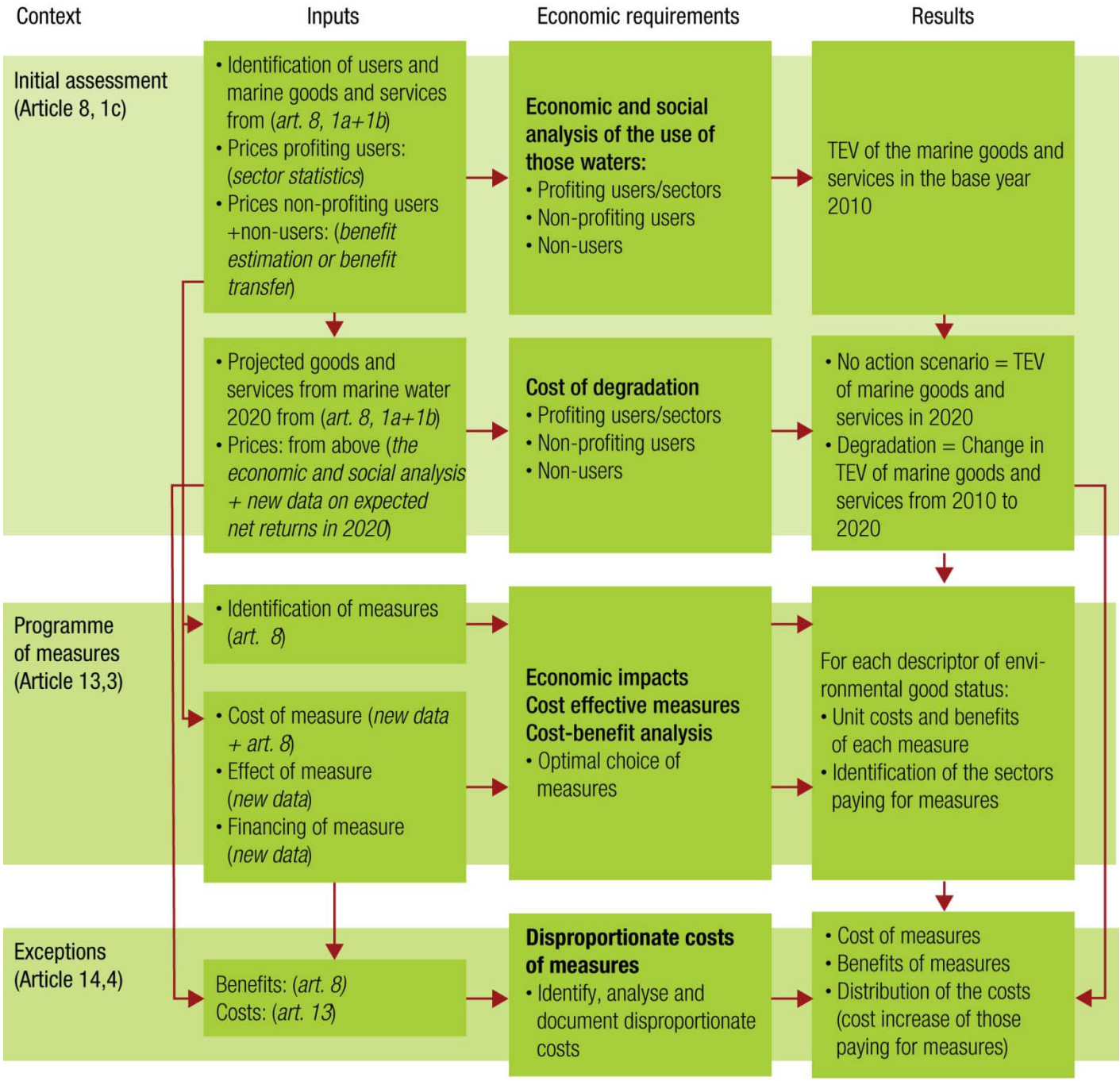
The second column shows the input and data needed to carry out the economic analysis. Furthermore it is indicted which data that can be used as input in the next economic analyses.

The third column represents the formulation of the requirements in the directive.

The fourth column shows a **non-exhaustive** list of examples of results and outputs of the economic analysis. As the arrows between the boxes in the fourth column indicate, the results of the economic analysis in the initial assessment will give inputs to the other economic analyses. These links are illustrated by arrows.

For example the results from the "economic and social analysis of those waters" will provide direct inputs to the estimation of the "costs of degradation" as it provides the economic results for the base year (2010). The cost of degradation analysis will include the time perspective and thereby identify possible gaps in/loss of environmental status, which in turn indicates which measures that need to be taken to prevent degradation. Therefore, the combined results from the two economic analyses of the initial assessments provide important inputs to setting up the programme of measures and to the economic analysis of exceptions.

Figure 5-2 *Illustration of **examples of link**s between the explicit economic requirements in MSFD*



6 Implicit economic requirements

This chapter contains the results of the screening and assessment of each of the implicit economic requirements. Implicit economic requirements are requirements where economic analysis or principles are not explicitly referred to in the MSFD text but where economics may be necessary and/or useful in meeting the particular requirement beneficial.

6.1 Programmes of measures

The implicit economic requirements when making the programme of measures are:

Economic requirement
Preamble no. 27 *[..] Those measures should be devised on the basis of the precautionary principle and the principles of preventive action should be taken, that environmental damage should, as a priority, be rectified at source and that the **polluter should pay.***
Annex VI, no (6) *[..] **Economic incentives**, ….., in the economic interest of those using the marine ecosystems to act in ways which help to achieve the good environmental status objective.*

6.1.1 Polluter should pay (Preamble no. 27)

Context

Preamble no 27 is connected to the implementation of the programmes of measures. Preamble no 27 says:
*Member States should then establish and implement programmes of measures which are designed to achieve or maintain good environmental status [..]Those measures should be devised on the basis of the precautionary principle and the principles of preventive action should be taken that environmental damage should, as a priority, be rectified at source and that the **polluter should pay.***

Concepts

Polluter should pay (Polluter Pays Principle=PPP)

Interpretation of concepts

The "polluter pays principle" (PPP) states that the party responsible for the pollution should pay for the damage done to the natural environment. It should be noted that the application of the PPP may not be consistent with adopting the most cost-effective measures, e.g. in the case where the most cost-effective action may be by the sector that is not the polluter.

Analytical approaches

In preamble 27 it is mentioned that the measures should be devised on the basis of the precautionary principle, the damage should be rectified at source and the polluter should pay. According to the polluter-pays principle, the actors causing the damage should pay the costs of damage, or pay the costs of avoiding the damage by implementing measures. This requires either an estimation of the damage or an estimation of the costs of the necessary measures to avoid the damage.

There are different ways of identifying the level of damage from each polluter, these are discussed below. There are several examples, representing different levels of analytical requirements:

- Damage cost estimation. Estimating the monetary value of the damage caused by each polluter.

- Proportion of expenditures. In the initial assessment, the pressures and impacts on marine waters are identified, including the activities and sectors generating these pressures. This provides a good basis for identifying the main polluters and consequently the sectors that need to pay for the pollution by financing some of the measures. According to the polluter pays principle, if a certain sector is causing 90 per cent of the degradation in a certain marine water good (for example reduced fish stocks), it is an indication that this sector should pay the highest proportion of expenditures in the programme of measures when it comes to measures improving this good (fish stock).

- Avoidance costs. One could try to estimate the costs of avoiding the damage from each source. This could be done by first identifying the necessary measures to avoid the damage and then by estimating the costs of these measures. For example, what are the necessary measures to avoid pressure from the fisheries sector on the fish stocks and the number of species? According to the "polluter pays principle", the fisheries sector should pay for these measures in the programme of measures.

- Equivalent methodology. One could try to design the measures in a way that enables the use of the equivalent methodology. This approach does not require monetary estimates of the damage, but is based on physical estimates (types and number of fish species etc). If for example an oil and gas company seeks permission to build a new drilling platform, a careful analysis of the environmental impacts on the marine water needs to be made. As part of the permission it could be demanded that the oil and gas company compensate this damage by paying for the improvement of for example the fish stock and species in another area of the marine water, if this is possible, and thus an equal fish stock with the same species can be established.

The polluter-pays principle could be used when designing the combination of measures and the dosing of each measure in each sector. The polluter-pays principle should be integrated into the design of the programmes of measures, and the financial mechanisms (economic instruments) could be used to distribute the costs between the polluters. In this context, a conflict may arise between the polluter-pays principle and the above-mentioned affordability issue (in section 5.3 about disproportionate costs).

Methodological approaches

In order to implement the Polluter pays principles, information on the impact of the pollution from the different sources is needed, along with the pollution loads and the resulting effects on the environmental quality and the environmental goods and services (e.g. the provision of clean water for tourists, fish species for anglers, clean water for cruisers and the knowledge that the water quality is good (existence values)). The necessary data can therefore be narrowed down to data on pollutant loads (different pollutants) from each source (sector), and how their pollutant loads affect the environmental goods.

Available data/tools

The same data are applied as those collected for the cost-effectiveness analysis, such as:

- The initial pressures/loads of each sector on the marine water
- The cost of measures
- The effects of measures (on the relevant descriptor)
- The resulting cost-effectiveness curve and optimal dosing of each measure

See also "Available data" under article 13, paragraph 3.

When it comes to the "full damage cost estimation" one could use the same data as collected for the economic analysis in article 8, paragraph 1c *"cost of degradation"*. The damage costs can be split among the different polluters (sectors) according to their localisation, their pollutant loads (including which pollutants) and the effects of these pollutants on the environmental quality.

Advantages and disadvantages

When it comes to the "damage cost estimation" it is an advantage that it estimates the total damage costs caused by the polluters, including all use and non-use values. This will give the theoretically correct basis for passing on costs to the polluters.

The disadvantage is that it might be difficult to obtain pollutant loads from each sector, and that there is a lack of data and models for modelling and estimating the effects of pollutants on certain species and the species distribution.

When it comes to the other three types of analysis (proportion of expenditures, avoidance costs and equivalent methodology) it is possible just to analyse the pressure data from each polluter combined with the results of the cost-effectiveness analysis. This will provide a good basis for discussing whether the polluter-pays principle is fulfilled. If not, it might result in a different dosing of the measures due to the polluter-pay principle, as well as the use of financial instruments to ensure that the polluter pays (taxes, subsidies etc).

6.1.2 Economic incentives (Annex VI, no (6))

Context

The programme of measures in article 13, paragraph 1 says: *"Those measures shall be based on the initial assessment …..and taking into consideration the types of measures listed in Annex VI"*. Annex VI is a list of eight types of measures that should be taken into consideration when making the programmes of measures. One of the measures listed is: "*Economic incentives: management measures which make it in the economic interest of those using the marine ecosystems to act in ways which help to achieve the good environmental status objective*."

Economic incentives are measures that through different economic mechanisms encourage certain, but voluntary behaviour. The changed behaviour that follows from the measures is voluntary compared to the forced change in behaviour that follows from administrative measures like a mandatory law based prohibitions or commands.

Analytical approaches

For example, the initial question that needs to be answered is why the desired changes in certain sectors do not take place today? If, for example, there is a need to make trawlers change from one type of equipment to another, predefined type - why does this not happen? What are the economic and other barriers? How can they be overcome by incentives? It may be that the catch of fish is the same with both types of equipment, but the desired equipment is more expensive than the existing equipment. In this case, it may be possible to impose a tax on the less environment-friendly equipment that makes it more expensive than the environment-friendly equipment. Similarly it is possible to make a revenue neutral tax differentiation where a tax is imposed on the less environment-friendly equipment and, at the same time, a subsidy (price reduction) is given to those buying the desired equipment. This would give the fishermen an economic incentive to buy the environment-friendly equipment when reinvesting.

Methodological approaches

When having identified a set of possible economic measures, it is important to make a thorough cost-effectiveness analysis of these measures - as it is done for all the measures in article 13, paragraph 3.

Furthermore, it is necessary to analyse whether there are any implementation barriers to these measures - as well as to other measures - since there might be certain barriers such as EU law (trade barrier) and border trade barriers if for example one country imposes taxes on equipment that is not taxed in other countries.

Advantages and disadvantages

It is an advantage to invest some effort in identifying and analysing possible economic incentives that incentivise certain behaviour since they might be more cost-effective than other types of measures. The advantage of economic incentive measures is that the market decides the optimal allocation of resources compared to "command and control" measures (administrative and regulatory interventions). If the common incentives are developed and implemented among all countries around a regional sea this would further strengthen the advantages.

6.2 Member State exceptions

The implicit economic requirements in article 14 are:

Economic requirement
Preamble no. 30 *[..] or because actions which that Member State has itself taken for reasons of **overriding public interest which outweigh the negative impact on the environment.***
Preamble no. 32 *[..] actions taken for **overriding reasons of public interest,** the Commission should assess whether modifications or alterations made to the marine environment as a consequence do not permanently preclude or compromise the achievement of good environmental status in the marine region.*
Art. 14, paragraph 1d *[..] modifications or alterations to the physical characteristics of marine waters brought about by actions taken for reasons of **overriding public interest which outweigh the negative impact** on the environment.*

Context

Article 14 expresses the Member States' possibilities to have an exception from the obligation to take measures to achieve good environmental status. Article 14, paragraph 1d says that the Member States can have an exception if there are "overriding public interest which outweigh the negative impact on the environment". This exception is one of several options for Member States' exceptions.

Article 14 - Exceptions - says:

1) A Member State may identify instances within its marine waters where, for any of the reasons listed under points (a) to (d), the environmental status cannot be achieved in every aspect through measures taken by that Member State, or, for reason referred to under point (e), they cannot be achieved within the time schedule concerned:
(a) action or inaction for which the Member State concerned is not responsible
(b) natural causes
(c) force majeure
*(d) modifications or alterations to the physical characteristics of marine waters brought about by actions taken for reasons of **overriding public interest which outweigh the negative impact on the environment** [..]*
(e) natural conditions which do not allow timely improvement in the status of the marine waters concerned.

4) Member States shall develop and implement all elements of the marine strategies [..], but shall not be required [..] to take specific steps where there is no significant risk to the marine environment, or where the costs would be disproportionate taking account of the risks to the marine environment, and provided that there is no further deterioration.

Where for either of these reasons, a Member State does not take any steps, it shall provide the Commission with the necessary justification to substantiate its decision […]

Concepts

Overriding public interest which outweigh the negative impact on the environment

Interpretation of concepts

This concept is one of several exception options that may be used by MS when they are developing Marine Strategies to achieve the environmental targets or good environmental status. It is relevant in situations where modifications or alterations have been made to the physical characteristics of marine waters. The challenge is to understand and interpret the exception, such as what is an overriding public interest in order for it to be important enough to outweigh the negative impacts on the environment? The text seems to suggest a comparison of the public interests that are fulfilled by the modification/alteration of the marine water with the negative impacts on the environment that it implies.

Economic analysis may have a role to play in the definition of overriding public interests since it might be useful to know the economic value of these activities in order to argue for their importance of public interest. The economic analysis is the most relevant type of analysis to document the value of the public interest activity (infrastructure etc.), since it includes all the impacts of an activity (included non market impacts) .

Examples of modifications or alterations of the physical characteristics (taken for reasons of public interests):

- Establishment and maintenance of bridges
- Establishment and maintenance of windmills
- Establishment and maintenance of oil and gas pipelines
- Establishment and maintenance of communication cables
- Establishment and maintenance of artificial islands for example for infrastructure projects
- Gravel digging at the bottom of the sea
- Establishment and maintenance of channels/fairways
- Water regulation (e.g. establishment of facilities to prevent flooding)
- Coast protection facilities.

Some of these activities might come within the category of public service obligations (energy supply, transport supply). Each Member State will identify the modified and altered marine waters or subareas of these in the Initial Assessment in article 8.

Analytical approaches

Economic analysis can be used to illustrate whether the benefits of modifications or alterations due to public interests exceeds the benefits that would have been generated if the marine water had not been modified.

The analytical approach is to carry out a cost-benefit analysis of the modification/alteration of the physical characteristics of marine waters.

The benefits of the modification (market- and non-market, e.g. the value of off-shore windmill parks) can be compared to the marginal cost of the modification (e.g forgone environmental benefits of fulfilling the environmental good status).

Modifications will be optimal from a social welfare perspective if the benefits of the modification exceed the costs of the modification (e.g. forgone environmental benefits). This can be useful as information to provide an analytical basis for the consideration of 'overriding public interests'.

Methodological approaches

A possible methodological approach could include an assessment of the benefits of the modified water and the specific activity (of public interest). The benefits can be estimated by undertaking a new valuation study of the specific marine water and the certain activity or by using relevant existing benefit estimates (benefit transfer).

The application of exceptions needs to be based on sound evidence. This could be done by an environmental impact assessment which includes both the economic analysis and an environmental analysis.

Available data/tools

There are two ways of generating data for the estimates of the benefits. The availability of data for estimating the forgone environmental benefits is more thoroughly described in section 5.1.1 and 5.1.2, "available data/tools". However, as mentioned in chapter 5.1.2 (economic and social analysis of the cost of degradation) in the section about "available data/tools" and "links to literature", which indicates that it might be difficult to find existing studies that can be used for benefit transfer of the assessments of the benefits of the marine waters. Consequently, it might be difficult to find existing studies to use for benefit transfer.

The availability of data for estimating the benefits of the public interest activities has to be found in literature about the relevant sectors (such as economic valuation of bridges, wind-mills and oil and gas pipelines).

Data for estimating the benefits of the public interest activities listed above might also be found in Environmental Impact Assessments (EIA) or Economic Impact Assessments. EIA is needed for all the examples of public interest activities listed above, and includes both environmental and economic analysis of the activity (bridges, windmills etc.).

Advantages and disadvantages

It is an advantage to have an estimate of the economic value of a certain modified marine water area and the activity of public interest as this would provide a consistent and transparent way to argue for the importance of that activity (overriding public interest).

It is an advantage to use the economic analysis to document the value of the pulic interest activity/infrastructure etc. since it includes also the non-market values such as the value of public service obligations (bridges, communication cables etc.).

It would be a helpful for a guidance document with examples of modifications or alterations to the physical characteristics of marine waters brought about by actions taken for reasons of overriding public interest. This would narrow the interpretation options for this exemption option and further the need for economic

documentation of overriding public interest. Denmark has for example published guidance for the purposes of the WFD including a special section that delimi-nates the types of modified water bodies that should be defined as heavily modi-fied by giving examples of these.

6.3 Community Financing (Art. 22, 1+2)

The implicit economic requirements in relation to community financing of the implementation of MSFD are:

Economic requirement
Article 22, paragraph 1 *[..] the implementation of this Directive shall be supported by existing **Community financial instruments** in accordance with applicable rules and conditions.*
Article 22, paragraph 2 *The programmes drawn up by the Member States shall be **co-financed by the EU** in accordance with existing financial in-struments.*

Context

The possibility of using Community financing instruments to finance the implementation of MSFD (the marine strategies and their measures).

Concepts

These articles highlight the need for Member States to focus on the possibilities of financing or co-financing some of the expenditures of the programmes of measures by EU financial instruments.

This could be fisheries grants and agricultural payments, support schemes for municipalities waste water treatment etc. LIFE, LIFE + and ++ are support schemes and financial instruments of relevance as well. In accordance with such programmes, there might be several EU financial instruments/programmes that have "environmental purposes" as one of the criteria for receiving support, with different implementation practices in different countries and regions. For exam-ple, it may have been a tradition to assign a certain amount of an EU pro-gramme/support to the criteria of environmental purposes and other amounts to other criteria (regional/local economic growth); this has been the case with agri-cultural payments and EUs Structural Funds.

As part of complying with this requirement, Member States could consider whether the existing practice on the use of the EU financing could be changed in order to improve the financing of measures of the Marine Strategies, e.g. changes in the weights of the "environmental purpose criteria" of a financing programme.

It is an advantage to make this analysis since it helps identify financing instru-ments for the programmes of measures. Any effort to use the possibilities of ex-isting EU support mechanisms (financial instruments) reduces the financing pressure on other actors in the marine region (users/actors, sectors, public sector

and tax payers etc.). It might also enable certain measures to be implemented that would otherwise not have been possible.

7 Policy areas, institutions and organisations

This chapter identifies the policy areas that are closely linked to the economic requirements of the MSFD. These policy areas are described and assessed in terms of their links to the economic aspects of the MSFD. This chapter also identifies the institutions and organisations that are closely linked to the implementation of the economic requirements of the MSFD identified in section 7.2. The need for coordination with these institutions/organisations is assessed and described.

It should be noted that this assessment is an initial assessment given the early stages of implementation of the MSFD. As the understanding of the MSFD develops as implementation progresses, it is likely that other relevant policy areas, institutions and organisations will be identified. In addition, the links and nature of the links with MSFD may also change. The output of this assessment should therefore not be considered as definitive in terms of MSFD implementation, rather it should be considered an initial assessment only.

7.1 Related policy areas

The related policy areas are listed in Annex 2, where each of the policy areas and links to the MSFD are assessed. This chapter sums up the main conclusions based on the information in Annex 2.

The identified policy areas that are strongly related to the MSFD can be divided in three categories:

1. EU policies/directives

2. Conventions for protection of specific Seas (Baltic sea, North East Atlantic, Black Sea, Mediterranean Sea)

3. International/global conventions of the seas.

EU policies/Directives
EU's Fisheries Policy has a strong link to the MSFD since the activities in this sector represents a key pressure and impact on the marine waters. In addition, the Common Fishery Policy (CFP), including the current review[16] would need to be taken into account in the specification of the baseline for economic analysis associated with the MSFD. Also, any economic analysis of fishery policy actions-/measures/instruments to manage fisheries - such as impact assessments and

[16] http://ec.europa.eu/fisheries/cfp/review_en.htm

other studies that analyse the effects of this policy – and information gathered as part of the regulation of the sector could provide valuable information and data to undertake the economic analysis in the MSFD (such as the cost-effective analysis, the economic analysis of the use of those waters and the cost of degradation).

The Integrated Maritime Policy (IMP) for the European Union is an approach driven by the recognition that there is a maritime dimension to virtually every major issue facing Europe today, including energy, climate change, environmental protection and conservation, research and innovation, competitiveness and job creation, international trade, transport and logistics. The integrated maritime policy integrates these so-called marine sector policies (energy, climate change, environmental protection and conservation, research and innovation, competitiveness and job creation, international trade, transport and logistics) with the aim to provide "an effective means of achieving coinciding policy goals and cost-efficient solutions"[17]. As part of this policy, a decision was made to develop a database on Community funding available for maritime projects and coastal regions as well as a database on socioeconomics of maritime sectors and coastal regions. These activities have strong links to the economic elements of the MSFD, such as the cost-effectiveness analysis and the economic analysis of the use of those waters.

The MSFD is the environmental pillar of the IMP, and the initiatives and measures in the IMP influence the implementation of the MSFD and vice versa. For example, the ongoing development of Integrated Maritime Spatial Planning should be closely linked to the implementation of the MSFD, and therefore there is a need to coordinate actions between these areas. The focus of IMP is on international collaboration or at least coordination as the waters are linked to each other, as it is not possible to isolate marine waters. The issues that IMP plans to address has many overlaps with the MSFD, such as the ecosystem approach, develop an interface between science and policy, reliable and comparable statistics. There is a link to the cost-effectiveness analysis in MSFD, since the IMP could provide information and data to undertake the cost-effectiveness analysis in MSFD. Due to the IMP, Eurostat has started a cross-sectoral work programme on socio-economic statistics covering maritime sectors and coastal regions. In addition, the IMP could provide valuable sector information which would assist in the initial assessment if such information is gathered as indented.

The EU's Common Agricultural Policy targets land-based sources of pollution and pressures. This policy mainly affects waters falling under the Water Framework Directive (WFD), which covers ground water, surface water and coastal waters up to one nautical mile from land. However, there might be important effects on the oceans and marine waters (more than one nautical mile from land) because nutrients and other emissions from land-based sources may be transported from the coastal areas to the open sea. Therefore, measures for nutrient emission reduction in the agricultural sector may also affect the eutrophication level in marine waters. Consequently, it is important to coordinate the WFD and MSFD policies and measures to take account of the effects both in coastal areas and in open sea regions.

[17] COM(2008)395 final, Guidelines for an integrated approach to Maritime Policy: Towards best practice in integrated maritime governance and stakeholder consultation

There are also important links from the Natura 2000 Directive, the Birds Directive and the Habitats Directive to the MSFD, particularly as regards the Habitats Directive. The policy instruments provided by these directives are important measures for meeting the targets of the MSFD (e.g. designation of protected areas in marine waters). These directives are strongly linked[18] with the economic elements of the MSFD. There is a link because these directives are important possible measures to contribute to the achievement of MSFD objectives. Therefore any economic analysis of habitat policy actions/measures - such as impact assessments and other studies that analyse the effects of these directives - can provide valuable information, data and methodology to undertake the economic analysis in the MSFD (such as the cost-effective analysis). Furthermore, if there is an economic analysis of "costs of no-action" in this field (habitat directive) it can provide data for the economic analysis in the MSFD (ie cost of degradation)[19].

Regional Sea Conventions

The MSFD requires regional cooperation (Article 5 (2)), and Article 6 specifically refers to the Regional Sea Conventions *"…MS shall, where practicable and appropriate use existing regional institutional cooperation structures, including those under Regional Sea Conventions…"*, Thus, the four conventions and the MSFD are closely linked since the action plans to improve the environment in these four seas is an important part of attaining the environmental objectives of the MSFD. There is a need to coordinate actions and measures agreed upon under the management of these four conventions and the future MSFD measures in these marine waters.

The web pages of the Conventions mostly contain reports on the status and monitoring of the environment and the level of pressures from the different sectors/sources and relatively few economic analyses. The exception is the Baltic Sea Convention (HELCOM) which has a stronger focus on economic analyses and the subsequent use of results as inputs to the development of a cost-effective Baltic Sea Action Plan (BSAP). These economic studies are very relevant to the economic elements of the MSFD. These studies provide data and methodology to undertake the economic analysis in MSFD, especially for the cost-effectiveness of programmes of measures and the economic analysis of the use of those waters, but also for the benefit analysis. However, the economic studies have focused more on reducing eutrophication and less on the improving the other water quality descriptors in the MSFD. HELCOM has also recently published an holistic

[18] For the Birds Directive the link is not assessed as "strong" but only as a "link" since it is a one-direction link whereas links between the other directives and MSFD are in both directions. The MSFD affects bird protection, but bird protection policies do not necessarily affect the marine environment (since bird protection areas are mainly designated in coastal zones not covered by the MSFD). In the Habitats Directive the designation of protected areas are both on land and open seas creating a link from measures taken under the Habitats Directive to the marine environment (assuming that there are restrictions on the use of the designated areas).

[19] Since it might have specific information about the development in the habitat areas in open seas, if no further actions are implemented (the baseline situation).

assessment of the Baltic Sea health, as a base for the MS Initial Assessments under the MSFD[20].

Recently, a study was undertaken that focused on the socio-economic analysis within a MSF for the OSPAR region, including a literature review of the economic analysis approaches used in OSPAR countries. This study is still ongoing[21]. Several important conclusions can be drawn from this literature study (see the seven bullets in Annex 3 in the column "comments"); one being that the majority of studies reviewed are economic approaches focussing on human activities and the financial impacts associated with marine resource usage, while only a minority of studies investigates the full economic implications.

International Conventions
There are strong links between "the United Nations Convention on Law of the Sea" (UNCLOS) and "the Convention on Biodiversity" (CBD) and the MSFD. The first mainly focuses on the international coordination of monitoring activities for the oceans/marine waters, but it also coordinates socio-economic information. The second has an important overview of studies of benefits of marine biodiversity (and the goods and services it provides), that could be useful for the assessment of benefits for such aspects as cost of degradation, disproportionate costs etc.).

7.2 Relevant institutions and organisations

This section covers the identification of relevant institutions and organisations involved in implementation of the MSFD. In addition, the possible role(s) that these institutions will play in terms of the economic elements of the MSFD is outlined.

The findings are presented in the table below.

[20] Ecosystem Health of the Baltic Sea 2003-2007 – HELCOM Initial Holistic Assessment (2010) Baltic Sea Environment Proceedings No 122

[21] R. K. Turner, D. Hadley, T. Luisetti, V. W. Y. Lam and W. W. L. Cheung. Report to OSPAR Working Group on Environmental Impact of Human Activities, commissioned by Defra, UK. Draft Final 2010. *Socioeconomic assessment within a marine strategy framework -Draft version.*

Table 7-1 Relevant institutions and organisations.

Institution	Degree of involvement in implementation	Coordination of economic elements in MSFD	Lack of coordination
EU	Full involvement	1) Very strong need for coordination of EU policies/directives. 2) Important to coordinate both financial analysis (typical sector analysis) and economic analysis (cost-benefit/cost-effectiveness) in order to ensure a broader focus, including e.g. transboundary considerations, benefits/spill-over to other sectors.	1) If financial analyses are only carried out for separate sectors and not coordinated it might lead to a suboptimal solution for the marine environment. 2) A risk of doing the same kind of economic/financial analysis twice. 3) If there is a lack of coordination, it will not be possible to make comprehensive economic/financial analyses for common waters (transboundary waters) in order to secure a cost-efficient mix of measures. This might conflict with the politically acceptable cost allocation of measures.
EU Member States	Full involvement	1) Very strong need for coordination of both national policies and EU policies/directives between Member States. 2) Important to coordinate both financial analysis (typical sector analysis) and economic analysis(cost-benefit/cost-effectiveness) to ensure broader focus, including e.g. transboundary considerations, benefits/spill-over to other sectors.	
UN UN/UNEP UNESCO	Depending on how each Member State participates. There might be some monitoring issues that can be useful to coordinate when implementing the MSFD.	Valuable information from monitoring data as input to cost of degradation analysis and baseline consideration.	
HELCOM OSPAR The Black Sea Commission/The Bucharest Convention The Barcelona Convention	Depending on how each MS decides to use these institutions in implementing the MSFD. These institutions might be used as a forum for coordination between Member States of implementation of the MSFD	1) Strong need to make existing and ongoing analysis, data and important knowledge - important for economic/financial analyses - available. 2) Common responsibility (EU, MS, conventions) of exchanging information. HELCOM and the North Sea states have decided on common action plans (The Baltic Sea Action Plan (http://www.helcom.fi/BSAP/en_GB/intro/) and the Bonn Agreement (http://www.bonnagreement.org/eng/html/welcome.html) that serve as more or less binding obligations on the member states.	

The implementation of the MSFD mainly involves the EU and the Member States. The implementation is mandatory for EU Member States. However, each country's degree of involvement in implementation of the Conventions is voluntary, and different degrees of involvement are therefore observed.

8 Overview of literature

This chapter sums up the main conclusions from the review of the identified literature in this field. A non-exhaustive list of literature that is relevant to the economic aspects of the MSFD was completed. The list of literature is presented in Annex 3.

The purpose of this task was **not** to undertake a standard detailed literature review, **rather** the focus was on identifying relevant literature and carrying out a brief scan of each source to identify whether it contains valuable information, inputs and data for the specific economic requirements in MSFD. The main focus in this study has been to elaborate a list of relevant literature, and that is the key output of this exercise. The review focused on assessing the relevance to the economic requirements and economic concepts identified in the chapter 5 and 6.

The most significant conclusions are presented below. Annex 3 contains more information about each of the specific sources (literature/studies/research projects).

Many of the studies and reports contain valuable information, inputs and concrete data that could be used in the *"economic analysis of the use of those waters"*. There are many examples of monetary values of the benefits that the main sectors/users obtain from using the marine resources, such as revenues/earnings in the fishery sector, offshore oil and gas sectors, tourism sector etc.

There is a lack of studies reporting monetary values of benefits of the marine waters. This is mainly due the limited knowledge of the causal relationship between the marine waters' biodiversity, ecosystem functioning and the provision of goods and services. This limits the capacity to put monetary values on ecosystems and their marine goods and services of interest.

However, several of the sources in the literature show that significant effort has been put into identifying the existing goods and services of ecosystems and categorising them into four categories[22]. This is an excellent platform for moving towards a more operational classification system that links changes in ecosystem services to changes in human welfare. One of the sources goes a step further and shows a detailed but non-exhaustive list of goods and services in each category (UNEP/WCMC and HERMES (2007)). The study performed by the Swedish

[22] 1) Supporting services (e.g. nutrient cycling, soil formations etc.), 2) Regulating functions (e.g. climate regulation, flood regulation, water purification), 3) Provisioning services (e.g. food, fresh water), 4) Cultural services (e.g. aesthetic, spiritual, recreational and other non-material benefits).

EPA in 2008 also provides a detailed overview of the ecosystem services and goods in the Baltic Sea.

The examples of monetary values of benefits mostly consist of use values such as the fishery sector and oil and gas extracted etc. since they are based on market prices, and therefore most accessible. However, only to a limited degree have monetary estimates have been obtained of the values for other goods and services of the marine water.

One of the sources (from 2002[23]) contains an overview of world wide examples of monetary benefit values of ocean and coastal resources. It indicates that there is a bias towards studies focusing on recreational benefits (especially beaches) and located in USA. Since coastal waters and beaches are not covered by the MSFD (but the WFD), these studies are not very useful for the purposes of MSFD implementation. There are a number of studies placing a value on the benefits from coastal areas, which is not the focus of the MSFD.

In a recent, ongoing study (Turner et al., draft 2010), the valuation literature with relevance for marine waters is scrutinized, providing a valuable overview of this literature and results. The Swedish EPA also made such an overview of the Baltic Sea, indicating that most studies in this region also covered coastal zones and inland waters, and that only few national or Baltic studies were directed to the open sea.

Many of the studies and reports described in Annex 3 contain valuable information, inputs and concrete data on the *"Cost effectiveness analysis of the programmes of measures"*. They present concrete and quantitative results on the cost effectiveness of measures for reducing nutrients and eutrophication in the Baltic Sea and Southern North Sea. On the other hand, there are no cost-effectiveness analyses of measures that are relevant to the other 10 descriptors of good environmental status in the MSFD (annex 1). There is a need to identify relevant measures targeting the other descriptors and to carry out cost-effectiveness analyses of measures to obtain good status of these descriptors.

[23] Ledoux, L. and Turner, R.K. 2002. *Valuing ocean and coastal resources: A review of practical examples and issues for further actions.*

9 Other issues relating to the economic aspects of the MSFD

A number of other issues were identified as needing to be considered in this study. These issues are addressed in the following section.

Identify the relevant economic issues relating to the monitoring requirements of the Directive. This will include identifying the approaches to assess, particularly quantitatively, the costs and benefits of monitoring activities

The question is how a cost-benefit analysis of a monitoring programme would be undertaken (e.g. what methodologies would be used) and what are the possible methodologies for assessing the costs and benefits of monitoring programmes.

To assess the **costs,** it is typically necessary to estimate

- Cost of monitoring equipment (ships/boats, measuring equipment, computer systems to register and analyse measure results, reporting systems for results)

- Manpower needed (number of employees, types of employees such as biologists, laboratory technicians etc, full-time/part-time, annual costs of staff by category etc.)

- Cost of establishing an administrative system to coordinate nationally or regionally all monitoring data from each marine water, and to analyse and report on the necessary results to authorities and the EU. It is also necessary to ensure compatibility with other countries' monitoring systems within the same marine water/marine region etc.

- Frequency of monitoring.

Estimating the costs of the required monitoring programmes involves several steps:

1. Identify the marine regions and subregions and identify the countries that border on the same marine waters/marine regions.

2. Identify and specify the requirements of the monitoring programme based on the Annex V of the MSFD

3. Identify to what degree the existing monitoring programmes in each country already fulfil these requirements. This leads to a list of gaps

4. Identify possible solutions to close the gaps. Such as 1) implementing new systems in each country, 2) adjusting and expanding existing systems in each country combined with a common new system that uses the monitoring results from each country and generates the required coordinated and consistent monitoring results to the EU, etc.

5. Estimate the costs of each solution (including all costs bulleted above). Remember only to include the extra marginal costs compared with the present situation (baseline).

To assess the **benefits**, it is necessary first to identify the possible benefits. Some might be:

- Monitoring results render it possible to make a more precise analysis of the fulfilment of overall and specific environmental targets and the distance to the target

- Monitoring data can be necessary to obtain information on the link between pollution loads, the environmental status and the environmental goods and services in the marine environment

- Some kind of "ex-post" assessment of the dose-response of measures as compared to the assumed response when making the first programme of measures

- Combining the above listed benefits with the cost information on measures allows for timely adjustment of the dosing of measures to provide for constantly improved cost effectiveness

- It makes it possible continuously to make a more cost effective mix of measures.

No existing work on assessing these benefits quantitatively and in monetary terms was found. However, one possibility is to use hypothetical examples to illustrate the future, hypothetical benefit of being able to correct errors made in the initial economic analysis to deliver the optimal programme of measures.

Identify the linkages between the requirements for scientific/ecological assessment and the economic elements of the Directive

There are strong linkages between the scientific/ecological assessment and the economic analyses. The economic analysis is reliant on the outputs of other analyses such as those assessing environmental impacts. However, in order to obtain the full benefits of the economic analyses required in the directive, it is important to integrate the economic analysis in the process from the beginning (e.g. initial assessment), e.g. by integrating economists into other work areas such as biology, ecology etc.).

Examples of the most important linkages are:

Cost of degradation: In order to assess the cost of degradation, it is necessary to understand ecological degradation, and specify what degradation means in terms

of impact, for example on ecosystem goods and services. Once this is identified and quantified, it would be possible to value (ie monetise) these impacts ie translate them into cost estimates. An example is a deteriorating marine environment which affects the catch of fish, which, in turn, affects the fisheries sector. When it comes to quantifying and monetising impacts on the economy of fisheries sector, a close dialogue between economic experts and experts from the fisheries sector is often required to understand the specific impact (e.g. does it require catchment of new species, does it require new equipment and what are the costs of all this). Such data collection requires tight cooperation between economists and ecologists, i.e. different experts in the field.

Programmes of measures: The cost-effectiveness analysis of the programmes of measures is closely linked to a set of ecological and scientific analysis results.

First, it depends on the results of impacts and pressures on each marine water (including human activities) from the initial assessment (article 8). This information gives a hint of the sectors that are the main polluters in a specific marine water.

Secondly, it depends on the definition and operationalisation of the descriptors of good environmental status.

Third, it depends on a close dialogue with scientific experts, marine experts, sector experts to identify and describe the possible and relevant measures to reduce the impacts and pressures. This also involves a dialogue about costs and expected effects of each measure, including side effects.

Baseline scenario**:** When devising the programme of measures, it is very relevant to know if the planned set of measures will meet the target for "good environmental status". Here, it is highly important to employ the scientific assessment of the baseline situation as a basis for the economic assessments. The effects and cost of each measure are always assessed relative to the baseline situation (no action situation).

Summing up: As can be seen from the above examples, the economic analysis often depends on the outcomes of the scientific/ecological assessments. To this end, it is important that the economists responsible for the economic analysis are involved as early as possible in the scientific/ecological assessments to ensure the outputs are relevant and can be used in the economic analysis.

One solution could be to integrate the economists from the beginning of the process (e.g. initial assessment) by securing their participation in expert working groups (together with biologists, ecologists etc.). This would bring economic analysis into focus during the entire process, and it would enable the economists to inform scientific experts on data needs for the economic analysis much earlier in the process thereby improving the quality of data for the economic analysis. It would probably also allow work on the economic analysis to begin sooner than would otherwise be the case, e.g. as an isolated work stream undertaken when the other analyses are completed.

Identify the implementation challenges and risks relating to the economic elements of the MSFD

In some cases, the economic elements of the MSFD are difficult to operationalise. Therefore common guidelines and understanding of the economic issues of the Directive will ensure that the national implementation of the economic elements and the results from these analyses become more consistent and comparable over time and across countries.

Difficult situations can emerge when undertaking the more comprehensive types of analysis, such as economic analysis of cost of degradation and cost-benefit analysis in relation to disproportionate cost assessment. In this case, there is a risk that data does not exist and that the analysis becomes very complex, which could make it difficult for all parties to complete the exercise to a high standard.

Carrying out a financial analysis might be easier, however there is a risk that some information may not be freely available from specific sectors. In addition, there is a risk of generating misleading results if only financial analysis is made, since it merely includes the financial costs of those having direct financial net returns from using the water. Costs of and benefits to recreational users and non-users are not captured. In this way, the social welfare effects are not known meaning that implementation decisions in relation to the MSFD may not be optimal in terms of maximising social welfare.

Finally, it is a challenge to implement the economic elements in a way that ensures that the results of the analysis are used and understood by policy makers/decision-makers. In this respect, there might be a difference between the financial analysis and the economic analysis. The financial analysis might offer an advantage over the economic analysis, since it focuses on direct financial net returns that are generated in a market and as such is understandable by stakeholders. On the other hand, the decisions that need to be made as part of the MSFD implementation depend on information that can only be provided by a full economic analysis (which includes, but is not limited to, the financial analysis).

Other specific issues

Short-term and long-term

There is a need to consider both the short-term and long-term context particularly given the requirement to review Marine Strategies every six years. In particular, what are the short-term needs for economic analysis and what needs to be done now to improve the economic analysis over the longer-term etc?

This issue is related to Article 17, paragraph 1 and 2

Member States shall ensure that, in respect of each marine region or subregion concerned, marine strategies are kept up to date.

For the purpose of paragraph 1, Member States shall review, in a coordinated manner as referred to in article 5, the following elements of their marine strategies ***every six years after their initial establishmen****t (initial assessment, environmental targets, monitoring programmes, programmes of measures).*

In the short term, each country will probably use slightly different types of economic analysis since they will implement whatever is possible within the short timeframe of the first marine strategy. The first economic analyses as part of the initial assessment have to be completed by 15 July 2012 (Initial Assessment).

The economic analysis of the programmes of measures has to be made before the end of 2015 allowing for the development of common guidelines and examples both at EU level and at national levels.

To enable the European Commission to compare the results of the economic analyses from each Member State, it is necessary to develop **both** a standard reporting format for reporting economic analysis results, which makes it easier to compare, **and** a set of pragmatic and detailed guidelines on how to make the economic analyses to meet each of the explicit, economic requirements in the MSFD. It might be that such reporting formats and guidelines can only be finished in the next cycle of the marine strategies[24], but Member States will then be able to familiarise themselves with them in due time before the final deadline.

Furthermore, clarification and definition of what is meant by reviewing and updating the economic analysis in the marine strategies are still required. Some might find it sufficient to adjust all price levels in the analysis to the new year (projecting prices six years forward) all other things being equal. Much will be gained by describing the level of ambition for the reviewing and updating process every six years. The better guidance, definitions, reporting formats, etc. the better economic analysis results will be, and the better the possibilities of securing consistent and comparable economic results over time and across EU countries.

Transboundary issues

*By reason of **the transboundary** nature of the marine environment, Member States should cooperate to ensure the coordinated development of marine strategies for each marine region or subregion. Since marine regions or subregions are shared both with other Member States and with third countries, Member States should make every effort to ensure **close coordination***

with all Member States and third countries concerned. Where practical and appropriate, existing institutional structures established in marine regions or subregions, in particular Regional Sea Conventions, should be used to ensure such coordination (Preamble 13)

Further mentioned in Article 2 (1), article 8 (3,b), article 10 (1), article 11(2,b) and article 14(1,d).

The requirements to the Member States of coordinating their strategy and measures in common marine waters do not explicitly demand an economic analysis. However, it could be very useful for the Member States to use the economic analyses that they make as inputs to a common discussion with the other countries of the marine regions or subregions. It may be that some pressures to the marine water are much cheaper to minimise in one country than in another.

It could be an advantage if Member States design their analyses in the same way to enable comparison of results and to ensure optimal target setting and combination of measures or for some sectors, such as shipping, do a common analysis.

Many of the problems will probably arise from the different ways and traditions of undertaking analysis across Member States. This problem could be eliminated

[24] Initial Assessment before 15 July 2018, programmes of measures before the end of 2021.

if the Commission drew up common guidelines on how to make the economic analyses.

10 Findings and recommendations

In this report, the economic requirements of the MSFD have been identified. The requirements have been split into explicit and implicit requirements. They differ in that explicit requirement are directly mentioned in the Directive and require the Member States to take action whereas the implicit requirements are a part of other parts of the Directive where economic analysis could be beneficial for securing an optimal solution to the implementation.

The below table provides an overview of the relevant **explicit economic requirements** of the Directive that were identified by this study:

Table 10-1 Explicit economic requirements

Context	Concepts
Initial assessment of marine waters (preamble no. 24, art. 8 par. 1c)	Economic and social analysis of the use of those marine waters
	Economic and social analysis of the cost of degradation to the marine environment
Programmes of measures (art. 13 par. 3)	Economic impacts of the measures
	Cost-effective measures
	Cost-benefit analysis of measures
Member States' exceptions[25] (preamble no 11, art. 14 par. 4)	Costs would be disproportionate
Establishment of environmental targets (Annex IV no. 9)	Economic concerns

The below table provides an overview of the relevant **implicit economic requirements** of the Directive that were identified by this study:

[25] The word exception is used since it is the word applied in article 14 of the MSFD *"Exceptions"*.

Table 10-2 Implicit economic requirements

Context	Concepts
Implementation of programmes of measures (preamble no 27)	Polluter should pay
Exceptions (preamble. no. 30 and 32, art. 14 par. 1d)	Overriding public interest which outweigh the negative impact on the environment
Community financing (financing of measures) (art. 22 par. 1 and 2)	Community financial instruments
Programmes of measures (Annex VI, no. 6)	Economic incentives

Recommended areas for further clarification

The study has identified the following points relating to the economic aspects of the Directive which require further clarification, possibly via the MSFD CIS process

- The time perspective in "cost of degradation"
- The role of economic analysis (i.e. cost-effectiveness analysis and cost benefit analysis – both mentioned in article 13) in the development of the programme of measures
- The impact assessment of the programme of measures (Art.13)
- Common understanding relating to the exception possibilities in the Directive(Art.14).
- Lack of studies reporting monetary values of benefits of the marine waters.

The time perspective in "cost of degradation"

The analysis of the requirements and the Directive as such has shown a need for the time horizon to be defined in order for the Member States to be able to make the assessment of the "cost of degradation" in the initial assessment (Art.8). It is necessary to clarify the reference year and time horizon that should be used as this will influence the scale of degradation and, in turn, the value of the costs associated with that degradation. The definition of the reference year and the time horizon will also be beneficial input also for the other economic requirements e.g. exceptions assessments, cost-benefit analysis of the measures.

The role of economic analysis in the development of the programme of measures

Further the analysis of the Directive identified a need to determine the role of the economic analyses in article 13) where a cost-effective as well as a cost-benefit analysis is required for developing the programme of measures. It will be necessary to consider the relevant methodology in terms of the overall purpose of the article in relation to identifying the best possible measures to fulfil the environmental targets. Cost-effectiveness analysis is a suitable methodology when the objective is established as the analysis focuses on the best way to meet the target. This seems to be the relevant methodology in article 13, where the objectives have already been established. In contrast, cost-benefit analysis is more suitable when the targets have not been set yet, as it can be used to determine if the bene-

	fits of the possible targets are higher than the costs, thereby informing what the target should be. Clarity regarding the purpose of the article including the specification of the decision that is to be informed by the economic assessment is needed to determine the appropriate methodology.
The impact assessment of the programme of measures	The Directive introduces the requirement for an impact assessment including a cost-benefit analysis for any new measure. It is not clear how the text in the Directive relating the Member States carrying out impact assessment prior to the introduction of any new measure fits into the process of developing and implementing the programme of measures. The requirement focuses on the measures separately whereas the outcome should be a programme of measures where the interaction between the measures is very important as one measure can interfere with the effect of another and vice versa.
Common understanding relating to the exception	In the absence of a common understanding of the definition of an exception, work will be needed to ensure a coherent and consistent approach when applying the exception options and also clarify the need for supporting economic assessment and documentation.
Lack of studies reporting monetary values of benefits	The literature review identified a lack of studies reporting on monetary values of benefits of the marine waters. The examples of monetary values of benefits mostly consist of use values such as the fisheries sector and oil and gas extracted etc. since they are based on market prices and therefore most accessible. However, monetary estimates have been obtained of the values for other goods and services of the marine water only to a limited degree. Recognising the lack identified it would be beneficial to undertake more work in this area such as a comprehensive literature study to identify existing studies or new pilot studies to estimate benefit values that can be used in the next cycle of the MSFD's economic analyses. The outcome of such studies will be necessary for all the Member States in order to be able to fulfil the requirements of the Directive.

Annex 1: Related policy areas

Policy/policy area	Institution	Geography	Characteristics	Comments/links	Links (direction)	Link description	Projects/reports	Source
Common Fisheries Policy	EU	EU	1) The European Union's instrument for the management of fisheries. 2) Focus areas: quotas, eliminating discards, funding	The policy has strong links to the cost effective analysis, the economic analysis of the use of those waters and the cost of degradation (cost-benefit analysis).	Strong link, both directions	Regulation of the fishery sector activities is an important possible measure to implement the MSFD. Any economic analysis of fishery policy actions-/measures/instruments to manage fisheries can give valuable information and data for undertaking the economic analysis in the MSFD. Important sector information and data.		http://ec.europa.eu/fisheries/cfp_en.htm
Common Agriculture Policies	EU	EU	1) The European Union instrument for management of agricultural. 2) Instruments used: subsidies, programmes and guarantee of minimum prices	1) Important to coordinate between WFD and MSFD, regarding second order effects from land sources. 2)The policy will have impact on the Cost of degradation.	Link (strong in WFD)	Need to coordinate agricultural actions/measures in WFD and MSFD.		http://europa.eu/pol/agr/index_en.htm
Natura 2000	EU	EU	The legal basis for the Natura 2000 network is found in the Birds Directive which dates back to 1979 and the Habitats Directive from 1991.	See birds directive and habitats directive				http://ec.europa.eu/environment/nature/index_en.htm
Birds Directive	EU	EU	Designation of birds to be protected	1) More important in coastal zones. 2) Impact on the assessment of cost of degradation.	Link, one direction link	From MSFD to birds protection and not necessarily from birds protection to the marine environment (MSFD)		http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm
Habitats Directive	EU	EU	Designation of areas to be protected	1)Important measure. 2) Impacts on the cost of degradation, particularly on the benefits.	Strong link, both directions	This policy is an important possible measure to implement the MSFD. Any economic analysis of habitat policy actions/measures can provide valuable information and data to undertake the economic analysis in the MSFD. Also, economic analysis of "costs of no-action" in this field can provide data for the economic analysis in MSFD (cost of degradation).		http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

Policy/policy area	Institution	Geography	Characteristics	Comments/links	Links (direction)	Link description	Projects/reports	Source
Water Framework Directive	EU	EU	Good ecological status, covers ground water, surface water (lakes, water courses, rivers etc.) and coast areas (until 1 nautical mile from land). Pressures and impacts from land are covered	1) measures to reduce nutrient emissions and other contaminants from land based sources that have strong effects on for example the level of eutrophication in marine waters 2) overlap of areas. Because land-based pressures and measures to reduce them have second order effects on oceans/marine waters (after 1 nautical mile from land).	Strong link	Need to coordinate actions and measures in WFD and MSFD. Some of the measures implemented in the WFD to reduce land based pressures on water environment have positive effects on ocean/marine waters. Provides data that can be useful to undertake the cost-effectiveness analysis in MSFD.		http://ec.europa.eu/environment/water/water-framework/index_en.html
Integrated maritime policy	EU	EU	Benefits the maritime economy, protect marine environment, strengthen research and innovation, fosters development in coastal and outermost regions, addresses international maritime affairs, and raises the visibility of Europe's maritime dimension.	1) Action plan sets six strategic policy goals including integration of maritime sectoral policies, development of integrated maritime spatial planning and policy tools, definitions of boundaries of sustainable development of the marine activities, linked to the MSFD 2) development of sea-basin strategies, strengthening of EU maritime policy in an international context and focus on sustainable economic growth. 3) Development of action plans for each marine sector which give information about environmental pressures from each sector.	Strong link	The initiatives and measures in the Integrated Maritime Policy influence the implementation of the marine strategy framework directive, and vice versa. Therefore, there is a need to coordinate actions. Especially there is a link to the cost-effectiveness analysis in the MSFD. The IMP provides information and data to undertake the cost-effectiveness analysis in MSFD. It provides valuable sector information.	1) Numerous studies undertaken and underway on climate and coastal activities, tourism in ports, aspects of maritime spatial planning and data gathering, employment, maritime ecosystems. 2) No studies on cost-effectiveness, benefits. 3) A database covering socioeconomic data on marine sectors and coastal regions is built up in 2009, as well as a database on funding for marine activities etc.	http://ec.europa.eu/maritimeaffairs/mp_dev_en.html
Convention on the Protection of the Marine Environment of the Baltic Sea Area	HELCOM	Baltic Sea	HELCOM works with: an environmental policy maker for the Baltic Sea area by developing common environmental objectives and actions (The Baltic Sea Action Plan, adopted 2007); an environmental focal point providing information about (i) the state of/trends in the marine environment; (ii) the efficiency of measures to protect it and (iii) common initiatives and positions which can form the basis for decision-making in other international fora; a body	Many assessments of the state of the Baltic sea, eutrophication, biodiversity, radio activity and more general reports.	Strong link	Need to coordinate actions and measures agreed upon in HELCOM framework and the future MSFD measures in this marine water. Provides data and methodology to undertake the economic analysis in the MSFD . Especially for the cost-effectiveness of programmes of measures and the economic analysis of the use of those waters, but also for the benefit analysis.	The BONUS research programme is funding a large number of research projects on risk management, measures and marine management, economic assessments www.bonusportal .org The Baltic Nest Institute in Stockholm and Roskilde, Denmark, has developed a Cost minimisation tool. At present this tool handles land-based abatement meas-	http://www.helcom.fi/Convention/en_GB/text/ http://www.helcom.fi/publications/en_GB/publications/

Policy/policy area	Institution	Geography	Characteristics	Comments/links	Links (direction)	Link description	Projects/reports	Source
			for developing, according to the specific needs of the Baltic Sea, Recommendations of its own and Recommendations supplementary to measures imposed by other international organisations; a supervisory body dedicated to ensuring that HELCOM environmental standards are fully implemented by all parties throughout the Baltic Sea and its catchment area; and a co-ordinating body, ascertaining multilateral response in case of major maritime incidents. Have done a base for the MSFD Initial Assessment through HELCOM Initial Holistic Assessment (publ no 122) which considers both environmental state, pressures and economic considerations.				ures for nutrient reductions www.balticnest.org The Interreg programme Baltic Sea Programme funds a number of projects on Baltic Sea improvements, including economic and planning tools for the Baltic Sea and assessment of sustainable economic potential of marine resources The Swedish EPA has funded a study around the Baltic on marine issues, see Hasselström et al 2008. HELCOM has published studies on Baltic sea recovery http://www.helcom.fi/publications/bsep/en_GB/bseplist/, however only few economic studies are reported, e.g. NEFCO/COWI 2007.	
Convention for the Protection of the Marine Environment of the North East Atlantic	OSPAR	North East Atlantic	The OSPAR Convention is the current legal instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic. There is focus on; The ecosystem approach, The precautionary principle, The polluter pays principle, Best available techniques (BAT) and best environmental practice (BEP), including clean technology. Quality status reports	1) A number of reports on the status of the environment with point of departure in the different sectors or issues very similarly to the descriptors in the directive having an impact. 2) Strong link in the objectives but no economic analysis undertaken so far.	Strong link	Need to coordinate actions and measures agreed upon in OSPAR and the future MSFD measures in this marine water. Potential provision of data and methodology to undertake the economic analysis in MSFD . Especially for the cost-effectiveness of programmes of measures and the economic analysis of the use of those waters, but also for the benefit analysis. But no economic analysis undertaken so far.		http://www.ospar.org/

Policy/policy area	Institution	Geography	Characteristics	Comments/links	Links (direction)	Link description	Projects/reports	Source
Convention on the Protection of the Black Sea Against Pollution	The Black Sea Commission	Black sea	Combating Pollution from land-based sources and maritime transport, achieving sustainable management of marine living resources and pursuing sustainable human development.	1) Includes some cost estimates from the implementation of measures related to the Action Plan. 2) Reports on the state of the environment. 3) Further national regulation needed. 4) The WFD does not include these countries (only Bulgaria)	Strong link	Need to coordinate actions and measures agreed upon in the Black Sea Commission and the future MSFD measures in this marine water. Provision of data to undertake the economic analysis in MSFD. Especially for the cost-effectiveness of programmes of measures and the economic analysis of the use of those waters.	Implementation of the Strategic Action Plan for the Rehabilitation and Protection of the Black Sea 2002-2007	http://www.blacksea-commission.org/main.asp
Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean of 1995 (UNEP-MAP)/Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources	The Barcelona Convention	Mediterranean Sea	The Convention's main objectives are: to assess and control marine pollution; to ensure sustainable management of natural marine and coastal resources; to integrate the environment in social and economic development; to protect the marine environment and coastal zones through prevention and reduction of pollution, and as far as possible, elimination of pollution, whether land or sea-based; to protect the natural and cultural heritage; to strengthen solidarity among Mediterranean coastal States; to contribute to improvement of the quality of life. Focus on agriculture, truism.	1) Focus on integrating the environment in social and economic development, 2) No reports identified dealing with economic issues. 3) Strong link in the objectives but no economic analysis undertaken so far.	Strong link	Need to coordinate actions and measures agreed upon in the Barcelona Convention framework and the future MSFD measures in this marine water. When it comes to providing data for undertaking economic analysis in MSFD, there is still a lack of economic analysis from the Barcelona Convention, since no economic analysis is undertaken so far.		http://www.unepmap.org/
United Nations Convention on Law of the Sea	UN	Global	A regular process for global reporting and assessment of the state of the marine environment, including socio-economic aspects (regular process). Focus on monitoring.	Coordination of monitoring activities, including socio-economic information	Strong link	Need for coordination of monitoring activities. But no specific data or methodology to undertake the economic analyses in MSFD.	8 reports on the topic. It gives an overview of the status and also some socio-economic considerations.	http://www.un.org/Depts/los/index.htm

Policy/policy area	Institution	Geography	Characteristics	Comments/links	Links (direction)	Link description	Projects/reports	Source
Convention on Biodiversity	UN/UNEP	Global	The Convention on Biological Diversity is dedicated to promoting sustainable development. Conceived as a practical tool for translating the principles of Agenda 21 into reality, the Convention recognizes that biological diversity is about more than plants, animals and micro organisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live.	Important overview of benefits studies of biodiversity including marine biodiversity.	Strong link	Provides data or literature relevant for undertaking specific parts of the economic analysis in MSFD (such as valuing the specific benefits relating to marine biodiversity, which is a part of the overall benefits of marine waters).	Numerous studies have been undertaken that considers economic value of these goods and services. An overview of studies is provided, but no direct links to studies.	http://www.cbd.int/
UNESCO's - marine spatial planning	UNESCO	Global	The purpose of this initiative is to help countries operationalize ecosystem-based management by finding space for biodiversity conservation and sustainable economic development in marine environments. One way to do this is through marine spatial planning. Work focuses on moving marine spatial planning beyond the conceptual level by: Developing a step-by-step Approach for implementing marine spatial planning; Documenting marine spatial planning initiatives around the world; Analyzing good practices of marine spatial planning; Collecting references and literature on marine spatial planning; Enhancing understanding about marine spatial planning through publications; Developing capacity and training for marine spatial planning.	1) Focus on management and sustainability. 2) The EIA also makes use of scenarios and analysis measures and have some similar approaches as the management of special planning	Weak link			http://www.unesco-ioc-marinesp.be/

Annex 2: Literature

Source	Title	Time	Relevance for economic concepts in task 1	Geographic area covered in source	Comment	Link
World Bank - FOA report	*The Sunken Billion. The Economic Justification for Fisheries Reform*	2009	1) Economic analysis of the use of those waters (partly only for fishery sector), 2) Cost of degradation (partly only for fishery sector), 3) Benefit analysis of marine waters goods and services (partly only for fishery production)	Global	Estimates of the value of fishery which can be used for benefit transfer (world wide estimates). Compare the value of fishery at a sustainable level (optimal level) with the value of the actual catchments in the fishing sector. The difference between these two estimates expresses the loss of economic value of the fishery resources in the oceans. The estimated yearly loss is $50 billion due to overfishing. The quantitative results are only presented at an global aggregated level and not in unit prices. This estimate might be a useful input to estimate the cost of degradation in the initial assessment in MSFD.	http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTARD/0,,contentMDK:21930578~pagePK:148956~piPK:216618~theSitePK:336682,00.html
TEEB	*The Economics of Ecosystems and Biodiversity study*	2008/ 2009	There are relatively little specific on marine waters. No directly links to the economic terms from task I.	Global	Focus on the need to make valuation of ecosystems. Contains examples of valuation and how these can be used in a political process. There is a framework for how valuation should be done.	http://ec.europa.eu/environment/nature/biodiversity/economics/pdf/teeb_report.pdf, http://ec.europa.eu/environment/nature/biodiversity/economics/pdf/d1_summary.pdf
Millennium Ecosystem Assessment	*Current State & Trends Assessment/ Scenarios /Policy Responses*	2005	No direct links to the economic terms from task I.	Global	Definition of a baseline. Listing how to asses benefits of marine waters; including an identification and categorisation of the existing goods and services of ecosystems. This is an excellent platform for moving towards a more operational classification system that links changes in ecosystem services to changes in human welfare.	
UNEP/WCMC and HERMES	*Deep -sea biodiversity and ecosystems - A scoping report on their socio-economy, management and governance*	2007	1) Economic analysis of the use of those waters, 2) Cost of degradation, 3) Benefit analysis of ecosystem functions	Global	**Re 1)** Overview of human activities on deep sea (fishing, offshore oil and gas, mining, waste disposal, cable laying, pipeline laying, surveys and marine scientific research). Useful to identify sectors using the marine waters as input to the economic analysis of the use of those waters. **Re2+3)** Goods and services: Same categories of marine ecosystem goods and services as in Turner et al. (2009) and the Millennium Ecosystem Assessment (MA) + a good but non-exhaustive figure of goods an services in each category (p. 26), results: The deep sea appears to be possibly the worst case for deriving monetary values. There are more results for use values such as the fishing sector and oil and gas extracted etc. since they are based on market prices but very limited monetary values for other goods and services. Reason: Limited knowledge of the deep sea affects our capacity to put values on ecosystems and their goods and services - see research gaps. There are some quantitative monetary values in this study on aggregated world wide level (e.g. food production from marine water, oil and gas wells, nutrient cycling function from worlds oceans). **Research gaps:** Conclude vast research gaps on the socioeconomic aspects of the deep sea (p. 69), gives a list of important research topics (a) Relationship between biodiversity, ecosystem functioning and the provision of goods and services, b) monetary and non-monetary valuation techniques and how they can be applied to deep sea goods and services, c) plausible future trends in economic activities for baseline, etc.).	http://www.unep-wcmc.org/resources/publications/UNEP_WCMC_bio_series/28/Deep-Sea%20Biodiversity%20and%20Ecosystems_large.pdf

Source	Title	Time	Relevance for economic concepts in task 1	Geographic area covered in source	Comment	Link
WWF. (WWF Germany)	*The Value of our Oceans - The Economic Benefits of Marine Biodiversity and Healthy Ecosystems*	2008	1) Benefit analysis of TEV, 2) Cost of degradation, 3) Disproportionate costs, 4) Polluter should pay (change in TEV=damage)	Global	Include many examples of quantitative monetary values of the benefits of the oceans. For example an estimate of the global value of the overall marine systems (ecosystem services). Furthermore there are examples of benefits and lost benefits (degradation) in each of these categories: **1) Tourism, recreation and leisure, 2) Feed the world** (fish and aquaculture production), **3) Health aspect** (marine based drugs, cosmetic products etc.), **4) Industrial resources** (raw materials and indirect products (fish meal and oil), **5) Defending coastal regions** (marine flora and faunas natural protection off shore/coast, UK and Germany salt marshes values, wetlands) and **6) Climate regulation (**carbon storage service of the oceans)	http://www.wwf.dk/dk/Service/Bibliotek/Hav+og+fiskeri/Rapporter+mv./The+Value+of+our+Oceans
Swedish EPA	*What's in the sea for me? Ecosystems services provide by the Baltic Sea and Skagerrak*	2009	1) Benefit analysis, 2) Cost-benefit analysis, 3) Cost of degradation, 4) Disproportionate costs	Baltic sea	A synthesis of **1**) analysis and descriptions of marine ecosystem services **2)** Valuation of benefits of changes in marine ecosystems **3)** Assessments of costs and cost-benefits **4)** Fisheries . WTP estimates described, but not TEV. The assessment of ecosystem services indicates that several of these are under threat (10 out of 24); and that the food web, biodiversity and the resilience of the sea are among the services under threat. The conclusion on the synthesis is that it is socially optimal to end Baltic Sea eutrophication in line with BSAP objectives, the net benefits exceed €2 billion a year, but the assessment is uncertain building on a number of outdated results. Further, there are large differences throughout the Baltic.	http://www.naturvardsverket.se/Documents/publikationer/978-91-620-5872-2.pdf
Swedish EPA . Söderqvist T. & L. Hasselström (Eds)	*The economic value of ecosystem services provided by the Baltic Sea and Skagerrak*	2008	1) Benefit analysis, 2) Cost-benefit analysis, 3) Cost of degradation, 4) Disproportionate costs, 5) Economic analysis of the use of those waters	Baltic Sea	WTP results are described, not TEV. **1)** Comprehensive overview of valuation studies in the countries surrounding the Baltic Sea **2)** Description of related studies **3)** background for potential benefit transfers using the summarised information of environmental focus, study population, valuation method, welfare measure and benefit estimates **4)** description of knowledge gaps. 40 valuation studies and related studies have been gathered and described related to values of the Baltic Sea environment. The studies mainly cover eutrophication, fisheries, oil and marine debris and offshore location of windmill farms, most of them related to local regions and specific scenarios, only one study deals with the TEV of improvements of the Baltic marine environment as such. The studies show significant benefits of improving the marine environment, but a large part of the results are outdated, especially the only study dealing with the entire Baltic sea. A number of needs for new assessments are described in the conclusions.	http://www.naturvardsverket.se/Documents/publikationer/978-91-620-5874-6.pdf

Source	Title	Time	Relevance for economic concepts in task 1	Geographic area covered in source	Comment	Link
Swedish EPA . Hasselström, L., Hasler, B., Martinsen, L., Pedersen, A.B., Petersen, L.K., Tukhanen, H., Kurki, K., Sievänen, T., Huhtala, A., Kowatsch, A., Vanags, A., Kaleja, A., Kalis, M., Semèniènè, D., Sceponaviciute, R., Daugintiene, S., Czajkowski, M., Markowska, A., Zygmunt, M., Zylich, T., Volchkova, N.	*Tourism and recreation industries in the Baltic Sea area - How are they affected by the marine environmental state?*	2008	1) Economic analysis of the use of those waters (qualitative descriptions)	Baltic sea	Qualitative description of the implications and effects of the current marine environment for tourism, but no economic numbers. 1) Interview study of tourism managers and actors, tourists not included. 2) Tourism industries around the Baltic are unaffected by current marine environmental problems 3) Blue green algae most important nuisance 4) Indication that increased frequency of algae blooms might induce harm to the tourism industries, mentioned in Denmark, Sweden and Finland. No economic numbers.	http://person.au.dk/en/pub/au01_2008_dfac90f0-865a-11dd-a5a8-000ea68e967b?id=10674428
Swedish EPA . Katarina Elofsson Swedish Agricultural University.	*The costs of environmental improvements of the Baltic Sea dn Skagerrak. A Literature review.*	2008	1) Cost effectiveness of programmes of measures	Baltic sea	Total welfare economic costs and cost-effectiveness of measures for nutrient reductions to the Baltic Sea. Qualitative description of costs of reductions of oil spill, hazardous substances and invasive species management. The costs of 50 % reduction of nutrient loads to the Baltic lead are estimated to EUR 2.8 billion. The costs of the BSAP target are estimated to the interval 2.6 billion euro - 5 billion euro depending on the implementation. The costs of abatement of hazardous substances, oil spill and invasive species are described and results from studies in other parts of the world are described and commented.	http://www.swedishepa.se/sv/Nedre-meny/Webbokhandeln/ISBN/5800/978-91-620-5876-0/
Swedish EPA . Ing-Marie Gren. Swedish Agricultural University.	*Costs and benefits from nutrient reductions to the Baltic Sea.*	2008	1) Cost effectiveness of programmes of measures, 2) Cost -benefit of measures	Baltic sea	Cost-benefit analysis of nutrient reductions to the Baltic Sea from different measure. Economic analysis. Net present value of BSAP targets (HELCOM). Cost-benefit analysis building on former valuation results from the 1990s, compared to results of cost-effectiveness analysis of different programme of measures for nutrient reduction. Net present values estimated with discount rates between 0 and 7%, net present values are positive for all of these.	http://www.naturvardsverket.se/sv/Nedre-meny/Webbokhandeln/ISBN/5800/978-91-620-5877-7/
HELCOM and NEFCO (COWI report)	*Economic analysis of the BSAP with focus on eutrophication*	2007	1) Cost effectiveness of programmes of measures	Baltic sea	1) Focus on cost effective measures to reduce eutrophication in the Baltic Sea. Used as input for the BSAP. 2) Focus on actions to reduce nutrients from diffuse sources (farmland), waste water plants, airborne nutrients from e.g. energy and transport combustion. 3) Economic analysis approach incl. all costs to society, 4) Baseline description, 5) Overview of measures and scenarios analysed (p-free detergent scenario, sewage treatment scenario, agricultural scenario, 7) Results (at source level/country level and Baltic Sea level) ,8) Supplementary to the cost-effectiveness - a short overview of Benefits of the Baltic Seas goods and services	

Source	Title	Time	Relevance for economic concepts in task 1	Geographic area covered in source	Comment	Link
Schou J. et al	*Costs of nutrient reductions to the Baltic Sea*	2006	1) Cost effectiveness of programmes of measures	Baltic sea	Cost-effectiveness of nutrient abatement measures, costs of action. Total economic costs and unit costs per kg N. Cost-minimisation strategies for the 9 countries surrounding the Baltic Sea using a cost-minimisation model.	http://www.dmu.dk
Söderquist T.	*Baltic Stern initiative. Stern initiatives for the Baltic sea- status and ongoing work*	2009	1) Cost-effectiveness of programmes of measures, 2) Cost-benefit analysis, 3) Cost of no action of nutrient abatement	Baltic sea	Ongoing network, no results yet. Linking Finnish, Danish and Swedish models, inlcluing cost-minimisation models and valuation studies. All environmental issues not yet decided.	http://www.helcom.fi/stc/files/Presentations/StakeholderConf2009/BalticSTERN_by_Tore_Soderqvist.pdf
Wateco, European Communities	*Guidance document No 1 on economics and environment*	2003	Guideline for implemention of economic principles in the WFD, i.e. cost-recovery, costs of water use, cost-effectiveness, accounting for environmental and resource costs, assessments of disproportionate costs (exemptions).	EU	Guideline defining economic methods and requirements, case studies and examples from European sites. WFD aims at improvements of groundwater, inland waters and coasts, and focus on abatement measures from land based activities, i.e. from other sources than the MSFD. Important guideline for MSFD because of methodological considerations and suggestions, but do not cover empirical unit cost estimates for abatement measures, environmental costs and benefits relevant for the MSFD. A large number of relevant case studies are described, and an annex provides practical advice.	http://www.waterframeworkdirective.wdd.moa.gov.cy/docs/GuidanceDocuments/Guidancedoc1WATECO.pdf
European commission	*Common Implementation Strategy for the Water Framework Directive (2000/60/EC)- Guidance Document No. 20 - Guidance Document on Exemptions to the environmental Objectives. Technical Report 2009- 027*	2009	Disproportionate costs	EU	General recommendations for Cost-Benefit ratios (C/B) in order to define when costs are disproportionate. Recommends also to look at affordability issues (ability to pay of those affected by the measures).	http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents
MPRA, Italy. Marin, G.	*Economic valuation of marine and coastal biodiversity in North Adriatic Sea: socio-economic situation of the area and benefit transfer*	2009	Benefit analysis	North Adriatic Sea (Mediterranean Sea)	Assessment of the monetary valuation of non-use values of marine and coastal biodiversity in North Adriatic Sea by using benefit transfer. In addition to assessments of non-use values, use values are assessed through market price analysis of economic activities.	http://mpra.ub.uni-muenchen.de/17793/

Source	Title	Time	Relevance for economic concepts in task 1	Geographic area covered in source	Comment	Link
Beaumont, Austen, Mangi & Townsend. Marine Pollution Bulletin. 56(3) 386-396.	*Economic valuation for the conservation of marine biodiversity.*	2008	1) Benefit analysis, 2) Cost of degradation, 3) Disproportionate costs	UK	Valuation of marine ecosystem services and goods for assessments of costs of no-action, benefit valuation. Assessment of the economic value of marine biodiversity in the UK using market prices and values of non-market goods and services from contingent valuation studies. Clarifying the role of valuation in the management of marine biodiversity. 13 ecosystem services are described for valuation, and 8 of the 13 services are valued in monetary terms. The study concludes that a decline in UK marine biodiversity could result in an unpredictable change in the provision of goods and services, including reduced resilience and resistance to change. They also conclude that there are risks for declining marine environmental health, reduced fisheries potential, and loss of recreational opportunities. The study delivers results which can be used as information for optimal allocation of resources in marine management, based on information of the benefits and costs of no-action.	http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V6N-4RKDHYF-2&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_searchStrId=1176501883&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=73a46719807e3ce3f24615f33e00549b
R. K. Turner, D. Hadley, T. Luisetti, V. W. Y. Lam and W. W. L. Cheung. (Report to OSPAR Working Group on Environmental Impact of Human Activities, commissioned by Defra, UK)	*Socioeconomic assessment within a marine strategy framework -Draft version*	Draft Final 2010	1) Economic analysis of the use of those waters, 2) Cost of degradation, 3) Cost effectiveness of programmes of measures, 4) Interpretations of socio-economic analysis (financial versus economic analysis), 5) Time perspective of economic analysis	North East Atlantic (e.g. North Sea, Celtic seas, Bay of Biscay etc.). (data general EU/global but literature study North East Atlantic countries)	**Re 1)** Annex 3 in this source is very useful for the economic analysis of the use of those waters, when it comes to the fishery sector. Annex 3 identifies key economic indicators in the fishery sector and translates them into concrete variables, and shows where to find data on each variable. It includes economic indicators at all levels of the dose-response relation. For each indicator is listed "variable", "unit of measurement", "level of aggregation" and most importantly the possible "Data sources". Indicators like "Fis catch/landings in tonnes", "Landed value in EUR", "Change in net revenue", "Change in jobs/employment", "investment in physical capital" etc. All are very useful fishery sector economy data for all the types of economic analysis required in MSFD , **Re 2)** This source helps identify the existing goods and services of ecosystems and group them into four categories, which is an excellent platform for moving towards a more operational classification system that links changes in ecosystem services to changes in human welfare. **Re 4)** Includes a literature review of the economic analysis approaches used in OSPAR countries (p. 3+annex 4): Conclusion: 1) The approaches focus on human activities and the financial impacts associated with marine resource usage, while only a minority investigate the full economic implications. (p. 3). 2) They focus on marginal costs rather than marginal benefits (p. 62) 3) Need for international studies covering regional sea scale (e.g. studies for the North Sea similar to Baltic sea - benefits of reducing nutrient loads) (p. 62). 4) Need for studies on fisheries production for commercial and recreational use (p. 62) 5) Need for studies about economic consequences of the ecological impacts of oil spill accidents (p. 62) 6) Need for studies on costs of non-action should be estimated (p. 62) 7) New studies should focus on the integration between natural	

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					sciences (studying ecological conditions) and economics/social sciences measuring welfare consequences of those conditions), **Re 5) I**ndicates that the full economic analysis could not be completed before the 15'th of July 2012 and therefore not in the first cycle of the Initial Assessment. This again indicates that the economic analysis will not play a major role until the next cycle of the marine strategies (July 2018 for the Initial Assessment, etc.). It also indicates that it will be valuable to carry out initial economic analysis at whatever level is possible since it builds the structure and identifies data needs for the later comprehensive economic analysis - interpreted as next/second cycle of the marine strategies.	
Nunneri, C., Windhorst, W., Turner, R. K., Lenhart, H. In Ecological Indicators 7 (2007) 776-792	*Nutrient emission reduction scenarios in the North Sea: An abatement cost and ecosystem integrity analysis*	2007	1) Cost effectiveness of programmes of measures, 2) Cost -benefit of measures, where benefits is measured in ecological risk reduction	EU /Southern North Sea	Implementation costs of measures for combating eutrophication, N and P effects (kg) and the corresponding reductions in ecological risk in the sea (inability to provide support function, goods and services) . Based on three case studies (Humber/UK, the Rhine/Germany/Netherlands, Elbe/Czech Republic/Germany) dealing with nutrient emission reduction to the southern North Sea. Results: for each case area and total: total economic costs of measures (million Euro), Unit costs of measures (Million Euro/inhabitant or capita) and reduced ecological risk (0;100). usefulness: Cost of measures very aggregated results at case study level and only divided into wetland creation, diffuse sources, point source reduction and not specific unit cost for each type of measure in these categories. Needs further background information/reports.	
Ledoux, L. and Turner, R.K. Ocean and Coastal Management, 45:583-616.	*Valuing ocean and coastal resources: A review of practical examples and issues for further actions.*	2002	1) Benefit analysis of ecosystem functions	Global	1) overview of valuation methodologies relating to ecosystem functions. 2) Overview of practical examples in annex A (converted to dollars using PPP to be comparable) 3) Conclusion: bias towards studies focusing on recreational benefits (especially beaches not included in MSFD) and located in USA. 4) Results: in comparable unit prices which make benefit transfer possible. For example there is the biodiversity value (variety of habitats and species): 35,4-181 ($2000) per person per year (world wide interval) and several country specific values in annex A	

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European Commission funded research project (funded by the EC's Framework 7 Programme). Implemented by a consortium of 30 partners from 15 countries.	*Knowledge-based sustainable management for Europe's seas (KnowSeas)*	2009, ongoing	1) Benefit analysis of ecosystem functions, 2) Cost of degradation	EU	No results yet, since the project has just started. The project had its inception meeting in May 2009 and the first scientific workshop will be held in April 2010. It is important to be aware of the future results from this project since it has a specific focus on modelling the impacts on human welfare caused by ecosystem state changes and to examine the benefits, costs and social acceptance of policy actions. Information about the purpose of the project and expected deliveries in the future: 1) KnowSeas involves a consortium of 30 partners from 15 countries, bringing together natural and social scientists with extensive experience in the marine environment. KnowSeas is unique in that it will operate on two geographical scales: Regional Sea Scale and Member State Economic Exclusive Zone (EEZ) scale. 2) In particular, criteria for assessing costs and benefits of management actions are poorly developed in the complex marine environment where multiple uses and management conflicts are common. 3) There is a strong need for a "joined up" systems approach between natural and social science that delivers the knowledge base to support management for sustainable seas. 4) Will deliver tools to assist policy makers and regulators with the practical application of the Ecosystem Approach. One of the deliveries will be "Assessment of the benefits of European marine ecosystems goods and services and the costs of human induced changes". 5) The project is divided into four Themes and 10 Work Packages. Work package 4 is about "Analysis of costs and benefits". **Benefits**: Identify the full range of benefits (TEV) as far as **existing data** will allow and otherwise identify shortcomings in existing datasets. That means that no new valuation studies will be undertaken in this project.	http://www.knowseas.com