KnowSeas

Knowledge-based Sustainable Management for Europe's Seas

Deliverable 8.5

Report on description of "Good Environmental Status" for the Black Sea and resulting sustainable management options, with suggestions for Marine Protected Areas.

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March 2013

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1 Introduction

The Marine Strategy Framework Directive obliges member states to achieve Good Environmental Status (GEnS) on a regional Seas basis by 2020 (EC, 2008a). Targets for GEnS for each of 11 descriptors of environmental status should have been set by each member state by July 2012, and programmes of measures to achieve these targets are to be put in place by 2015. The directive mandates that existing regional seas agreements be used to implement these environmental objectives. The descriptors of GEnS are further refined in the commission decision on descriptor (EC, 2010).

Only two of the six Black Sea states (Romania and Bulgaria) are EU member states, with the other states (Russia, the Ukraine, Georgia and Turkey) have no legal obligations under the MSFD. Given that the healthy functioning of particular subsections of the Black Sea (for example the Exclusive Economic Zones of Romania and Bulgaria) depends on the Drivers, Pressures and resulting environmental States throughout the Black Sea, achieving GEnS within Bulgarian and Romanian Exclusive Economic Zones is dependent not only on the targets and programmes of measures of these EU member states but also on the activities of non-EU member states.

The only regional agreement relating directly to the environmental management of the Black Sea and applying to all Black Sea nations is the Bucharest Convention (1994). The convention put into place the Black Sea Commission and all Black Sea nations have committed to the Black Sea Strategic Action Plan (BSSAP, 2009) adopted in Sofia. The BSSAP recognised four major environmental challenges for the Black Sea: eutrophication, commercial marine living resources, chemical pollution and biodiversity. The action plan set out four Ecosystem Quality Objectives (ECOQs):

1. Preserve commercial marine living resources
2. Conserve Black Sea biodiversity and habitats
3. Reduce eutrophication
4. Ensure good water quality for human health, recreational use and aquatic biota

The environmental problems of the Black Sea are more thoroughly described in the Black Sea Transboundary Diagnostic Analysis or TDA (BSC, 2008).

The aims of this deliverable are

- To describe in detail how each of the 11 descriptors of GEnS defined in the MSFD (EU, 2008) and described further in the commission decision (EU, 2010) relate to the Ecosystem Quality Objectives of the BSSAP.

- To examine the implications of the transboundary nature of many of the environmental problems (as described in the TDA) on the potential for EU member states to meet the demands of the MSFD, including the efficacy of existing and potential Marine Protected Areas in achieving their goals.

2 The Marine Strategy Framework Directive and the Black Sea Strategic Action Plan

From a legislative perspective the MSFD and BSSAP are very different instruments. The MSFD is an enforceable, binding directive transcribed into law for each of the EU member states and describing a detailed set of eleven specific descriptors, further supported by detailed guidance and explanation (EU, 2010; EU 2012 [working paper]) as well as specific funded research dedicated to its interpretation and

implementation both on a European scale and on a regional seas basis (eg. KnowSeas, ODEMM, MESMA, PISCES). By contrast, the BSSAP is a non-binding international policy statement made by diverse nations with no real history of cooperation on environmental issues and in a region of particular geo-political tension, where political and economic interests are strongly related to the highly lucrative transportation of oil and gas.

Thus while there is a clear legal (and financial) motivation for actions to improve environmental status under the MSFD, the BSSAP represents a statement of good intention but without the scientific, technical, political or financial means to support concrete actions. There is no jointly nominated scientific body responsible for delivering scientific advice, and no forum for coastal states to make decisions regarding the shared and straddling stocks (which comprise the most important commercial fisheries). Agreement on the text of a Legally Binding Document on Fisheries and the Conservation of Living Marine Resources (LBDFCLR) has been undermined by political disagreements, most recently (in 2007) regarding EU desire to accede to the Bucharest Convention on the Protection of the Black Sea Against Pollution. Furthermore the different levels of engagement in global governance agreements related to exploitation of living marine resources also relieves governments from a commitment to seek agreements on fishing which is fundamentally connected to other aspects of marine environmental health. In particular, the non-participation of Turkey in United Nations Convention on the Law of the Sea, whilst being the main fishing nation, is an obvious barrier.

The spatial and temporal characteristics of major environmental problems in the Black Sea were addressed in KnowSeas Deliverable 8.1, which gives a detailed account of the trans-boundary nature of many of the Black Sea's environmental problems, including small pelagic fisheries (where the stocks of anchovy migrate across international EEZs) and eutrophication (where the principle nutrient Pressures are located in nations remote from the environmental State changes they cause). These scale mismatches require international cooperation beyond the scale of EU jurisdiction and represent a major challenge to achieving Good Environmental Status in the EU Black Sea riparian nations (Romania and Bulgaria).

The Water Framework Directive (WFD) (EU 2000) presented and still presents similar international jurisdictional challenges, which have been met to some extent through agreements on regional cooperation. Considerable efforts have been made to reduce nutrient loading in the Danube catchment area by European Union nations under the EU Water Framework Directive and on a regional basis through the International Commission for the Protection of the Danube River, with over €4bn having been spent to reduce eutrophication in the period 2000–2005 (IDCPR, 2007). The major efforts have concentrated on improvements to waste water treatment facilities. As such there is a precedent for international action to achieve EU Water Framework Directive goals on environmental issues in the Black Sea region. However, the environmental scope and geographic scales of management required for achievement of Good Environmental Status goals under the MSFD are greater than those of the WFD.

The two instruments (MSFD and BSSAP) do however share commonalities. The BSSAP's basis for cooperative action includes sustainability; the use of the precautionary principle and public participation; the terms "sustainability" and "precautionary principle" are also present in the language of the MSFD and the importance of public participation in an ecosystem approach (as espoused by the MSFD) is often stressed. However, the MSFD focuses on implementation of an Ecosystem Approach to management, which is generally considered to include; a multi-sectoral focus; the consideration of ecosystem services in the decision making process and a recognition that human and ecological systems are tightly coupled; this focus is not explicit in the BSSAP.

Understanding how the BSSAP aligns with the MSFD represents a significant first step to identifying potential areas for synergy and collaboration in order to align the legally binding targets of the MSFD with those aspirations agreed under the BSSAP.

3 How does Good Environmental Status relate to BSSAP Ecological Quality Objectives?
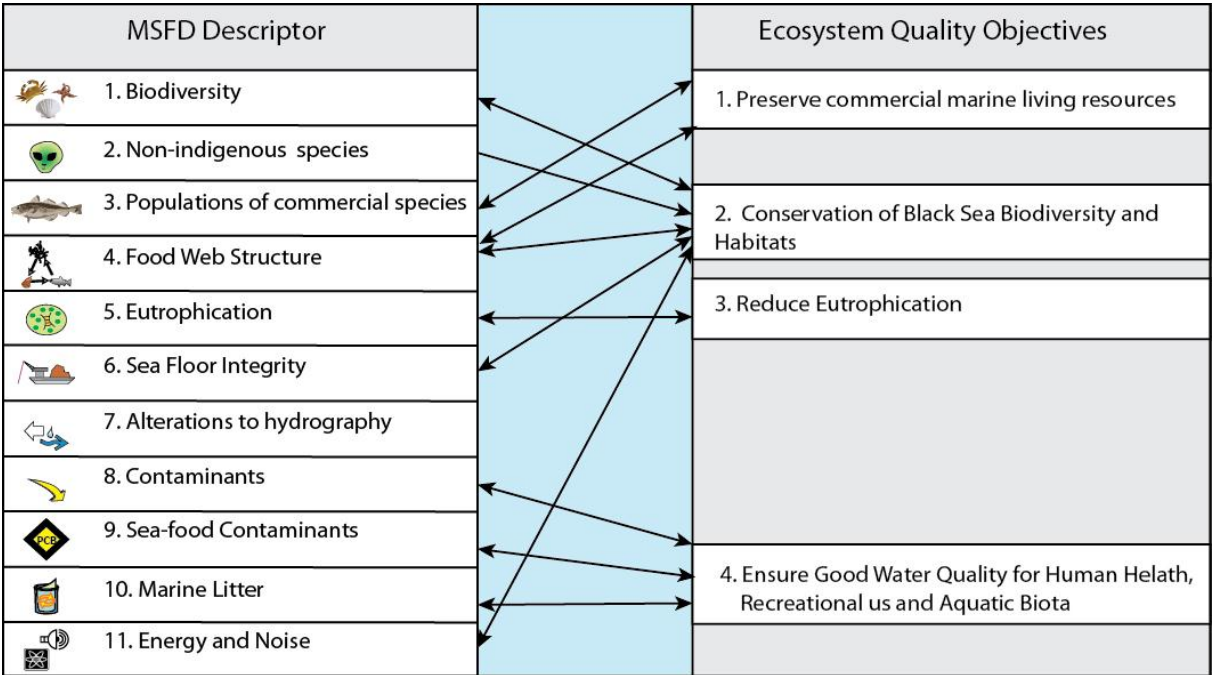
Figure 1. Relationship between the MSFD descriptors of Good Environmental Status and the BSSAP Ecological Quality Objectives

Figure 1 clearly illustrates that there is a varying degree to which the MSFD descriptors of GEnS are related to the BSSAP ECOQs. Both the directive and the action plan clearly share certain aims with respect to the better known environmental problems of the Black Sea, in particular eutrophication and overfishing (Descriptors 3 and 5, ECOQs 1 and 3). Many of the MSFD descriptors are interrelated and overlapping (e.g. food web structure, eutrophication and biodiversity are all interrelated). By contrast the ECOQs are broader and less specific but often clearly encompass several MSFD descriptors. For example, ECOQ 2 encompasses MSFD descriptors 1, 2, 4, 6 and 11; while ECOQ 4 is related to descriptors 8, 9 and 10.   These similarities indicate that there is a clear potential synergy between the MSFD and BSSAP. The following sections give a more detailed account of the differences and similarities between the Descriptors and ECOQs.

3.1 Descriptor 1: Biodiversity

MSFD Descriptor 1 Biodiversity (D1) concerns the maintenance of biodiversity, indicated by the quality and occurrence of habitats and the distribution and abundance of species. The Commission

Decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters and a number of other technical documents provide guidance on defining, assessing and reporting "good environmental status" in consistency with the concepts of previous European legislation (e.g. "favourable conservation status" of the Habitats Directive and "good ecological status" of the Water Framework Directive. Descriptor 1 has a broad scope, with assessment required at several ecological levels: species, habitats (including their associated communities, in the sense of biotopes) and ecosystems, briefly outlined as follows.

At the species level, GEnS shall be defined for the full range of functional and taxonomic groups occurring in the marine environment, including the native angiosperms, macro-algae and invertebrate bottom fauna, phytoplankton and zooplankton, fish, mammals, reptiles, seabirds and cephalopods. The MSFD requires member states to understand and assess the condition of the **typical species** associated with the seabed and the pelagic habitats and the **representative species** of the functional groups. Special attention is given to the **listed species** (considered as **endangered**) under EU Directives (the Birds Directive, the Habitats Directive) and international conventions (Helsinki, OSPAR, Barcelona, Bucharest, etc.). Good environmental status for the listed species is equivalent to the "favourable conservation status" as defined by the Habitats Directive. In addition to typical and endangered species, good environmental status is required for the **commercially exploited species** addressed by the Common fisheries policy legislation (EC 2008b), the criteria and indicators for healthy stocks detailed in Descriptor 3.

At the habitats level, determination of GEnS is required for the **predominant** habitat types, the **special** habitat types listed under EU legislation or international conventions and habitats in **particular areas subject to pressures or designated/deserving designation for protection**. Good environmental status for the listed habitats is equivalent to the "favourable conservation status" as defined by the Habitats Directive.

The determination of GEnS for biodiversity at the ecosystem level shall be based on evaluation of the **structure** (composition and proportion) and **interaction** between the ecosystem components, the **processes and functioning**, **connectivity and resilience** of the ecosystem, addressed by other descriptors as well (D4 Food web, D6 Seafloor integrity).

How is biodiversity addressed in the Black Sea regional policies?

Are the regional biodiversity objectives and measures consistent with the MSFD goal to achieve "good environmental status", including of biodiversity and its components, as described by MSFD Descriptor 1?

The regional policy on marine biodiversity is outlined by two key legally binding documents – the Black Sea Biodiversity and Landscape Conservation Protocol 2002 (BSBLCP), which entered into force in 2011, and the second Black Sea Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea (BSSAP), signed in 2009.

These documents convey the regional awareness of the transboundary nature of the causes and consequences of biodiversity degradation and underline the need for "concerted actions by all of the Black Sea coastal states and the states in the basin of the Black Sea" in order to "counteract the multiple threats to biological and landscape diversity" (BSBLCP) and that "conservation, protection of biodiversity …. are primary areas for transboundary cooperation" (BSSAP).

The purpose of BSBLCP is "to maintain the Black Sea ecosystem in the good ecological state and its landscape in the favourable conditions, **to protect, to preserve and to sustainably manage the biological and landscape diversity** of the Black Sea in order to enrich the biological resources".

The BSBLCP stipulates a number of regional measures that are consistent with MSFD Descriptor 1: "Biodiversity is maintained". According to BSBLCP the contracting states "shall ensure that species occurring in the area to which this Protocol applies are maintained at **favourable conservation status** and habitats **close to undisturbed**" and "shall ensure that **species of economic importance**, especially living marine resources, **are used sustainably**". Within three years of BSBLCP coming into force (i.e. 2014) the contracting states "shall adopt a **list of species of Black Sea importance** that may be threatened, or important by reason of their role in ecosystem functioning or other significance for the region". The listed species "will be subject to special measures". The regional states "shall adopt a **list of landscapes and habitats of the Black Sea importance** that may be destroyed, or important by their nature, cultural or historical value that constitute the natural, historical and cultural heritage or present other significance for the Black Sea region".

In line with MSFD attention to particular areas subject to pressures or designated/deserving designation for protection, the BSBLCP stipulates to "restore and rehabilitate **damaged areas** of previously high biodiversity and landscape value", as well as to "protect, preserve, improve and manage in a sustainable and environmentally sound way **areas of particular biological or landscape value**, notably by the establishment of **protected areas**". The regional provisions on Marine Protected Areas (MPAs) are addressed in more detail further in this document.

BSBLCP requires that contracting countries "shall produce and commonly agree on the **Strategic Action Plan for the Black Sea Biodiversity and Landscape Conservation Protocol**" by 2014, "which shall be reviewed every five years". A draft of this document is available on the Black Sea Commission website (http://www.blacksea-commission.org/_od-draft-biodiversity-strategy.asp) but due to being outdated before it was signed, it is not further considered here.

In addition to BSBLCP provisions, the BSSAP determines the "**Conservation of Black Sea Biodiversity and Habitats**" as the second of four **Ecosystem quality objectives** (ECOQOs) towards achieving the overall long-term desired ecosystem state called "Vision for the Black Sea". A couple of sub-objectives are formulated with regards to the native biodiversity:

> *EcoQO 2a: Reduce the risk of extinction of threatened species.*

> *EcoQO 2b: Conserve coastal and marine habitats and landscapes.*

The management targets defined to achieve the EcoQOs of BSSAP are conceptually equivalent to the "operational targets" *sensu* MSFD. The biodiversity management targets include regular conservation status assessment of threatened species and the critical habitats for these species, and based on that adoption of a regional conservation plan for endangered species and national action plans. Expanding the BSBLCP provisions for listing the habitats of Black Sea importance, BSSAP aims at developing a comprehensive inventory, classification and a mapping system for Black Sea habitats and inventory of landscapes of high natural and cultural value. BSSAP reaffirms the BSBLCP commitment to develop a regional SAP for the Black Sea Biodiversity. Provisions for Marine Protected Area (MPA) designation and expansion are made as well.

The lack of definitions (in qualitative or quantitative terms) for "favourable conservation status" and "good status" of biodiversity at the Black Sea regional level makes it ambiguous to assess the success

of the management targets towards reaching the objective to conserve biodiversity. The BSSAP definition for Ecological Quality Objective is "A desired level of ecological quality relative to predetermined reference levels"; however it is far from clear what is the desired state for EcoQO2 "Conservation of Black Sea Biodiversity and Habitats", as well as what is the reference level and how the progress is measured towards reaching the objective.

The Black Sea Integrated Monitoring and Assessment Program 2002 (BSIMAP) requires that biodiversity shall be assessed in terms of its characteristics and the anthropogenic impacts on them at the level of key species, including exploited marine species, habitats, processes and relationships (http://www.blacksea-commission.org/_bsimap_description.asp). Although the approach is similar to the concepts and criteria of MSFD and Commission Decision of 2010, a fully developed list of related indicators is absent. The Black Sea policies are still in need of developing a comprehensive set of regionally agreed criteria and indicators for biodiversity state and environmental state assessment in general. BSSAP addresses this deficiency by setting a high priority management target to "Harmonise environmental quality standards throughout the Black Sea region and elaborate regionally agreed criteria for assessment of the state of the Black Sea environment". The deadline of 2019 for doing this with regards to biota (i.e. biodiversity) is a long delay relative to MSFD implementation timelines.

Reading through the regional policies it can be concluded that the Black Sea states share common views with Europe on the conservation, maintenance and restoration of marine biodiversity as a stepping stone towards achieving good overall status of the marine environment. Thus in theory, the regional policies and cooperation for biodiversity conservation should aid achieving the MSFD goal "biodiversity is maintained" in EU waters of the Black Sea. However, the chances for successful implementation of the regional objectives are compromised by the lack of enforcement measures and regular funding provisions in the Bucharest Convention. Given the transboundary nature of the pressures causing marine biodiversity degradation, an implementation failure of the regional policies might hinder biodiversity maintenance *sensu* MSFD in Bulgaria and Romania.

Marine protected areas

Both BSBLCP and BSSAP envisage marine protected areas as a major tool for biodiversity conservation in the Black Sea. According to the BSSAP definition, a marine protected area is "an area of sea (or coast) especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means".

BSBLCP defines the objectives of protected areas, which are to safeguard the representative types of ecosystems and landscapes; the habitats, which are in danger of disappearing in their natural range or which have a reduced area/quality; the habitats critical to the survival, reproduction and recovery of threatened species; and sites of particular importance because of their scientific, aesthetic, landscape, cultural or educational value.

BSBLCP requires that the contracting states "shall produce criteria/guidelines for identifying areas that meet the objectives" by 2013 and "shall compile a list of sites that meet their criteria/guidelines" by 2014. Based on the list of proposed sites the states shall "endeavour to establish protected areas" and cooperative measures shall be taken in listed transboundary areas. Although "Adequate size to ensure … long-term viability" is aspired, targets are not set for MPAs spatial extent, and further guidance is not provided on how to define what is "adequate". Deadlines for MPAs designation are not set.

The BSSAP reaffirms that states shall "consider the necessity for designation of new and expansion of existing MPAs, including transboundary" but although setting high priority to this management target, the deadlines for producing the long-anticipated regional guidance document on MPAs selection and list of recommended areas are shifted to 2014 and 2016 respectively. The expected outcome of the management target is "Sufficient number, size and networks of BS PAs" but as in BSBLCP how much is "sufficient" remains unknown. As in BSBLCP deadlines for MPAs designation are not set. BSSAP identifies two major uncertainties for MPAs successful designation - "political acceptance" and "funding". Presumably the lack of "political acceptance" could be interpreted as political primacy of short-term economic interests over conservation. The lack of specified timeline for MPAs designation and continuous delay in producing the lists of threatened species, important habitats and proposed areas makes doubtful the true political commitment to conservation.

Suggestions for MPAs

The aim of this section is to provide some methodological guidance for establishing a Black Sea MPA network.

Bearing in mind that all six Black Sea countries are parties to Convention on Biodiversity , the region can readily adopt the already existing methodological framework provided by Decision UNEP/CBD/COP/9/L.20 on Marine and Coastal Biodiversity adopted by the 9th Conference of Parties to the CBD (Bonn, 19-30 May 2008). This Decision recommends scientific criteria and guidance for identifying ecologically or biologically significant marine areas in need of protection, as well as for designing representative networks of marine protected areas, beyond the limits of national jurisdiction in accordance with international law, including the UNCLOS. However, if parties choose to apply the criteria and guidance within their national jurisdiction, then they will do so with regard to national policies and criteria, but should integrate the traditional, scientific, technical and technological knowledge of indigenous and local communities, consistent with Article 8(j) of the Convention, and ensure the integration of social and cultural criteria and other aspects for the identification of marine areas in need of protection as well as the establishment and management of marine protected areas. More detailed guidelines and case studies have been provided subsequently by the IUCN World Commission on Protected Areas (IUCN 2008).

The CBD Decision UNEP/CBD/COP/9/L.20 sets out four initial steps to be considered in the development of representative networks of marine protected areas, namely:

(i)   Scientific identification of an initial set of ecologically or biologically significant areas considering the best scientific information available, and applying the precautionary approach. This identification should focus on developing an initial set of sites already recognised for their ecological values, with the understanding that other sites could be added as more information becomes available.

The criteria to be used are:

• **Uniqueness or rarity:** ecosystems and habitats which are the only one of their kind or occur in few locations

• **Special importance for life-history stages of species:** spawning, nursery, feeding grounds, migration routes

• **Importance for threatened, endangered or declining species and/or habitats**

- **Vulnerability, Fragility, Sensitivity, or Slow recovery**: habitats, communities and species with low tolerance to natural and anthropogenic disturbance

- **Biological productivity**

- **Biological diversity:** exceptional variety of species or genetic diversity and highly varied ecosystems, habitats and communities

- **Naturalness:** ecosystems and habitats that are pristine or near natural

(ii)   Develop/choose a biogeographic, habitat, and/or community classification system. This system should reflect the scale of the application and address the key ecological features within the area. This step will entail a separation of at least three realms: coastal, benthic/neritic and pelagic.

(iii)   Drawing upon steps 1 and 2 above, iteratively use qualitative and/or quantitative techniques to identify sites to include in a network. Their selection for consideration of enhanced management should reflect their recognised ecological importance or vulnerability, and address the requirements of ecological coherence through:

- **Representativity:** all habitats should be presented within the network**,**

- **Connectivity**: linkages amongst MPAs within the network, achieved through propagule dispersal and movement of adults,

and

- **Replication:** all habitats should be replicated, and these should be spatially separate, to safeguard against unexpected failures or collapse of populations.

(iv)   Assess the adequacy and viability of the selected sites. Consideration should be given to their size, shape, boundaries, buffering, and appropriateness of the site management regime.

In addition to the above, EU member or accession states will need to take account of specific obligations under the Birds and Habitats Directives. Bulgaria and Romania shall designate sites for the maintenance and restoration in favourable conservation status the marine natural habitats and species listed in Table 1 as part of the coherent European ecological network of Special Areas of Conservation (SACs) called NATURA 2000.

Table 1. Marine habitat types and species for which Special Areas of Conservation (SACs) shall be designated in the Black Sea EU countries under the Habitats directive.

EU Code	Habitat
1110	Sandbanks which are slightly covered by seawater all the time
1130	Estuaries
1140	Mudflats and sandflats not covered by seawater at low tide
1150	Coastal lagoons
1160	Large shallow inlets and bays
1170	Reefs
1180	Submarine structures made by leaking gases
8330	Submerged or partially submerged sea caves
4125	Alosa immaculata
4120 (4127)	*Alosa caspia* (Syn. *Alosa tanaica*)
1349	*Tursiops truncatus*
1351	*Phocoena phocoena*

The selection of sites suitable for designation is made at two stages – national and international.

The following criteria are listed for the national selection process:

A. *Site assessment criteria for a given natural habitat type*

    (a)   Degree of representativity of the natural habitat type on the site.

    (b)   Area of the site covered by the natural habitat type in relation to the total area covered by that natural habitat type within national territory.

    (c)   Degree of conservation of the structure and functions of the natural habitat type concerned and restoration possibilities.

B. *Site assessment criteria for a given species*

    (a)   Size and density of the population of the species present on the site in relation to the populations present within national territory.

    (b)   Degree of conservation of the features of the habitat which are important for the species concerned and restoration possibilities.

    (c)   Degree of isolation of the population present on the site in relation to the natural range of the species.

Combining the provisions in CBD Decision 9/20, the obligations of the Birds and Habitats Directives and the regional provisions of BSSAP and BSBLCP, it is possible to outline a "common approach" for establishing MPAs in the Black Sea as drawn in Figure 2, as suggested by Goriup (2008).
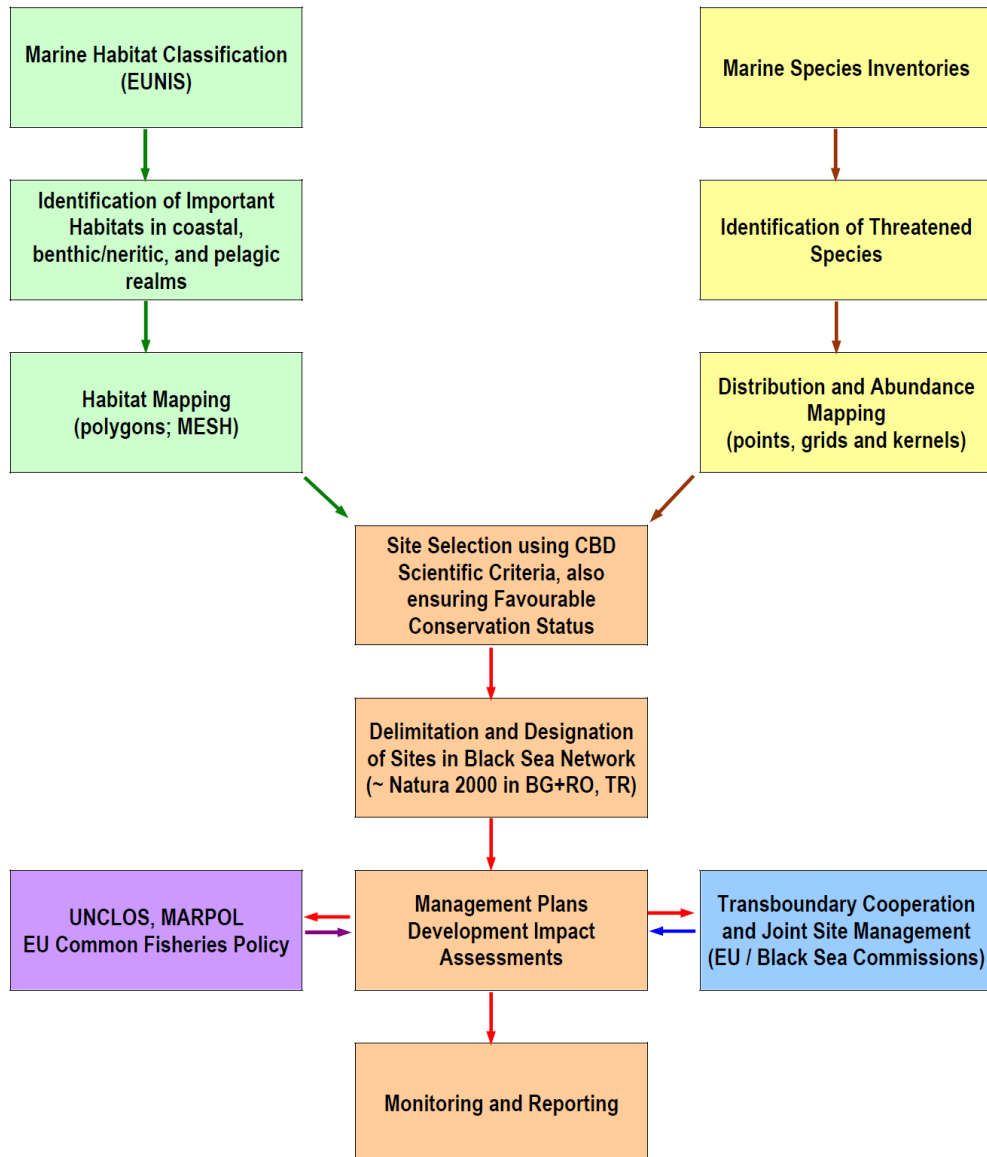
Figure 2. Common approach for establishing a Black Sea marine protected area network (from Goriup, 2008)

The approach presented on Figure 2 is reviewed and adopted by the Advisory group on the Convention of Biological Diversity to the Black Sea Commission.

The starting point in the above scheme is the classification of habitats and listing of important species, required in step (ii) of CBD Decision 9/20, as well as in BSSAP and BSBLCP. Although Black Sea habitats have been already listed in the European Nature Information System (EUNIS) as a result of Birds Directive consultation with the BSC, the lack of descriptions and scientific references raises uncertainty regarding the credibility of the proposed classification. Further dedicated work is needed to review the classification and identify those Black Sea habitats, which are important in terms of ecosystem goods and services provision, as well as which are sensitive and vulnerable to human pressures. In view of the fact that the Black Sea Red Data Book 1994 is outdated and TDA 2007 admits that the list of threatened species in the Black Sea is far from being complete, an extensive assessment is needed to work out a regionally agreed comprehensive list of species which need

conservation efforts around the Black Sea as to provide a proper scientific basis for potential MPA identification.

Having established the important habitats and species for conservation, more detailed mapping of their distribution and abundance should be carried out. Experience with proposing EU Natura 2000 sites in the marine environment has shown that this exercise presents a challenge because of a general lack of expertise and the high costs of carrying out surveys in marine areas. For marine habitats, the study on Mapping European Seabed Habitats (MESH; JNCC, 2008) could offer a useful approach for the Black Sea. Species are normally mapped using a grid based on subdivisions of the pan-European 50 x 50 km chorological system, combined with censuses.

GIS databases on the distribution and status of habitats and species aggregated at the level of the Black Sea as a whole provide the basis for selection of sites suitable for designation.

3.2 Descriptor 2: Non-indigenous species

MSFD Descriptor 2 stipulates that "Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems".

Non-indigenous species are addressed by BSSAP as a sub-objective of "**Conservation of Black Sea Biodiversity and Habitats**":

EcoQO 2c: Reduce and manage human mediated species introductions

The past introduction of exotic species, through the deballasting of vessels, has seriously damaged the Black Sea ecosystem and constitutes a threat to the adjacent Mediterranean and Caspian Seas. The considerable number of records of new aliens between 1996 and 2005 show that the Black Sea is under risk of new invasions, especially transported with ballast waters. Therefore, the prediction and prevention of invasion by potentially harmful species continues to be a challenge for the Black Sea.

The present status of ballast water management requirements in the Black Sea countries varies substantially, i.e. a harmonized and agreed upon uniform approach is lacking (BSC, 2009). Most countries require ballast water reporting and follow the IMO Assembly Resolution 868(20) which contains a ballast water reporting form. Ballast water reception facilities are available in the Georgian ports Batumi and Poti, but it remains unclear if these are only in use for ballast water carried in empty cargo holds of oil tankers. Countries that implement ballast water management rules require exchange for ballast waters originating outside the Black Sea before entering the Black Sea or inside the Black Sea. A systematic management plan is applied only in the Russian Federation and all rules on management of ships' ballast waters are included in the collection of obligatory orders on the sea trading port of Novorossiysk. Since 2004 deballasting is allowed 12 nautical miles away from the port and the authorities carry out monitoring and ecological research on biological pollution of ballast waters on a voluntary basis. Regular monitoring of ballast waters was planned in Romania and Bulgaria, but so far is not in place. Harmonization of ballast waters rules is still under discussion in the frames of the BSSAP and upon availability of financial support.

The BSSAP views the appropriate management solutions in promoting cooperation in the Black Sea in line with the principles and recommendations of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention). However, out of six Black Sea countries only the Russian Federation has ratified the BWM Convention to this date. As of 6 March 2013, the BWM Convention was ratified by 36 countries representing 29.07% of the world's

merchant shipping capacity. The thresholds for the BWM Convention to enter into force are defined at 12 months after ratification by 30 States, representing 35% of world merchant shipping tonnage. The expectations for the BWM Convention to come into force in the recent future are unlikely to come true due to shipbuilding tonnage rates exceeding ratification tonnage rates.

Should the Black Sea countries wait for the world to reach enforcement of the BWM Convention, if only six countries could resolve the problems associated with ship ballast water at the regional level? Having full control of the Black Sea, being a land-locked basin, the littoral states are able to introduce regional harmonized regulations and measures for the ballast water management that shall be applied by all ships. Certainly a cost is involved in such a regional agreement for building reception facilities, certification and inspection. Whether the stakeholders (shippers, governments, etc.) are willing to pay this cost should be further examined by appropriate cost-benefit analysis.

3.3 Descriptor 3: Populations of commercially exploited fish and shellfish

The formulations and their context

The criteria of GenS on commercially exploited fish and shellfish are described under Descriptor 3: "Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock" (EC 2010).

The criteria are accompanied by a list of related indicators to make such criteria operational and allow subsequent progress (EC 2010).

The Ecosystem Quality Objectives (EcoQOs) reflect the desired state of the Black Sea over the long term, based on a resolution of priority problems identified in the Transboundary Diagnostic Analysis. (BSSAP, 2009 http://www.blacksea-commission.org/_bssap2009.asp, TDA, 2008)

The EcoQOs and associated Sub-EcoQOs stated for marine living resources and fisheries are:

> *EcoQO 1: Preserve commercial marine living resources.*

> *EcoQO 1a: Sustainable use of commercial fish stocks and other marine living resources.*

> *EcoQO 1b: Restore/rehabilitate stocks of commercial marine living resources.*

Further, a number of short-, mid- and/or long-term management targets are proposed in order to achieve the EcoQO by addressing the root causes of the concern areas (Appendix 1).

In order to monitor and evaluate the management progress toward ECOQ 3, types of indicators (used by the Global Environment Facility) are formulated (Appendix 2): a) process indicators, b) stress reduction indicators and c) environmental status indicators. In relation to fisheries resources progress indicators are mostly related to establishment of common fisheries assessment and management in regional context, whereas stress reduction indicators account for some actions directed toward improving the state of the fisheries resources such as establishment of closed fishing seasons and areas and bans on unsustainable fishing practices (Appendix 2).

The closest notion to the MSFD criteria and indicators are the so called environmental state indicators which are measuring the actual success in improvements of ecosystem quality in the Black Sea (A3).

These are rather general and more relevant to ecosystem health but two of them can be applied more specifically to fish resources, namely Indicators 3 and 4 (Appendix 2):

3.   Improved recruitment classes of targeted fish species/diversity/keystone species

4.   Increase in the availability of fishing resources.

Comparison between MSFD criteria and indicators and BSSAP management targets

Three main characteristics of fish stocks and related fisheries are addressed by the MSFD criteria: these are fishing pressure, size of the spawning stock and abundance of large individuals and species in the fish communities (Table 2). The state of these criteria can be assessed and monitored by a set of standard indicators developed by the fisheries scientists and routinely applied by the WGs (e.g. STCF EWG on Black Sea assessments, JRC. 2012). The management targets and actions aiming to improve GEnS according to the MSFD criteria can encompass some of the common fisheries regulations such as reduction of fishing effort, catch quotas, and mesh-size regulations, as well as establishment of areas and seasons closed for fishing. The expected impacts would be recovery, protection and sustainable use of healthy and productive fish stocks in a healthy ecosystem.

BSSAP fisheries ECOQ is also clearly set around the recovery, protection and sustainable use of commercial marine living resources. However the management targets and activities listed in the ECOQ matrix (Appendix 1) are more diffuse in aiming various objectives in fields of legislation, research, monitoring as well as some practical measures in fisheries management. The criteria/indicators of evaluation of the progress also concern quite different fields such as organisation/implementation of research/monitoring and preparing/adopting collaborative agreements between the others. On the other hand, two of the environmental state indicators relevant for fish stocks: 3) improved recruitment classes of targeted fish species/diversity/keystone species; and 4) increase in the availability of fishing resources, are rather general and hardly can be operationally used to assess the status of the stocks/fisheries. These should rather be expressed by more specific indicators similar to those developed following the MSFD and consequent WGs (EC 2010, JRC 2012).

In Table 2 we attempted to extract and present some management target, actions and expected impacts following the general goal of comparing BSSAP fisheries EcoQO to the MSFD criteria. The management targets and operational activities for their achievement are conditional to the existence and operation of a regional fisheries management system (e.g. implemented regional fisheries convention with operational bodies and WGs) which does not exist at present, but is scheduled as the first policy/legislation target related to the BSSAP fisheries EcoQO (Appendix 1: Adopt and implement a Regional Agreement for fisheries and conservation of living resources of the Black Sea).

In relation to the MSFD criterion for the level of fishing pressure, the BSSAP proposes to create a regional system of control on the fishing effort, some related activities such as a satellite based system of controlling of fishing operations and a regionally agreed seasonal ban on fishing for shared and migratory stocks, all of these aiming a better control on fishing effort and illegal fishing. The control on fishing effort can certainly be an adequate target in the future regional management system, but measures for its regulation should not necessary be limited to satellite observation and closed seasons.

Table 2. MSFD (criteria and indicators) for Descriptor 3 and BSSAP Management targets toward EcoQOs, how they are aimed to be achieved and expected impact

MSFD criteria and indicators	Management action	Expected Impact	Management targets toward EcoQOs	Management action	Expected Impact
D 3.1 Level of pressure of the fishing activity 3.1.1 Fishing mortality F=<Fmsy Achieving or maintaining good environmental status requires that F values are equal to or lower than F MSY , the level capable of producing Maximum Sustainable Yield (MSY). Secondary indicators (if analytical assessments yielding values for F are not available): 3.1.2 Ratio between catch and biomass index (hereinafter 'catch/biomass ratio')	Regulate fishing effort and/or catch	Sustainable fishing	Improved regionally-agreed system to match fishing efforts to stocks (Control of fishing effort)	Establish remote sensing (satellite) system for observing and controlling fishing operations in open sea Common prohibition periods/terms for shared and migratory stocks;	Better control of fishing effort and illegal fishing
D 3.2 Maintain reproductive capacity of the stock 3.2.1 Spawning Stock Biomass SSB=>SSBmsy Secondary indicators (if analytical assessments yielding values for SSB are not available): 3.2.2 Biomass indices from surveys	Regulate catch to adapt to variation in recruitment. Keep stock size/age structure in condition to assure high reproductive output	Healthy stock size and structure	Protect and recover and turbot stock and other demersal fish stocks Improve fish recruitment for the protection of juvenile commercial fish	Introduce quota regime for turbot and other demersal fish stocks Establish closed nursery areas (MPA) seasons for demersal fish	Increase in biomass of demersal fish stocks by 30% Improved recruitment
D 3.3 Healthy stocks are characterised by high proportion of old, large individuals. Indicators based on the relative abundance of large fish include: 3.3.1 Proportion of fish larger than the mean size of first sexual maturation 3.3.2 Mean maximum length across all species found in research vessel surveys 3.3.3 95 % percentile of the fish length distribution observed in research vessel surveys	Protect large-sized fish and healthy size/age structure	Healthy and variable species and size composition	Reduce by-catch/discards of immature fish	Establish regionally agreed minimum permitted length of commercial fish and minimum mesh sizes for target species	By-catch levels are immature fish (e.g. turbot) low or negligible
			Protection of benthic environment (improved habitats for reproduction of demersal fish and invertebrates	Ban on non–precautionary fishing technologies in force (notably dredging and bottom trawling)	Improved benthic habitat

The management targets related to the conservation of the reproductive capacity of the stocks are also limited to certain (priority) issues such as protection and recovery of demersal stock targeting the Black Sea turbot, and protecting juvenile fish and improving recruitment. These targets should be achieved by setting quotas for turbot and establishing areas closed for fishing (MPA) in the nursery areas, with expected impact of 30% increase in biomass of demersal fish (Table 2).

The third MSFD criterion of larger size of fish in stocks and communities is approximated by the BSSAP target of reducing bycatch/discards of immature fish, through regionally agreed minimum lengths of capture of commercial fish and related regulation of the minimum mesh size of nets.

The BSSAP addresses also one ecosystem-related management target that is related to the protection and recovery of productive habitat for demersal fish. The main activity/regulation aiming at the improvement of the benthic habitat is the ban on destructive fishing gears such as dredges and bottom trawls (Table 2).

3.4   Descriptor 4: Food web structure

The formulations and their context

The criteria of GenS on marine food webs appear under Descriptor 4: "All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity". This descriptor concerns important functional aspects such as energy flows and the structure of food webs (size and abundance). Additional scientific and technical support is required, at this stage, for the further development of criteria and potentially useful indicators to address the relationships within the food web (EC 2010).

In BSSAP (BSSAP, 2009 http://www.blacksea-commission.org/_bssap2009.asp) there are no specific EcoQOs assigned to food webs, but we find analogous issues described under marine living resources and biodiversity/habitats EcoQOs:

> **EcoQO 1: Preserve commercial marine living resources.**
>
> *EcoQO 1a: Sustainable use of commercial fish stocks and other marine living resources.*
>
> *EcoQO 1b: Restore/rehabilitate stocks of commercial marine living resources.*
>
> **EcoQO 2: Conservation of Black Sea Biodiversity and Habitats.**
>
> *EcoQO 2a: Reduce the risk of extinction of threatened species.*
>
> *EcoQO 2b: Conserve coastal and marine habitats and landscapes.*
>
> *EcoQO 2c: Reduce and manage human mediated species introductions*

Among the environmental state indicators listed in Appendix 2, the following seem relevant to food webs:

1.   Measurable improvements in trophic status

2.   Improved (measurable) ecological or biological indices

3.   Improved recruitment classes of targeted fish species/diversity/keystone species

8.   Relevant coastal habitats rehabilitated

9.   Reduced number of threatened species

Comparison between MSFD criteria and indicators and BSSAP management targets

Within the Descriptor 4 it is claimed that:" …Additional scientific and technical support is required, at this stage, for the further development of criteria and potentially useful indicators to address the relationships within the food web "(EC 2010). Therefore, the formal criteria and indicators relevant to marine food webs are still to be developed and operationally implemented. Rogers et al. (2010) provide some examples of possible indicators of food web structure and energy flows.

With respect to the food web functional aspects such as production, consumption and energy transfer, the MSFD criteria and indicators cover production/biomass ratios that provide measures of energy transfer efficiencies, performance (productivity) of top predators (e.g. marine mammals, birds); as well trophic relationships that secure the long-term viability of components (e.g. Marine Trophic Index, Rogers et al. 2010).

Another aspect to Descriptor 4 relates to the structure of food webs mainly in terms of relative or absolute abundance of various key groups (EC 2010, Rogers et al. 2010). Here some indicators are proposed such as the proportion of large fish in the food web to be maintained within an acceptable range, and abundance trends of functionally important selected groups/species such as groups with fast turnover rates (e.g. phytoplankton, zooplankton, jellyfish, bivalve molluscs, short-living pelagic fish); groups/species that are targeted by human activities or that are indirectly affected by them (in particular, in by-catch and discards); habitat-defining groups/species (e.g. habitat engineers - mussels, sea grasses); groups/species at the top of the food web; long-distance anadromous and catadromous migrating species; and groups/species that are tightly linked to specific groups/species at another trophic level (key-stone species e.g. small pelagic fish, *Mnemiopsis*).

A combination of BSSAP fisheries and biodiversity/habitat EcoQO management target and indicators is used to match the MSFD food web criteria and indicators in Table 3. Quite normally, only some aspects of the MSFD food web criteria are covered by the BSSAP targets/indicators.

Table 3. MSFD (criteria and indicators) for Descriptor 4 and BSSAP Management targets toward EcoQOs, how they are aimed to be achieved and expected impact

MSFD criteria and indicators	Management action	Expected Impact	Management targets toward EcoQOs	Management action	Expected Impact
4.1. Productivity (production per unit biomass) of key species or trophic groups 4.1.1 Performance of key predator species (e.g. sea mammals, seabirds) using their production per unit biomass (productivity) 4.1.2 Trophic relationships that secure the long-term viability of components (Rogers et al. 2010)	Conservation/recovery of top-predators and supporting ecosystems	Optimal food-web structure, productivity and viability	Minimise ghost fishing caused by discarded, abandoned or lost fixed and floating nets, including those used in illegal fishing activities	Improve control over illegal fishing	Reduce accidental catch of sea mammals and birds
4.2. Proportion of selected species at the top of food webs 4.2.1 Large fish (by weight)	Protect large fishes in populations and communities	Healthy and variable species and size composition	Reduce by-catch/discards of immature fish	Establish regionally agreed minimum permitted length of commercial fish and minimum mesh sizes for target species	By-catch levels are immature fish (e.g. turbot) low or negligible
4.3. Abundance/distribution of key trophic groups/species 4.3.1 Abundance trends of functionally important selected groups/species — groups with fast turnover rates (e.g. phytoplankton, zooplankton, jellyfish, bivalve molluscs, short-living pelagic fish) that will respond quickly to ecosystem change and are useful as early warning indicators, — groups/species that are targeted by human activities or that are indirectly affected by them (in particular, by-catch and discards), — habitat-defining groups/species, — groups/species at the top of the food web, — long-distance anadromous and catadromous migrating species, — groups/species that are tightly linked to specific groups/species at another trophic level.	Protect and support species, groups and links important the food-web integrity/viability	Healthy food-web structure and energy flows	Protect and recover and turbot stock and other demersal fish stocks Improve fish recruitment for the protection of juvenile commercial fish Adopt a regional Conservation Plan for Black Sea endangered species (inc. cetacean and anadromous fishes) and develop national plans Protection of benthic environment (improved habitats for reproduction of demersal fish and invertebrates	Introduce quota regime for turbot and other demersal fish stocks Establish closed nursery areas (MPA) seasons for demersal fish Development of stranding network, by- catch network and network of MPAs eligible for cetaceans conservation. Ban on non–precautionary fishing technologies in force (notably dredging and bottom trawling)	Increase in biomass of demersal fish stocks by 30% Improved recruitment Increased abundance of cetaceans and anadromous fishes Improved benthic habitat

The MSFD indicator of productivity of top predators, e.g. cetaceans, is partly matched by the BSSAP target to reduce ghost fishing impacts on the Black Sea cetaceans and tighter control on illegal fishing, that can by-catch dolphins and porpoises (Table 3).

The protection of large fish in the food web is related to the BSSAP target to reduce bycatch/discards of immature fish, through regionally agreed minimum length of capture of commercial fish and related regulation of the minimum mesh size of nets (Table 3), that can also be related to the respective MSFD fisheries indicator in Table 2.

Various BSSAP targets/indicators are available related to abundance of key species and protection of habitats. These are:

- Protection and recovery of top predatory fish such as the Black Sea turbot via a catch quota system (also matching a respective MSFD fisheries indicator)
- Protecting juvenile fish and improving recruitment by establishing areas closed for fishing (MPA) in the nursery areas (also matching a respective MSFD fisheries indicator)
- Building upon conservation of endangered species such as cetaceans and anadromous fishes
- Protection and recovery of benthic habitats/communities through a ban of the habitat destructive fishing gears such as dredges and bottom trawls (Table 3).

3.5   Descriptor 5: Eutrophication

The criteria of GEnS on human-induced eutrophication are described under Descriptor 5: "Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters" (EC 2010).

The criteria are accompanied by a list of related indicators to make such criteria operational and allow subsequent progress (EC 2010).

The Ecosystem Quality Objectives (EcoQOs) reflect the desired state of the Black Sea over the long term, based on a resolution of priority problems identified in the Transboundary Diagnostic Analysis. (BSSAP, 2009 http://www.blacksea-commission.org/_bssap2009.asp, TDA, 008)

Within the BSSAP, the EcoQO 3 is "Reduce eutrophication".

In order to monitor and evaluate the management progress toward EcoQO 3 type of indicators (used by the GEF) are formulated (Annex 3 of the BSSAP): a) process indicators, b) stress reduction indicators and c) environmental status indicators (EC 2010).

a)   Process indicators

-        Adoption of LBSA Protocol
-        Agreed standards for N/P for all WWTWs >100,000 p.e.
-        Lists of emissions developed
-        Revised list of hot-spots developed
-        Agreed monitoring procedures and detailed environmental status indicators
-        Agreed monitoring locations

b)   Stress reduction indicators

-        Lists of WWTWs (municipal and industrial) for upgrading with financing

- Percent of P-free detergents sold in BS countries
- Prosecution numbers of dischargers failing standards
- Investments in agricultural facilities to reduce N/P pollution
- Funds available for economic incentives in agriculture
- Area of land under modified farming practices
- Number of (and investment in) farm demonstration projects

c)   Environmental status indicators

- Measurable improvements in trophic status
- Improved (measurable) ecological or biological indices
- Improved recruitment classes of targeted fish species/diversity/keystone species
- Environmental conditions
- Reduction of pollutant concentrations in coastal areas and port zone (heavy metals, persistent organic compounds concentrations, etc.)

A detailed comparison of the MSFD and BSSAP eutrophication criteria is given in the supporting excel file for this document (D8.5.xls)

The MSFD and its indicators for GEnS related to eutrophication focus on the marine system, and mention indicators as nutrient levels, nutrient ratios, direct and indirect effects of nutrient enrichment in the national waters of the member states. In contrast, the BSSAP and its Ecosystem Quality Objectives 3 – Reduce eutrophication – deals with the ultimate sources for eutrophication, which are, in the case of the Black Sea, mainly land-based. The BSSAP provides a detailed and thorough account on the land-based sources such as industry, municipal sources (WWTPs), tourism, agriculture, and elaborates on measures how to combat the specific sources of eutrophication. Therefore, the measures and indicators suggested in the BSSAP to combat eutrophication are more related to the Water Framework directive. Hence, the measures and indicators suggested in the BSSAP should be better compared to the WFD than to the MSFD.

The marine system is mentioned in ECOQO 4:

"Ensure Good Water Quality for Human Health, Recreational Use and Aquatic Biota, a) Reduce pollutants originating from land based sources, including atmospheric pollutions

Management target: Harmonise environmental quality standards throughout the Black Sea region and elaborate regionally agreed criteria for assessment of the state of the Black Sea environment

Anticipated output: Improved assessment of loads entering the Black Sea and the quality of the marine environment".

Here, good environmental/ ecological status of the Black Sea is mentioned: "Establishment of reference conditions and corresponding classification system for identification of good ecological status of the Black Sea".

An indicator, "Agreement of all 6 countries to use a standard operational procedure for the measurement and calculation of loads discharged from point sources of pollution (including rivers) into the Black Sea" is mentioned. The detailed indicators in the sea, as in the in MFSD, are not provided.

As the BSSAP is a regional agreement which all Black Sea member states are committed to (in contrast to the MSFD and the WFD), the adoption of these measures by all Black Sea countries – if implemented – should ultimately lead to significant reduction of eutrophication.

3.6 Descriptor 6: Sea floor integrity

MSFD Descriptor 6 stipulates that "Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected".

The physical loss and damage of the sea floor is not among the prioritised environmental problems in the Black Sea region. Among the pressures causing seabed physical loss and damage, only dredging and disposal of dredge spoil have received official regional attention; however the main concern is pollution with hazardous substances, rather than physical disturbance. The Protocol on the Protection of the Black Sea Marine Environment Against Pollution by Dumping (1992), which is ratified by all the countries, is the only legal instrument for the region at the moment which is principally based on a permit system to control dumping activities. Any dumping except of dredged spoils is prohibited in the Black Sea. Dumping of any type of hazardous substances is prohibited. Dumping of dredged spoils is allowed by the Protocol only if the limits of its Annex I contaminant concentrations in the dredged material are not exceeded.

This Protocol was considered outdated already in 2009 and the BSC recommended implementation of the London Convention and Protocol as a way to avoid the lengthy and costly procedure of amending the Black Sea Dumping Protocol (BSC, 2009). BSC was alarmed that the volume of dredged spoils dumped into the Black Sea by the coastal states showed a tendency toward increasing and warned that silting of the Black Sea bottom and valuable habitats destruction may result. This situation called for protection measures, especially in shallow waters.

The BSSAP 2009 sets a management target to "Improve regulations/ management of dredging / dumping activities", however with a medium priority. This target is mainly aimed at chemical pollution reduction, rather than at habitat conservation. Clearly, physical loss and degradation of the sea floor are issues of lower transboundary concern, given that the associated pressures and impacts occur at the spatial scales of local to national level. Therefore, it is a national responsibility to implement environmental measures such as to maintain or restore the sea floor integrity. Since member states have access to European marine waters for fishing, Bulgaria and Romania shall also adopt bilateral measures to prevent unacceptable levels of seabed physical disturbance by fisheries in their EEZs in order to meet the obligations of MSFD.

3.7 Descriptor 7: Alterations to hydrography

The MSFD GEnS descriptor has set out rather detailed criteria for assessing whether hydrographical conditions have been permanently altered, including spatial extent of alterations and changes in habitats as a consequence of those alterations. The only thing the BSSAP EcoQOs state on issues relating to hydrography is that it aims to "Improve regulations/ management of dredging / dumping activities"(target 59). Thus, when it comes to the issue of alterations to hydrography the MSFD descriptors are only to a very limited extent followed up in the BSSAP.

3.8   Descriptor 8: Contaminants

MSFD Descriptor 8 requires that "Concentrations of contaminants are at levels not giving rise to pollution effects".

A number of regional legal documents address the chemical pollution issue, including:

- Protocol on the Protection of the Marine Environment of the Black Sea from Land-Based Sources and Activities (LBSA Protocol 2009) (entry into force pending)
- Protocol on Protection of the Black Sea Marine Environment Against Pollution from Land Based Sources (1992)
- Protocol on Cooperation in combating pollution of the Black Sea Marine Environment by Oil and Other Harmful Substances in Emergency Situations
- Protocol on The Protection of The Black Sea Marine Environment Against Pollution by Dumping

Chemical pollution is enrolled third in the Black Sea TDA-2007 list of priority transboundary problems. Consequently, the BSSAP 2009 gives adequate attention to the problem setting the Long-term Ecosystem Quality Objective to "Ensure Good Water Quality for Human Health, Recreational Use and Aquatic Biota" through:

> *EcoQO 4a: Reduce pollutants originating from land based sources, including atmospheric emissions.*
>
> *EcoQO 4b: Reduce pollutants originating from shipping activities and offshore installations*

A comprehensive suite of relevant management targets are set addressing the causes (drivers), state changes and the international responses needed to combat chemical pollution in the Black Sea. With regards to drivers the BSSAP management measures target all sources of pollution - land-based, atmospheric, shipping and offshore. The application of Best Available Practices and Best Available Techniques in agriculture and industries and environmentally safe navigation, including implementation of economic instruments for their promotion, limitation of liability and compensation are recognized as the way towards clean marine environment.

The most important regional legal responses required include the ratification of the revised LBSA Protocol to the BS Convention pending since 2009 and the development and adoption of the Contingency Plan and the Chemical Plan to the Protocol on Cooperation in Combating Pollution of the Black Sea by Oil and Other Harmful Substances in emergency situations. The ratification and adoption of certain international agreements (e.g. MARPOL Annexes) by all six Black Sea counties also provide common legal bases for cooperation.

It is widely recognized that data on contaminants and pollution loads are very incomplete in the Black Sea (TDA, BSSAP 2009, BSC 2010). To improve the regional monitoring it is critical to settle upon the "list of Black Sea specific priority pollutants" and define harmonized environmental quality standards. Political acceptance, funding availability and cooperation between different stakeholders are identified as the main uncertainties for the successful implementation of the proposed measures.

3.9 Descriptor 9: Sea food contaminants

MSFD Descriptor 9 requires that "Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards".

Contaminants in seafood are not specifically addressed by the regional policy documents and the BSSAP 2009. BSC 2010 recognizes that data on hazardous substances in biota are very limited in the Black Sea Information System and other main regional data sources, while information on the effects of contaminants on biota are thoroughly absent. This clearly defined gap is where further efforts are needed to improve the monitoring and reporting systems in the Black Sea region, as well as to meet the obligations under MSFD.

3.10 Descriptor 10: Marine Litter

The BSSAP sets out three 'targets' on the importance of monitoring marine litter and the need to develop monitoring and assessment methodologies. Thus, the issue of tackling marine litter is squarely addressed, but the criteria for its assessment are not developed to the same extent and detail that the GEnS criteria are developed. Unlike the BSSAP the GEnS criteria emphasise the importance of identifying trends, including explicitly the issue of micro-particles, and notes the importance of monitoring trends in the amount and composition of litter ingested by marine animals.

3.11 Energy and Noise

Descriptor 11 of the MSFD covers the introduction of underwater noise, thermal energy, electromagnetic fields and light. To date the particular focus for implementation of the directive has been on the introduction of underwater noise, with the other aspects being deemed to require further research in the development of criteria for the directive. While there is no reference to the introduction of energy or noise in the BSSAP this descriptor is of clear relevance to the ECOQ 2 relating to biodiversity and habitat and in particular relevant to the protection of endangered cetaceans species under ECOQ 2a. Developing an understanding of underwater noise conditions within the Black Sea might contribute to the development of MPAs to contribute to the proposed regional conservation plans under the BSSAP.

4 Transboundary problems and a regional approach

Which problems described above are transboundary? Can they be fixed by unilateral measures of Romania and Bulgaria or do they require regional harmonisation?

The drivers, pressures and states for biodiversity, commercial fisheries, food webs, eutrophication, non-indigenous species, contaminants and litter all occur at or are dependent on processes at the regional scale or larger. The remaining descriptors; descriptor 6 (seafloor integrity) 7 (alterations to hydrography) and 11 (energy and noise) may feasibly be managed at the level of the EEZ. Thus achieving GEnS for EU member states, for the majority of descriptors, will require an integrated regional approach.

How limited is our ability to achieve GEnS and what could we do to improve the situation?

Achieving an integrated region-wide approach to environmental management of the Black Seas represents a major political challenge. There have been 50 years of failure to agree a common strategy toward rational management of the region's fisheries. Geopolitical and economic tensions between the Black Sea nations are likely to remain a major barrier to a unified regional approach.

Nevertheless all the Black Sea nations are committed through the Bucharest convention toward protecting the Black Sea's environment, and the aims and goals of the BSSAP are consistent with (if not identical to) those of the MSFD, as demonstrated in the sections above.

Experience in the region with WFD and the International Commission for the Protection of the Danube River can serve as examples for future cooperation. Consideration of the spatial scales of drivers and pressures causing particular environmental problems may help to focus efforts in achieving particular aspect of GEnS as occurred with the efforts to reduce eutrophication on a regional basis under the WFD.

However the importance of a regional fisheries agreement cannot be overestimated. Fisheries directly affect biodiversity, populations of commercial species, food web structure; the capacity of the system to withstand eutrophication and the introduction of marine litter (6 of the 11 descriptors of GEnS: D1, D3, D4, D5, D6 and D10). To this end, the Ecosystem Approach and the valuation of ecosystem services as mandated by the MSFD have the potential to offer economic justifications for cooperative environmental measures. For example, Goulding et al., (in press) illustrate that management of fisheries at the Maximum Sustainable Yield level within the Black Sea is economically feasible and similar justification could be made for other descriptors.

Whatever the justification, it is clear under the current economic circumstances (and in a region not inclined toward active cooperation), that if the goals of obtaining GEnS in Romanian and Bulgarian waters is of importance to the European Union, financial and technical support must be provided to foster regional efforts designed to improve environmental cooperation and stewardship in the region.

5 Conclusions and recommendations

According to EC (2010) Good Environmental Status (GEnS) requires that all relevant human activities are carried out in coherence with the requirement of protecting and preserving the marine environment. The application of criteria for GEnS needs to be carried out keeping in mind the need to target assessment and monitoring and to prioritise action in relation to the importance of impacts and threats to marine ecosystems. The main management approach – the adaptive management on the basis of the ecosystem-based approach – is said to require the regular update of the determination of the GEnS.

The EC Decision (EC 2010) states that in a number of cases, it can be appropriate to apply as a first step some selected criteria and related indicators for an overall screening of the environmental state at a broader scale, and only then identify instances and specific areas where the necessary assessment would involve all criteria and indicators developed by the working groups (JRC 2012)

The MSFD clear presents a more complete and articulated framework and approach in terms of GEnS descriptors, criteria and indicators.

BSSAP on the other hand, accentuates cooperative actions and inter-calibration of methods in order to resolve transboundary issues.

In this way the two approaches look complementary and some fusion between them should provide solutions addressing both specific management problems and transboundary issues. In future, much more clear and specific targets and evaluation indicators should be formulated, in relation to the BSSAP, possibly based on existing and developed at the country level MSFD indicators.

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APPENDIX I. EcoQO Matrices from Black Sea Strategic Action Plan (Annex 3)

Annex 3. EcoQO Matrices

Each EcoQO consists of a number of short-, mid- and/or long-term management targets that address the root causes of the concern areas. For regional level interventions, the Black Sea coastal States and the international partners shall work collectively to take the required steps to fulfill the intervention. The national level supporting interventions will be the responsibility of the individual states. The EcoQOs and their targets are listed below, including outputs, time to implement, legal, institutional and policy reforms required, indicators of success, priorities and uncertainties. It is worthy to note that, having regard to the ecosystem approach, the management targets 2 to 10 are recommendations made to competent authorities on fisheries management.

EcoQO 1: Preserve commercial marine living resources.
EcoQO 1a: Sustainable use of commercial fish stocks and other marine living resources.

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORS	dPRIORITY	UNC
aTime required to implement, bLegal, institutional or policy reforms required, cIndicators of success, dRelative priority: high, medium, or low,						
Policy/legislation						
(1). Adopt and implement a Regional Agreement for fisheries and conservation of living resources of the Black Sea	Stocks managed in a sustainable manner		LBD on fisheries adopted in all Black Sea countries	Regional agreement on fishery management signed and enforced.	High	Posit
Short-term target Introduce quota regime for turbot and other demersal fish stocks	Management of the state of fish stocks in sustainable way	5 years		Increase in biomass of demersal fish stocks of 30%		
Mid-term target Establish remote sensing (satellite) system for observing and controlling fishing operations in open sea	Control of fishing vessels during the closed season and protection of the closed areas	10 years		End of poaching activity in open sea		
Monitoring and assessment						
(2). Harmonise and improve methodologies for the collation of fisheries statistic data and for assessment of the fish stocks at a regional level	Knowledge of the state and fluctuations of the exploited stocks improved; Effective control/improved statistical system for data collection		Adoption of national requirements for collection and processing of fishery statistics		High	Polit: Diffe Conf

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORS	dPRIORITY	UN
Short-term target Stock assessment methodologies agreed for all demersal fish, anchovy and sprat Methodologies agreed by all 6 countries for improved estimation of individual species and total fish landings	Improved methodologies developed and agreed by all 6 countries	3-4 years		Methodologies developed and accepted by all 6 countries for harmonised stock assessments to be undertaken and improved landing statistics to be collected		
Mid-term targets Undertake regular, and where possible, coordinated stock assessments of all commercially important fish Reporting of improved landing statistics to the Black Sea Commission and FAO	Improved fisheries data collection, reporting and assessment	5-6 years 5-6 years		Reporting of improved statistics to the Black Sea Commission and FAO		
Capacity-building of regulatory/enforcement authorities						
(3). Increase resources to regulatory bodies responsible for fisheries management	Increased protection of marine living resources	1 – 5 years	Yes	Number of staff employed in enforcement activities Number of permits/licenses granted Number of inspections undertaken Number of fees/measures applied/taken for non-compliance	Medium	Poli Finar

EcoQO 1b: *Restore/rehabilitate stocks of commercial marine living resources.*

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORS	dPRIORITY	UN
a**Time** required to implement, bLegal, institutional or policy **reforms** required, c**Indicators** of success, dRelative **priority**: high, medium, or low,						
Management, Policy and Legislation						
(4). Improved regionally-agreed system to match fishing efforts to stocks	Common prohibition periods/terms for shared and migratory stocks; Harmonised scientific approach and standardized regulations	3-6 years	Yes	See EcoQO 1a, Target (2)	High	Poli Diff

				See EcoQO 1a, Target (1)		Con
(5). Ban on non–precautionary fishing technologies in force (notably dredging and bottom trawling	Protection of benthic environment (improved habitats for reproduction of demersal fish and invertebrates Ban of unsustainable fishing practices		Yes		High/ Medium	Effe Inte
Short-term target Develop draft document, including detailed regionally-agreed definition of unsustainable fishing gear	Draft agreement developed	3 years		Document drafted		
Mid/long-term targets Agreement signed and ratified	Agreement adopted and ratified					
Effectiveness of ban assessed	Surveys of known impacted zones to assess recovery	6 years 10+ years		Document signed by all countries Number/scope of surveys funded and undertaken		
(6). Introduce instruments including management, economic and legal to ensure increased production from environmentally friendly mariculture to encourage a decrease in fishing effort.	Decreased fishing effort on natural living resources Increased production from mariculture – impact assessment on the environment	5 years	1. Policy reforms to encourage/ support relevant activities	Significantly increased production from environmental friendly mariculture	High/ Medium	Neg envi
(7). Develop regulations aimed at decreasing by-catch level	Low levels of by-catch/discards; Selectivity of the fishing gears introduced.		Yes	By-catch levels are low or negligible	High / Medium	By-c Sma as a over ther fish
Short-term target Establish regionally agreed minimum permitted length of commercial fish and minimum mesh sizes for target species		3 years		Agreement established		
Mid-term target Robust enforcement of regulations						

		7 years		Number of vessel inspections undertaken		
				Biomass of enforced discards		
(8). Elaborate and implement measures for increasing of the fish recruitment for the protection of juvenile commercial fish **Short-term targets** Identify and introduce closed nursery areas	Properly managing the exploitation of the stock		Yes	Measures elaborated and agreed by all countries	Medium	Esta intro
	Introduction of closed nursery areas	4 years		Juvenile stocks increase		
Establish and introduce closed seasons for demersal fish				Area of closed nursery waters		
	Introduction of closed seasons for turbot and other demersal fish	4 years		Closed seasons introduced		
(9). **Minimise ghost fishing caused by discarded, abandoned or lost fixed and floating nets, including those used in illegal/unregulated fishing activities**	Amendment to draft LBD on fisheries, identifying national enforcement agencies responsible for the collection and, disposal of abandoned fishing gear, and where appropriate, penalisation of offending parties	5-10 years	Yes	Draft amendment produced. Amendment agreed and ratified by all 6 countries Number/length/area of discarded nets recovered	Medium	This acce prop it ha and,
Monitoring						
(10). Develop and introduce methodologies to assess the condition of populations of commercial marine living resources **Short-term target** Scheme developed and adopted at Commission level, including detailed methodologies **Mid-term target** Raw assessment data reported to the BSC permanent secretariat by all countries	Proper management of marine resources		1. Policy, in some countries, to ensure required data are collected		Medium	Agr sche
	Document written and agreement reached	2 years		Established regionally agreed set of indicators		
	Annual assessments made			First assessment made by the Black Sea		

EcoQO 2: Conservation of Black Sea Biodiversity and Habitats
EcoQO 2a: Reduce the risk of extinction of threatened species

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORS	dPRIORITY	UNC
aTime required to implement, bLegal, institutional or policy reforms required, cIndicators of success, dRelative priority: high, medium, or low,						
Management, Policy and Legislation						
11). Finalise and adopt the regional SAP for Black Sea Biodiversity, and undertake 5 yearly regional update of the list of conservation status of threatened coastal and marine species as well as list of critical habitats for these species	Finalised and adopted regional Biodiversity Strategy Development of National plans Regularly updated Red List of species and List of critical habitats Electronic version of updated BS Red Data Book of species on the web page of the BS Commission		Reflects the regional SAP for biodiversity in national policies,	Approved SAP for Black Sea Biodiversity Reduced number of threatened species and increase in their abundance. Red list of species and BS Red Data Electronic Book updated every 5 years Number of species evaluated according to IUCN criteria, categories and regional guidelines Reduced number and area of critical habitats	High	Regi
Short-term targets Regional SAP for Black Sea Biodiversity finalised and adopted by all six countries Red list updated in 2 years time		5 years				
Mid-term target Red list of species in Annex 2 of the BSBLC Protocol updated in 4 years time		2 years				
Long-term target Red list of species updated in 12 years time, etc.		4 years 12 years				
(12). All six BS countries to adopt a regional Conservation Plan for Black Sea endangered	Regional survey. Assess species	5-10 years	Yes	The regional Plan is approved by the BSC	Medium	Polit

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORS	dPRIORITY	UNC
species and develop national action plans	requiring conservation plan. Development of stranding network, by- catch network and network of MPAs eligible for cetaceans conservation.			National Plans developed Networks developed Endangered species abundance, distribution and threats assessed Established national and transboundary MPAs; Methodology developed to reduce significant by-catches of cetaceans		Avai imple
Climate change						
(13). Assess impacts of climate change on Black Sea ecosystem and sustainable development of the coastal population	Knowledge on the impacts of climate change improved	3-5 years	No	Comprehensive study on the consequences of climate change in the Black Sea region	Medium/ Low	Opti lie in and r Fram (inco Diffe

EcoQO 2b: Conserve coastal and marine habitats and landscapes

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORS	dPRIORITY	UNC
a**Time** required to implement, bLegal, institutional or policy **reforms** required, c**Indicators** of success, dRelative **priority**: high, medium, or low,						
Management, Policy and Legislation						
(14). Consider the necessity of creation of new and/or expansion of existing protected areas, including transboundary areas in consultation with the relevant Black Sea coastal countries with particular attention to the marine protected areas **Short-term target** Develop harmonised approach for the identification of Black Sea PAs **Mid-term target**	A sufficient number, size and network of coastal and marine BS PAs, to ensure the conservation of natural ecosystems and processes ensuring long term continuity between areas Methodology developed for identification, characterisation and assessment of the areas of high regional importance (potential protected areas)	5 years	Yes	Number and total area of marine and coastal PA's increased :		Fund Polit

Produce list of receommended Coastal/Marine Protected Areas	List of recommended areas for designation as protected.	5-7 years				
(15). Further recognise and implement integrated coastal zone management principles	Common understanding of what ICZM is and how to apply it		Yes	Number of policies, plans or legislative acts related to the coast that reflect ICZM principles		Polit Finar
	Clear boundaries of the coastal zone eliminate uncertainties about responsibilities					
	Acceptance that conservation of coastal habitats and species is of equal relevance to socio-economic development					
Short–term target Develop ICZM Guidelines		5 years		BS Regional ICZM Guidelines written and accepted		
(16). Develop and disseminate information, training and education materials on ICZM in regional languages, referring to coastal biodiversity conservation **Short-term target** Educational materials produced and disseminated **Mid-term target** National training exercises held	Increased awareness of stakeholders to the benefits of ICZM and coastal biodiversity conservation	1 – 3 years	No	Number of publications produced and disseminated Number of training workshops held		Oper ICZM Supp Polit

		3-6 years				
(17). Regionally converge Environmental Statement, Environmental Impact Assessment and Strategic Environmental Assessment procedures	Revision of preliminary plans/ programmes with unacceptable consequences for coastal biodiversity Spatial plans balance different coastal uses, including biodiversity conservation in a fair manner		Yes	EA/EIA/SEA procedures for the Black Sea region Number of EIA and SEA studies conducted in accordance with regional guidance/national legislation		Enfo Finan
Short-term target Development and acceptance of guidance document by BSC	Agreement on a list of assessment indicators	3 years		Harmonised guidance document produced and agreed to by all 6 coastal countries		
Mid-term target Harmonisation and/or introduction of national ES/EIA/SEA legislation in all 6 countries	Agreement on assessment methodology	7 years		National legislation developed/adapted to take account of regional guidance document		
(18). Amend national waste strategies and national coastal zone management plans with the aim of marine litter minimisation	Reduced input of land-derived solid waste to the marine environment		Change in strategy, if not policy			Costs Natio wheth all co
Short-term target Amendments to national strategies accepted, where required		1-3 years		Amendments incorporated into national strategies		
Mid-term targets Clean-up of unregulated/illegal riverine and coastal dumping sites Amendments to national strategies incorporated into local, costal and landfill site management plans		3-6 years		Number of illegal costal dumping sites cleaned-up		

		3-10 years		Changes in strategies incorporated in national/local coastal management plans Number of operational plans at regulated river/coastal landfill sites amended to reduce input of solid waste to rivers or directly to the Black Sea		
(19). Develop regional and national marine litter monitoring and assessment methodologies on the basis of common research approaches, evaluation criteria and reporting requirements	Improved quantification of marine litter and identification of sources, allowing improved prosecution of offenders	1-6 years	Yes, policy at least	Regional guidance produced and distributed by BSC. National programmes developed, funded and operational Results reported to BSC for incorporation within a regional marine litter database		Likel comm escal
(20). Promote/develop investment projects within national strategies/local plans to engineer, construct and install new solid waste recycling facilities and incineration plants, complying with BAT regulations	Improved recycling/ incineration of solid waste, resulting in reduced solid waste for disposal to landfill and reduced atmospheric emissions from incinerators	Continuous improvement over 15+ years		No of project outlines developed No. of projects financed No. of projects completed		Proje
Monitoring						
(21). Monitor and facilitate the progress in the implementation of nationally developed management plans for designated protected areas	Regional assessment of the progress of the management of BS protected area	1-5 years	Yes	Approved Management plans printed and/or placed on web site(s) Improved state of the protected areas	High Low	Finan
(22). Develop an inventory, classification and a mapping system for BS habitats	Improved knowledge of BS habitats GIS maps and list of BS threatened habitats	1-7 years		Approval of classification system by the scientific communities in the BS region Inventory and classification of coastal and marine habitats completed and published BS Habitats Maps available on the web page of the BSC Regularly (5 years) updated list of the BS threatened habitats on the web page of the BSC	High / Medium	Acce indiv Avai
(23). Identify and make an inventory of Black Sea landscapes of high natural, historical, cultural and aesthetic value	Regionally agreed guidelines for identification and characterization of	1 -10 years	No	BS landscapes of high natural, historical, cultural and natural, Natural, historical, cultural and aesthetic value of key	Medium	Polit

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORS	dPRIORITY	UNC
	the BS landscapes Improved knowledge of the BS Landscapes			landscapes identified Inventory completed		
(24). Undertake preliminary regional assessment of coastal erosion	Preliminary assessment would identify sites of high erosion/deposition, consider impacts and options for management (sea defence construction, artificial beach nourishment, managed retreat, etc.)	3 years	No, but report should include recommendations for regional/ national policy development	Report produced, including recommendations	Low	Expe... Ident as be trans prior Poter being
Capacity-building of monitoring staff						
(25). Support coordinated scientific studies, increase resources to marine scientists and improve capacity particularly through targeted training programmes supporting scientific projects/programmes	Increased knowledge of BS ecology/chemistry	1 – 5 years	Yes	National budgets allocated to BSIMAP-participating laboratories to undertake BSIMAP-specific monitoring, Number of BSIMAP-participating staff attending capacity-building events (training workshops, conferences, etc.)	High/ Medium	Finar

EcoQO 2c: Reduce and manage human mediated species introductions

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORS	dPRIORITY	UNC
aTime required to implement, bLegal, institutional or policy reforms required, cIndicators of success, dRelative priority: high, medium, or low,						
Management, Policy and Legislation						
(26). Promote cooperation in the Black Sea in line with principles and recommendations of the International Convention for the Control and Management of Ships' Ballast Water and Sediments	Overview of BS states national legislation relevant to ballast water management	1-2 years	Yes	Level of compliance with the provisions of the BWM Convention	High	Low on in
(27). Harmonise ballast water procedures using IMO guidelines	Agreed areas of exchange and amount of exchanged waters, agreed controls of ballast waters in ports	1-5 years	Yes	Harmonised national legislations on ballast water exchanging control	High	

MANAGEMENT TARGET						
	Enhanced control of transfer of alien species					
(28). Identify actions towards ratification of the BWM Convention in the BS region	Road map to reduce the risk of alien species invasion	1-7 years	National plans for BWM management	Road map produced and acted upon	High	Politi

EcoQO 3: Reduce eutrophication

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORS	dPRIORITY	UNC
aTime required to implement, bLegal, institutional or policy **reforms** required, c**Indicators** of success, dRelative **priority**: high, medium, or low,						
Nutrient Management Policies						
(29). Implement integrated river basin management and integrated coastal zone management approaches, as stated in revised LBSA protocol **Short-term target** Adoption of LBSA **Mid/Long-term target** Implementation of River Basin Management principles	Revised LBSA protocol ratified by all BS countries Adoption of a River Basin based' approach to managing eutrophication	Yes 2 years 4-15 years	Yes	Adoption of LBSA protocol Introduction of River Basin Management (RBM) principles in BS basin by all countries, with appropriate reporting through the BSC	High	Politi Finan throu
(30). Introduce cost efficiency approach to nutrient management in all BS countries	Reduced costs to tackle the issue of excessive nutrient emissions.	6-7years	Possibly	Studies undertaken in all BS countries to identify cost efficient approaches	Medium	Acce Natio studi Coun natio unde nutri
(31). Upgrade all WWTPs serving populations > 200,000 p.e. within the six BS country sub-basins to include N&P removal **Short-term target**	Overall: reduced nutrient loads from WWTPs.		No		High/ Medium	Politi Finan

Identify WWTPs requiring upgrade						
	Priority list prepared for investments (See EcoQO 4 – Chemical Pollution)	2 years			Priority lists of WWTPs for upgrade	
Mid/Long-term target Upgrade identified WWTPs					Financing plans developed.	
	Upgraded WWTPs (See EcoQO 4 – Chemical Pollution)	9 -20 years			Number of identified WWTPs upgraded	
(32). Ensure all tourist resorts are connected to sewerage systems with WWTPs of adequate capacity to address seasonal loads	Reduced loads of N/P etc. and improved bathing water on beaches Improved environmental sustainability of tourism sector Priority lists for upgrading sewerage connections and / WWTPs in tourist centres		No		Reduced marine pollution and improved bathing water quality	Medium/ High	Agre wast Fina
Short-term target s Identify locations in need of connection to sewerage systems and required capacity of WWTPs Preparation of national priority lists for investments	(See EcoQO 4 – Chemical Pollution)	2 years			Prioritised list for upgrading sewerage and WWTPs in tourist centres	
Long-term target Implement upgrading of priority sewerage systems and WWTPs		10 – 20 years			Identified priorities incorporated into national finance plans Number of priority list actions implemented	
(33). Ensure that all industrial plants have adequate wastewater treatment to reduce N&P emissions from direct discharge to surface waters	Hot-spots from industrial discharges identified Reduced N/P discharged (See EcoQO 4 – Chemical Pollution)		No		Updated hot-spot analysis for BS region	High / Medium	Lack Insuf to co Fund
Short-term target Develop prioritised list of investments needed based on hot-spot analysis.		1 year			Agreement of prioritised list of industrial discharges to be addressed	
Long-term target					Agreed financing plan (private, national	

Implement investments to reduce industrial pollution				and international sources)		
		10 – 20 years		Completion of investments to reduce industrial discharges		
(34). Reduce or phase out the use of high P-containing laundry detergents	Significantly reduced P loads (>20% reduced from domestic sources) to the BS Developed strategies in each country to address high-P laundry detergents		Yes		High	Oppo possi Polit
Mid-term target Promote the production, distribution and use of P-free detergents in all 6 countries		6-7 years		Low-P products available for consumers		
Long-term target If necessary, introduce compulsory bans where voluntary measures prove unsuccessful				Reduced P loads discharged from WWTPs		
		10+ years		High-P-containing laundry detergents no longer sold		
(35). Introduce harmonized P and N standards for all WWTPs serving >100,000 p.e. Ensure compliance with and harmonise standards at regional level	Reduced N/P emissions through improved management and enforcement of standards Agreed quantitative nutrient discharge standards		Yes		Medium	Polit Reso enfor Reso upgra
Short-term target Agree on harmonized N and P standards		2 years		Standards agreed		
Long-term target Adherence to standards through improved enforcement		10 + years		Monitoring results show reductions and compliance with standards Prosecution numbers of dischargers failing to meet standards		

(36). Reduce atmospheric emissions of N from municipal, agricultural and industrial sources, though the introduction of BAT, BAP principles etc.	Reduced atmospheric deposition of N in BS; Improved understanding of sources of atmospheric N in region (Link with EcoQO – Chemical Pollution)	10+ years	Yes	Lists of sites where N emissions are established	High/ Medium	Unce sourc Reso and i
Monitoring and Modelling						
(37). Harmonise the monitoring and assessment of N&P in major rivers and straits	Improved knowledge of N/P loads discharged into the Black Sea enabling improvements to be readily identified and reported to the BSC and other stakeholders.		Yes		High	Regi Fund
Short-term target Agree the procedures (determinants, methods, QA/QC frequency, locations, reporting, interpretation etc.)	Agreed procedures recommended for adoption and implementation	2 years		Agreement by all countries to adopt common procedures for nutrient load monitoring and reporting with common QC/QA procedures		
Mid-term target Implement the agreed load monitoring procedures for major rivers discharging into the Black Sea	All countries adopt harmonised procedures for monitoring nutrient loads discharged to the Black Sea (Link with EcoQO – Chemical Pollution)	10 years		All countries undertake and report agreed data to the BSC Trend analysis on nutrient loads utilised by policy makers within 10 years of all countries undertaking monitoring.		
(38) Improve network of atmospheric deposition monitoring stations around the Black Sea coast (at least 1 per country)	Better understanding of the estimates of atmospheric deposited pollutants enabling more reliable management decisions to be taken at sources of pollutants (Link with EcoQO 4 – Chemical Pollutants)		No		Medium	Need Fund netw
Short-term target Agree location, monitoring procedures etc. for atmospheric deposition monitoring program/ network **Long-term target**						

Implementing the agreed atmospheric monitoring network		5 years		Monitoring network agreement		
		10 + years		Monitoring implemented		
				Results from atmospheric deposition of N reported by all countries regularly to the BSC		
(39). Develop a nutrient modelling tool to enable source apportionment estimates to be made **Short-term target** Define and agree functionality and operation of nutrient model. **Mid-term target** Develop and test model leading to an operational tool with results accessible to policy makers in all countries	An agreed modelling tool for all major rivers discharging into the Black Sea		No		Medium	Agre Acce Data Finar
		2 years		Agreed specification and functionality of model		
		10 years		Countries provide data to test / validate model		
				Model used to assist policy makers address nutrient hot spots		
Agricultural sources of nutrients						
(40). Improve the use of regulatory instruments for reducing point and diffuse source pollution from agriculture	Clear definition for each country of the minimum standards of farm management to reduce the risk of nutrient pollution e.g. closed periods for application of fertiliser/manure to land, restrictions on application rates, minimum storage requirements for manure etc. Introduction or improvement of national regulations to encourage minimum standards of agricultural pollution control Full compliance of farmers with these regulations		Yes – in some countries. .		High	Com accep gove Defir contr coun Finar Cont

Mid-term target Where necessary, introduce new/improve existing regulatory instruments to control specific farming practices with a high risk of causing nutrient losses **Long-term target** Full compliance and effective enforcement of national regulatory instruments for reducing nutrient losses from agriculture		5-6 years 10+ years for all farmers to fully comply with regulations		Definition of national minimum farming standards Development and legal adoption of new/improved regulations Level of compliance with new/improved regulations Level of investment in new/improved manure storage facilities		
(41). Where financial resources are available and greatest possible extent, introduce appropriate economic incentives to reduce nutrient emissions from agriculture	Where financial resources are available, introduction of incentive schemes (e.g. agri-environment type payments) to encourage farmers to go beyond the minimum standard of agricultural pollution control and introduce specific management practices for the further reduction of nutrient losses Participation of farmers in these incentive schemes Effective impact of schemes upon water quality, particularly in areas most vulnerable to high nutrient losses		Yes – in some countries In BG and RO significant reforms have already been made to use available funds from the EU Common Agricultural Policy		High/ Medium	Com accep gove Prov polic ensu Farm losse will Cont pollu some Prom effec capa

Mid-term target Utilise available funds to introduce appropriate economic incentives for farmers to introduce specified management practices for reducing nutrient losses from agricultural land **Long-term target** Widespread adoption by farmers of specified management practices for reducing nutrient losses from agricultural land		6 years depending on country 10+ years depending on country		Total funds available for incentive schemes Effective absorption of available funding resources Number of farmers participating in incentive schemes Area of land with modified farming practices e.g. the *increased* use of crop rotations, re-integration of grazing livestock into specialised crop production systems (traditional mixed farming systems), introduction of legumes as substitute for fertiliser nitrogen, sowing of winter cover crops, creation of uncropped buffer zones, preparation of nutrient management plans etc.		
(42). Develop and expand the capacity of national agricultural extension services for promoting the control of agricultural pollution	Simple, key advisory messages and supporting advisory materials/guidelines for farmers available in all local languages of Black Sea region Publication of recommendations on fertiliser application rates for individual crops Development of a) appropriate advisory tools and b) new advisory facilities to promote good practice for reducing nutrient losses from agriculture		Yes – will vary between countries, but considerable reform of existing agricultural advisory services are necessary in some countries	Number of staff employed in agricultural advisory services	High	Com accep gove Cont pollu some Many cond of ag woul exam

Mid-term targets Introduce BAP concept to national agricultural extension services and the development of key advisory messages for reducing losses of nutrients from agriculture Effective communication of key advisory messages for reducing agricultural nutrient losses by national agricultural extension services		5-6 years depending on country		Advisory materials/guidelines printed e.g. *Codes of Good Agricultural Practice for Protection of Water* Local training courses for advisers implemented New advisory tools and facilities developed e.g. farm gate nutrient balances, nutrient management plans, farmer awareness events, farm visits/open days, farm demonstration projects, etc. Number of farm visits undertaken	
(43). Promote organic farming and other low input farming systems	Advisory materials/ guidelines for organic farming and other low input farming systems (e.g. EUREPGAP etc.) available in all local languages of Black Sea region Relevant legislation for organic farming developed and fully harmonised with international standards Increased uptake of organic farming methods and other low input farming systems		Yes – will vary between countries depending upon progress to-date to harmonise legislation, develop inspection and certification systems etc.		Medium	Com accep gove Tech to or Avai servi Unce
Short-term target Raise farmer awareness of certified organic farming and other low input farming systems as viable alternatives to conventional		1-3 years		Production and distribution of educational	

agriculture				materials		
Mid-term target Widespread adoption by farmers of certified organic farming and other low input farming systems		3-10 years depending on country		Development and legal adoption of new/improved regulations for organic production Area of agricultural land under certified organic production or other recognised low input farming system Total sales of organic products Total sales of products from other recognised low input farming systems e.g. EUREPGAP etc.		
(44). Develop/define BAT for the design and operation of large-scale agro-industrial livestock production units, including pig and poultry farms with no land	Improved control of nutrient content of livestock feed. Technical in-plant measures for the reduction of waste water volume and pollution load Reduction of nutrient emissions by end-of-pipe measures Improved environmental management e.g. improved disposal of livestock waste to land, close co-operation with environmental authorities etc.		Yes		High / Medium	Com accep gove Low- Avai in BA
Short-term target Introduce necessary legislation for application of BAT to agro-industrial units **Mid-term target:**		3-5 years for		Regulations drafted and adopted in all 6		

Full introduction of BAT for all agro-industrial units in Black Sea region		regulatory framework 6-10 years to fully introduce/ enforce regulations		Black Sea countries Number of agro-industrial production units modernised with a) technical in-plant measures e.g. separation of solid and liquid wastes, modification of livestock feed, mechanical cleaning rather than cleaning with liquids etc. and b) end-of-pipe installations

EcoQO 4: Ensure Good Water Quality for Human Health, Recreational Use and Aquatic Biota

EcoQO 4a: Reduce pollutants originating from land based sources, including atmospheric pollutions

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORS	dPRIORITY	UNC
a**Time** required to implement, bLegal, institutional or policy **reforms** required, c**Indicators** of success, dRelative **priority**: high, medium, or low,						
Policy / Legislation						
(45). All BS states agree to implement provisions of the revised LBSA Protocol to the BS Convention	LBSA protocol ratified by all 6 countries. .	1 -2 years following signature by all six BS Countries	Yes	Approval of the final text of the LBSA Protocol by the BSC Adoption of LBSA protocol by all 6 coastal countries.	High.	Depe Politi recon
(46). Strengthen enforcement of national/regional and international regulations on land – based pollution sources	Full compliance with the provisions of environmental legislation in and by each country	5–10 years	Yes	Level of compliance with regulations Number of permits/licenses granted Number of inspections undertaken	High/ Medium	Politi Regi Finan
Economic instruments						
(47). Develop economic mechanisms for chemical pollution control	Regionally harmonised economic mechanisms promoting, for example, BAT/BAP, recycling etc.	10 years		P-free detergent sales increased (see Target (36)) Number of farmers applying BAP Number of installation using BAT Well functioning advisory services	High	Politi

(48). Introduce and disseminate the concept of BAP and BEP as a tool for encouraging farmers to deliver the highest level of on-farm pollution control	Published guidelines on BAP and BEP concept for the Black Sea Region		Yes – will vary between countries, but various reforms may be necessary to implement the BAP and BEP concept		High	Com BAP
	Appropriate activities to introduce BAP and BEP concept to relevant governmental institutions, NGOs and donors					Selec
						Inter /impr minis
	Black Sea countries agree to adopt BAP and BEP concept					Enfo
Short–term target Introduction of BAP and BEP concept to relevant governmental institutions, NGOs, donors etc.						Fund and l imple
	Inclusion of BAP and BEP concept in national strategies for protection and rehabilitation of the Black Sea	1-5 years		Guidelines developed in all countries in local languages		
				Guidelines printed and/or placed on website(s)		
				Number of regional/national dissemination workshops held		
Mid–term target Full adoption of the BAP and BEP concept by relevant governmental institutions , NGOs, donors etc. and widespread practical implementation by farmers	Development of integrated programmes for reducing agricultural pollution at local/national level (depending on nature/scale of pollution problems) with a mix of regulatory, advisory and economic measures (where resources are available)	5-10 years		Number of integrated pollution control programmes adopted – including new/improved regulations, economic incentives (where resources available) and strengthened extension services		
	Greater public awareness and transparency regarding agricultural pollution			Improved dialogue between Environment and Agricultural ministries through inter-ministerial meetings		
Pollution Management Policies						
(49). Introduce BAT and BEP for the most polluting industries in all BS countries	BS Countries Agree to implement BAT and BEP		Yes		High/ Medium	Polit Lack Low
	Environmental Management					

	Systems implemented; Cleaner production technologies/ activities in place					Finar...
						Lack... Limi... mech...
	Reduced industrial pollution					Inter-...
Mid-term targets Adopt BAT principles and policies		6 years		National environmental legislation developed/adopted		Low...
Identify priority industries to implement BAT and BEP				List of most polluting industries established		
Provide training to priority industries on BAT and BEP				Agreed priority list of industrial sites to implement BAT and BEP.		
Long-long-term target Implement BAT and BEP				National/regional database of polluting industrial plants established and populated with metadata		
				Reduced pollutant emissions		
				Investments made on clean technologies		
		10-15 years				
(50). Harmonise environmental quality standards throughout the Black Sea region and elaborate regionally agreed criteria for assessment of the state of the Black Sea environment	Improved assessment of loads entering the Black Sea and the quality of the marine environment		No	Agreement of all 6 countries to use a standard operational procedure for the measurement and calculation of loads discharged from point sources of pollution (including rivers) into the Black Sea	High	Acce... by in...
	Establishment of reference conditions and corresponding classification system for identification of good ecological status of the Black Sea					
Short-term target Harmonise environmental water quality standards		2-3 years				
Mid-term target						

Harmonise environmental sediment, biota and discharge quality standards		5-10 years				
Environmental Monitoring						
(51). Develop/improve the existing monitoring system to provide comparable data sets for pollutant loads (from direct discharges and river inputs) and for other parameters	Improved knowledge of pollution loads to the Sea.	5 years	Yes	Acceptance of method(s) by all countries Agreement of all 6 countries to participate in (and fully fund) a harmonised monitoring programme, including equipment and staffing costs Operational national quality assurance programmes for the inter-comparison / inter-calibration of chemical concentration and flow data from point sources All agreed raw data and annual loads regularly reported to the BSC	High	Staff Tech in so
(52). Improve the "list of Black Sea-specific priority pollutants" to help target monitoring priorities	Harmonised monitoring strategy of the marine environment and point (including rivers) and diffuse sources of pollution	2 years	Yes	Agreement of all 6 countries to use the list of priority pollutants BSIMAP updated/revised accordingly.	High / Medium	Staff
Rehabilitation / construction						
(53). Continue/improve rehabilitation /construction of wastewater treatment plants **Short-term target** Prioritise wastewater treatment investments needs **Mid-long-term target** Rehabilitation / construction of municipal and industrial treatment plants	List of project proposals cleared Reduced loads of pollutants from major point sources discharging directly or indirectly (via rivers).				High	Polit Enco upgra Finan
		1 – 5 years	Yes	List of investments established		
		5– 20 years	No	Investments made (DABLAS) Reduced loads of nutrients, BOD, etc.		
Capacity building						

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORRS	dPRIORITY	UNC
(54). Optimise and/or increase resources to regulatory bodies responsible for pollution control and improve capacity through targeted training programmes	Build capacity of environmental authorities for enforcing regulations to control discharges from both point and diffuse sources	1- 5 years	Yes	Number of staff responsible for pollution control Budget allocated for pollution control Number of staff participating in training courses, workshops, etc.	High / Medium	Polit Finan

EcoQO 4b: Reduce pollutants originating from shipping activities and offshore installations

MANAGEMENT TARGET	ANTICIPATED OUTPUTS	aTIME	bREFORMS	cINDICATORRS	dPRIORITY	UNC
aTime required to implement, bLegal, institutional or policy **reforms** required, c**Indicators** of success, dRelative **priority**: high, medium, or low,						
Policy/legislation						
(55). Adopt the Black Sea Contingency Plan to the Protocol on Cooperation in Combating Pollution of the Black Sea by Oil and Other Harmful Substances in emergency situations (Part I – Response to oil pollution)	Adoption of the Plan by all 6 Black Sea Countries	1- 2 years	Georgia, Ukraine and Russia	Adoption of the Plan at national levels	High/ Medium	Polit
(56). Develop and adopt Part II (Chemical Plan)of the Black Sea Contingency Plan to the Protocol on Cooperation in Combating Pollution of the Black Sea by Oil and Other Harmful Substances in Emergency Situations **Short-term target** Development of Part II of the Black Sea Contingency Plan (response to pollution from harmful substances) **Mid-term target** Adoption of Part II of the Black Sea Contingency Plan (response to pollution from harmful substances)	Part II developed ,agreed and adopted by all BS countries	2-3 years 4 -8 years	Yes	Part II of the Plan finalised and sent to countries for adoption Part II of the Plan is adopted by all 6 Black Sea Countries	High	Polit Finan
(57). Establish an inter-state ministerial mechanism to enable a quick response to major pollution events	National Contingency Plans, covering both vessels and off-shore installations in place and coordinated		Yes	National authorities/ institutions/ stakeholders involved in contingency and emergency situations response identified in	High / Medium	Finan

	between the Black Sea Countries			all BS Countries		Lack
				The mechanisms for intervention, information exchange, etc. in place		
				National/regional contingency action plan published and operational		
				Scheduled oil spills preparedness and response exercises, including bi-annual DELTA exercises, agreed by countries		
(58). Adopt and enforce relevant international legal instruments for safety navigation, pollution prevention, limitation of liability and compensation	Ratification/accession/ adoption of MARPOL 73/78 (Annexes III, IV&VI) , AFS by all six Black Sea Countries		Yes	Assessment of ratification and effective application and enforcement of relevant legal instruments	High/ Medium	Politi Finan Inter-
				All 6 Black Sea Countries are parties to the relevant legal instruments and apply an harmonized system of enforcement		
Short-term target Cooperate and access relevant international legal instruments for safety navigation, pollution prevention, limitation of liability and compensation (MARPOL, BWM, London Protocol added in glossary etc)		3 – 5 years		Ratification of legal instruments		
Mid-term target Enforce relevant international legal instruments for environmentally safe navigation, pollution prevention, limitation of liability and compensation (MARPOL, BWM, London Protocol etc)		5 – 10 years		Documented enforcement of legal instruments		
(59). Improved regulations/ management of dredging/ dumping activities	Reduced transfer of dangerous pollutants into the marine environment by dumping Improved reporting to the BSC of the dredging operations and deposit sites	5-6 years	Yes	Number of permits for dredging/disposal to the Sea; Number and locations of official deposits for dredged sediments	Medium	No st analy No in ident
Waste management						
(60). Provide adequate port reception facilities for ship-generated wastes according to MARPOL 73/78, Annex I, IV, V.	Reduction of illegal discharges of ship-generated waste, including oily mixtures, noxious liquid substances, sewage, garbage and cargo residues into the Black Sea marine environment	3-10 years	Yes	Increased disposal and treatment of ship-generated wastes and cargo residues in full compliance with MARPOL 73/78 Management Plans for Ship Generated –	High / Medium/	Finan Low indus

				Waste and cargo residues published/ implemented in all BS Ports		Low decis
				Investments		
				Annual Report to the BSC on port's ship waste management		
				3 Years assessment report of the Black Sea State of Environment		
(61). Establish a harmonised fee/cost recovery system on ship-generated waste	Reduction of illegal discharges of ship-generated waste	1-3 years	Yes	Regionally harmonised cost recovery/fee system in place.	High / Medium	Polit

Surveillance/Monitoring

(62). Develop systems for the identification of illegal pollution sources from vessels and off-shore installations	Reduced illicit chemical and solid waste discharges		Yes, a change in policy at least	VTOPIS or equivalent systems implemented and operational in all Black Sea countries to support national Governments in surveillance of vessels traffic and in reducing/eliminating the pollution originating from vessels, including off-shore installations	Medium	Finar Link moni locat the i
				System operational		Uncl view
Mid-term target System for monitoring oil pollution		5-10 years for oil pollution		System operational		May ident exper
Long-term target System for monitoring solid waste disposal		10+ years for solid waste				

Economic mechanisms/instruments

(63).. Develop/establish a harmonised enforcement system in cases of illegal discharges from vessels and off-shore installations, including technical means and fines	Infringement of discharge regulations as well as aiding, abetting or inciting an illegal discharge is punishable	3-5 years	Yes	A harmonised system of penalties established and enforced Effective, proportionate and dissuasive	High / Medium	Polit Finar Limit

	mech				
					Inter-
(64). Develop a common system for claims management for pollution damages compensation	Common and effective policy on claims management	1-3 years	Yes Ukraine - CLC 92 Protocol	Common procedures and panel of experts, databases, etc.	Medium
					Polit
					Inter-
(65). Assess the need to develop a legal framework for assessment of the transportation of hazardous wastes in line with Basel Convention	Regional Studies of the movement of Transboundary hazardous waste. Decision on the necessity of development of the Protocol on Hazardous Waste.	3-6 years	Yes, a change in policy at least		Medium / High
					Inter-
					Polit

Appendix II. Monitoring the SAP: Process, Stress Reduction and Environmental Status Indicators from Black Sea Strategic Action Plan (Annex 4)

Monitoring and Evaluation (M&E) indicators are tools to monitor and verify SAP implementation. Therefore, it is necessary to elaborate an indicator set that will measure progress towards the successful outcome of the EcoQOs and the short and long term management targets. GEF establishes three types of indicators: a) process indicators, b) stress reduction indicators and c) environmental status indicators:

a) **Process Indicators** focus on the processes *or outputs* that are likely to lead towards a desirable outcome. They demonstrate actual on-the-ground institutional, political, legislative and regulatory progress in resolving the transboundary problems in the Black Sea. They should assist in tracking the institutional, policy, legislative and regulatory reforms necessary to bring about change.

b) **Stress reduction indicators** relate to project objectives or *outcomes*. In particular, they focus on concrete actions that reduce environmental stress. Stress reduction indicators indicate the rate of success of specific on-the-ground actions implemented by the collaborating Black Sea countries. Often a combination of stress reduction indicators in several nations will be needed to produce detectable changes in transboundary waters.

c) **Environmental state indicators** are *goal orientated* and focus on actual improvements of ecosystem quality that usually extends beyond the lifetime of the project. They are measures of actual success in restoring or protecting the targeted waterbody. It can take a number of years before sufficient stress reduction measures are implemented in a sufficient number of countries to detect an environmental state change in the transboundary water environment.

In order to accurately measure environmental state indicators, the collaborating Black Sea countries will need to fully harmonise their sampling/laboratory/analysis methods so that they all agree on what water quality, quantity, or ecosystem parameters that should be sampled to track progress toward a goal.

A detailed set of management targets and indicators are presented in the EcoQOs (Annex 1) that give the short, medium and long-term perspective on the actions needed. A set of *preliminary* M&E indicators to measure the success of Strategic Actions Plan implementation are proposed below.

Process Indicators

1. Adoption and implementation of the SAP by all countries
2. Agreed baseline for assessing indicators of SAP implementation
3. **EcoQO 1: Preserve commercial marine living resources**

    1. Adoption and implementation of a Regional Agreement on Fishery Management
    2. Agreed stock assessment methodology for all demersal fish, anchovy and sprat
    3. Establishment of regionally agreed minimum permitted length of commercial fish and minimum mesh size for target species

4. Development and adoption (by BSC) of detailed methodology for determining the ecological parameters for fish condition

4. **EcoQO 2: Conservation of Black Sea Biodiversity and Habitats**

    1. Official recognition by the BSC and all national governments of the Black Sea Red Data book
    2. ICZM Guidelines developed and supported by regional ICZM Declaration
    3. Increasing number of policies or legislative acts reflecting ICZM principles
    4. Development of an inventory, classification and mapping system for BS habitats
    5. Level of harmonization with provisions of the BWM Convention

5. **EcoQO 3: Reduce eutrophication**

    1. Adoption of LBSA Protocol
    2. Agreed standards for N/P for all WWTWs >100,000 p.e.
    3. Lists of emissions developed
    4. Revised list of hot-spots developed
    5. Agreed monitoring procedures and detailed environmental status indicators
    6. Agreed monitoring locations

6. **EcoQO 4: Ensure Good Water Quality for Human Health, Recreational Use and Aquatic Biota**

    1. Adoption of LBSA protocol
    2. Harmonisation of environmental water quality standards across region
    3. Agreed monitoring procedures
    4. Agreed list of BS-specific priority pollutants
    5. Renegotiation (if necessary) and adoption of the BS Contingency Plan by Georgia, Russia and Ukraine

Stress Reduction Indicators

1. **EcoQO 1: Preserve commercial marine living resources.**

1. Closed fishing seasons established
2. Number and area of no-fishing areas developed
3. Ban on unsustainable fishing practices in place

2. **EcoQO 2: Conservation of Black Sea Biodiversity and Habitats**

1. Number and total area of Protected Areas
2. Surface area of buffer zones
3. Number of EA/EIA/SEA procedures used
4. Number and area of illegal dumping sites cleaned-up
5. Number of new projects to install solid waste handling facilities

3. **EcoQO 3: Reduce eutrophication**

1. Lists of WWTWs (municipal and industrial) for upgrading with financing

2. % of P-free detergents sold in BS countries
3. Prosecution numbers of dischargers failing standards
4. Investments in agricultural facilities to reduce N/P pollution
5. Funds available for economic incentives in agriculture
6. Area of land under modified farming practices
7. Number of (and investment in) farm demonstration projects

4. **EcoQO 4: Ensure Good Water Quality for Human Health, Recreational Use and Aquatic Biota**

1. Number of permits / licences granted and inspections undertaken
2. % increases in state budget for pollution prevention
3. Number of installations using BAT
4. Number of permits for dredging disposal
5. Increases in treatment of ship-generated wastes
6. Investments in ship waste handling facilities
7. Harmonised cost recovery / fee system in place for ship-generated waste

Environmental Status Indicators

1. Measurable improvements in trophic status
2. Improved (measurable) ecological or biological indices
3. Improved recruitment classes of targeted fish species/diversity/keystone species
4. Increase in the availability of fishing resources
5. Changes in local community income/social conditions as a result of improvements in environmental conditions
6. Stakeholder awareness raised and involvement documented.
7. Reduction of pollutant concentrations in coastal areas and port zone (heavy metals, persistent organic compounds concentrations, etc.)
8. Relevant coastal habitats rehabilitated
9. Reduced number of threatened species