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Guidelines for National Economic and Social Analysis of Mediterranean Marine Ecosystems

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This report results from the work conducted by the Plan Bleu as part of the initial economic and social analysis of the EcAp project, Ecosystem Approach for the Management of human activities, coordinated by the Coordinating Unit of the MAP.

The present report has been prepared by Carla Murciano Virto, project officer at Plan Bleu, and Didier Sauzade, Programme Officer "Sea" at Plan Bleu. The final edition of the report was made by Sandra Dulbecco, Plan Bleu.

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Acronyms

CIS	Common Implementation Strategy
CP(s)	Contracting Party(ies)
COP	Conference of the Parties
COR ESA	Correspondence Group on Economic and Social Analysis (EcAp)
EC	European Commission
EcAp	MAP's Ecosystem Approach Initiative
EC WG DIKE	European Commission Working Group on Data, Information and Knowledge Exchange
EC WG ESA	European Commission Working Group on Economic and Social Assessment
EIB	European Investment Bank
EO(s)	Ecological Objective(s)
ESA	Economic and Social Analysis
EU MS	European Union Member State
GEF	Global Environment Facility
GES	Good Environmental Status
GVA	Gross Value Added
IA	Initial Assessment
MAP	Mediterranean Action Plan
METAP	Mediterranean Environmental Technical Assistance Program
MSFD	Marine Strategy Framework Directive
ReGoKo	Regional – Governance and Knowledge generation Project
UNEP	United Nations Environmental Programme
WB	World Bank

Introduction

OBJECT OF THE REPORT

The present report is intended to provide guidance to national authorities of non EU Mediterranean countries in charge to conduct an Economic and Social Analysis (ESA) of the uses of the marine waters and the cost of degradation at the national level.

ESA in the Mediterranean context is being carried out as part of the Ecosystem Approach (EcAp) Initiative of the Mediterranean Action Plan (MAP). Through Decision IG.17/6 the Contracting Parties (CPs) to the Barcelona Convention have committed to progressively apply the Ecosystem Approach[1] to the management of human activities impacting marine and coastal ecosystems, to achieve their Good Environmental Status (GES).,

In the case of Mediterranean EU countries, the Ecosystem Approach is also being implemented through the Marine Strategy Framework Directive (2008/56/EC), aiming at achieving GES in European Seas. The difference between the two strategies is mainly related to their different jurisdictional contexts; the European MSFD and the MAP's EcAp Initiative are complementary and mutually reinforcing, avoiding duplications of activities or duties, and share the common final objective of achieving GES in the Mediterranean Sea..

The implementation of the MSFD requires EU Member States (EU MS) to conduct ESA as part of their Initial Assessment (Art. 8c). In the framework of the Common Implementation Strategy (CIS), a European working group was set up to elaborate a Guide specifically concerning ESA (EC – WG ESA, 2010). Based on both the economic and social analysis conducted at the regional Mediterranean scale and on pilot ESA case studies recently carried out in Mediterranean countries, it was concluded that the adaptation of the European Guide to non-EU Mediterranean countries could be useful to better take their specificities into account, particularly regarding data availability and needs to conduct ESA. These considerations have led to the elaboration of the present guidelines.

Under MAP's EcAp Initiative, the ESA consists of two different and complementary assessments: first, an economic and social assessment of the main human activities taking place in marine and coastal environments; and, second, the evaluation of the costs of degradation of marine and coastal ecosystems which result from human activities. The ESA will be used to support the selection of measures that will contribute cost-effectively to the improvement of the ecological status of marine and coastal ecosystems. Most of these measures to achieve or maintain GES in Mediterranean waters will need to be set up at national levels to ensure that they are mandatory. Therefore, Mediterranean countries may experience a growing need to carry out their own national socioeconomic assessments to build a solid basis on which to take action and develop their national programmes of measures on marine and coastal protection.

The present document aims fundamentally at providing recommendations to undertake such assessments based on existing methods and similar experiences already carried out or being currently implemented in the Mediterranean basin, at national levels, under different governance frameworks. Several methodologies are detailed in the present document to assess the economic and social performances of human activities and the cost of environmental degradation. In addition, examples of practical experiences on ESA recently implemented in the region are described, outlining both their final results and the difficulties in the process (e.g. regarding the acquisition of data, the availability and accessibility of information or the application of methodological approaches).

[1] Issued from the Convention on Biological Diversity, the Ecosystem Approach is a paradigm aiming to reach a balance between three objectives: the conservation of ecosystems and biodiversity, their sustainable use and achieving an equitable sharing of benefits arising from the utilisation of natural resources (JNCC). It accounts for all social and economic aspects related to the human activities that benefit from, and impact on, the quality and ecological health of coastal and marine ecosystems. In the context of the MAP, the overarching goal of the EcAp Initiative is to ensure a healthy Mediterranean ecosystem while contributing to the sustainable development of the Mediterranean basin.

The general objective of these guidelines is to encourage Mediterranean non-EU MS to conduct national ESA in a harmonized manner to facilitate the implementation of coordinated EcAp National Action Plans, thus contributing to achieve the EcAp final vision across the Mediterranean basin.

THE CONTEXT OF THE GUIDELINES: THE MEDITERRANEAN ACTION PLAN

The Contracting Parties to the Barcelona Convention agreed in 2008 a roadmap to implement the Ecosystem Approach (EcAp) Initiative (Decision IG 17/6) to reach the Vision of "a healthy Mediterranean with marine and coastal ecosystems that are productive and biologically diverse for the benefit of present and future generations".

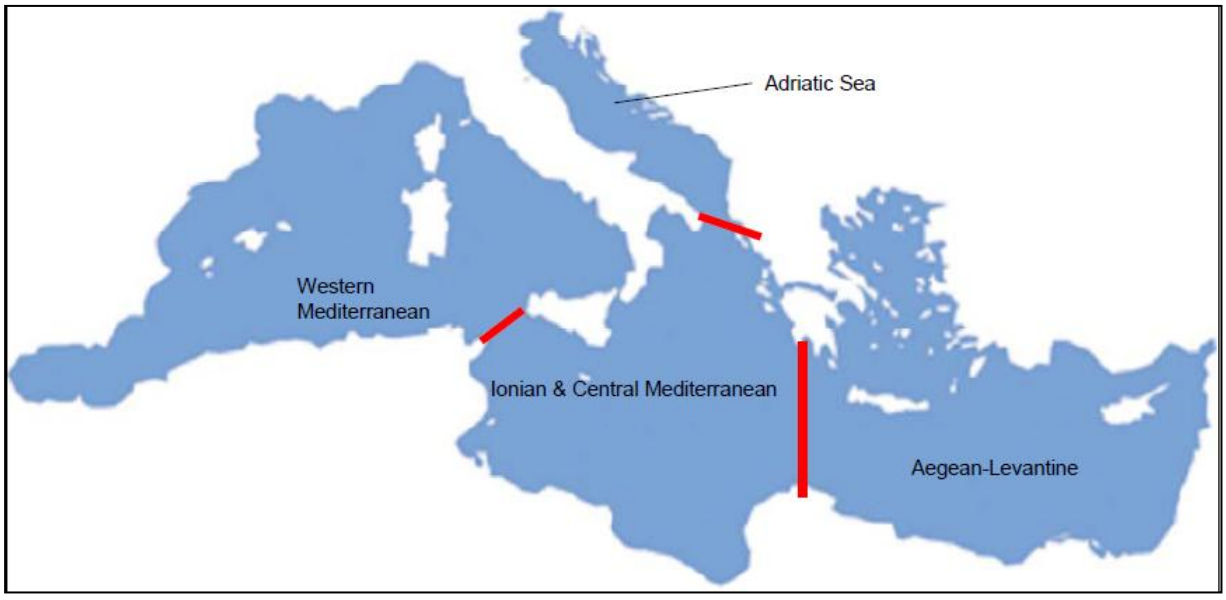
The implementation of the EcAp Initiative involves a rational and strategic seven-step process (Box 1) including an initial assessment of the environmental status of the Mediterranean ecosystems as part of step 3.

Box 1 The seven steps of the MAP's Ecosystem Approach

1. Definition of an Ecological Vision for the Mediterranean.
2. Setting of common Mediterranean strategic goals.
3. **Identification of important ecosystem properties and assessment of ecological status and pressures.**
4. Development of a set of ecological objectives corresponding to the Vision and strategic goals.
5. Derivation of operational objectives with indicators and target levels.
6. Revision of existing monitoring programmes for on-going assessment and regular updating of targets.
7. Development and review of relevant action plans and programmes.

The initial assessment has been conducted at regional level as well as according to the four main sub-basins of the Mediterranean sea, i.e.: Western Mediterranean, Adriatic Sea, Ionian and Central Mediterranean and Aegean-Levantine.

Figure 1 Sub-regional basins in the Mediterranean Sea



Source: UNEP/MAP (2011)

To achieve an Integrated Initial Assessment, it has also been agreed to conduct an economic and social analysis aiming to determine how human well-being and economies are linked to the state of the ecosystems in the Mediterranean region. The purpose of this socioeconomic analysis is to contribute to the protection of marine environments and to the sustainable use of the seas, by supporting the identification of economically efficient and cost effective policy options, i.e. projects, policies, programmes and courses of action (Turner et al., 2010).

The growing appreciation of the important role that ecosystems play in providing goods and services, which contribute to human present and future welfare, along with the recognition of the impacts of human actions on ecosystems have led to progressive efforts to integrate ecology and economics. A lack of economic valuation may result in underestimating the importance of such resources and may lead to detriment of marine ecosystems.

The consideration of economic aspects has led, in the framework of the first cycle of EcAp's implementation (EcAp Med 2012-2015), to a wide set of activities that have formed the ESA action. This action has produced several outputs at different scales.

At the Mediterranean regional and sub-regional scales:

- Plan Bleu (2014) Economic and social analysis of the uses of the coastal and marine waters in the Mediterranean, characterization and impacts of the Fisheries, Aquaculture, Tourism and recreational activities, Maritime transport and Offshore extraction of oil and gas sectors, Technical Report, Plan Bleu, Valbonne.
- Plan Bleu, ACTeon (2014), Scoping study for the assessment of the costs of degradation of the Mediterranean marine ecosystems, Technical Report, Plan Bleu, Valbonne.

At the national scale:

- Different ESA conducted in Egypt, Lebanon, Morocco and Tunisia.
- The present document, compiling guidelines for national ESA adapted to non-EU Mediterranean countries.

The implementation of the Mediterranean ESA action under EcAp has benefitted from the work of a large panel of experts integrating the Correspondence Group on Economic and Social Analysis[2] (COR ESA), a platform for discussions and experience exchanges coordinated by Plan Bleu and the MAP Coordinating Unit. The major aim of the COR ESA Group is to establish a common understanding of the economic and social analysis to be conducted at regional, sub-regional and national scales regarding human activities using and impacting marine and coastal areas of the Mediterranean Sea basin.

OTHER FRAMEWORKS TACKEN INTO CONSIDERATION

Other frameworks have been considered for the elaboration of these recommendations, mainly the EU Marine Strategy Framework Directive (MSFD), for which guidelines regarding socioeconomic analysis to be included in the national initial assessments have been developed; the Regoko project, in which pilot national socioeconomic analyses have been conducted for some non-EU Mediterranean countries; and the METAP partnership, which provides a valuable experience in the field of the assessment of the costs of degradation in southern Mediterranean countries.

The Marine Strategy Framework Directive (MSFD)

In 2008, the European Commission (EC) made a commitment to foster the sustainable use of marine resources with the stated vision of achieving and/or maintaining a clean, healthy, and productive sea, through the Marine Strategy Framework Directive (MFSD 2008/56/EC). The MSFD establishes a

[2] The COR ESA Group is composed of national experts designated by the Contracting Parties through Plan Bleu/RAC Focal Points in coordination with MAP Focal Points; UNEP/MAP Secretariat, Components and Partners and international experts selected by the Plan Bleu and the MAP Coordinating Unit.

framework within which each EU MS must take the necessary measures to achieve or maintain GES of its marine environment by 2020. The MSFD has developed a vision-driven process that also uses the principles of the Ecosystem Approach to achieve GES within a particular marine region or sub-region, imposing to EU MS countries a legal commitment requiring them to develop a marine strategy for their marine waters, in a coherent and coordinated way across the marine region or sub-region concerned.

The elaboration of this national marine strategy should follow a precise roadmap to be achieved in a six years cycle, including the following stages: development of an initial assessment; determination of GES for the concerned waters; determination of a series of environmental targets and associated indicators related to GES; implementation of a monitoring programme; and establishment of a programme of measures to achieve or maintain GES.

Article 8, Assessment, states that each MS shall conduct an initial assessment of its marine waters comprising the following:

- an analysis of the essential features and characteristics as well as current environmental status of their marine waters;
- an analysis of the predominant pressures and impacts, including human activities on the environmental status of their marine waters;
- an economic and social analysis of the use of their marine waters and of the cost of degradation of the marine environment (Article 8,c).

Considering that the implementation processes of the MSFD and EcAp roadmap are harmonized, it has been assumed that the objectives of the EcAp national initial assessments regarding the economic and social analysis should be similar to those of the MFSD in order to ensure synergy between the two frameworks.

The implementation of the MSFD is strongly coordinated by the EC. Within the Common Implementation Strategy (CIS), several workgroups covering multiple innovative aspects provided by the directive have been established to provide coordinated views and recommendations, and to precise common obligations. Among them, the Working Group on Economic and Social Assessment has drafted a guidance document on how to perform economic and social analysis for the initial assessment for the MSFD (EC WG ESA, 2010).

The work carried out by EC-WG ESA has been a very valuable source of inspiration for drafting the present document, which can viewed as an adaptation of the EC WG ESA guidelines to the context of the southern Mediterranean countries aiming to develop a socioeconomic analysis in the framework of EcAp implementation at national level.

This adaptation was required for two main reasons:

- This kind of analysis is constrained by data limitations: the EC WG ESA document recognises that data are generally lacking on non-economic uses, non-use values, correlations between drivers, pressures and states, as well as regarding spatial scales. Countries should therefore need to focus on making the best use of the available data. It was suspected that these limitations were even stronger in the southern Mediterranean countries, a fact what has been confirmed by the pilot cases carried out within the ReGoKo project (see below).
- To consider specific experiences in socioeconomic analysis of marine and coastal activities of Mediterranean countries. Such experiences mainly come from the METAP assessments in some southern Mediterranean countries (see below), the regional assessments made in the framework of the MAP's EcAp Initiative and the national analysis carried out within the ReGoKo project in some non EU countries (see below). Moreover, these guidelines also benefit from feedbacks issued from the recent analyses conducted by EU Mediterranean countries in the MSFD framework.

In addition, the adaptation of the guidelines is justified by the difference in scope between the MSFD and the MAP's EcAp Initiative. The latter is driven regionally by the MAP and, so far, it is developing

analyses and recommendations at the regional level. Its implementation at national scales is to date not scheduled. Conversely, the MSFD provides a community framework to develop marine strategies at national level. Each EU MS is responsible, in its jurisdictional waters, to reach predefined targets that must be documented according to a well-defined time line. Failure to comply with MFSD requirements may lead EC to start proceedings against MS, as for any other European Directive not duly transposed or implemented.

Another difference between the scopes of the EcAp initiative and the EU MFSD arises because MSFD only focuses on MS marine waters, as coastal waters are subject of the Water Framework Directive (WFD), while the EcAp initiative considers both the marine and the coastal ecosystems.

The ReGoKo Project

The Regional – Governance and Knowledge generation (ReGoKo) Project is funded by the Global Environment Facility (GEF), supervised by the World Bank and implemented by Plan Bleu. The project was conceived and launched in 2012 to foster the integration of environmental issues into sectorial and development policies of several southern Mediterranean countries such as Egypt, Lebanon, Morocco and Tunisia.

The project aims at achieving this objective via production of innovative knowledge on environmental issues, with specific reference to water related issues (freshwater, coastal and marine resources) and organization of conferences, seminars, workshops, etc. during which knowledge will be used to strengthen the capacity of key stakeholders at local, national and regional level.

Among the decisions taken, some participating countries have decided to conduct a socioeconomic evaluation of maritime activities. Pilot cases in Lebanon (Kanbar N. et al, 2015), Morocco (Belghazi S. et al, 2015) and Tunisia (Meddeb S. et al, 2015) have been developed to carry out national ESA, aiming to analyse the economic and social aspects of the use of marine and coastal waters under the jurisdiction of the countries and to assess the costs linked to a degraded state of the marine and coastal environment.

The experience gained from these first national ESA in non-EU Mediterranean countries has greatly influenced the elaboration of these guidelines.

METAP Partnership

The Mediterranean Environmental Technical Assistance Program (METAP), a partnership between the European Union (EU), the European Investment Bank (EIB), the United Nations Development Programme (UNDP), Switzerland, Finland and the World Bank (WB), started in 1990 to provide assistance to thirteen Mediterranean Beneficiary Countries: Albania, Algeria, Bosnia-Herzegovina, Croatia, Egypt, Jordan, Lebanon, Libya, Morocco, Syria, Tunisia, Turkey, and West Bank and Gaza.

The METAP program was conceived to bring together the Mediterranean countries to cope with and reduce the effects of environmental degradation. Environmental damage cost assessments were carried out at country scales for priority setting and as a tool for integrating environmental issues into economic and social development in the Middle East and North Africa region. Cost of environmental degradation reports were also prepared for Algeria, Egypt, Jordan, Lebanon, Morocco, Tunisia and Syria during the period 2001-2004 (Sarraf, 2004)

The overall objectives of METAP were to:

a. strengthen the institutional capacity required to manage environmental issues;
b. prepare a strong portfolio of priority environmental projects in order to accelerate and catalyse investment in environmental activities in the region; and
c. formulate a set of focused key policy factors affecting the Mediterranean environment.

OBJECTIVES OF THE GUIDELINES

The achievement or the maintenance of GES in the Mediterranean Sea needs the development of relevant action plans and programmes of measures at regional and national levels. The majority of the Mediterranean riparian countries does not belong to the EU and thus is not subjected to the enforcement of supranational EU directives (such as the MSFD). However, most of the measures needed to achieve or maintain GES in national waters are to be set up and implemented at the national level, which will require informing the national policy makers about the potential socioeconomic impacts and benefits of such measures. Indeed, their definition is based not only on the Ecological Objectives but also on economic and social considerations, which are addressed in socioeconomic assessments of uses of the coastal and marine ecosystems and the costs of degradation deriving from human-related activities. It is important, thus, to encourage non-EU MS to perform their national ESA and generate the knowledge and information needed to guide decision making, so as to contribute at their national level to the achievement of EcAp's overarching goal.

The present guidelines target specifically non-EU Mediterranean countries while intend to remain coherent with the implementation of the MSFD in the Mediterranean basin. To this purpose, they are built on guidance documents drafted to meet the requirements of similar ESA actions along with existing experiences in the Mediterranean region:

- EC Working Group on Economic and Social Assessment (2010) Economic and Social Analysis for the Initial Assessment for the Marine Strategy Framework Directive: a Guidance document. As said, this document has been a model to elaborate these Guidelines adapted to non EU Mediterranean countries; some borrowings have been made, especially for the presentation of concepts and methods.
- Draft material and documents for discussion on the issue of the Mediterranean Regional ESA (COR ESA Group).
- Regional ESA and Scoping study on the costs of degradation of marine ecosystems, conducted as part of the EcAp Initiative.
- MSFD Initial Assessments (IAs), submitted to the EC by Mediterranean EU MS.
- ESA pilot cases conducted in some Southern and Eastern Mediterranean countries under the ReGoKo Project.

As a result, this guidance provides knowledge, methods, key issues and practical examples to illustrate the different steps that should be followed for developing ESA as well as main challenges that need to be overcome. Its objective is to help practitioners/ decision-makers regarding:

1. The understanding of the economic and social analysis required under the EcAp Initiative, and its role in EcAp implementation;
2. The selection of the most suitable methodological approach, according to three main criteria: practicability, resource efficiency and replicability/ iteration.
3. Learning from past experiences;
4. Elaborating a common understanding and standards with regard to the analysis to be undertaken, so that results can be shared or compared between countries. This aspect is particularly important since coordination between countries is needed, as most of the environmental pressures are transnational;
5. Using the results and outputs of the ESA for decision-making.

This guidance is advisory and not binding for Contracting Parties to the MAP. It has been developed based on Mediterranean experiences and designed to meet the demands and needs of Mediterranean non-EU countries.

WHAT IS ECONOMIC AND SOCIAL ANALYSIS

In line with the provisions of the MSFD, it was agreed that the following assessments should be the main core components making up an Economic and Social Analysis in the context of the EcAp Initiative:

1. An assessment of the human uses of marine waters, in terms of their economic and social importance and environmental pressures.

   These include:

   - Identifying and describing the different human uses of coastal and marine ecosystems as well as associated environmental pressures;
   - Assessing direct and, if possible, indirect benefits of these uses, in economic and social terms;
   - Describing the most probable trend over the next decades for every human use assessed, to foresee future impacts on the ecosystems;
   - Describing in qualitative and, if possible, quantitative terms the extent of pressures caused by human uses of marine waters and their effects on coastal and marine ecosystems.

2. The description in qualitative terms and, if possible, in quantitative terms of the cost of degradation of the marine environment.

   - Identifying the links between human activities and their pressures on the marine environment, and quantifying the environmental degradation observed;
   - Quantifying the impacts of the environmental degradation for the different economic sectors that benefit from goods and services provided by marine ecosystems;
   - Valuating in monetary terms the impacts of environmental degradation for economic activities, using available economic methods and tools.

These assessments should be conducted taking account of the four Mediterranean marine sub-regions.

Box 2 Differences and complementarities related to the main ESA components

Both the assessment of the human uses of marine waters and the costs of environmental degradation examine the links existing between human and ecological systems although they use different -and complementary- methodological approaches.

The study of the **human uses of marine waters** is focused on the **goods and services provided** by marine ecosystems and on how these turn into economic benefits and improvement of human welfare. On the contrary, the study of the **costs of degradation** of coastal and marine ecosystems targets the **goods and services** that are **forgone** as a consequence of the negative side-effects of human activities.

In the first case, the analysis consists of examining the current state; whereas in the second one a comparison should be established between two contrasted scenario, one in absence of environmental policy (present state or BAU situation) and a reference situation (GES situation, past pristine state, etc.)

Level of detail required for the Initial Assessment

Recommendations and guidance in this document are to be considered in the context of EcAp and its overall goal of achieving GES and the protection of Mediterranean environments, for which it is necessary to characterize the basin's socioeconomic situation.

The socioeconomic analysis of human activities makes up a challenging and ambitious exercise in a wide set of aspects, ranging from the acquisition of general data to the adjustment of such data to meet the scale of the study area. The lack of quantitative and/or monetary data regarding indirect (non-economic) or non-use values may lead to a qualitative description of several uses of marine and coastal areas. In addition, in this particular case, the need to obtain economic and social information regarding exclusively the exploitation of the maritime space and resources by activities taking place both inland and offshore may involve a gap between theoretical objectives and practical achievements. These difficulties have already been highlighted by the EC WG ESA which, for the purposes of such analysis, recommended the EU national authorities to make the best use of current available information while keeping knowledge and data development towards a more comprehensive coverage over the longer term. Carrying out the

socioeconomic analysis may involve the combination of both quantitative and qualitative data and, when needed, the employment of expert opinion to achieve the expected results, while being transparent regarding the levels of uncertainty of the assessment.

Definition of main key concepts

Some key concepts related to the ESA are here described:

- **Human use of marine waters:** defined as any human activity using or influencing the marine space and/or ecosystem goods and services provided by marine waters.
- **Ecosystem services:** defined as goods and services or benefits that the ecosystem provides to human well-being. Ecosystem services can be separated into intermediate and final services.
- **Intermediate services:** Intermediate services are those that in a supporting or regulating way enable the final services and thereby influence human well-being indirectly, such as primary production or climate mitigation.
- **Final services:** result from ecosystem processes and constitute ecosystem functions, e.g. regulation of water flow and quality, creation of beaches, carbon sequestration. They directly provide benefits for humans, such as food provision, amenity and recreation or carbon storage, among others.
- **Degradation:** the reduction in the provision of ecosystem services compared to another (reference) state.
- **Cost of degradation:** the welfare forgone reflecting the reduction in the value of the ecosystem services provided compared to another state.
- **BAU, Business As Usual:** a baseline scenario describing the anticipated evolution in the environmental, social, economic and legislative situation in a marine environment over a certain time horizon in the absence of the policy under consideration.
- **Use values:** both direct and indirect values capture the direct link between ecosystem services and human welfare and originate from the society's gains from using, or potentially using, a given environmental resource or its services.
- **Direct use values:** include the economic value or profits of human activities (fisheries, tourism, oil and gas industries, etc.) and wider benefits more complex to assess due to the difficulty to capture them from market interaction (e.g. recreational activities such as bathing, swimming, scuba diving, recreational fishing) or for exemple the importance to local coastal communities to maintain their natural marine heritage.
- **Indirect use values:** benefits derived from the environment's provision of ecosystem services such as waste decomposition or carbon sequestration.
- **Option values:** derive from the potential use of resources, if there is a future need and new information arises. For example, the conservation of a natural area is an option and gives the possibility of transforming the area in the future, or keeping it, according to the new information gathered on the relative value of the natural area.
- **Non-use values:** also referred to as "passive use" values, are values that are not associated with actual use, or even the option to use a good or service. They are the manifestation of people's willingness to pay for a resource regardless of their ability to make any use of it now, or in the future.
- **Non-marked goods and services:** goods and services not traded in markets and, consequently, unpriced.
- **DPSIR framework:** conceptual framework analysing relationships between **D**rivers i.e. socioeconomic activities inducing environmental pressures (e.g. agriculture, fishing or maritime transport), which need to be identified when looking into different policy options; environmental **P**ressures, i.e. forces induced by Drivers which generate changes in the state of ecosystem (pollution inputs, extraction of biomass, etc.); environmental **S**tates (polluted waters and sediments, depressed fish stocks); **I**mpact on welfare (reduced catch revenues, loss of recreational values) as a result of a deteriorated environmental state; and policy **R**esponses designed to restore the state of the ecosystems (regulations, action plans and programmes of measures).

- **Maritime façade:** country seaboard or littoral and marine space bordering a particular marine region or sub-region.
  E.g. among Mediterranean states, some have several maritime façades in front of more than one marine region such as France, Morocco, Spain (Atlantic Ocean and Mediterranean Sea); Egypt (Red Sea and Mediterranean); and Turkey (Black Sea and Mediterranean).

Economic and social analysis of the use of marine waters

CAPTURING THE USE OF MARINE WATERS

The objective of EcAp is the management of economic activities based on the Ecosystem Approach. To this purpose, the links between human activities benefitting from marine ecosystems, related environmental pressures and their impact on human welfare are to be elicited. Their assessment and quantification require to combine environmental and socioeconomic information and might be challenging from a methodological and knowledge perspective.

The objectives of the first component of the ESA, the characterization of the human uses of marine waters, are ambitious. Ideally, according to the EC Working Group of ESA, an economic and social analysis intends to capture:

- Direct uses of marine waters: economic activities that use directly, or rely on or take place in close vicinity to coastal and marine environments.
  - Examples: aquaculture and mariculture, fisheries, shipping and shipbuilding, coastal defence, tourism, mining, hydrocarbon (oil and gas) extraction, cables and pipelines, etc.
- Direct use, other activities: non-market activities or uses not reflected in the above sectors, such as recreational activities and cultural benefits.
  - Examples: bathing, sport/recreational fishing, scuba diving, educational and research activities linked to marine areas, importance that local communities attach to their marine environment.
- Indirect use values: ecosystem services from which individuals benefit which are supported by a resource not directly used.
  - Examples: capacity of the system for carbon sequestration, nutrient cycling, resilience, natural coastal protection, etc.
- Non-use values: values linked to marine ecosystem services. These include:
  - Existence values: benefits obtained just by knowing that a particular ecosystem exists/ is maintained,
  - Bequest values: passing on ecosystem services intact to future generations, and
  - Altruistic values: knowing that other people enjoy the services provided.

In environmental economics, the aggregation of the different values provided by a given environment (in this case, marine and/or coastal) is known as the Total Economic Value (TEV). TEV includes both use and non-use values, as described above.

Regarding the geographical scope, MSFD requires that the initial assessment is made according to marine sub-regions, to take into account ecosystem's common features. In the Mediterranean Sea, the MSFD sub-regions are:

- Western Mediterranean Sea;
- Adriatic Sea;
- Ionian Sea and the Central Mediterranean Sea;
- Aegean-Levantine Sea.

The MAP's EcAp Initiative has adopted a similar approach, with the same sub-regions.

DIFFERENT APPROACHES FOR THE ANALYSIS

Two approaches have been proposed by the EC Working Group of ESA in order to evaluate the use of marine waters, on account of their pragmatism as well as on information required and data available for its development: the Ecosystem Services Approach and the Marine Water Accounts Approach. These approaches have different starting points, focus on different aspects and result in very different methodological schemes, yet share the same goal. The Ecosystem Services approach is more ambitious as it takes into consideration more aspects than the main economic sectors, and therefore may support the valuation of non-economic and non-use values; however, it also requires more resources (time, knowledge and information). The two approaches are detailed in the following section.

Ecosystem Services Approach

The Ecosystem Services Approach as stated by WG ESA involves three main steps:

1. Identification of the ecosystem services provided by the considered marine areas, in relation with the analysis of pressures and impacts.
   - A list of marine ecosystem services may be used to provide a preliminary qualitative assessment of the use of marine waters, as well as to identify which services are likely to be affected by policies (*e.g.* MSFD).
2. Identification and, if possible, quantification and valuation of the human welfare derived from ecosystem services, both estimating use and non-use value. This step includes several tasks:
   - Identifying and dividing services into intermediate and final, since only final services contributing to human welfare have to be economically quantified / assessed;
   - Describing and valuing benefits, by use and non-use values, derived from final ecosystem services;
   - Using the theoretical approach "Total Economic Value (TEV)", involving economic and social aspects.
3. Identification of the drivers and pressures affecting the ecosystem services.
   - Identification of human activities (drivers) taking place in, or close to, coastal and marine environments, along with a list of pressures generated by these drivers which affect intermediate and final ecosystem services.

Definition of *pressures* under the Ecosystem Services Approach:

- Pressures are associated to the *factors that affect the state* of the marine ecosystem.

Strengths of the Ecosystem Services Approach:

- A very exhaustive assessment may result by adopting this approach.

Limitations of the Ecosystem Services Approach:

- Need to characterize intermediate and final services and factors that may impact them: as opposed to final services, intermediate services are more difficult to identify because they capture the underlying services (regulating, supporting) which affect final services. They require a deeper understanding of the functioning of marine ecosystems, their dynamics and interactions.
- Deep knowledge of the marine environment functioning is needed for quantification and valuation of direct and indirect uses, as well as of non-use values.

Marine Water Accounts Approach

According to this approach, the analysis of the uses of the marine and coastal waters is made by analysing the socioeconomic value of marine environments.

The Marine Water Accounts approach involves four main steps:

1. Identifying and describing the region of interest.
2. Identifying and describing the economic sectors using marine waters.
   As a practical example, Box 4 provides detail of the economic activities examined and valued by Mediterranean EU countries, reflecting previous Mediterranean experiences in this field.
3. Identifying and, if possible, quantifying the economic and social benefits derived from the economic sector's use of marine waters in terms of socioeconomic quantitative indicators.
4. Identifying and, if possible, quantifying environmental impacts generated by these sectors (e.g. CO_2 emissions, pollution and nutrient inputs, energy inputs, overfishing, introduction of alien species, etc.).

The indicators that might be used to characterize the economic sectors are as follow:

- Production value
- Use of intermediary products (at purchase prices)
- Gross value added
- Employer's wages
- Labour force

Definition of *pressures* under the Marine Water Account Approach:

- Pressures are associated to the *effects on marine waters caused by the economic sectors* that are inventoried in the first step.

Strengths of the Marine Water Accounts Approach:

- Less constraining in terms of required data, which can be derived from national accounts and which are therefore generally available.
- Possible use of qualitative or quantitative data.

Limitations of the Marine Water Accounts Approach:

- It might only identify and measure what is obtained from national accounts, i.e. direct uses of the marine environment.
- Indirect uses and non-use values related to the marine environment are not captured under this approach.

The WG ESA guidance document highlights thus a significant gap between theoretical ideals and practical achievements, as well as the lack of data regarding non-economic uses, non-use values, causal correlations between drivers, pressures and state changes, and their spatial scale. These aspects are to be carefully considered before undertaking ESA in the Mediterranean Sea as well as during the analytical process.

Box 3 The challenges of socioeconomic evaluation of the human uses of marine waters

Undertaking ESA on the human uses of marine waters in the context of the Mediterranean countries presents major issues to be addressed pragmatically and transparently. These are related to:

- The availability and accessibility of data: identification and critical analysis of the data sources in terms of availability and accessibility are needed as a first stage. Together with the assessment of the data gaps, it is critical to select the best analytical method. This work should ideally be done in close cooperation with the National Statistics Authority.
- The characteristics of existing data, which need to be clearly described: granularity e.g. spatial scale and sectoral scope of data, i.e. specificity to the assessed sectors, among other.
- The comparability of existing information may be challenging and the aggregation of raw data impracticable, due to their great heterogeneity. Efforts need to be made so as to ensure the pertinence of selected data and that their aggregation or comparison makes sense.
- The selection of the analytical methods as well as the indicators used to present the information need to be justified.
- The replicability of ESA must be facilitated: the selection of the ESA method is to be done taking into account that the assessment might need to be updated periodically to assess the effects of adopted measures.
- Interpolations used to estimate non available information and/or indicators ought to be clearly detailed.
- Human activities are to be linked to the pressures they exert in the marine environment which, in turn, need to be related as far as possible to impacts on marine ecosystems. The characterization of the link(s) between drivers-pressures-states may allow assessing in which manner and to what extent environmental degradation imposes a detrimental effect on socioeconomic drivers and thus on human well-being.

Box 4 Example of the economic activities considered* by the Mediterranean countries under EU obligations

Activity theme	Activity	Cyprus	Greece	France	Slovenia	Spain	Italy	Malta
Food Production	Aquaculture and mariculture	X	X	X	X	X	X	X
Man-made structures	Coastal defence and flood protection			X	X			X
	Port operations and supporting infrastructure (e.g. ports, marinas, navigation aids)	X	X	X	X	X	X	X
	Placement and operation of offshore structures (other than energy)							
	Cables (e.g. Power transmission, Telecommunications, Pipelines interconnectors)			X				X
Military defence	Defence / Military			X	X		X	X
(water) Transport	Shipping	X	X	X	X	X	X	X
	Shipbuilding			X	X	X	X	X
Extraction of living resources	Fisheries	X	X	X	X	X	X	X
	Seaweed and other sea-based food harvesting				X	X		
	Commercialisation and processing of seafood products	X	X	X	X	X		
Extraction of non-living resources	Mining (gravel, sand and shell extraction)			X				X
	Salt extraction			X	X			
	Dredging			X				X
	Desalination / water abstraction	X		X		X		X
Energy Production	Renewable energy (e.g. wind farms)			X				X
	Marine hydrocarbon (oil and gas) exploitation / extraction		X	X		X	X	X
Tourism and recreation	Tourism and recreation incl. yachting	X	X	X	X	X	X	X
	Seaside resort activities				X			
	Recreational fisheries	X	X	X				X
	Recreational boating / water sports	X		X	X	X	X	X
Waste disposal	The use of the marine water for waste and wastewater disposal (agriculture, industry, households etc.)							X
	Storage (of gases e.g. CO_2, CCS)							
Research and survey	Marine research, survey and educational activities			X	X			
Land-based activities	Agriculture			X	X			X
	Industry			X	X			
	Wastewater treatment plants			X	X	X		X

*At least described, most of them also economically valued.

SELECTING THE MOST SUITABLE METHOD

It is worthwhile to consider the approaches selected under the implementation of the MSFD for Mediterranean countries and the regional EcAp initiative.

MFSD implementation in the Mediterranean

As shown in Box 5, all Mediterranean EU MS selected the Marine Water Accounts approach as the most suitable option to conduct ESA on the use of their marine waters, in the context of the EU MSFD. Examples of their final outputs can be found in Box 6.

Box 5 The socioeconomic analysis of marine waters under the MSFD. Experiences from Mediterranean countries

The European Union has jurisdiction over 30-40% of the Mediterranean waters: among the countries surrounding the Mediterranean Sea, seven were EU Member States by the MSFD approval and therefore subject of implementation of MSFD (*i.e.* Cyprus, Greece, France, Italy, Malta, Slovenia and Spain). They were due to submit the required Initial Assessment to the European Commission (as stated in MSFD, art. 8), including a socio-economic analysis of their marine waters and the assessment of the cost of degradation by the 15th of July 2012.

All seven Mediterranean MS opted for the Marine Water Accounts Approach as the most suitable method to develop the uses of their Mediterranean marine waters.

Table 1 Review of Economic and Social Analysis in submitted IAs of MS-Mediterranean countries

Economic and Social Analysis of the Use of Marine Waters	Cyprus	Greece	France	Slovenia	Spain	Italy	Malta
Ecosystem Services Approach							
Marine Water Accounts Approach	X	X	X	X	X	X	X

Regional EcAp initiative

After review of available methods, considering their strengths and limitations, the required information as well as previous ESA experiences, the COR ESA Group recommended the Marine Water Accounts Approach as the most suitable method to assess human uses of marine waters at the regional and sub-regional scale of the Mediterranean Sea. Prioritising feasibility and simplicity, the Marine Water Accounts was considered as a resource-efficient approach allowing sufficient level of detail to produce a comprehensive assessment illustrating (qualitatively and/or quantitatively) links between human activities and environmental pressures and impacts, in consistency with the DPSIR framework.

The Ecosystem Services approach better focuses on marine ecosystem services and might provide a better economic valuation, as it also encompasses non-market and indirect values. However, it is also considered as more resource-consumer as requires specific and often currently non-available or non-existing data: the use of the Ecosystem Services approach would require strengthening the knowledge on ecosystem service flows and its valuation in quantitative and monetary forms.

In addition, today economic statistics are collected, treated and aggregated mainly according to economic sectors[3]. Therefore, the socioeconomic analysis of human activities might be easier to conduct by using the Marine Water Accounts approach, which approximates the value of ecosystem services partially based on socioeconomic benefits issued from human activities, for which data are at periodically compiled by National Statistics Authorities.

[3] For example, European countries' statistical data are presented in Eurostat at the national level, according to the "Statistical classification of economic activities in the European Community" (NACE, deriving from the French « Nomenclature statistique des Activités économiques dans la Communauté Européenne »), a 4-digit classification providing the framework for collecting and presenting a large range of statistical data according to economic sectors (e.g. production, employment and national accounts).

Therefore, in the light of the above mentioned considerations, **the Marine Water Accounts approach** is strongly recommended to perform the analysis of the uses of marine waters under national jurisdiction. Selecting a similar approach allows for experience exchanges and enables comparison of results and harmonization of outputs. Additionally, the common addressing of shared environmental issues of concern might also be facilitated.

Box 6 The socioeconomic analysis of marine waters under the MSFD. Results from Mediterranean countries

The following table provides some examples of the socioeconomic assessments of maritime activities carried out by Mediterranean MS under the MSFD, on their Mediterranean façade.

A series of sector indicators –which vary from one country to another– are displayed to quantify the relevance and performance of each activity. On the other side, economic and social impacts are characterized in the majority of cases by means of common indicators such as turnover, gross value added and employment, which facilitates the comparison of data among activities as well as among countries.

FISHERIES - MSFD IA FRANCE			
Sector indicators	Nr Vessels	1 600	32% of French fleet
	Total Power	154 000 kW	
Production value	Million €	128	14% of total fisheries national production value
Gross value added (GVA)	Million €	73	15% fisheries national GVA
Employment	Employees	2 400 mariners (in ETP)	22% of national mariner's jobs. 21% of fisheries national jobs.
SHIPPING- MSFD IA SPAIN (data referring to 2009)			
Sector indicators	Passengers (millions)	Levantine & Balearic Sea: 9.76 Gibraltar strait – Alboran Sea: 1.81	
	Goods (million tons)	Levantine & Balearic Sea: 198 Gibraltar strait – Alboran Sea: 12.6	
Production value	Million €	1 850 (total national)	
Gross value added (GVA)	Million €	Levantine & Balearic Sea: 194.6 Gibraltar strait – Alboran Sea: 23.14	
Employment	Employees	334 operating companies (total national) Levantine & Balearic Sea: 3 063 Gibraltar strait – Alboran Sea: 364	
AQUACULTURE- MSFD IA GREECE (data referring to 2010)			
Sector indicators	Production	110 000 annual tons	
	Total Power	154 000 kW	
Production value	Million €	192.45 million €	
Gross value added (GVA)	Million €	18.5 million €	
Employment	Direct jobs	70 active companies 5 000 FTE	
TOURISM- MSFD IA ITALY (data referring to 2006-2007)			
Sector indicators	Total arrivals	21,5 million tourists	
	Nr Beds	1 650 000	36% of national offer
Production value	Million €	4 000	
Gross value added (GVA)	Million €	-	
Employment	Employees	470 000	

LESSONS LEARNED

The several studies carried out to link ecology and economics in the context of the marine environment, mainly under the framework of the MSFD and EcAp, have allowed identifying a series of issues of concern and challenges that need to be addressed when dealing with socioeconomic analyses. Some of them are being detailed in the present section.

- Data collection

Collection of information, is part of the initial stages when developing socioeconomic analysis. The need for homogeneous and comparable data stands out among the main challenges. Suitability, pertinence and availability of data regarding the study area need to be carefully considered. As stated earlier, it is essential that information is adapted as much as possible both to the scale (or scales) of the study area and the object of assessment (in this case, the socioeconomic activities taking place in maritime or coastal areas). Large scales might need different level of detail and data sources than small scale analysis.

- Spatial scale and data scope

Matching data on economic activities, mostly aggregated at national level, with a particular marine ecoregion defined according to ecological parameters is likely to be challenging. However, coherence of socioeconomic data with the study area is a key issue which allows a better linkage and understanding environmental pressures and socioeconomic benefits.

In the case of the Mediterranean ESA, the analysis targeted five main economic activities in the Mediterranean: Fisheries, Aquaculture, Tourism and recreational activities, Maritime transport and Offshore extraction of oil and gas. It was carried out at the scale of the basin and of the four sub-basins: the Western Mediterranean, the Adriatic Sea, the Ionian-Sea and Central Mediterranean and the Aegean-Levantine Sea.

When identifying data to describe human activities, it is often found that sector and socioeconomic information characterizing them are commonly aggregated at the national level of the countries where they take place (sometimes at supranational level and rarely at sub-national levels). Countries presenting several maritime façades belonging to different marine regions (or sub-regions) raise additional difficulties. In the Mediterranean, this is the case for France, Morocco and Spain (Atlantic and Mediterranean façades), Egypt and Israel (Mediterranean and Red Sea façades) or Turkey (Mediterranean and Black Sea). Some countries have facades in several sub regions, such as Italy (Western Mediterranean, Ionian Sea and Adriatic Sea sub-regions), Tunisia (Western Mediterranean and Ionian Sea) and Greece (Ionian Sea and Aegean-Levantine basin). In such cases, small-scale data should be used, that is, information related to sub-national levels. National statistical services gradually disaggregate statistics and make them available at lower scales than the national one. If the appropriate time and resources are available, the support of country statistical services may greatly facilitate the task. Conversely, when no low-scale data is available, pertinent information could be derived from existing data at larger scales. Interpolations may be used as long as used assumptions are conveniently described. An example is given in Box 7, illustrating the ratios used to adapt national-scale data to Mediterranean sub-regional levels for the Regional ESA.

Box 7 The regional ESA: the estimation of fishing activities in the four Mediterranean sub-regions

The need for interpolations in the sub-regional analysis:

Many Mediterranean countries are bordered by more than one marine sub-region i.e. Greece (Central Mediterranean and Aegean Levantine Sea); Italy (Western Mediterranean, Adriatic Sea and Ionian Sea and Central Mediterranean); and Tunisia (Western and Central Mediterranean). The socioeconomic analysis at the Mediterranean sub-regional level dealt with the fact that sector and socioeconomic information is often not specifically related to marine areas and even less to marine sub-areas.

Sub-regional shares of human activities taking place in countries bordered by several marine sub-areas were frequently unavailable and were estimated by means of ratios based either on relative coastal lengths or extracted from other studies and similar analyses (Plan Bleu technical reports, country EC Initial Assessments) focusing on these particular drivers and sub-regions.

Example: Ratios applied to the sub-regional analysis of Mediterranean fisheries

Information on fishing activities in the Mediterranean was found in international databases and technical studies, mainly aggregated at country national scales. A series of criteria and ratios issued from different sources were searched to estimate socioeconomic impacts of fishing activities in each Mediterranean sub-region. An example of the procedure followed is provided in the table below.

Sub-regional shares for some countries	**Applied Ratio**				**Ratios extracted from:**
	Production	Production value	GVA	Employment	
Greece					EC Initial Assessment, 2012, Greece
Aegean-Levantine basin	78%	71%	16%	80%	
Ionian Sea and Central Med	22%	29%	84%	20%	
Italy					EC Initial Assessment, 2012, Italy
Adriatic Sea	42%	42%	45%	34%	
Ionian Sea and Central Med	29%	29%	26%	28%	
Western Mediterranean	29%	29%	29%	38%	
Tunisia					Coastal length, Plan Bleu calculations
Western Mediterranean	32%	32%	32%	32%	
Ionian Sea and Central Med	68%	68%	68%	68%	

- Estimating non-available information based on existing data: approximation methods, calculations and transparency

Available sector and socioeconomic information is likely not to be specifically related to marine or coastal areas, particularly in cases of activities taking place both inland and offshore, such as hydrocarbon extraction, tourism, environmental research or fishing and aquaculture, among others. Again, interpolations may be used to spatially assess the share of human activities taking place in the area of study, provided that methods and estimates are transparently detailed.

As an example, Box 8 illustrates how the share of tourism and recreational activities in coastal fringes of Mediterranean countries was assessed in the regional ESA. Estimations of coastal tourism were based on available data on total tourism aggregated at the national level and using ratios issued from existing technical studies.

- The need for a common approach to harmonize results and better achieve final goals

Coordination between countries committed to develop ESA should be among the main key issues of the action, as it is necessary to ensure coherence. This is particularly relevant in the case of countries affected by transboundary pressures and impacts. The need for synergies to carry out national socioeconomic assessments has become apparent for countries sharing the same marine space. Constant feedbacks and experience exchanges would feed and help the work so that the resulting analyses are coherent among them and thus comparable. Such coordination not only would help selecting similar economic and social data on human activities and linking them to environmental pressures and impacts, but it would also enable to adopt comparable spatial and temporal scales to carry out the analyses.

This "national but regionally coordinated" aspect is important and strategic because (part of) the process of selecting future programmes of measures shall, ideally, be carried out based on results issued from countries' analyses. To this purpose, the examination of the general environmental and socioeconomic picture needs to be done from a perspective higher than national to take into account transnational issues and be able to compare their magnitude. The adoption of common approaches (i.e. the harmonization between countries) is thus essential to address common issues of concern.

The need for coordination is also highlighted by the EU MSFD, and takes added significance when considering the first results achieved by the EU countries. Indeed, the text states that although each EU MS is responsible for the implementation of the directive, there is a need to collaborate with other countries in the same region or sub-region, either EU-MS or non-EU. Administrative compliance with the directive has been nonetheless uneven: all EU-MS have transposed the directive (art. 26), completed the initial assessment including ESA (art. 8), determined GES (art. 9), and defined environmental targets and indicators (art. 10) yet there is only limited coherence at regional and sub-regional levels (Cinirella et al. 2014).

Box 8 Estimating the coastal share of Mediterranean tourism. The regional ESA in the Mediterranean Sea

The analysis of the several economic activities in coastal and marine areas under the Mediterranean regional ESA addressed several constraints regarding the granularity of the available data.

An illustrative case is the analysis of tourism and recreational activities in coastal zones, for which statistics on national and international tourism arrivals and socioeconomic data were issued from the UNWTO, the World Bank and the WTTC. These data are provided by countries annually and therefore they are available only at the national level. Specific data on littoral tourism was hence not available and needed to be estimated based on national statistics.

To this purpose, a ratio of littoral versus total tourism in Mediterranean countries was applied to assess sector, economic and social impacts of tourism in coastal areas. An example of how regional results were estimated is shown in the table below, regarding tourist arrivals in Mediterranean coastal fringes. The share of the tourist presence in littoral areas has been inferred by previous Plan Bleu works concerning the weight of coastal tourism over total national tourism for each country in the Mediterranean region.

Ratios applied to estimate the coastal share of the Mediterranean Tourism sector

Country	International Tourism Share Coastal/Total*	Total International Arrivals[a]	Coastal International Arrivals[b]	Domestic Tourism Share Coastal/Total*	Total Domestic Arrivals[a]	Coastal Domestic Arrivals[b]
Albania	50%	3.156	1.578	50%	238	119
Algeria	30%	2.634	790	50%	5.704	2.852
Bosnia & Herzegovina	10%	439	44	10%	714	71
Croatia	93%	10.369	9.643	72%	6.056	4.360
Cyprus	100%	2.465	2.465	100%	1.088	1.088
Egypt	10%	11.196	1.120	35%	8.300	2.905
France	20%	83.018	16.604	18%	199.577	35.924
Greece	95%	15.518	14.742	90%	13.091	11.782
Israel	70%	2.886	2.020	80%	7.655	6.124
Italy	65%	46.360	30.134	70%	78.703	55.092
Lebanon	65%	1.365	887	80%	na	na
Libya	95%	na	na	85%	na	na
Malta	100%	1.454	1.454	100%	334	334
Montenegro	10%	1.264	126	15%	1.008	151
Morocco	15%	9.375	1.406	30%	17.486	5.246
Palestinian Terr.	10%	488	49	20%	174	35
Slovenia	25%	2.156	539	25%	2.065	516
Spain	70%	57.701	40.391	40%	146.554	58.622
Syrian Arab Rep.	10%	5.070	507	30%	947	284
Tunisia	95%	5.950	5.653	90%	4.115	3.704
Turkey	65%	35.698	23.204	40%	64.922	25.969
Mediterranean Sea		**298.562**	**153.355**		**558.731**	**215.178**

[a]Original data from UNWTO.
[b]Estimates based on inferred coastal versus total tourism ratios.
*Plan Bleu, 2005, Statistical annex

Assessment of the Cost of Degradation

WHAT IS THE COST OF DEGRADATION?

The cost of degradation (CoD) has been defined as the welfare forgone reflecting the reduction in the value of the ecosystem services provided compared to another state of the marine ecosystem (EC WG ESA, 2010). In the context of MSFD, this reduction is assessed between two scenarios, a first one where GES has been achieved (in 2020) and a second one where no specific additional measures have been taken, the Business As Usual (BAU) scenario.

The Driver-Pressure-State-Impact-Response (DPSIR) conceptual framework helps understanding the origin of this human welfare loss. Drivers, such as economic activities and/or population increases, lead to environmental pressures as pollution inputs or biomass extractions, which affect the state and functioning of marine ecosystems as well as their ability to provide services to human beings (beach nourishment, healthy fish stocks and food provision, etc.). Inadequate state and negative impacts require specific policy actions (responses) to minimise the extent of such pressures and restore marine ecosystems. The cost of degradation is understood as the change in the state of the environment due to human activities that negatively affects other human activities and welfare.

The analysis of the cost of degradation of marine and coastal environments constitutes the second component of the socioeconomic assessment required by the MSFD. Although challenging from the knowledge and data perspective (see Box 9), it provides an argument justifying the socioeconomic need for achieving or maintaining GES of marine and coastal environments.

Box 9 The challenges of assessing the costs of degradation in marine environments

The assessment of the costs of degradation requires to question oneself on several critical points:

- The conceptual definition: according to its full acceptation, the assessment of the cost of degradation may be understood as a marginal differential analysis, i.e. a comparison of welfare losses between two different states of the marine ecosystem.
- The definition of the environmental "reference state", to which the present one is to be compared. The reference state may be defined according to a variety of factors: to legal requirements, to pristine conditions of the environment, to a historical state of the ecosystems, or to a Business as Usual (BAU) scenario, etc.
- The links between environmental degradation and its negative effects on human activities: considering the high complexity of environmental interrelations, the identification of straight (causal) links between human pressures, alterations of marine ecosystems and the effects that these may cause on economic activities that benefit from them (involving loss of benefits, loss of profits, increases in costs…) may be challenging.
- Practicability of the assessment: the feasibility of (economic) quantification of such causal relationships between environmental degradation and impacts on human activities and losses of welfare needs to be considered to evaluate the practicability of the assessment. For instance, it is particularly difficult to put quantitative (and even more, monetary) values on degradation effects on uses which benefit from healthy marine environments, particularly when these do not operate on markets.

Examples of these are:

- impacts of overfishing and declining stocks in fisheries, in terms of loss of revenues or jobs;
- losses of revenues and jobs in the tourism sector as a consequence of landscape degradation and biodiversity losses;
- impacts of ecosystem degradation on recreational activities such as swimming, sea angling, scuba diving or sailing.

In addition to providing the first analysis specifically targeting links and impacts of human activities on marine and coastal systems, it is intended to be used as a basis to undertake the next steps of the MSFD and the EcAp Initiative implementation, such as the socioeconomic assessment of the measures (cost-benefit or cost-efficiency analyses); and/or the justification for exception instances, for which the costs of measures would be disproportionate by comparison to the risks posed to the environment (MSFD, art. 14.).

Practically, the assessment of the CoD raises a number of difficulties, due to the lack of knowledge on the degradation costs resulting from the loss of ecosystem services. To overcome these technical constraints, the ESA WG (2010) has proposed three methods attempting to assess the CoD considering data and knowledge generally available.

In the framework of EcAp ESA Action, a scoping study regarding the costs of marine and coastal degradation has been carried out at the regional scale. Its main objective was to examine and discuss the applicability of available methods for assessing costs related to the current environmental degradation, particularly in the light of the technical difficulties involved in each method. The following sections enhance some of the key methodological aspects addressed by the scoping study of the costs of environmental degradation in the Mediterranean context.

METHODOLOGICAL APPROACHES AND VALUATION METHODS

Three approaches were suggested by the EU WG ESA (2010) for undertaking the cost of degradation of marine waters:

- The Ecosystem Service Approach
- The Thematic Approach
- The Cost-based Approach

The Ecosystem Service Approach

Definition of "Cost of Degradation":

- The cost of degradation is the potential difference between the value of ecosystem services provided in two scenarios: the first one is characterized by the achievement of GES and the second one is characterized by the projection of the current practices, in the absence of new policy (the "Business As Usual" (BAU) Scenario).

Objectives:

- Capturing the potential difference between the reference condition (attaining GES) and the BAU scenario, by identifying and inventorying the ecosystem services and associated benefits that might be lost due to the degradation of the marine and coastal environment.

The Ecosystem Service Approach involves 4 main steps:

1. Defining GES for each component[4] of the marine environment
2. Assessing the environmental status in a BAU Scenario, ideally done through projections (forecast of drivers and pressures or simple extensions of historic trends in the state of the environment)
3. Describing in a qualitative and, if possible, quantitative manner, the difference between GES and the environmental status under the BAU Scenario.
4. Describing consequences of environmental degradation to human welfare in a qualitative, quantitative or monetary manner.

Strengths of the Ecosystem Service Approach:

- Consistent with the theoretical definition of the cost of degradation.
- Very detailed and exhaustive, identifies and focuses on the causes of the cost of degradation.

[4] In this case, it was related to MSFD Descriptors. It might be associated to EcAp's Ecological Objectives for the Mediterranean Sea case.

- Qualitative and quantitative data can be considered.
- The potentially forgone benefits of the BAU scenario might be compared to the costs of reaching the GES targets, when the programmes of measures are specified.

Limitations to the Ecosystem Service Approach:

- Dealing with **uncertainty**: two future scenarios need to be assessed (*e.g.* the "BAU Scenario" and the "GES – MSFD scenario").
- A monetary valuation of ecosystem goods and services is needed.
- Indicators enabling the comparison between different scenarios should be established.
- Risk of double counting when estimating the value of ecosystem services.
- Dealing with **reality**: a significant amount of resources (time and data) are needed for a quantified and monetized assessment of the full cost of degradation.
- Lack of available data to evaluate precisely ecosystem service benefits; multiple and complex extrapolations are needed, some based on expert advices, which despite being carefully described may weaken final results.
- Taking into account the former aspects, a qualitative assessment might be the result of adopting this approach.

The Thematic Approach

Definition of "Cost of Degradation":

- The socioeconomic impacts of the current environmental degradation with respect to a reference situation, e.g. a condition where targets for GES are achieved.

Objectives:

- Assessing, per environmental themes, the current costs of measures for environmental protection and prevention; abatement costs and transaction costs, as well as opportunity costs that are related to loss of benefits for activities that suffer from environmental degradation.
- Analysis of the financing structure for the protection of marine environments, that is, providing an overview of the economic actors that are involved in the implementation of these measures.

The Thematic Approach involves four main steps:

1. Defining degradation themes (*e.g.* chemical compounds, marine litter, oil spills, microbial pathogens, eutrophication, invasive species, degradation of natural resources etc.).
2. Defining the reference condition for each theme, based on the assumption that the GES is achieved.
3. Describing in a qualitative and, if possible, quantitative manner, the difference between the reference condition and the present environmental status, for all themes.
4. Describing consequences of environmental degradation of marine environments to human welfare in a qualitative, quantitative or monetary manner.

It may include four types of costs to be analysed for each degradation theme:

- Expenditures on current measures for environmental protection and prevention
- Mitigation costs: expenses for avoiding impacts linked to the loss of ecosystem services.
- Transaction costs: linked to monitoring and dissemination of information.
- Opportunity costs: loss of benefits of activities suffering from environmental degradation or lack of biodiversity resources.

Strengths of the Thematic Approach:

- Less data limitation than in the case of the Ecosystem Services Approach, as data and statistics from the National Statistics Authorities can be used.
- Since no BAU Scenario is to be forecast, this approach is less controversial from the analytical perspective.

- It provides information that may be useful for assessing the benefits of additional measures to achieve GES
- Qualitative and quantitative data can be used.

Limitations to the Thematic Approach:

- The reference situation (GES) needs to be determined and explained for each cost type and degradation theme.
- Limitations on data availability, even if less constraining than for the Ecosystem Services Approach, may lead to an assessment rather qualitative and requiring extrapolations.
- Risk of double counting, e.g. some environmental expenses having effects on several degradation themes.

The Cost-based Approach

Definition of "Cost of Degradation":

- Cost incurred to avoid effects of the present environmental degradation, according to the relevant legislation put in place for the protection of the marine environment.

Objectives:

- This approach assesses the current costs of degradation by quantifying the present costs, expenses and loss of benefits related to the anthropogenic degradation of the marine environment.

The Cost-based Approach involves four main steps:

1. Identifying current measures intended to improve the status of the marine environment and mitigate the effect of degradations.

   This step involves the following tasks:

   - Considering all individual measures that have been put in place and have a significant effect upon the marine environment.
   - Considering if measures are on land or sea; whether they are paid by public or private sectors; and the time scale they are paid over.

2. Assessing the costs of these measures to the public and private sectors.

   E.g. costs to public sector: subsidies, personnel costs, carrying out measures for land-based activities, etc.

3. Assessing the proportion of this legislation that can be justified on the basis of its effects on the marine environment.
4. Adding together costs attributable to protecting the marine environment from the review of the different legislation.

Strengths of the Cost-based Approach:

- It refers to the present situation and consequently data and information are more easily available.
- It delivers useful information for assessing benefits of measures currently put in place.
- There is no need for developing neither a reference condition nor future scenarios.
- It can also consider measures resulting from concerns in areas other than marine environments (*i.e.* agricultural sectors, wastewater treatment plants, etc.) but having an effect on them.
- It provides an overview of the financing structure for the protection of the marine environment by detailing which are the economic sectors implementing measures (and assuming costs), which could be useful for further economic assessment of additional measures.

Limitations to the Cost-based Approach:

- It only considers quantitative data on already implemented measures for preventing marine degradation.

- It does not include a reference condition (since it does not aim to present benefits of improving marine environmental status or achieving *GES*).
- Cost of total degradation is not quantified, since current measures are not able to prevent total degradation of marine environments.
- The inventory of land-based measures having effect on marine environment might be challenging: to what extent do they need to be considered?

EXPERIENCES OF THE COST OF DEGRADATION IN THE MEDITERRANEAN REGION

The MSFD and the MAP's EcAp are the most recent initiatives having put the issue back on the agenda, yet a variety of studies regarding the costs of degradation of marine and coastal environments in the Mediterranean have been developed during the last decades under different frameworks. As mentioned earlier, in 1990 the METAP[5] developed a programme to provide capacity building and management on environmental issues to several Mediterranean countries, which also involved the assessment of the costs of environmental degradation and included, although not exclusively, coastal and marine areas. However, such assessments mostly focused on specific (and measurable) costs such as those derived from the effects of environmental degradation on human health, and/or on key Mediterranean socioeconomic sectors such as tourism and recreational activities.

The subsequent sections focus on some of the assessments developed under the above mentioned initiatives in greater detail, as practical examples of the work have been carried out in the field.

The Marine Strategy Framework Directive

The EU Mediterranean countries have in large followed the methodological advices provided by the EC WG ESA, adopting a variety of techniques to develop the assessment on the costs of environmental degradation in their coastal and marine areas required under Article 8c. Box 10 shows that the **Cost-based approach** was the method most frequently used among Mediterranean EC countries. This choice was often justified for practical reasons, stressing that this method requires less extrapolations and thus is more replicable than the others, which is an advantage since the MSFD establishes a cyclical managerial framework requiring the updating of the initial assessment. Box 11 provides detail on the analysis of one Spanish maritime façade, as an example of the work that has been carried out at the national level.

Cost-based approach in the context of the MSFD: The Spanish assessment on the CoD in the case of the Levantine-Balearic basin

The Spanish ESA focuses on several marine sub-areas which lie on the Atlantic Ocean and the Mediterranean Sea. These are the following:

- Levantine-Balearic basin
- Strait of Gibraltar and Alboran Sea
- Bay of Biscay and Iberian Coast
- Macaronesia sub-region (Canary Islands).

To undertake the assessment of the cost of degradation, the methodology adopted was the Cost-based approach.

[5] Mediterranean Environmental Technical Assistance Programme (METAP)

Box 10 The analysis of the Cost of Degradation under the MSFD. Experiences from Mediterranean countries

Several approaches have been adopted by EU Mediterranean Member States concerning the calculation of the CoD of their marine waters. The selection of the method depended on the difficulties found regarding information and data availability as well as how data are presented or aggregated.

Cost of degradation	Cyprus	Greece	France	Slovenia	Spain	Italy	Malta
Ecosystem Services Approach	X	X					
Thematic Approach			X				
Cost-based Approach			X		X	X	X
Other				X			
Identifying and Valuing current Marine Ecosystem G&S				X			

The Cost-based Approach

The most common method among EU countries was the Cost-based approach, adopted by Spain, Italy, Malta and to a certain extent, by France*. In all the assessments, the current costs related to the established programmes for the protection of the marine environment were analysed. A proxy of how much each sector pays in relation to the total budget was also provided. This approach is based on the assumption that the value obtained by applying these programmes of measures is higher than their application costs and, therefore, it can be considered as a conservative estimation of the total CoD.

* Note: France followed a mixed method half-way between the Cost-based approach and the Thematic approach, and assessed the CoD by analysing qualitatively and quantitatively the accounting costs (proven, perceived but also potential) related to past, current or potential degradations of marine ecosystems. The estimation of the CoD was addressed by themes, according both to the eleven MSFD GES descriptors and to the main pressures affecting marine ecosystems (MSFD, Annex III).

The Ecosystem Services Approach

Cyprus and Greece used a simplified Ecosystem Services Approach, focusing on the impacts of sectors directly benefitting from the uses of the marine waters and the goods and services they provide, measuring the costs accumulated by these sectors (losses of financial benefits) due to the degradation of the environmental status of marine waters. The calculation of the CoD was based on the construction of hypothetical scenarios assuming benefit losses for each of the economic sectors examined. The CoD is considered equal to the GVA forgone.

The Slovenian method for valuing the degradation of marine waters derived from the Ecosystem Services approach and consisted, first, of an identification of all ecosystem services provided by marine waters in relation to human uses and activities; and, second, of the economic valuation of these goods and services according to published information and data. In this case, the sum of all economic estimations might correspond to a hypothetical situation of total degradation of the marine ecosystems, where all goods and services are lost.

To this purpose, several steps were followed:

1. Identification of the current regulations intending to improve the marine environment and mitigate effects of environmental degradations;
2. Assess costs of these regulations for private and public sectors;
3. Assess shares of these regulations which have an effect on marine environment;
4. Summing up of the costs related to marine ecosystems of all assessed regulations.

The amounts of the national and the several regional budgets (issued from regional administrations called "autonomous communities") allocated to environmental protection and surveillance programmes were identified for a short time period (2008-2010). The analysis needed to cope with several difficulties, again regarding spatial issues and the "granularity" or sectoral scope of the information:

i) Spatial issues: the amount of the national programmes for the surveillance and protection of the marine environment destined to each maritime façade had to be estimated (or disaggregated) out of the national budgets.
ii) Data scope: share of the budget allocated to environmental protection corresponding to marine and/or coastal protection needed to be estimated.

The costs of all the surveillance programmes were finally summed up. Detail for one of the sub-areas assessed, the Levantine-Balearic basin, can be found in Box 11 for year 2010.

Other methods: the METAP case studies

In METAP assessments, the costs of environmental degradation have been estimated according to several field themes:

- Indoor and outdoor air pollution;
- Lack of access to water supply and sanitation services;
- Land degradation;
- Coastal zone degradation;
- Waste management;
- Global environment.

For each environmental concern, potential impacts were listed along with the identification of the possible economic valuation techniques. Two main types of methodological sets were used to allocate monetary values to the impacts:

1. Methods based on Dose-Response effects: referring to a series of assessment techniques based either on changes in production or on changes in health;
2. Methods based on people's behaviour: based primarily on changes in people's behaviour, that is, changes observed or revealed as a consequence of environmental degradation[6].

In the case of coastal zone degradation, impacts such as eutrophication, habitat destruction or beach erosion are highlighted and methods such as changes in production, hedonic prices, recreational travel cost or contingent valuation are proposed as economic measurable methods.

The cost estimates reported were only approximations. Nevertheless, the studies highlighted numerous benefits involved in such an exercise:

- It provides a useful mechanism for ranking the relative social costs of various forms of environmental degradation.
- It offers policymakers an instrument for integrating environment into economic development decisions.
- By expressing damage costs as a percentage of GDP, it allows their comparison with other economic indicators.
- It gives environment ministries a tool for discussing the importance of environmental protection in economic terms, in the same "language" as is used by ministries of finance or economy.

Examples of case studies under the METAP Program

Most of the countries studied under the METAP program are located on the Mediterranean Sea, and have coastal resources which represent an important cultural, ecological, economic and recreational asset. However, uncontrolled urban development, untreated industrial and municipal discharges and port activities, among other factors, have contributed to coastal pollution and degradation. Marine ecosystems have suffered irreversible damages.

[6] See "Plan Bleu, ACTeon (2014), Scoping study for the assessment of the costs of degradation of the Mediterranean marine ecosystems, Technical Report, Plan Bleu, Valbonne" and "Bolt K, Ruta G, Sarraf M (2005) Estimating the cost of environmental degradation – a training manual in English, French and Arabic. Environment Department Papers, World Bank, Washington, DC, 106, p E1-79"

Box 11 The costs of degradation of the Lebanese coastal zone

Area of study	Coastal fringes of Lebanon
Threats	Uncontrolled construction in coastal areas, population concentrated along the coastline, pollution degradation (untreated municipal wastewater, seafront solid waste dumps)
Analytical Method	Estimates on: 1) the cost of environmental degradation in Lebanon 2) the cost of remediation of environmental degradation for selected actions. Aspects valued: • Impacts on health or on quality of life: loss of international tourism revenues, effects on domestic tourism, • Impacts on natural resources: costs of sea turtle extinction, in terms of lost ecological and non-use value. Methods: • Domestic recreation: Additional cost of recreation &increase travel costs (time and vehicle) • International tourism losses: comparison with tourism in other countries (e.g. Tunisia). • Ecological and non-use values: willing-to-pay methods.
Main results	The cost of total environmental degradation in 2000 was estimated at close to **565 million US$ / year** (around 3.4 % of GDP); The cost of the coastal zone degradation is estimated at **110 million US$ / year** (0.7 % of GDP) The costs of environmental remediation make up **34 million US$ / year** (0.2 % of GDP)
Detail of costs	1) Costs of degradation:

Nature of the impacts		**Costs (% DGP)**
Natural resources	Domestic recreational losses	0.06
	International tourism losses	0.42
	Losses of ecological and non-use value	0.2
TOTAL		0.68

2) Costs of remediation:

Nature of the impacts		**Costs (million US$/year)**	**Costs (% DGP)**
Natural resources	Wastewater treatment	34	0.2

Limitations	Annual costs of coastal zone degradation are presented exclusively in terms of impacts on the tourism sector (domestic recreation and international tourism) as well as in losses in ecological and non-use values. Remediation costs do not include industrial wastewater treatment or other sources of coastal pollution.
References	Sarraf, M., B. Larsen and M. Owaygen (2004)

Box 12 Assessment of the cost of environmental degradation of coastal zones in Tunisia, World Bank, 2005

Area of study	Pilot area in the north-eastern Tunisian coasts
Threats	Coastal erosion along with water and land issues, although it still has relatively well-preserved coastal areas
Main results	The cost of total environmental degradation was estimated at **97-143 million Tunisian Dinars / year** or **115 – 170 million USD* / year)**
Detail of costs	Costs were structured according to several categories and sub-categories that could be economically assessed and valued according existing data in the pilot zone.

Categories	**Sub-categories/ sectors**	**Methods and calculation**	**Estimated costs in the pilot area (M. Tunisian Dinar / year)**
Health Loss		Impacts on water quality and bathing.	36 – 65
Loss of economic revenues issued directly from natural and renewable resources or from its exploitation	Loss of the fisheries sector (fish captures and aquaculture)	Loss of fishing captures in localized sites due to low water quality; Aquaculture affected in sites such as Monastir and comparison to other less affected aquaculture sites.	Fisheries: 0,1 – 0,6 Aquaculture: 4,7 – 6,3
	Loss of the tourist sector	Beach erosion and loss of revenues Degradation of water quality	6 – 12
	Loss of agricultural lands	Urban expansion at a rate of 100 Ha/ year, causing loss of olive tree lands and loss of production.	1,9 – 2,7
Loss of public assets	Recreation opportunities	Degraded beaches, loss of access to beaches of good quality.	0,3 – 1,6
	Loss of ecosystem services	Services: water supplies, breeding areas, erosion protection and pollution reduction. Losses: groundwater overexploitation, draining of wetlands and coastal physical change.	0,5 – 1
Loss of existence values		Aesthetic, cultural and landscape values, biodiversity.	0,9 – 7
Costs related to the implementation of measures targeting environmental protection, rehabilitation and restoration		Drinking water supply, waste water treatment, waste management, restoration and cleaning of beaches.	47
TOTAL			97 - 143

References	Sarraf, M., B. Larsen and M. Owaygen (2004)

* DT/USD (1999) 1.19

The ReGoKo Project

Among the activities of the Regional Governance and Knowledge Generation project (ReGoKo), an action has been launched for strengthening and developing knowledge on the socioeconomic relevance of maritime activities in the Mediterranean region and their link with degradation of coastal and marine ecosystems. Socioeconomic assessments regarding human activities and the costs of degradation were prepared for four countries, i.e. Lebanon, Morocco and Tunisia and later Egypt.

The assessments are implemented at national scales, in a coordinated manner. Illustrations on the costs of degradation are intended to give a first picture on how maritime activities are deteriorating marine ecosystems and to what extent such a degradation might in turn have negative effects in human welfare.

SELECTING THE MOST SUITABLE METHOD

Selection of a suitable approach to conduct national assessments of the CoD in the Mediterranean context relies again on the existence and accessibility to suitable data as well as existing knowledge and experience in the field. In this respect, it is worthy to consider the approaches selected under the implementation of the MSFD for Mediterranean countries and the conclusions of the COR ESA Group which has coordinated the ESA action under EcAp.

Despite the fact that the EU Mediterranean countries have in large followed the methodological guidelines provided by the EC WG ESA, a variety of techniques have been used to assess CoD, which hinders the possibility to compare their final results. Nonetheless, as shown previously (Box 10), most of Mediterranean EU MS selected the Cost-based approach as the most suitable option. Even though other methods would provide a better approximation of the CoD, in the light of the challenges faced by the EU MS along with their final results, practicability has taken precedence over ambition.

From these experiences and after review of strengths and limitations of possible methods, the COR ESA Group concluded that, as a first attempt, the **Cost-based Approach** might be the best way to assess environmental degradation costs in the Mediterranean region.

The adoption of this method is not without its own challenges: every costs of public organisations and programmes, directly or indirectly involved in marine and coastal protection, need to be identified and collected; the share of these costs dealing specifically with marine and/or coastal environments is to be assessed; and separating measures and budgets according to Ecological Objectives (as one measure might target two or more objectives at one time) might be rather difficult.

While it is granted that MAP Contracting Parties might select the method that best works for their situation, harmonization between these countries is critical as it fosters exchanges of experiences and adds insight to a subject insufficiently studied in the Mediterranean region. Collaboration on this issue and selection of a common method will ease comparison of results and output harmonization.

Results presentation

In the context of the Common Implementation Strategy of the MSFD, the EC Working Group on Data, Information and Knowledge Exchange (WG DIKE) edited a guidance document regarding MS reports under the Directive, in order to support EU MS to report and present the considerable volumes of information to be collated and processed to develop the Initial Assessment of their jurisdictional marine waters. The reporting format prepared for the MSFD could be usefully considered for the reporting ESA analysis results in non-EU Mediterranean countries.

The MSFD Art. 8c (Economic and Social Analysis) reporting format is structured into three sections:

- Background, indicating overall approaches adopted
- Uses of marine waters (a sector by sector report) or report on ecosystem services or other approaches used
- Cost of degradation

In accordance with these sections, a number of "Reporting Sheets" (Excel spreadsheets) were designed to provide detail on the analyses. These sheets could be easily modified if needed.

With respect to the socioeconomic analysis of human uses, two different reporting sheets were issued, one for the Marine Water Accounts approach and one for the Ecosystem Services approach.

The reporting sheets were developed to provide:

- High-level summary information: key information enabling to assess adequacy of the reporting and the assessment, as well as consistency between neighbouring countries sharing the same region/ sub-region.
- Supporting evidence: presented in the form of datasets and metadata on the methods used, and intends to substantiate the high-level information supplied. As an example, such datasets may show the distribution and abundance of particular elements (ecosystem components, pressures) and any change over time.
- Commentary/descriptive information, including descriptive text: a free text facility to report on the details of the assessment or to comment on the provided information (e.g. descriptions of the characteristics of predominant habitat types). Some of this information may be of high importance at the national level, to bring together information summarizing nature of pressures, impacts and ecosystem components, useful for public dissemination, policy makers or managers.

The following key elements are proposed for each activity/use:

- Characteristics of the activity, including seasonal variations.
- Current distribution and intensity of the activity, and changes over time.
- Economic and social benefits of the activity.
- Key pressures arising from the activity.

Instruction for the MSFD reporting are available on the Eionet / European Topic Centre on Inland, Coastal and Marine waters / Marine Strategy Framework Directive reporting resources web pages including the spreadsheet[7]

Detail of part of the structure of one of the reporting sheets used in the implementation of the MSFD is found in Annex 2.

[7] http://icm.eionet.europa.eu/schemas/dir200856ec/resources/TablesForMSFDdatabase_120724.xlsx

Conclusions

These guidelines provide an overview of the frameworks using Economic and Social Analysis (ESA) to qualify and quantify links between human activities and impacts on marine ecosystems in the Mediterranean region at regional, sub-regional and national levels, such as the Ecosystem Approach Initiative of the Mediterranean Action Plan (EcAp) and the European Marine Strategy Framework Directive (MSFD). This document delivers methodological and practical recommendations for undertaking ESA as part of the Initial Assessment, thus preparing implementation of measures aiming to achieve or maintain the Good Environmental Status (GES) of the marine and coastal ecosystems. It also reviews previous experiences of ESA in the Mediterranean region, stressing their usefulness as well as their limitations and strengths.

Until the last decade, ESA experiences in the Mediterranean were rather localized and focused on specific themes. However, since 2008, the MSFD requirements, attempting to apply the principles of the Ecosystem Approach to the management of European seas, have pressed the Mediterranean EU countries to develop comprehensive ESA assessments for their jurisdictional waters. In parallel, the Contracting Parties to the Barcelona Convention have committed to implement the ecosystem approach (EcAp) in the Mediterranean with the ultimate objective of achieving the GES of the Mediterranean Sea and Coast. This process aims to achieve GES through informed management decisions, based on integrated quantitative assessment, including ESA, and monitoring of the Marine and Coastal Environment of the Mediterranean.

So far, the EcAp Initiative has been carried out at regional and sub-regional levels. Nonetheless, to contribute to the achievement of EcAp's final goal, each signatory country should implement EcAp targets at the national level. Therefore, the elaboration of a common understanding on ESA to foster acquaintance by Mediterranean riparian countries of the social and economic dimensions in the implementation of EcAp has become necessary and has been the object of the overall ESA action in the Mediterranean basin.

ESA is developed with a double objective:

- Generate and share knowledge and data on the relationships between human activities and environmental pressures and impacts in Mediterranean ecosystems, in economic terms, which in a "price-system" helps providing a more utilitarian view of the preservation of the natural capital;
- Give socioeconomic arguments to take actions and elaborate a grounded program of measures to achieve GES, by managing human activities and help preventing and mitigating environmental pressures and impacts on marine and coastal ecosystems.

In this context, the ESA involves the development of two complementary assessments which allow understanding the magnitude and intensity of human activities which take place in the considered waters, along with related environmental pressures, with the aim to provide tools and knowledge to manage them:

- The economic and social analysis of the human activities taking place in or close to coastal and marine ecosystems, including data and information on economic and social aspects but also on expected trends at the mid and/or long term along with information of the pressures they exert in the environment.
- The assessment of the economic costs of environmental degradation derived from human uses.

Both assessments have been considered as necessary and useful to support environmental protection, by highlighting the economic negative impacts that degradation of marine ecosystems generates on economic sectors.

Their development need to overcome difficulties, which deal to a great extent with the lack of suitable socioeconomic data. These have already been outlined by previous works on socioeconomic analysis

carried out both at the national scale, under the MSFD framework, and at the regional and sub-regional scale, under Step 3 of the EcAp Initiative. In addition, results of MSFD works have highlighted the need for "supranational" coordination in the case of countries undertaking ESA so as to ensure collaboration among them and harmonization of final outputs.

For the **socioeconomic analysis of human uses**, two methods have been considered: the Ecosystem Services and the Marine Water Accounts approaches. The Ecosystem Services consists of identifying and listing final ecological services provided by marine areas, in order to identify the economic benefits arising from marine ecosystems and to quantify them. On the other side, the Marine Water Accounts approach consists of an evaluation of the socioeconomic activities which benefit from the exploitation of coastal and marine environments, based on economic and social indicators. The Ecosystem Services is considered as consistent with the theoretical definition of the cost of degradation, allowing the assessment of the ecosystems' total value, as it involves use values (direct and indirect) and non-use values. On the contrary, the Marine Water Accounts approach only deals with the ecosystem values that are traded, which leads to a partial quantification of marine ecosystems' total economic and social value.

Notwithstanding this difference, according to available information and based on the principles of simplicity and feasibility, in the context of Mediterranean countries the Marine Water Accounts approach has appeared as the most suitable method to undertake the socioeconomic assessment of human activities. It should be however considered that despite national socioeconomic data might be simple to obtain, the main challenge might be related to the disaggregation of socioeconomic sectors in a way that allows both matching marine ecosystem scales and capturing economic benefits only from marine and coastal ecosystems.

For the assessment of the **costs of environmental degradation**, three methods have been taken into account: the Ecosystem Services, the Thematic and the Cost-based approaches. In summary, the first method intends to capture the loss of ecosystem services between a reference situation (e.g. achieving GES) and a Business As Usual situation (BAU), which is forecast by projecting the current trends without any additional environmental measures. The Thematic approach assesses economically the difference between the maintenance costs related to the current state of the marine environment and the hypothetical costs in a reference situation where GES is achieved, by degradation themes. Finally, the Cost-based approach quantifies the current societal costs and expenses for the protection of the marine ecosystems and the mitigation of environmental degradation.

The three approaches differ regarding their level of ambition, the Ecosystem Services being the method that could provide a more complete assessment of the costs of marine degradation, while the Thematic and the Cost-based approaches give only an underestimation of them. However, it is important to highlight that every approaches raise difficulties concerning different aspects, such as the absence of quantified data characterizing the effects of the current environmental degradation on socioeconomic sectors and beyond, the social welfare; the definition of GES descriptors to characterize a reference situation, the needs for prospective analysis to build future scenarios (e.g. BAU) or the assessment of the share of budgets allocated to marine or coastal protection.

Although less consistent with the theoretical definition of the CoD, the Cost-based approach is considered as the most feasible method to conduct the analysis of the costs of marine degradation in the Mediterranean, particularly in the light that this method has been widely used in the basin for the MSFD Initial Assessment. Measures for marine protection and mitigation as well as the current associated costs can be easily identified by countries and even split according to Ecological Objectives. In contrast, the collection of indirect costs involved in the protection of the marine environment from several public organizations and programmes, including the assessment of the share of these costs focusing only on marine ecosystems, represent a main challenge to overcome. Looking ahead, the assessment of the current degradation costs might support the Cost Benefit or Cost Efficiency Analysis, which should be carried out for the development of the new monitoring plans and additional measures definition, planned for Steps 6 and 7 of the EcAp roadmap.

Previous experiences on ESA developed at the national scale under the MSFD have resulted in a variety of approaches adopted by EU countries, and therefore into a variety of methods and indicators having limited consistence between them, thus making comparison between theses national assessment rather difficult. For this reason, application of a common methodology is strongly recommended for future ESA development in southern Mediterranean countries. Coordination between countries, ensuring feedbacks and exchanges, might come up with more harmonized and comparable findings.

At this stage, it is important to highlight that progress is to be done regarding the development of knowledge on the degradation of marine environments as well as on the economic valuation of ecosystem services. Knowledge generation concerning the value lost by economic activities due to environmental degradation might be the basis for the assessment of the benefits of new measures, which should be implemented under Steps 6 and 7 of the EcAp roadmap. Finally, since the EcAp Initiative envisages an iterative 6-year cycle, the generation of new knowledge and information might support ESA updates with the progressive implementation of more ambitious methods supporting the progressive achievement of GES in the Mediterranean basin.

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Annexes

ANNEX 1 - INDICATIVE LIST OF HUMAN ACTIVITIES AND USES

Activity theme	Activity/use
Extraction of living resources	Fisheries incl. recreational fishing (fish and shellfish) Seaweed and other sea-based food harvesting Extraction of genetic resources/ bioprospecting/ maerl
Food production	Aquaculture (fin-fish and shellfish)
Man-made structures (incl. construction phase)	Land claim, coastal defence & flood protection Port operations Placement and operation of offshore structures (other than for energy production) Submarine cable and pipeline operations
Extraction of non-living resources	Marine mining (sand and gravel, rock) Dredging Desalination/water abstraction
Energy production	Marine-based renewable energy generation (wind, wave and tidal power) Marine hydrocarbon (oil and gas) extraction
Transport	Shipping
Waste disposal	Solid waste disposal incl. dredge material Storage of gasses
Tourism and recreation	Tourism and recreation incl. yachting, bathing, diving
Research and survey	Marine research, survey and educational activities
Military	Defence operations Dumping of unwanted munitions
Land-based activities/industries	Industrial discharges and emissions Agricultural and forestry run-off and emissions Municipal waste water discharge

ANNEX 2 – ESA REPORTING FORMAT

Feature	Area	Topic	Description	Summary information 1	SumInfo1_ Confidence	Summary information 2	Trends Recent	Recent Time Start	Recent Time End	Trends Future	Future Time Start	Future Time End	Limitations
Select relevant feature	Select relevant Marine UnitID		Provide brief summary information, not extensive descriptive text		Low, moderate, high, not relevant		Select one: Increasing, Stable, Decreasing, Unknown/not assessed	YYYY	YYYY	Select one: Increase, Be Stable, Decrease, Unknown/not assessed	YYYY	YYYY	Describe uncertainties, main gaps and progress in reporting
Uses/activity		**Characteristics** of activity (/use/sector) in assessment area	Describe elements included within this activity (e.g. if activity is Fisheries, is this specifically commercial fisheries, are both finfish & shellfish included etc; are other uses/sectors incorporated?). Describe the main characteristics of the Activity including its spatial distribution and intensity, any temporal (seasonal) variation, and trends in the Activity (is it increasing, declining) (maximum 500 words).	Proportion (%) of assessment area subject to this Use/activity (select one): <1%; 1-5%; 5-25%; 25-50%; 50-75%; 75-100%; Unknown/not assessed		Provide a list of relevant NACE codes							
Uses/activity		**Production value**	Describe economic value of the activity and trends (maximum 100 words)	Production value (€ million)		Socio-economic indicators: MS that are reporting their analysis of the use of marine waters on reporting sheet 8C02 (Ecosystem Services and Other Approaches) do not need to complete this indicator information.							
Uses/activity		**Value added**	Describe value-added, upstream and downstream, of the activity and trends (maximum 100 words)	Value-added (€ million)									
Uses/activity		**Employment**	Describe employment (e.g. number of jobs) and relative importance for the area assessed (maximum 100 words)	Employment (direct) (*1000 FTE)									
Uses/activity		**Other indicators** [add rows for other indicators as needed]	Describe levels of indicator (maximum 100 words)	Add name of indicator, value and associated units									
Uses/activity		**Cost of degradation**	Describe costs incurred in relation to this activity/sector in preventing degradation to the environment, and whether these costs are borne by the public or private sector.	Costs (€ million per year)		Describe measures included	These fields to be completed only if a cost-based approach has been used						
Uses/activity		Explain **information gaps** and **plans** to address them	See general guidance										

Cells giving titles for fields and guidance on information to be provided on the field

Fields to be completed. This typically includes text Description fields and categorical Summary Information fields that provide supporting and contextual information to the priority fields, including trend information.

Fields to be completed as a priority. These are typically Summary Information fields in Article 8 that provide key information on the Initial Assessment or the key fields for Articles 9 and 10. This prioritisation is linked to how the information can be expected to assist the Commission in its Article 12 assessment.

ANNEX 3 - POTENTIAL DATA SOURCES, ADAPTED TO THE MEDITERRANEAN CONTEXT

EU level and international organizations:	
Directorate-General for Maritime Affairs and Fisheries	Links: http://ec.europa.eu/dgs/maritimeaffairs_fisheries/index_en.htm
Directorate-General for the Environment	Links: http://ec.europa.eu/dgs/environment/index_en.htm
Horizon 2020 Mediterranean report European Environmental Agency:	The H2020 Mediterranean Report is a joint effort of the EEA and UNEP/MAP resulting from the creation of a regular review mechanism of environmental progress in the three H2020 policy priorities. These are municipal waste, urban waste water and industrial pollution. The report also serves as a contribution to the mid-term review of the H2020 initiative. Focus on Jordan, Israel, Morocco, Palestine and Tunisia. Links: http://www.eea.europa.eu/publications/horizon-2020-mediterranean-report, Including a downloadable database:(http://www.eea.europa.eu/data-and-maps/data/meddb)
Shared Environment Information System (SEIS):	The European Environment Agency (EEA) was assigned by EC Directorate-General EuropeAid Co-operation Office (EC/DG EuropeAid) to carry out a project for gradually extending the Shared Environment Information System (SEIS) principles to the European Neighbourhood Policy (ENP) South and East neighbours and the Russian Federation. The ENPI-SEIS project aims to improve environmental monitoring and data and information sharing by gradually extending the SEIS principles to the European neighbourhood. The ENPI South includes the following countries of the southern rim of the Mediterranean Sea: Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine and Tunisia. Links: http://enpi-seis.ew.eea.europa.eu/south
EUROSTAT	Eurostat is the statistical office of the European Union. Its task is to provide the European Union with high quality statistics at European level that enable comparisons between countries and regions. Links: http://ec.europa.eu/eurostat including the database: http://ec.europa.eu/eurostat/data/database
Euro-Mediterranean statistical cooperation programme - MEDSTAT	International statistical cooperation of the European Union (EU) with non-EU countries and it focuses on the southern grouping of countries under the European Neighbourhood Policy (the ENP-South countries). The principal vehicle by which the EU currently provides the necessary assistance to ENP-South countries in statistics is the multi-country programme called 'MEDSTAT'. Links: http://ec.europa.eu/eurostat/en/web/products-pocketbooks/-/KS-DI-05-001 http://ec.europa.eu/eurostat/statistics-explained/index.php/MEDSTAT_programme including the database: http://ec.europa.eu/eurostat/data/database (Database by themes > Non EU countries)
Pocketbook on Euro-Mediterranean statistics	An annual Eurostat publication on Euro-Mediterranean statistics presenting a series of key statistical data for the nine southern partner countries (Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestinian Authority, Syria and Tunisia) and comparative EU aggregates, across the key themes of the economy: labour force, international trade in goods, demography, education, living conditions, tourism, transport, energy, agriculture and environment.
Euro-Mediterranean statistical cooperation programme - MEDSTAT II	Final draft report state of play and specific needs of ENP South countries with regard to main SEIS components focusing on horizon 2020 priorities. Report prepared by UNEP MAP Secretariat as part of the European Commission project "Towards a Shared Information system in the European Neighbourhood" UNEP/MAP 2010 Links: http://enpi-seis.ew.eea.europa.eu/south/20101018-draft-seis-stateofplay-final-report-annexes.pdf/download
EIONET- Central Data Repository (CDR)	Each EU MS country has a collection for its deliveries to the EC or a referral to a different preferred repository. The data reports within each country collection are arranged under the relevant reporting obligations or agreements. Provides access to EU countries' national Initial Assessments. Links: http://cdr.eionet.europa.eu/

European Environmental Agency (EEA)	The European Environment Agency (EEA) is an agency of the European Union. Our task is to provide sound, independent information on the environment. We are a major information source for those involved in developing, adopting, implementing and evaluating environmental policy, and also the general public. Currently, the EEA has 33 member countries. Links: http://www.eea.europa.eu/ Datasets:http://www.eea.europa.eu/data-and-maps#tab-datasets
Data repositories	
National statistic authorities	The main data source recommended for consultation when carrying out a national assessment, as it might be the best data repository and contain the most reliable and pertinent information. Most countries have developed statistical services which collect data on all economic sectors at the sub-regional levels, which is useful in case where countries have maritime façades belonging to different marine areas (Egypt, Israel, Morocco and Turkey). Working with national compiled data directly allows decreasing uncertainty and fine-tune outputs.
UNEP/ Mediterranean Action Plan Regional Activity Centres: • Regional Activity Centre for Sustainable Consumption and Production (SCP/ RAC) • Plan Bleu Regional Activity Centre • Priority Actions Programme Regional Activity Centre (PAP/ RAC) • Regional Activity Centre for Specially Protected Areas (RAC/SPA) • Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) • INFO Regional Activity Centre (INFO/ RAC)	MAP Technical Reports and MAP Meeting documents dating back to 1975 are available online, including MAP, MEDPOL and Regional Activity Centres' thematic publications (Plan Bleu/ RAC, SPA/ RAC, PAP/ RAC). Links:http://www.unepmap.org/ Resource database : http://www.unepmap.org/index.php?module=library&module=library&mode=mts&s_keywords=&s_title=&s_year=&s_category=MAP%20Technical%20Reports%20MTS&id=&page=&s_descriptors=&s_type=&s_author=&s_final=&s_mnumber=&action=search
Plan Bleu Regional Activity Centre	Plan Bleu's mission is to provide the MAP Contracting Parties with assessments of the state of the environment and development of the Mediterranean and a solid basis of environmental and sustainable development data, statistics, and indicators to support their action and decision making process. Links:http://planbleu.org/en Data and resources:http://planbleu.org/en/ressources-donnees
United Nations Food and Agricultural Organisation - FAO:	FAO develops methods and standards for food and agriculture statistics, provides technical assistance services and disseminates data for global monitoring. FAO's statistical activities cover the areas of agriculture, forestry and fisheries, land and water resources and use, climate, environment, population, gender, nutrition, poverty, rural development, education and health as well as many others. Links:http://www.fao.org/home/en/ Datasets FAO-Fishstat:http://www.fao.org/fishery/statistics/en FAO-Country Profiles:http://www.fao.org/countryprofiles/en/ FAO – Fishery and Aquaculture Country Profiles: http://www.fao.org/fishery/statistics/en http://www.fao.org/fishery/countryprofiles/search/en
General Fisheries Commission for the Mediterranean - GFCM	The purpose of the Commission is to promote the development, conservation, rational management and best utilization of living marine resources, as well as the sustainable development of aquaculture in the Mediterranean region. Among its functions it has these responsibilities: to assemble, publish or disseminate information regarding exploitable living marine resources and fisheries based on living marine resources. Links:http://www.gfcm.org/gfcm/en Studies and Reviews:http://www.gfcm.org/gfcm/topic/16096/en
International Commission for the Conservation of Atlantic Tunas – ICCAT	ICCAT compiles fishery statistics from its members and from all entities fishing for these species in the Atlantic Ocean, coordinates research, including stock assessment, on behalf of its members, develops scientific-based management advice, provides a mechanism for Contracting Parties to agree on management measures, and produces relevant publications. Links:https://www.iccat.int/en/

World Bank	World Bank Open Data offers free access to comprehensive, downloadable indicators about development in countries around the globe. Links:http://www.worldbank.org/
Relevant research programmes and projects	
EC funded	
ODEMM - Options for Delivering Ecosystem-Based Marine Management	
Devotes - Development of Innovative Tools for Understanding Marine Biodiversity and assessing Good Environmental Status	Links: http://www.devotes-project.eu/
PERSEUS - Policy-oriented marine Environmental Research for the Southern European Seas	Links: http://www.perseus-net.eu Deliverables: - D1.2 "Pressure in the Southern European Seas open waters in socio-economic terms, Gap analysis on data and knowledge" http://www.perseus-net.eu/assets/media/PDF/deliverables/3288.2_Final.pdf - D2.2 "Pressure in the Southern European Seas coastal waters in socio-economic terms, Gap analysis on data and knowledge" http://www.perseus-net.eu/assets/media/PDF/deliverables/3332.2_Final.pdf
KnowSeas - The Knowledge-based Sustainable Management for Europe's Seas	Links: http://www.knowseas.com/
Sesame: Southern European Seas: Assessing and Modelling Ecosystem changes	
Partnerships **Global Environmental Facility / World Bank**	
ReGoKo/ Regional – Governance and Knowledge generation Project	Conceived to foster the integration of environmental issues into sectoral and development policies of Egypt, Lebanon, Morocco, Palestinian Territories and Tunisia (Beneficiaries), and potentially of Algeria, Libya and Syria (potential Beneficiaries). Case studies regarding economic and social analysis of marine and coastal environments of Egypt, Lebanon, Morocco and Tunisia (currently under progress). Links: http://regoko.planbleu.org/
The Mediterranean Environmental Technical Assistance Programme - METAP Partnership:	Assessment of the cost of environmental degradation in Tunisia, World Bank, 2003 Assessment of the cost of environmental degradation of water in Tunisia, World Bank, 2007 Assessment of the cost of environmental degradation of coastal zones in Tunisia, World Bank, 2005 Loss of tourism revenues as a result of littoral degradation, included in the assessment of the costs of environmental degradation, World Bank, 2003, COMETE Engineering. Costs of degradation of fisheries in the Khniss littoral, governorate of Monastir, World Bank, 2006.

ANNEX 4 – INVOLVEMENT OF MEDITERRANEAN SOUTHERN AND EASTERN COUNTRIES IN ENVIRONMENTAL AGREEMENTS AND INITIATIVES REQUIRING DATA REPORTING

Country actively involved	X
No involvement	
It is expected that country will be included in the programme/initiative	X

		Algeria	Egypt	Israel	Jordan	Lebanon	Morocco	oPt	Syria	Tunisia
The Barcelona Convention; the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources (LBS Protocol)	UNEP/MAP - MED POL	x	x	x		x	x		x	x
Strategic Action Programme (SAP MED) to address pollution from Land Based Sources	SAP	x	x	x		x	x		x	x
	SOURCEs of Pollution	x	x	x		x	x		x	x
	PRTR (test)		x				x		x	
Mediterranean Commission on Sustainable Development	MCSD	x	x	x		x	x		x	x
Regional statistical co-operation programme between the European Union and 10 Mediterranean partner countries	MEDSTAT	x	x	x	x	x	x	x	x	x
United Nations Statistics Division	UNSD	x	x	x	x	x	x	x	x	x
Economic and Social Commission for Western Asia	UN-ESCWA		x		x	x		x	x	
Food and Agriculture organisation of the United nations	FAO	x	x	x	x	x	x	x	x	x
World health Organisation	WHO	x	x	x	x	x	x	x	x	x
United Nations Industrial Development Organization	UNIDO	x	x	x	x	x	x	x	x	x
The World Bank	WORLD BANK	x	x	x	x	x	x	x	x	x
EU Water Framework Directive / Marine Strategy Framework Directive	MARINE Water Framework Directive /MSE	x	x	x	x	x	x	x	x	x
The European Marine Observation and Data Network.	EMODNET	x	x	x	x	x	x	x	x	x
Global Monitoring for Environment and Security	GMES	x	x	x	x	x	x	x	x	x
United Nations Environment Programme - Global Environment Outlook	UNEP/GEO	x	x	x	x	x	x	x	x	x
United Nations Environment Programme - World Resource Institute	UNEP/WRI	x	x	x	x	x	x	x	x	x
UNEP Division of Early Warning and Assessment	UNEP / DEWA WEST ASIA	x	x	x	x	x	x	x	x	x
The Environment Outlook for the Arab Region (UNEP DEWA)	ARAB OUTLOOK	x	x		x	x	x	x	x	x
Stockholm Convention on Persistent Organic Pollutants	STOCKHOLM CONVENTION	x	x	x	x	x	x		x	x
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	BASEL CONVENTION	x	x	x	x	x	x		x	x