

# Economic and social analysis of the proposed programme of measures in order to achieve good environmental status in Turkish Seas: The case of the EU Marine strategy framework directive

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## ABSTRACT

The EU Marine Strategy Framework Directive (MSFD) requires Member States to assess the costs and benefits of Programmes of Measures (PoMs) put in place to ensure that European marine waters achieve Good Environmental Status by 2020. The analysis and interpretation presented in this work is a result of the "Workshop on Economic and Social Analysis and Programmes of Measures in accordance with the MSFD", held in Turkey (Bolu Workshop) and this study reflect the personal view of the author. Similarly to the impact evaluation of the PoMs, the costs of measures were estimated using expert elicitation and conditional probability distributions. This study applies and tests an approach to assess costs and benefits of management measures with potential to support the overall goal of the MSFD for the Black and Mediterranean Seas waters under the sovereignty and jurisdiction of Turkey.

*Key words* : Descriptor, Ecosystem services, Marine Strategy Framework Directive, Program of measures, Socio-economic analysis

## Introduction

Regarding the marine environment, the EU Marine Strategy Framework Directive (MSFD, 2008/56/EC) was promulgated in 2008 as a means to ensure that European marine waters achieve Good Environmental Status (GES) by 2020. MSFD requires EU member states to develop and implement marine strategies containing programs of measures to protect and preserve the marine environment (Van Beukering *et al.*, 2007).

Article 13.3 of the MSFD requires that "When drawing up the programme of measures pursuant to paragraph 2, Member States shall give due consideration to sustainable development and, in par-

ticular, to the social and economic impacts of the measures envisaged. [...] Member States shall ensure that measures are cost-effective and technically feasible, and shall carry out impact assessments, including cost-benefit analyses, prior to the introduction of any new measure."

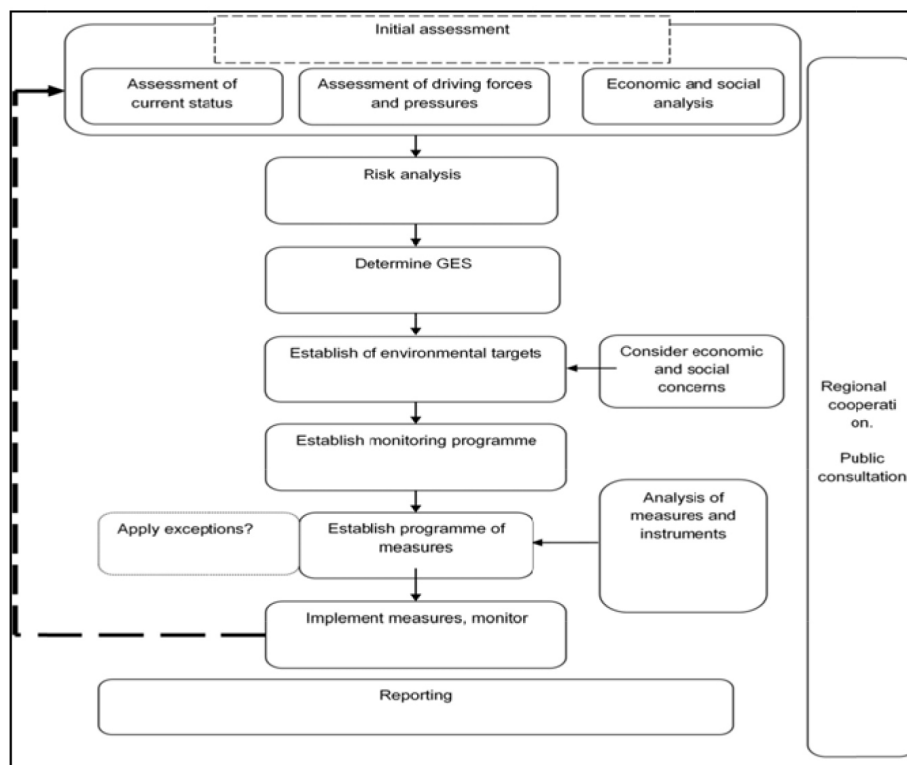
The Marine Strategy Framework Directive (MSFD) requires EU member states to develop and implement marine strategies containing programs of measures to protect and preserve the marine environment. To this end, the MSFD requires Member States to define environmental targets and associated indicators and to develop and implement Programmes of Measures (PoMs) that will ensure the achievement of GES (Kontogianni *et al.*, 2015).

Prior to the implementation of the various PoMs the MSFD requires that each Member State undertakes an impact assessment, including environmental cost-benefit analysis (CBA), on any measure they are planning to implement to support the realization of GES (Arcadis, 2014; Interwies *et al.*, 2013). The set of proposed measures are therefore considered to be a reasonably comprehensive list of measures that will contribute to the achievement and maintenance of GES, as well as eventually meeting the objectives of the draft environmental targets compiled under Article 10 of the Directive. The purpose of this study is to list experiences in relation to the economic analysis already applied as part of the prioritisation and/or development of the first PoM.

The main objective of the Program of Measures is to ensure that the good environmental situation in the seas is achieved as set out in Article 10 of the Directive. Given the close linkage between several Directives (e.g. WFD, Habitats Directive, Birds Directive), coordination and integration with the MSFD is highly recommended (Holzwarth *et al.*, 2009). This would ensure mutual/multiple benefits

and the development of a cost-effective Programme of Measures. The Water Framework Directive (WFD) is important as it is the first directive in which the economic analysis is evaluated (Oinonen *et al.*, 2016). It is to be noted that the measures relating to Turkey's Water Framework Directive (EU, 2000) are drawn from what is understood to be an ongoing implementation of the WFD in Turkey. The delegates and stakeholders attending the PoMs Workshop held between the 12<sup>th</sup> and the 14<sup>th</sup> of July in Bolu determined that there were a total of 162 constituent measures which Turkey is currently undertaking, will be undertaking in the near future or have the capability of initiating as part of the broader effort towards ecosystem-based management of the marine environment. Further measures were added following an institutional review of the initial measure inventory and some measures were removed, resulting in a final total of 162 measures.

These are thus all measures that are considered appropriate for the achievement and maintenance of Good Environmental Status (GES) for Turkey's marine waters, in line with the objectives of the



**Fig. 1.** Illustration of linkages between requirements on economic and social analysis and other requirements by the Marine Strategy Framework Directive (2008/56/EC). (Note that the “risk analysis” is here placed according to a direct interpretation of the wording in the MSFD. However, another interpretation could indicate an analysis of risk to be included also later on in the process) (EC DG ENV. 2011).

MSFD. Note, however, that Turkish marine waters for the purposes of MSFD assessment comprise two separate sub-regional sea areas. In the scope of initial Assessment, which was carried out the conclusion of assessment of Turkish seas pressure-impact-state, a socio-economic analysis study performed to determine the contribution to the Turkish seas to the national economy. Within the socio-economic analysis conducted under the Programmes of Measures has been fulfilled to determine the economic impact of the measures taken. To be able to understand the role of the economic and social analysis in the context of the achievement of good environmental status (GES) in the marine environment, it is important to identify the phase of the implementation of the Directive when such analysis is required. This is seen in Figure 1 (as shown in the EC Guidance document “Economic and Social Analysis for the Initial Assessment for the Marine Strategy Framework Directive”).

As seen in Figure 1, economic and social analysis is important during the Initial Assessment and the preparation of the Programmes of Measures. Based

on the initial assessment, determination of good environmental status and definition of targets (Anon, 2012), measures have to be identified in order to address human activities that have an impact on the marine environment and to improve or maintain the status of the marine environment (Arcadis, 2015).

Although the measures have been addressed under the 11 descriptor of the Marine Strategy Framework Directive in Table 1, they mainly serve more than one descriptive objective and definition (Börger *et al.*, 2016).

For socio-economic analysis, firstly sectors interacting with the sea should be identified. The description of the Drivers, Pressures, State and Impact of the marine water use obtained under Art. 8 MSFD will therefore be an important input in setting environmental targets (Turner *et al.* 2010). In order to identify the best option for a marine and coastal environment, it is important to know what ecosystem goods and services will be affected by coastal development and /or changes in management of sites and how these goods and services cre-

**Table 1.** Qualitative descriptors for determining good environmental status (according to Annex 1, 2008/56/EC) (EU, 2008)

	<b>Descriptor definition</b>	<b>Short name</b>
D1	Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.	Biological diversity
D2	Non-indigenous species introduced by human activities are at levels that do not adversely alter ecosystems	Non-indigenous species
D3	Commercially exploited fish and shellfish.	Commercially exploited fish and shellfish
D4	All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.	Food webs
D5	Human-induced eutrophication is minimized, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters	Human-induced eutrophication
D6	Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.	Sea floor integrity
D7	Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.	Hydrographical conditions
D8	Concentrations of contaminants are at levels not giving rise to pollution effects.	Contaminants
D9	Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.	Contaminants in fish and other seafood
D10	Properties and quantities of marine litter do not cause harm to the coastal and marine environment.	Marine litter
D11	Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.	Energy, including underwater noise

ate value for different members of society.

For performing socio-economic analysis first sectors interacting with the sea should be identified. This issue is also stated in Article 8 under the Marine Strategy Framework Directive.

According to the Article 8.1.(c), it should be carried out that an analysis of the essential features and characteristics of those sea waters, an examination of the pressures and impacts, definition primary pressures and an economic and social analysis of the use of those waters and of the cost of degradation of the marine environment (*Draft Common Understanding of (Initial)*). An economic analysis of sectors interact with the sea requires an experienced multidisciplinary team as well as reliable data (Bann and Baþak, 2012).

### Methodology and approach

For the Economic Analysis of Programmes of Measures in Turkey, it was decided to apply the multi-criteria analysis (MCA) - also known as multi-criteria decision analysis - due to limited knowledge on both the range of costs and benefits that each new (in the project at hand called "proposed") measure would entail. The MCA was deemed the most appropriate decision support tool since the negative impacts (costs) and the positive impacts (benefits) of alternative policy options could not entirely be quantified in monetary terms with precision.

Article 13.3 of the MSFD basically requires Impact assessments (IA) of new measures, including cost-effectiveness analysis (CEA) and cost-benefit analysis (CBA) when new measures are envisaged (Van der Veeren *et al.*, 2018). The European Commission has published Impact Assessment Guidelines on how to perform an IA and indicates three relevant tools for comparing options: cost-effectiveness analysis (CEA), cost-benefit analysis (CBA) and multi-criteria analysis (MCA).

CEA is an analysis of the costs of alternative individual and/or sets or programmes of measures designed to meet well specified objective. It can be used to identify the highest level of a physical benefit given available resources or the least-cost method of reaching a prescribed target (Kronbak and Vestergaard, 2013). The cost-effectiveness approach calculates the monetary value of all costs. MCA is a useful tool to support the evaluation of measures and present the full range of benefits (EU, 2014). For the Economic Analysis of Programmes of Measures in Turkey, it was decided to apply the

multi-criteria analysis (MCA) - also known as multi-criteria decision analysis - due to limited knowledge on both the range of costs and benefits that each new measure would entail. The MCA was deemed the most appropriate decision support tool since the negative impacts (costs) and the positive impacts (benefits) of alternative policy options could not entirely be quantified in monetary terms with precision (EC, 2015).

Cost effectiveness analysis, as in many other EU countries, was not directly carried out due to not clear physical targets to be achieved. It is recognised in the EU countries that currently pressures - impact relationship in the complex marine environment is not known or at least not quantified. There is a substantial uncertainty of both cost and in particular effects of different measures to close the gap, which is also not quantified (Semeniene, 2017a). Thus, it was decided, as mentioned above, to apply the MCA, which is a substitute of the cost-benefit analysis (CBA). To this end, the MSFD requires the development of improvement measures, which have to be assessed *inter alia* by examining their cost-effectiveness and by carrying out cost-benefit analysis (CBA) before their implementation (Bertram and Rehdanz, 2012).

Multi-criteria analysis (MCA) is a general framework for supporting complex decision-making situations with multiple and often conflicting objectives that stakeholder groups and/or decision-makers value differently (Belton and Stewart, 2002).

The basic idea of the MCA is to evaluate the performance of alternative courses of action (e.g. management or policy options) with respect to criteria that capture the key dimensions of the decision-making problem, and elicit stakeholder and/or decision-maker preferences for option performance under each criterion (UNEP: IPBES, 2015). The criteria are often grouped into environmental, social and economic categories (Van Beukering *et al.*, 2007).

In the framework of the MSFD in Turkey, four consecutive broad steps have been taken in order to apply the multi-criteria analysis for the programme of measures (PoMs).

- Selection of new (proposed) measures to implement the MSFD
- Assessment of cost ranges of proposed measures
- Determination of benefit ranges of proposed measures
- Synthesis of costs and benefits.

The set of proposed measures are therefore considered to be a reasonably comprehensive list of measures that will contribute to the achievement and maintenance of GES, as well as eventually meeting the objectives of the draft environmental targets compiled under Article 10 of the Directive.

It is to be noted that the measures relating to Turkey's Water Framework Directive (WFD 2000/60/EEC) are drawn from what is understood to be an ongoing implementation of the WFD in Turkey. Participants of each Descriptor expert group were consulted to select the given cost categories for each of the proposed policy measure. Of interest to the research presented here is the fact that the Directive obliges the Program of Measures (PoM), which lists the measures to fulfil the environmental objectives of the WFD, to be drawn up according to economic principles (Berbel *et al.*, 2011). In accordance with Article 8.1 (c), it should be carried out that an analysis of the essential features and characteristics of those sea waters, an examination of the pressures and impacts, definition primary pressures and an economic and social analysis of the use of those waters and of the cost of degradation of the marine environment (Turner *et al.*, 2010). The Guidance document (EC, DG ENV, 2011) proposes two approaches/methods for this step: the Ecosystem Services approach and Marine Water Accounts approach, although there are several other approaches for undertaking an economic and social analysis of the use of marine waters (WG ESA 2010). The main difference between these two approaches lies in different starting points and ambition level, which also implies different data requirements. While the Ecosystem Services approach starts by identifying ecosystem services of the marine area (Oinonen *et al.*, 2016), the Marine Water Accounts approach takes its starting point at the economic sectors (activities) using the marine waters (Brouwer *et al.*, 2005).

According to the Ecosystem Services approach the following steps are required (Van der Veeren *et al.*, 2018);

- Identify ecosystem services of the marine areas in cooperation with the analysis of status and the analysis of pressures and impacts.
- Identify and, if possible, quantify and value the welfare derived from the ecosystem services using different methods to estimate the use and non-use values of these services (usually the latter involves stated preference valuation methods).

- Identify the main drivers and pressures affecting the ecosystem services.

The Marine Water Accounts approach requires to:

- Identify and describe the region of interest for the analysis.
- Identify and describe the economic sectors (activities) using marine waters.
- Identify and, if possible, quantify the economic benefits derived from the economic sector's use of marine waters in terms of production value, value added, number of employees, salaries, etc.
- Identify and, if possible, quantify impacts generated by these sectors.

Quantitation of ecosystem services obtained from the sea is a demanding process. Although it is calculated by assuming that these services do not exist, and estimating the loss of the sector the guidance document states that Member States can work through the method of their choice (EC, DG ENV. 2011). The use of the Ecosystem Services Approach will yield more reliable results. However, in order to apply this approach, a price must be determined for the benefit obtained from the sea (Semeniene, 2017a).

Analysis of the different uses of the marine environment in terms of their economic and social importance was conducted applying the Marine Water Accounts approach and is provided for the following economic activities (EU, 2008):

- Extraction of minerals (rock, metal, ores, gravel, sand)
- Fish and shellfish harvesting (fishing) and processing
- Aquaculture – marine
- Transport infrastructure
- Transport – shipping, including ship-building
- Urban and industrial uses
- Waste treatment and disposal
- Tourism and leisure activities
- Research and survey

In order to determine the position of the relevant sectors in the economy; value added, turnover and employment indicators were used.

After a literature review of approaches to economic and social analysis of the use of marine waters and costs of degradation, as well as based on available expertise on ecosystem services valuation in Turkey, it was decided that, as in the vast majority of the EU member states, Water Accounts approach is the most suitable for Turkey.

The following steps were completed during the analysis of the marine water uses in Turkey:

- In case of data are not available on a provincial basis, smaller units were taken into account. For the Mediterranean, 31 coastal regions have been identified. Seventy-six coastal districts were defined for the Black Sea Region.
- Literature review was conducted related economic sectors.
- Interviews and meetings were organized with 10 different institutions including Turkey Statistical Institute in order to demand and collect data.
- During the initial assessment analysis, necessary data were determined in cooperation with the beneficiaries and stakeholders.
- The data obtained from the relevant studies and reports were determined according to the economic and social importance of economic activities/sectors. These analyses were performed on the basis of value added, turnover and employment data.
- Taking account to the value-added, turnover and employment data have been compared to financial benefits gained from the marine sectors.
- Social and financial benefits from marine related sectors have been calculated.
- Relevant sectors' that caused pressure on the seas numerical data have been obtained.

## Results

### The assesment of proposed measures costs and benefits

Turkey's Marine Strategy Framework Directive's our seas for the 11 descriptor with relevant stakeholders to achieve good environmental status for the purpose of identifying measures program was created. There exists different designated competent authorities for different aspects regarding the protection of marine environment in Turkey. Studies conducted in Turkey Prevention of marine pollution is among responsibilities of many institutions and organizations in Turkey, Therefore, the task of linking measures to established environmental targets is difficult.

The delegates of the Bolu Workshop determined that that there was a total of 167 constituent measures which Turkey is currently undertaking, will

be undertaking in the near future or have the capability of initiating as part of the broader effort towards ecosystem-based management of the marine environment.

Further measures were added following an institutional review of the initial measure inventory and some measures were removed, resulting in a final total of 162 measures. These are thus all measures that are considered appropriate for the achievement and maintenance of Good Environmental Status (GES) for Turkey's marine waters, in line with the objectives of the MSFD.

The set of proposed measures are therefore considered to be a reasonably comprehensive list of measures that will contribute to the achievement and maintenance of GES, as well as eventually meeting the objectives of the draft environmental targets compiled under Article 10 of the Directive. It is to be noted that the measures relating to Turkey's Water Framework Directive (WFD 2000/60/EEC) are drawn from what is understood to be an ongoing implementation of the WFD in Turkey.

A total of 162 measures have been proposed in the evaluation of stakeholders and relevant experts; 73 of those measures were defined as "Existing measures", 29 as "Future measures" and 59 as "Proposed measures". The distribution is illustrated in Figure 2. There was also one measure for which the status could not be clarified.

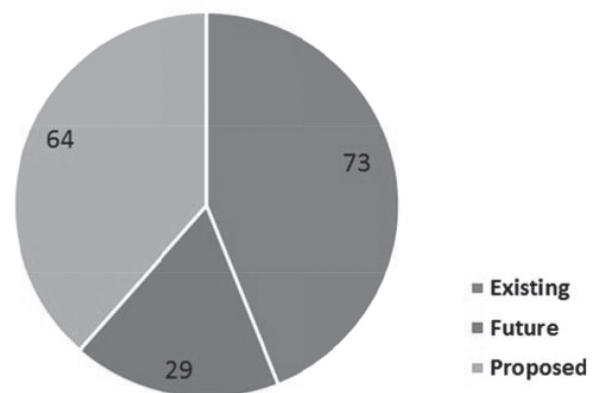


Fig. 2. Distribution of existing, future and proposed measures

While some of the measures are relevant to only one descriptor, some of them can be related to more than one or even to all descriptors. The number of proposed measures affecting each descriptor is illustrated in Figure 3 below.

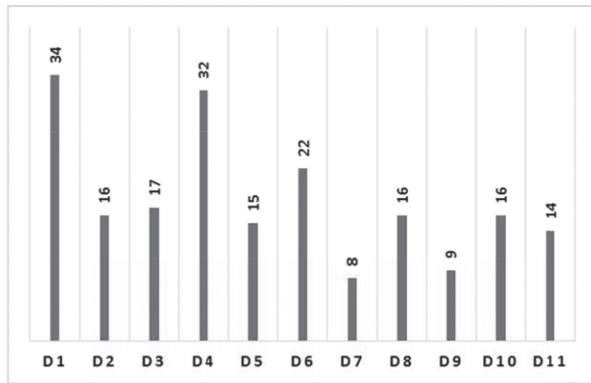


Fig. 3. Number of proposed measures per descriptor

Provided that the measure also includes tasks regarding implementation of such documents including on-site actions, it is categorised as medium-cost measure, since on-site actions would require additional costs such as vessels, equipment and very specific expert man-days. If further on-site actions and/or investments are needed as well, it is assumed that the measure falls under high-cost measure category.

Following these assumptions, the cost estimation study for the proposed measures was carried out with the relevant institutions and organizations and then developed with economic analysis experts. The results of the study reveal that there exists 32 low-cost, 21 medium-cost and 6 high-cost measures both in the Black Sea and the Mediterranean Sea.

As also presented in Figure 4, only 10% of the proposed measures are estimated to be high-cost measures. Most of the proposed measures are low

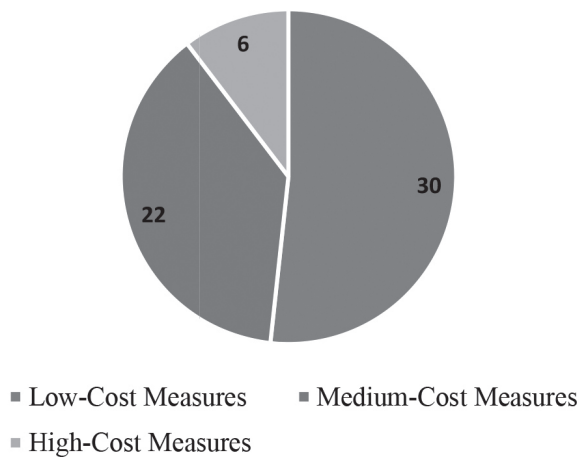


Fig. 4. Distribution of measures according to their cost categories

and medium-cost. The competent authorities (CAs), which are most likely to be responsible for the implementation of these proposed measures (as discussed during the Bolu Workshop) and the distribution of all measures per CA and distribution of proposed measures for CA are given in Figure 5.

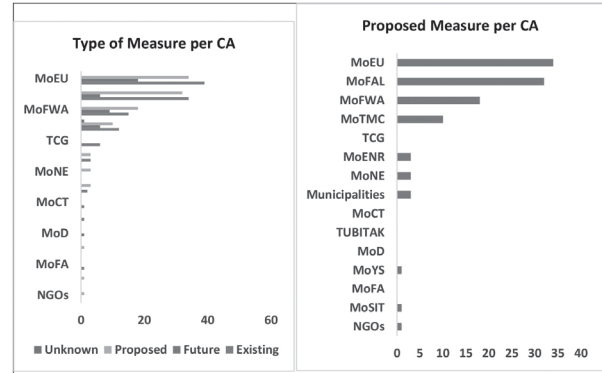


Fig. 5. Type of proposed measures per CA (left) and proposed measures per CA (right)

As can be seen from Figure 5, it is proposed that the Ministry of Environment and Urbanisation (MoEU) would have responsibilities for 34 of the proposed measures, Ministry of Food, Agriculture and Livestock (MoFAL) for 32, Ministry of Forestry and Water Affairs (MoFWA) for 18, Ministry of Transport, Maritime Affairs and Communications (MoTMC) for 10, Ministry of Energy and Natural Resources (MoENR), Ministry of National Education (MoNE) and Municipalities each for 3 and Ministry of Youth and Sports (MoYS), Ministry of Science, Industry and Technology (MoSIT) and NGOs each for 1.

The experts who participated in the Bolu Workshop on 12-15 July 2017, were also consulted to determine the scope of the benefits that can potentially be derived via the new policy measures.

For this, the socio-economic team has developed a marine ecosystem services typology by using existing frameworks such as Marine Ecosystem Services Partnership and IPBES (UNEP: IPBES, 2015). The typology was then adapted to a survey format, sub-divided to the Black Sea and the Mediterranean Sea which are MARinTURK project’s (Marine Strategy Framework Directive Capacity Building Project in Turkey) sub-regional sea areas (MARinTURK, 2017).

For each of the sub-regional sea, participants of the Bolu workshop were asked to fill a survey in which they needed to consider each of the ecosys-

tem services (ES) categories and whether these are likely to face pressures if no policy action is taken by ranking the pressures as 'high', 'medium' and 'low' (Table 2).

A total of 70 surveys were compiled and the resulting pressure categories were clustered separately for the Black Sea and the Mediterranean. Subsequently, a weighting system was conceptualised in order to derive at the overall benefits that the proposed policy measures would bring to Turkish society and Turkey's marine waters.

As seen from the Table 2, The survey results reflect the perceptions regarding the most critical ES in contributing to human wellbeing both in the

Mediterranean and the Black Seas in Turkey.

For example, it is not surprising that the provisioning of food (captured fisheries and other marine wildlife) has been ranked as the ecosystem services (ES) benefit that will be subject to the highest amount of pressure if the foreseen PoMs are not initiated and implemented for both seas.

The following ES benefits under biggest pressure were natural coastal protection and water purification/waste treatment under the Regulating Services which point to the perceived conversion pressures in Turkey's coastal zones and the insufficient level of waste treatment infrastructure affecting natural ecological processes of the coastal/marine ecosys-

**Table 2.** Classification of marine ecosystem services and contributions (Example of survey filled by the Bolu Workshop participant: adapted from IPBES).

Ecosystem Service Type	Ecosystem	Benefit Result	Mediterranean			Black Sea		
			High Print	Medium print	Low print	High Print	Medium print	Low print
Procurement Services	Food	Nutrients obtained from natural organisms (sea fishing and other seafood caught)		High		High		
		Food based on aquaculture production (Aquaculture)			High		High	
		Feed production used in aquaculture and animal husbandry			High		High	
	Natural resources and raw materials	Industrial use, e.g. Marine aggregates (gravel, sand, etc.) sea shell, algae, salt production		High			High	
		Biochemical, medical and genetic resources obtained from marine species			High			High
		Decorative use-e.g. Sea shells etc. use in handicrafts as jewelry			High			High
		The use of sea water for drinking			High			High
		The use of seawater for cooling purposes			High			High
Energy source	Energy Supply (Tidal energy, wave, wind)			High			High	
Editing Services	Climate regulation	Regulation of greenhouse gases and carbon retention of plant plankton and marine plants	High			High		
	Macro-air conditioning balancing	The sea's heat, precipitation, wind, humidity, etc. regulation of factors			High		High	
	Buffer function for natural disasters	Natural coastal protection (eg Coastal Wetlands, deltas, lagoons, via deltas)		High			High	
		Sediment stabilization						
Treatment and waste disposal	Waste absorption and biological pollution improvement	High				High		
Cultural Services	Cultural identity, social relations	Country, heritage,			High			High
	Information and training	Creating a scientific source or a natural laboratory of the sea to understand marine processes and species	High			High		
	Recreation and tourism	Recreation and recreation opportunities offered by the sea and coasts	High			High		
	Sense of spirituality	Recreation and recreation opportunities offered by the sea and coasts		High				High
	Continuation / existence of biological diversity	Preserving marine biological diversity and wildlife, know that it will be passed on to future generations	High			High		



tems and marine waters’ quality, again for both seas.

Then, for the Mediterranean, the recreational opportunities and tourism sector was identified as vulnerable if the PoM fails to be adopted.

Finally, the maintenance of biodiversity, implying an enhanced wellbeing from knowing that future generations will enjoy a maintained marine biodiversity, was seen as an important factor to be addressed by a policy measure and seemed equally relevant to both the Mediterranean and the Black Seas. Moving beyond the coastal and marine systems’ critical role in sustaining the wide range of human and natural economic activities, the urge for maintaining marine biodiversity for the future is perhaps an indication of the survey participants’ level of expertise and awareness at the Bolu workshop.

**Benefits of Proposed Measures**

It is well-acknowledged that ecosystems, including marine and coastal ecosystems and the biological diversity contained within them, contribute to individual and social wellbeing (MEA, 2005; TEEB, 2010).

The value of ecosystems to human wellbeing has multiple dimensions associated with different institutional and cultural contexts – i.e. social, ecological

and economic dimensions– that can be expressed in a range of measurement units (Pascual *et al.*, 2017; UNEP/IPBES 2016, Brondizio *et al.*, 2009).

These values co-exist in human societies (often in competing ways) and constitute determinants of policy and decision-making. The essential goods and services that are provided by ecosystems and that support human health, survival, livelihoods and wellbeing have generally been termed as ‘Ecosystem Services’ and more recently as ‘Nature’s Contributions to People’ (Diaz *et al.*, 2015).

All Ecosystem Services are underpinned by ecological functions or ecosystem properties including biodiversity (Oinonen *et al.*, 2016); thus, to be able to derive final societal ‘benefits’ and their respective ‘values’ or importance levels, it is crucial to have data and methods to assess processes in the marine environment (Figure 6). Improved integration of Ecosystem Services data with marine policy needs is likely to lead to better informed and more holistic decision making about resource use. This is why the Ecosystem Services approach has been used as a frame in the analysis of benefits regarding the PoM. The ecosystem services approach therefore provides a framework for considering whole ecosystems in decision making and for accounting the services they provide (Bann and Bařak, 2013).

Within the MSFD PoMs framework for Turkey,

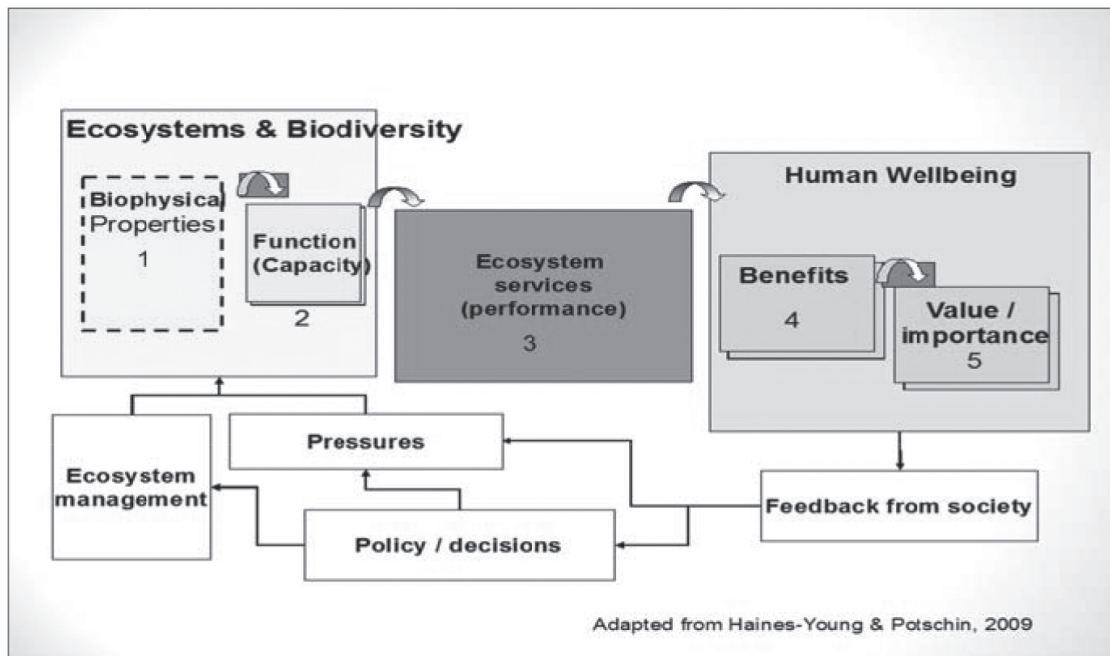


Fig. 6. Schematic representation or the ‘cascade’ of linkages between the biophysical properties and functioning of ecosystems that underpin all direct and indirect ecosystem services (MSFD Guýdance Document, 2018)

in order to assess the full range of benefits that arise from the natural functioning of marine/coastal ecosystems, economic and social analysis experts has developed a typology of marine and coastal ecosystem services following the Ecosystem Services approach. The developed typology consisting of 19 benefits was compared and fine-tuned with the European the Common International Classification of Ecosystem Services (CICES) classification in order to make sure that the wide-range of marine and coastal benefits are captured and well-aligned with EU standards.

The typology was then adapted to a simple survey format, sub-divided to the Black Sea and the Mediterranean Sea, which are the sea areas of the project at hand. Taking into account the economic services and related benefit categories, if any measures /policy actions take place, the likelihood of their exposure to pressures is rated as "high", "medium" and "low" (Semeniene, 2017b).

The following ecosystem services benefits under biggest pressure were natural coastal protection and water purification/waste treatment under the Regulating Services which point to the perceived conversion pressures in Turkey's coastal zones and the insufficient level of waste treatment infrastructure affecting natural ecological processes of the coastal/marine ecosystems and marine waters' quality, again for both seas (Bassak Dessane, 2017). Finally, the maintenance of biodiversity, implying an enhanced wellbeing from knowing that future generations will enjoy a maintained marine biodiversity, was seen as an important factor to be addressed by a policy measure and seemed equally relevant to both the Mediterranean and the Black Seas (Semeniene, 2017c).

#### **Availability of financial resources for programme of measures**

The availability of predictable and stable finances for the program of measures (PoM) is a key issue in the MSFD implementation (EU, 2014).

Financial availability will surely increase the possibility to carry out long-term planning and increase overall stakeholder support by assuring the continuity of financial resources aiming at both marine biodiversity conservation and sustainable development of all sectors dependent on the marine and coastal environment in Turkey. There are basically two sources to be used in the future for funding the MSFD implementation related measures.

Besides the EU, other multilateral donor agencies such as the World Bank (through their Country Partnership Strategy with Turkey), Global Environment Facility (GEF) and the UN Agencies should be considered for financing the relevant PoMs in ways that are compatible with each institution's globally and regionally defined objectives.

In accordance with the Turkish national accounting standard, ministries and agencies that are directly affiliated to the ministries are tied to the central state budget. The Turkish budget formulation process is heavily centralised as it is based on a top-down steering process (OECD 2007).

The central budgeting framework of the Turkish administration requires that all Ministries request their annual budget from the Ministry of Development in the form of either investments or currency transfers.

Currently, Turkey is in the second IPA phase that runs between 2014-2020 in which the environment programme receives around 600 million EUR (Basak Dessane, 2015).

The overall objective of the environment programme is to improve environmental protection and living standards for the population of Turkey by supporting investments in the environment infrastructure sector. The Ministry of Environment and Urbanisation is the lead institution to continue aligning environmental policies with the EU acquis. The priorities of the Environment Operational Programme for IPA 2 in Turkey are climate change, nature protection and disaster management (EU, IPA. 2014).

The MSFD represents the EU approach to the management of European Seas and is based on an adaptation of the WFD for the marine environment. Given the broad scope of the Environment Operational Programme priorities, it can be expected that the next stages of the Directive's implementation in Turkey will naturally involve European Union funding.

#### **Summary of Turkish Black Sea and the Mediterranean Coastal Waters, the different uses of the marine environment and marine environment protection expenses**

Based on the environmental expenditure of the economic activities described workshop, summary of cost of degradation could be presented.

Cost of degradation of the marine environment, based on multiple assumptions, can be considered

to amount at least to 870 million per year (sum of the public and private annual costs) for the Turkish Black Sea (Kocaman, 2017b). However, this figure might increase a few times if all the related data is known or if another approach for the environmental benefit/cost valuation is applied. In any case, costs of degradation not necessarily always are presented in monetary terms.

Qualitative description is equally important in order to reflect the reduction in human well-being caused by the deterioration of the marine environment. Different uses of the Black Sea marine environment have been evaluated by considering the indicators foreseen within the scope of the sea water approach.

All the analysed economic activities have quite a big impact on the economy and/or social indicators of the region and Turkey. For example, the Black Sea is responsible for over 80% of reported fish landings in Turkey, 24% of RO-RO (roll on roll off) ships are in the Black Sea while Aquaculture–marine activity in the Black Sea totals to 7.4 per cent of overall employment in the sector (MARinTURK, 2017).

There are some gaps in economic data of separate economic activities relevant to the selected Mediter-

anean regions. Though quite big efforts have been made to acquire monetary data on the value added and turnover of the main economic activities, because of reasons mainly related to the confidentiality, these numbers cannot be presented explicitly (Kocaman,2017a). All the analysed economic activities have quite a big impact on the economy and/or social indicators of the region and Turkey. For example, tourism and leisure activities bring more than 11 per cent of Gross domestic product of the Mediterranean region, employment in this sector amount to 11.5 per cent of the region and even 5% of the country.

Transport–shipping sector employment in the Mediterranean makes 7 per cent of total employment in the sector while Aquaculture–marine activity in the Mediterranean totals to almost 20 per cent of overall employment in the sector. The cost of degradation of the marine environment, based on multiple assumptions, can be considered to amount at least to 700 million per year (sum of the public and private annual costs) for the Turkish Mediterranean Sea (Kocaman, 2017b).

However, this figure might increase a few times if all the related data is known or if another approach for the environmental benefit/cost valuation

**Table 3.** Development of economic activities in the Black Sea and Mediterranean

Activity	Forecasted development in the future	Remarks
Extraction of minerals (rock, metal, ores, gravel, sand)	?	Information on extraction of minerals available is not sufficient to foresee any trends.
Fish and shellfish harvesting (fishing)	or	Trends are not clear. There are various factors influencing fishing.
Fish and shellfish processing	?	Information is not sufficient to describe any trends.
Aquaculture – marine		Limited growth is foreseen in the future.
Transport infrastructure		Growth is foreseen, in particular in yachting /tourism sector.
Transport – shipping		It is a very important marine sector. Because of growing market and planned State support growth of ship building is foreseen.
Tourism and leisure activities		Firm growth is forecasted.
Urban and industrial uses		Because of foreseen new TPPs and NPPs more abstraction of marine water is foreseen
Waste treatment and disposal (wastewater treatment)		Because of industrial developments bigger wastewater loads are foreseen, even though treatment criteria will remain strict.
Research and survey		Because of increasing requirements for the marine environment protection growth of research activities is foreseen.

is applied. In any case, costs of degradation not necessarily always are presented in monetary terms. Qualitative description is equally important in order to reflect the reduction in human well-being caused by the deterioration of the marine environment (Semeniene, 2017a).

Based on the trends of the marine - related economic activities and on the plans for the future of development, It seems that almost all economic activities will experience growth. It was understood that the Fisheries sector for Turkish seas is an unpredictable sector and is affected by various national conditions and generally international requirements (Table 3).

The most important challenges to performing cost-benefit analysis were considered to be a lack of data on costs of measures, and the limited understanding of the cause-effect relationships and ecological processes, which make quantification of environmental and social impacts of measures difficult if not impossible.

## Discussion

The necessary measures for achieving good environmental status for all descriptor of the Directive for Turkish seas have been drafted. For future, it is significantly important that the determination of the relevant policy and decision-makers and funders and implementing institutions/organizations to implement proposed measures taking into consideration of the ecosystems' slow response. Therefore, the allocation of central state funding will be a critical factor in the financing of the proposed policy measures. Accordingly, the results of the multi-criteria analysis laying out the measures with the highest benefits and lowest costs should ideally be considered first for financing. Based on this, the institutional arrangements required to support the financing system should be clearly defined by the leading partners.

Among the measures with the highest benefits and lowest costs are considered those to strengthen the liaison between relevant governmental bodies, carrying out environmental awareness campaigns, educational programmes, promoting collaborations. Some of the awareness raising activities are intended for general audiences while others are sector specific. These initiatives with multiplier effects can be financed in diverse ways: collaboration with the pilot municipalities or the Union of Turkish Muni-

palities, building private sector and/or philanthropic sector partnerships. On the other hand it is seen that the measures taken primarily for marine litter awareness, and awareness-raising measures towards the forefront. Impact assessments and cost-benefit analyses need to be performed prior to the introduction of any new measure. Economic (multi-criteria) analysis, carried out for the PoMs of the Black and the Mediterranean Seas, revealed a few aspects which are important for further work regarding the MSFD implementation in Turkey.

The first priority measures, identified during the workshop with the help of various stakeholders, who participated in the workshop are "soft" measures. This is very similar to what the EU countries had identified as well.

The cost assessment for each measure can be carried out more easily, however, the monetary evaluation of marine waters/ecosystem services is not an easy task. Marine water resources have not been evaluated in monetary terms in Turkey so far. Water valuation (in all cases surface, but not marine water) efforts have been concentrating mostly on valuing recreation and to a lesser degree on the purification and other functions of water bodies (Semeniene, 2017a).

## Conclusion

### Lessons Learnt During Case Study

The Workshop event was planned in two phases. First part of the workshop aimed to increase capacity of participants in understanding the socio-economic analysis of the marine water uses with emphasis on understanding of evaluating costs of degradation of the marine waters and of environmental resource costs / ecosystem services. Results of the economic analysis of water uses and cost of degradation conducted for the Black and the Mediterranean Seas were presented and discussed.

The First phase of discussions in Bolu were organized in random groups, since the aim was to develop common understanding of approach to multi-criteria analysis and provide their opinions about ecosystem services at risk in both seas (Black Sea and Mediterranean). Discussions in the second phase were held in groups organized by descriptors according to preferences /knowledge of participants. Preliminary list of management measures for each of descriptors (except for D11 on underwater

noise since none of participants had any expertise on the topic) were discussed. Lists were also revised with information about responsible authorities and other elements. In some cases measures were deleted or added to the list. The knowledge of participants about actual implementation of various legislation was very helpful.

Finally, the participants were implement the knowledge obtained about the economic analysis and cost benefits, by giving their opinions about costs of measures and their benefit to ecosystem services. This information will be further analysed and can serve as the first input into cost benefit analysis of the Programmes of Measures. This workshop was planned for approximately 100 participants. In this workshop, 8 international speakers from 8 different countries, and 15 speakers in total, guided the participants through their presentations and roles as moderators in group activities.

### Suggestions

To develop well-grounded basis for making cost-benefit analysis, marine waters' valuation studies, covering a wider range of benefits of marine ecosystem services, are recommended to be carried out. Preparation of guidelines for such valuation might be needed as well. Understanding of the concept of ecosystem benefit valuation and a will to incorporate it into the decision-making process is an important precondition for the efficient use of the marine waters. This can only be successful if a cooperation and coordination among all relevant stakeholders takes place. Involvement of stakeholders' process tends to make cost-effectiveness analysis/ cost-benefit analysis/multi-criteria analysis results better match reality and leads to a reduced regulatory burden, increased certainty of investment and fairer or more affordable measures. The socio-economic analysis has been conducted by taking into consideration the program of measures and identified some gaps for Turkish seas. In this study, 15 provinces, 76 coastal districts were evaluated in the Black Sea. In addition, 31 coastal districts and 5 provinces in the Mediterranean Region were assessed. It has been determined that many data were incomplete for socio-economic analysis.

In the socio economic analysis, the following gaps were identified:

- Many types of data necessary for the socio economic analysis (ESA) according to provinces and according to districts are missing.

- Limitations because of the Regulation on the Procedure and Principles of Data Confidentiality and Confidential Data Security in Official Statistics' of the Statistical Office of Turkey (TUIK).
- Few marine ecosystem services assessment studies are available in Turkey, so ecosystem services method for the cost of degradation could not be applied.
- Lack of impact data because of unclear GES and links between descriptors and drivers/ pressures; the relationship between descriptors and ecosystem services.
- Very difficult to separate coastal activities from land-based ones.

Recommendations for better implementation of socio economic analysis (ESA) during the initial assessment and development of programme of measures and to wisely use results of this analysis are:

- Economists / persons responsible for ESA are needed in relevant institutions;
- Regular capacity building events / trainings for them and other staff;
- Work with the TUIK on possibility to collect and obtain relevant data;
- Studies on monetary valuation of environmental and resource costs/benefits;
- Better understand the valuation results and their policy implications consultations with stakeholders are needed;
- Regular capacity building events / trainings for them and other staff;
- Integrate environmental valuation into decision making processes;

As a result, the measures with the highest benefits and lowest costs are determined those to strengthen the liaison between relevant governmental institutions, carrying out environmental awareness campaigns and educational programmes, promoting collaborations.

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