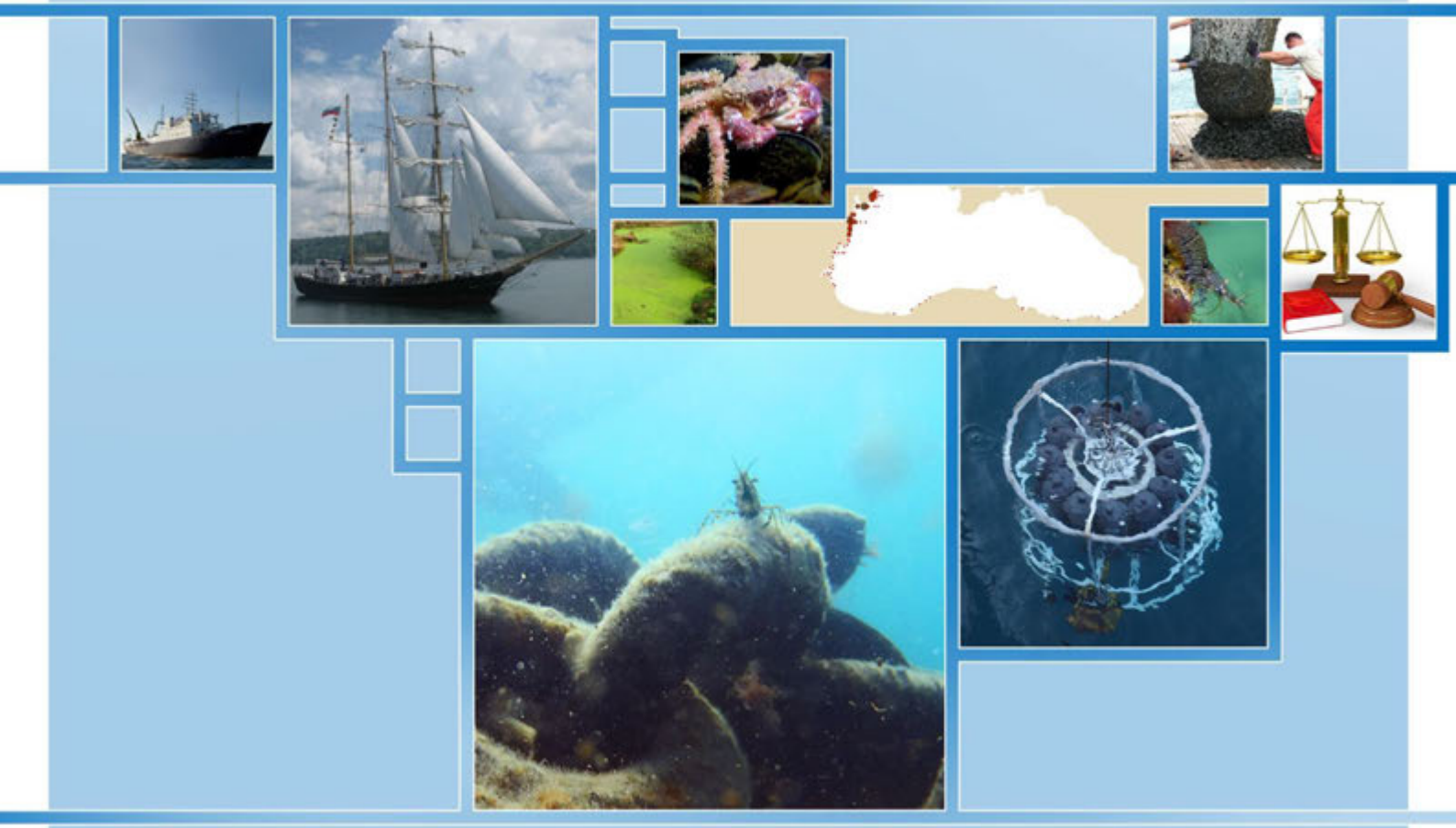
Diagnostic report II

Guiding improvements in the Black Sea integrated monitoring system, data management, and assessments



Diagnostic Report II

Guiding improvements in the Black Sea integrated monitoring system (including capacity building and utilization of equipment), data management, and assessments

www.misisproject.eu

EC DG Env. Project MISIS
No. 07.020400/2012/616044/SUB/D2

This document has been prepared with the financial assistance of EC DG Environment. The views expressed herein can in no way be taken to reflect the official opinion of EC DG Environment. The opinions expressed are those of the authors. Any errors or omissions are responsibility of the authors and should be reported to them accordingly.

Contact details for sending comments on the Report:
lboicenco@alpha.rmri.ro
colpan.beken@mam.gov.tr
velikova_violeta@yahoo.com

For bibliographic purposes this document may be cited as:

Velikova V., Boicenco L., Beken-Polat C., Moncheva S., Levent B., Sezgin M., Begun T., Oros A. 2013. "Diagnostic Report II guiding improvements in the Black Sea monitoring system". EC DG Env. MISIS Project, Ed. ExPonto, 295pp, ISBN 978-606-598-364-9

Information included in this publication or extracts thereof are free for citing on the condition that the complete reference of the publication is given as stated above.
Design and layout: Tudor Fulga
Number of pages: 594
ISBN 978-606-598-364-9

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the authors, provided acknowledgement of the source is made.The authors would appreciate receiving a copy of any publication that uses this report as a source of information.

Acknowledgements

The authors thank Ms Eva Gelabert from EEA who made the Diagnostic Report I (http://www.blacksea-commission.org/_publ-BSDiagnosticReport2010-Acknowledgements.asp) possible and lead them into the temptation to continue working so that to further generate activities, such as the MISIS Project, which would bring to an improved performance of the Black Sea region in environment protection, providing support to the ecosystem-based management of the Black Sea, observing also the needs of the people depending on this Sea's services and goods.

Great thanks to all stakeholders who worked with the MISIS Questionnaires and provided information for this report. Their names have not been mentioned in the filled Questionnaires (only the names of organizations' directors or other persons authorised to represent the organization), however, we should like to acknowledge their support and thank for the time spent to help the MISIS Project.

CONTENTS

List of figures

List of tables

ABBREVIATIONS

and acronyms

Note: The report uses abbreviations of different EC DG.
Research projects, full names of these are provided in Table 70, p. 127.

ACCOBAMS	Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic Area, http://www.accobams.org/
ARGO	The broad-scale global array of temperature/salinity profiling floats (http://www.argo.net/)
BAS	Bulgarian Academy of Science
BG	Bulgaria
BS	Black Sea
BSC	Black Sea Commission (Commission on the Protection of the Black Sea Against Pollution), www.blacksea-commission.org
Black Sea ERA-NET	Networking on Science and Technology in the Black Sea Region, http://www.bs-era.net
BlackSeaGOOS	Global Ocean Observing System (Black Sea), http://www.ims.metu.edu.tr/Black_Sea_GOOS/
BSIMAP	Black Sea Integrated Monitoring and Assessment Program
BSIS	Black Sea Information System
BS SAP	Black Sea Strategic Action Plan
CBD	Conservation of Biological Diversity
CIESM	The Mediterranean Science Commission, http://www.ciesm.org/
EBRD	European Bank for Reconstruction and Development, http://www.ebrd.com
EC	European Commission, http://ec.europa.eu/
ECBSea	Environmental Collaboration for the Black Sea (Project of EC DG Devco), http://81.8.63.74/ecbsea/en/documents/relevant/index.htm
EcoQOs	Ecosystem Quality Objectives
EEA	European Environment Agency
EIA	Environmental Impact Assessment
EMODNET	European Marine Observation and Data Network (Project of EC DG MARE)
EPA	Environmental Protection Agency
ERA-NET	European Research Area Network
EU	European Union
EU FP	European Union Framework Programmes, http://cordis.europa.eu/fp7/home_en.html
EuroARGO	European Contribution to ARGO Programme, http://www.euro-argo.eu/
EuroGOOS	European Global Ocean Observing System, http://www.eurogoos.org/
EUROPEAID	Development and Cooperation Directorate General of the European Commission, http://ec.europa.eu/europeaid/index_en.htm
GEF	Global Environment Facilities
GeoEcoMar	National Research and Development Institute for Marine Geology and Geoecology, Constanta, Romania
GES	Good Environment Status
GIS	Geographic Information System
GMES	Global Monitoring for Environment and Security, http://www.gmes.info/
GOOS	Global Ocean Observing System, http://www.ioc-goos.org/
IAEA	International Atomic Energy Agency, http://www.iaea.org/
IBER-BAS	Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Science
ICPDR	Convention on the Protection of the Danube River, www.icpdr.org/
IFR	Institute of Fishing Resources, Varna, Bulgaria
IMO	International Maritime Organization
IMS/METU	Institute for Marine Sciences/Middle East Technical University (Erdemli, TR)
IOC	Intergovernmental Oceanographic Commission, www.ioc-unesco.org/

IO-BAS	Institute of Oceanology - BAS, Varna, Bulgaria
IODE	International Oceanographic Data And İnformation Exchange, www.iode.org/
ISO	International Organization for Standardization, http://www.iso.org
LBS	Land Based Sources (of pollution)
MISIS Project	EC DG Env. Project "MSFD Guiding improvements in the Black Sea integrated monitoring system"
ML	Marine Litter
MONINFO	Monitoring And Information System For Reducing Oil Pollution İn The Black Sea (Project of EC DG Env.)
MSFD	Marine Strategy Framework Directive
NAFA	National Agency for Fishery and Aquaculture
NATO	North Atlantic Treaty Organization, www.nato.int/
NIMRD	National Institute for Marine Research and Development, Constanta, Romania
NODC	National Oceanographic Data Center
OSCE	Organization for Security and Co-operation in Europe, www.osce.org/
PA	Project Activity
PDF	Project Development Fund
PM	Particulate matter
QA	Quality assurance
QC	Quality control
SASEPOL	Development of Security Management and Maritime Safety and Ship Pollution Prevention for the Black Sea and Caspian Sea (Project of DG DEVCO, EuropAid, www.sasepol.eu)
SIDA	Swedish International Development Cooperation Agency, www.sida.se/
RO	Romania
SRA	Strategic Research Agenda
TDA	Transboundary Diagnostic Analysis
TPH	Total petroleum hydrocarbon
TR	Turkey
TUBITAK	The Scientific and Technological Research Council of Turkey, *www.tubitak.gov.tr/*
UN	United Nations
UNDP	United Nations Development Program
UNEP	United Nation Environment Programme
VTMS	Vessel Traffic Monitoring System
WB	World Bank
WFD	Water Framework Directive

Partner Institutions of MISIS:

- NIMRD, Constanta, Romania (Coordinator)
- GeoEcoMar, Constanta, Romania
- Ovidius University, Constanta, Romania
- IO-BAS, Varna, Bulgaria
- Sinop University, Sinop, Turkey
- TUBITAK – the Marmara Research Center, Istanbul, Turkey (MRC/TUBITAK, Istanbul, Turkey, sub-contractor to the Sinop University)

Executive Summary

This Report has been prepared as part of the MISIS Project 'MSFD Guiding Improvements in the Black Sea Integrated Monitoring System (EC DG Env. Project MISIS: No. www.misisproject.eu, EC DG Env. Project MISIS: No. 07.020400/2012/616044/SUB/D2). The Report is shortly named Diagnostic II, because it builds on the findings of the EEA/BSC Diagnostic Report (Diagnostic I) upgrading it for Bulgaria, Romania and Turkey to include more information on their national monitoring programmes (or any other Black Sea-related observations), national data/information management tools (which were not part of the BSC Diagnostic Report), operational monitoring, etc. The Report utilizes also the findings of the EC SeasEraNet Project on laboratory infrastructure, equipment and vessels available with the aim to contribute to more efficient use of them in the Black Sea region.

The review includes information on the policy/legal frameworks of monitoring, types of implemented monitoring, status of operational monitoring, parameters measured, monitoring networks available, data management specifics, progress in water/ecological quality/GES classifications, research infrastructure/equipment/vessels available, trainings and harmonization process identified, etc.

The report is designed to guide a revision of national monitoring programs and improvements in data reporting and DPSIRR assessments in the MISIS beneficiary countries (Bulgaria, Romania and Turkey) based on the review of information provided by many different stakeholders. It contains 110 tables and 34 figures to present the information collected in the easiest way to digest it. The report presents detail analysis of the data/information availability in BG, RO and TR, following specifically Annex I and III of the MSFD.

Information on many different projects (past and on-going) in the Black Sea is included, with more detail notes on those which had or have monitoring component and also produced data bases.

The information mining disclosed major deficiencies in the provisions for indicator-based reporting in line with the DPSIRR model, hence, with the MSFD requirements, they are presented in detail for each beneficiary country. The gaps are at all levels – monitoring, data management, methodologies for assessments, etc. Where possible, the reasons for those deficiencies are discussed.

Each Sub-chapter is supplemented with conclusions and in the end of the Report all findings are summarised and recommendations are given. The recommendations produced take into consideration the requirements of the MSFD to provide for knowledge-based decision-making and the needs of the stakeholders contacted in strengthening of institutional frameworks, harmonisations and capacity building.

INTRODUCTION

This Report has been prepared as part of the MISIS Project 'MSFD Guiding Improvements in the Black Sea Integrated Monitoring System (www.misisproject.eu, EC DG Env. Project MISIS: No. 07.020400/2012/616044/SUB/D2). The Project is financed by EC as an activity under the EC DG Env. Programme 'Preparatory action – Environmental monitoring of the Black Sea Basin and a common European framework programme for development of the Black Sea region/Black Sea and Mediterranean 2011'. MISIS is an integral part of the overall ongoing process of harmonization of policies in the Black Sea region in the field of environment protection, taking into consideration relevant European acqua.

The overall objective of MISIS is to support efforts to protect and restore the environment quality and sustainability of the Black Sea. Additional specific objectives have been identified as follow:

- To improve the availability and quality of the chemical and biological data provided for integrated assessments of the Black Sea state of environment, including pressures and impacts (in line with Annex I and III of the MSFD);
- To increase the number and size of protected areas in the Black Sea as well as to increase their degree of protection;
- To enhance stakeholders' participation and public awareness on environmental issues.

MISIS involves three countries: Bulgaria, Romania and Turkey (Fig. 1), they are further named 'beneficiary countries'.

Figure 1. Location of the MISIS beneficiary countries (Bulgaria, Romania and Turkey) around the Black Sea.

The MSFD and MISIS

The Marine Strategy Framework Directive (MSFD) requires Member States to go through a number of key stages before the subsequent implementation of management measures to achieve Good Environmental Status (GES) of their seas. These key stages are:

1. Carry out an initial assessment of the current status of their seas and to determine specific characteristics of GES for their marine waters, setting out specific environmental targets and indicators to assist the process (based on the 11 Descriptors of GES given in the Directive) [1];
2. Put in place monitoring programmes to measure progress towards GES;
3. Implement management measures to achieve GES by 2020.

Each stage of the implementation process then has to be reviewed every 6 years and if necessary updated. The second stage is to be completed by 2014 and the MISIS project is designed to primarily provide support to revision of the existing monitoring systems so that to generate data and information for knowledge-based and ecosystem-based environmental protection.

A key requirement of the MSFD is that Member States work together to implement each stage of the Directive in a coherent and coordinated way, in order to ensure comparability across Europe. For the Black Sea, coordination between Romania and Bulgaria would not be sufficient to achieve GES. The regional cooperation includes non-Member States where the Black Sea Regional Sea Convention (the Bucharest Convention[2]) has been the key forum for coordination and harmonization processes. Certain progress has been made by the Black Sea Commission (BSC)[3], however, further efforts to improve coordination between EU-member and non-member states are required[4]. MISIS contributes to the latter, having Turkey as a beneficiary country of the project results and working closely with partner-institutions from Turkey which are leaders in the workpackage dealing with the revision of monitoring programmes (Project Activity (PA) I: **Contribution to development of national integrated monitoring programmes compliant with the MSFD and the WFD allowing also compliance of beneficiary countries with other international obligations, in particular implementation of the Bucharest Convention and its Protocols.**

In 2010 the BSC implemented a small-scale project financed by the European Environment Agency (EEA) to guide improvements to the regular reporting process on the state of the Black Sea environment. The deliverable of this project was shortly named 'The Diagnostic Report' (http://www.blacksea-commission.org/_publ-BSDiagnosticReport2010.asp). This report evaluated mainly the suitability of Black Sea data to apply/calculate EEA and BSC indicators, revealing also associated major gaps in BSIMAP (Black Sea Integrated Monitoring and Assessments Program) and BSIS (Black Sea Information System), with a forward-looking component related to the MSFD Descriptors included. MISIS planned to further develop the EEA/BSC Diagnostic Report, analysing in further detail the monitoring systems and data availability in Bulgaria, Romania and Turkey taking into consideration the requirements of the MSFD and WFD.

In 2011-2012, the EC Seas-EraNet Project produced a Black Sea Strategic Research Agenda (BS SRA, http://www.seas-era.eu/np4/%7B$clientServletPath%7D/?newsId=162&fileName=SEAS_ERA_BS_SRA_Final.pdf), which stated: 'The analysis of identified datasets and BS monitoring/observation systems revealed gaps in regularity and coverage in the national monitoring systems, and non-compliance with commitments in terms of reporting, problems with data accessibility, compatibility and suitability to produce indicators. Further analysis of the accessibility of data and relevance of monitoring systems,

[1] This stage had to be completed by July 2012, certain delays are encountered, especially in Bulgaria.
[2] Convention on the Protection of the Black Sea Against Pollution.
[3] Commission on the Protection of the Black Sea Against Pollution.
[4] The MSFD has been introduced to non-member states under the MSFD project of the BSC (Grant Agreement No 21.0401/2008/517948/SUB/D2 "Support to the Black Sea Commission for the Implementation of the Marine Strategy"), which aims at achieving of common understanding of GES in the Black Sea region, further development of BSIMAP, improvement of assessments of pressures, state and impacts, etc.

availability of data management tools and their products usage at the level of decision-making, capacities and potential for change is required to recommend improvements. Beyond the need for improvement of the monitoring and data management system in support to the regional and EU Policies; specifically the MSFD, environmental targets and GES indicators, taking into consideration Annex I and III of the MSFD, as well as the corresponding criteria and methodological standards are to be developed for the Black Sea'.

Thereafter, this report, named Diagnostic Report II, is designed to guide a revision of national monitoring programs and improvements in data reporting and DPSIRR assessments in the MISIS beneficiary countries (Bulgaria, Romania and Turkey) based on the review of:

- National monitoring systems and data/information management tools for assessing data obtained from monitoring activities with particular focus on biological quality/biodiversity components in marine environment monitoring (Ref: MSFD, Annex I and III)
- Data availability, analysis of the gaps in the initial assessments, including pressures (based on compliance monitoring of municipal and industrial sources, rivers, atmospheric pollution),

This Report utilises the findings of the EEA/BSC Diagnostic Report upgrading it for Bulgaria, Romania and Turkey to include more information on their national monitoring programmes (or any other Black Sea-related observations), national data/information management tools (which were not part of the BSC Diagnostic Report), operational monitoring, etc. The review includes information on the policy/legal framework of monitoring, types of implemented monitoring, status of operational monitoring, parameters measured, monitoring networks available, data management specifics, progress in water/ecological quality/GES classifications, research infrastructure/equipment/vessels available, trainings and harmonization process identified, etc. The recommendations produced take into consideration the needs in capacity building/training, in harmonization and the needs and obligations in reporting of different stakeholders.

The Report utilizes also the findings of the EC SeasEra Project:
http://www.seas-era.eu/np4/homepage.html
on laboratory infrastructure, equipment and vessels available contributing to their more efficient use in the Black Sea region.

A special Questionnaire (English version, Annex I) has been developed covering the numerous issues reflected in this report and the stakeholders have been inventoried (Annex II). The stakeholders were identified based on the following criteria:

- Participating in environment protection (research and management);
- Managing Monitoring Programmes;
- Implementing Monitoring Programmes and projects with a monitoring component;
- Collecting and/or managing data (sensu Annex I and III of the MSFD);
- End-users of environment data/information.

The Questionnaire has been translated into the national languages of the beneficiary countries and distributed to some of the stakeholders and their response has been also evaluated (Tables 1, 2, 3)[5]. In general, the response was insufficiently comprehensive, additional materials[6] have been reviewed to compliment the information provided by the quest so that to meet the objectives of this report.

[5] The Tables reflect the responses to Part I of the Questionnaire, which deals with monitoring and data management. Part II is about data availability, needs in harmonization and training, reflected in Chapters IV-VII of the Report.
[6] Sources for additional information:
National Gap Analysis Reports of Bulgaria, Romania and Turkey on the implementation of the BS SAP1996 (BSC Archive).
BS SAP Implementation Report, BSC publications, http://www.blacksea-commission.org/_publ-BSSAPIMPL2009.asp
BSC Advisory Groups Annual Reports for the period 2006-2011 (BSC Archive).
Project Reports (EuroArgo, MONINFO, Baltic2Black, etc.).
Webpages of various projects (see Table 60 on p. 105).
Webpages of Ministries and organizations participating in BS-related monitoring.

BULGARIA

In total 8 organizations responded among the 39 stakeholders identified in Bulgaria (Annex II). Table 1 reflects the level of response to the Part I of the Questionnaire, which dealt with monitoring and data management.

Table 1. Information on the response to the MISIS Questionnaire Part I on monitoring and data management in Bulgaria

	Type of organization	Replied/Not replied/ Partially replied: **R / NR / PR**									
		Part I.I (General info)	**Part I.II (Monitoring)**					**Part I.III (Data management)**			
			Legal/policy instruments	Type of monitoring	QA/QC	Reporting	Projects	Data bases	Data products	QA/ QC	Assessments
1	**Municipality**										
2	**NGO**										
	Black Sea NGO Network	R	PR	NR	NR	NR	NR	R	NR	NR	NR
3	**University**										
4	**Public Institute**										
	Institute of Fishing Resources (IFR)	R	R	R	R	R	R	R	PR	PR	R
	Institute of Biodiversity and Ecosystem Research-BAS, Laboratory of Marine Ecology (IBER-BAS)	R	R	R	R	NR	NR	R	R	R	R
	Institute of Oceanology-BAS (IO-BAS)	R	R	R	R	R	R	R	R	NR	R
5	**Governmental Agencies**										
	NAFA (National Agency for Fishery and Aquaculture)	R	R	PR	NR	R	NR	NR	NR	NR	NR
6	**Ministries**										
	Ministry of Environment and Water	R	R	NR	NR	NR	NR	NR	NR	NR	NR

In Romania, 24 stakeholders have been contacted among the 41 identified (Annex II), the response to the Part I of the Questionnaire is presented in Table 2.

Table 2. Information on the response to the MISIS Questionnaire Part I on monitoring and data management in Romania

	Type of organization	Replied/Not replied/ Partially replied: **R / NR / PR**									
		Part I.I (General info)	**Part I.II (Monitoring)**					**Part I.III (Data management)**			
			Legal/policy instruments	Type of monitoring	QA/QC	Reporting	Projects	Data bases	Data products	QA/ QC	Assessments
1	**Municipality**										
	City Hall Constanta	R	NR	PR	NR	NR	NR	NR	NR	NR	NR
	AQUA SERV Tulcea (operating WWTP)	R	PR	R	R	R	R	R	R	R	NR
2	**NGO**										
	Mare Nostrum NGO	R	NR	R	NR	R	R	R	NR	NR	R
3	**University**										
4	**Public Institute**										
	County Department for Statistics Constanta	R	NR	NR	NR	NR	NR	NR	NR	NR	NR
	NIRD GeoEcoMar	R	R	R	R	R	R	R	R	R	R
	National Institute for Tourism Research	R	NR	NR	NR	NR	R	R	R	NR	NR
	NIMRD "Grigore Antipa"	R	R	R	R	R	R	R	R		R
5	**Governmental Agencies**										
	Directorate for Public Health Constanta	R	R	R	R	R	NR	R	NR	NR	R
	Directorate for Public Health Tulcea	R	PR	R	NR	R	R	R	NR	NR	R
	Environmental Protection Agency Constanta	R	R	R	R	R	R	R	NR	NR	R
	National Company Maritime Port Administration	PR	PR	R	NR	R	NR	NR	NR	NR	NR
	Environmental Protection Agency Tulcea	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	Romanian Spatial Agency	R	NR	NR	NR	NR	R	R	R	NR	NR

	Type of organization	Replied/Not replied/ Partially replied: **R / NR / PR**									
		Part I.I (General info)	**Part I.II (Monitoring)**					**Part I.III (Data management)**			
			Legal/policy instruments	Type of monitoring	QA/QC	Reporting	Projects	Data bases	Data products	QA/ QC	Assessments
	Water Administration Dobrogea Littoral	R	R	R	R	R	NR	R	R	NR	R
	Constanta Maritime Hydrographic Directorate	R	NR	R	NR	R	NR	R	NR	NR	NR
	Naval Academy	R	NR	NR	NR	NR	NR	NR	NR	NR	NR
6	**Ministries**										
	Ministry of Environment and Forestry	R	R	NR	NR	NR	NR	NR	NR	NR	NR
7	**Private companies**										
	Thermoelectric Factory Midia	R	NR	PR	NR	R	NR	NR	NR	NR	NR
	EXXON Exploration Co	R	R	R	R	R	R	R	R	R	R
	OMV Petrom SA - offshore oil and gas exploitation	R	R	R	R	R	NR	R	NR	NR	R

TURKEY

In Turkey 89 stakeholders have been identified (Annex II), and 23 of them have been contacted and they are those organizations which deal with the Black Sea monitoring and data collection/management. The rest of the organizations in the List of TR Stakeholders (Annex II) deal with environment protection and often with monitoring as well, however, their activities are related to other TR seas or inland fresh-waters. The response to the Part I of the Questionnaire is presented in the table below.

Table 3. Information on the response to the MISIS Questionnaire Part I on monitoring and data management in Turkey

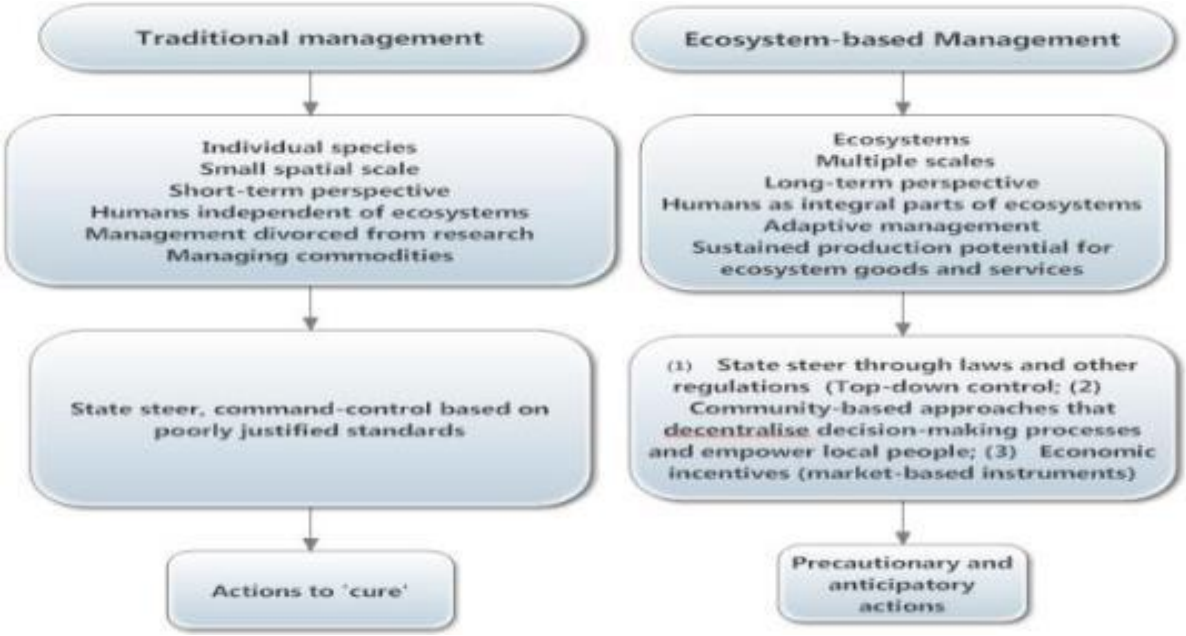
	Type of organization	Replied/Not replied/ Partially replied: **R / NR / PR**									
		Part I.I (General info)	**Part I.II (Monitoring)**					**Part I.III (Data management)**			
			Legal/policy instruments	Type of monitoring	QA/QC	Reporting	Projects	Data bases	Data products	QA/ QC	Assessments
1	**Municipality**										
	Zonguldak M.	R	NR	NR	NR	NR	NR	NR	NR	NR	NR
	Kastamonu M.	PR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2	**NGO**										
	Nature Conservation Center	R	R	NR	NR	NR	NR	NR	NR	NR	NR

	Type of organization	Replied/Not replied/ Partially replied: **R / NR / PR**									
		Part I.I (General info)	**Part I.II (Monitoring)**					**Part I.III (Data management)**			
			Legal/policy instruments	Type of monitoring	QA/QC	Reporting	Projects	Data bases	Data products	QA/ QC	Assessments
	Turkish Sturgeon Conservation Society	R	NR	NR	NR	NR	NR	NR	NR	NR	NR
	Turkish Marine Environment Protection Association (TURMEPA)	R	NR	NR	NR	NR	NR	NR	NR	NR	NR
3	**University**										
	Çanakkale Onsekiz Mart U. Fisheries Faculty	R	NR	NR	NR	NR	NR	NR	NR	NR	NR
	Çanakkale Onsekiz Mart U. Faculty of Marine Science and Technology	R	NR	NR	NR	NR	NR	NR	NR	NR	NR
	DEU- Ins. of Marine Scs. and Tech.	R	NR	R	R	R	R	NR	NR	NR	NR
	Ondokuz Mayıs U.	R	R	R	NR	R	NR	NR	NR	NR	NR
	Atatürk U.- Fisheries Faculty	R	NR	PR	NR	NR	NR	NR	NR	NR	NR
	Sinop University	R	NR	R	NR	R	NR	NR	NR	NR	NR
	Istanbul University Faculty of Marine Science and Management	R	NR	R	R	R	NR	R	NR	NR	NR
	Istanbul University Faculty of Fishery	R	NR	NR	NR	NR	NR	NR	NR	NR	NR
	Recep Tayyip Erdoğan University (Faculty of Fisheries)	R	NR	NR	NR	NR	NR	NR	NR	NR	NR
	METU-IMS	R	NR	R	R	R	R	R	NR	R	NR
	Karadeniz Technical University, Faculty of Marine Science	R	NR	R	NR	NR	R	NR	NR	NR	NR
4	**Public Institute**										
	Trabzon Central Fisheries Research Institute (SUMAE)[1]	R	R	R	R	R	R	NR	NR	NR	NR
	TÜBİTAK-MRC	R	NR	R	R	R	R	R	R	R	R
5	**Governmental Agencies**										

	Type of organization	Replied/Not replied/ Partially replied: **R / NR / PR**									
		Part I.I (General info)	**Part I.II (Monitoring)**					**Part I.III (Data management)**			
			Legal/policy instruments	Type of monitoring	QA/QC	Reporting	Projects	Data bases	Data products	QA/ QC	Assessments
6	**Ministries**										
	Ministry of Environment and Urbanization	R	R	R	R	R	NR	R	NR	R	NR
7	**Private companies**										
	DenAr Ocean Engineering Ltd. Co.	R	NR	NR	NR	NR	NR	NR	NR	NR	NR
	TUDAV	R	NR	NR	NR	NR	NR	NR	NR	NR	NR
8	**Private companies**										
	Doğu Karadeniz Regional Union of Fisheries Cooperatives	R	NR	NR	NR	NR	NR	NR	NR	NR	NR

I. MONITORING (routine and operational)

No proper management of environment protection is possible without a regular and integrated monitoring and without robust scientific understanding of pressures, state, impact and response of an ecosystem to the measures taken to prevent or mitigate undesirable change. Where there are gaps in monitoring, hence, in data, information and knowledge, there will be always gaps in environmental protection. Fortunately, this understanding in the Black Sea region has not been missing before, and the regular complex monitoring of the Sea dates back to the early 1950s (the history in Turkey only is shorter). However, the new environment management approaches, coming into life, such as the Integrated Coastal Zone Management, the Ecosystem-based[7] and Integrated River Basin Management generated inexperienced previously challenges for scientists and decision-makers. The ecosystem-based management is a serious paradigm shift (Lubchenco, 1994; Sherman and Duda, 1999[8]) as presented below in the sheme (major differences betwenn traditional and ecosystem-based management):



[7] The approach of ecosystem-based management (EBM) is not a very new idea. The concept for the marine realm has emerged in the late 1980s (UNEP/GPA2006) in response to increasing recognition of the declining state of fisheries, and ocean ecosystems, in general. However, the EBM historical development can be traced back to the 1930's in relation to terrestrial ecosystems. During this time, the scientific communities who studied ecology realized that current approaches to the management of national parks did not provide effective protection of the species within. In 1932, The Ecological Society of America's Committee for the Study of Plant and Animal Communities recognized that US national parks needed to protect all the ecosystems contained within the park in order to create an inclusive and fully functioning sanctuary, and be prepared to handle natural fluctuations in its ecology. Also the committee explained the importance for interagency cooperation and improved public education, as well as challenged the idea that proper park management would "improve" nature (Grumbine 1994). These ideas became the foundation of the modern ecosystem-based management.

[8] References cited:

Grumbine, R.E. 1994. What is Ecosystem Management? Conservation Biology. 8:27-38.

Lubchenco, J. 1994. The Scientific Basis of Ecosystem Management: Framing the Context, Language and Goals. Pages 33-39 In: Committee on Environment and Public Works, United States Senate, *Ecosystem Management: Status and Potential.* Proceedings of a Workshop by the Congressional Research Service, March 24-25, 1994. 103rd Congress, 2nd Session. United States Government Printing Office, Washington dc

Sherman, K. and A.M. Duda.1999. An Ecosystem Approach to Global Assessment and Management of Coastal Waters. Marine Ecology Progress Series, Vol. 190:271-287 www.int-res.com/jounals/meps

Ecosystem-based management is concerned with the processes of change within living systems, and with sustaining the goods and services that healthy ecosystems produce, adopting management frameworks that minimize impacts to marine environments while allowing for sustainable development, an integrated approach that recognizes humans are part of and have significant influences on their environments. Ecosystem-based management is therefore designed and executed as an adaptive, lessons-learnt process that applies science-based decision-making. And logically, it requires changes in the existing old-fashioned monitoring programmes/systems which have been intended to meet the needs of the traditional management.

In this relation, the MSFD stipulates in its Art. 11.1 on Monitoring Programmes:

1. On the basis of the initial assessment made pursuant to Article 8(1), Member States shall establish and implement coordinated monitoring programmes for the ongoing assessment of the environmental status of their marine waters on the basis of the indicative lists of elements set out in Annex III and the list set out in Annex V, and by reference to the environmental targets established pursuant to Article 10.

The sustainability of each monitoring program (existing or deemed for upgrade) lies in the acting legal/policy framework of the country implementing it (and of course in its enforcement). Further in this chapter the Report gives information on the monitoring-related legal/policy documents developed at different levels and enacted in the beneficiary countries. Bulgaria and Romania are EU Member States and apart from their national legislation the European legislation is mandatory for implementation. Turkey is in a different position, developing extensively during the last decades its own legislation so that to utilize best available practices. There are also a large number of global and regional agreements which shape various kinds of monitoring activities required to enforce compliance.

1. Legislation/Policy (national and international instruments), achievements and gaps

This sub-chapter deals with the achievements and weakness observed in the legislative and regulatory provisions governing inter alia the marine and other sea-related monitoring activities (e.g. pressures) in the beneficiary countries versus the requirements of the MSFD. The MSFD stipulates:

The legislative framework should provide an overall framework for action and enable the action taken to be coordinated, consistent and properly integrated with action under other Community legislation and international agreements.

For Turkey the main question was whether the acting policy/legislation allows for a coordinated and harmonized with Bulgaria and Romania environmental protection, specifically in the field of monitoring activities.

The international (global) level legislation enforced in the beneficiary countries is presented in Table 4. The level of implementation of the listed legal documents is far beyond the scope of this report, general remarks are made where possible. Among 16 important UN (United Nations) and IMO (International Maritime Organization) international agreements, seven have not been ratified by Turkey, and one, namely the Ballast Water Management Convention 2004, is not ratified by any of the beneficiary countries, though preparations are in place in all of them. Besides, the TDA 2007 report (http://www.blacksea-commission.org/_publications-GEF.asp) and last BS SoE (for 2001-2006/7, http://www.blacksea-commission.org/_publ-SOE2009.asp) have recognized the invasion of alien species as one of the priority transboundary environmental problems in the Black Sea, with negative consequences for human activities and economic interests, still awaiting its proper decision-making and management. The number of registered alien species in the Black Sea region amounts to 244, as 56 of them were registered between 1996 and 2010[9].

Table 4. Inventory of major monitoring-related legal/policy documents (international level)

N	Legislation/policy	Bulgaria	Romania	Turkey
		Date of ratification		
1.	International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)	19.05.2005	18.03.1993	10.10.1990
2.	Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention)	24.02.2006	27.01.2000	No
3.	OPRC (Oil spill preparedness and response) 1990 (https://imo.amsa.gov.au/public/circular-titles/oprc.html)	12.03.2002	03.10.2000	18.09.2003
4.	Convention on Environmental Impact Assessment in a Transboundary Context (Espoo C.)	12.05.1995	29.03.2001	No
5.	UN Convention on Biological Diversity (CBD)	29.02.1996	17.08.1994	14.02.1997
6.	UN Convention on Wetlands of International Importance especially as Waterfowl Habitat-RAMSAR	24.01.1976	21.09.1971	13.11.1994
7.	Convention on the Conservation of European Wildlife and Natural Habitats, Bern Convention	01.05.1991	01.09.1993	09.01.1984
8.	Convention on Migratory Species - Bonn Convention	01.09.1999	01.07.1998	No
9.	UN Convention on International Trade of Endangered Species-CITES	16.04.1991	16.11.1994	22.12.1996
10.	UNCLOS - The 1982 United Nations Convention on the Law of the Sea	15.05.1996	17.12.1996	No
11.	Ballast Water Management Convention, 2004	No	No	No
12.	Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention)[10]	25.06.1998	11.07.2000	No
13.	Framework Climate Change Convention (FCCC)	12.05.1995	08.06.1995	24.02.2004
14	Kyoto Protocol (to the FCCC)	15.08.2002	19.03.2001	26.08.2009 [11]
15.	UN Convention on Long-Range Transboundary Air Pollution	19.02.1981		18.04.1983
16.	Stockholm Convention on POPs	20.12.2004	28.10.2004	14.10.2009

[9] The List of Black Sea non-native species is under revision, it has been finalised for fishes (http://documents.blacksea-commission.org/Downloads/BlackSea-Non_Native_Species_List.pdf), for phytoplankton and zooplankton the drafts are quite advanced, benthic species are not yet attended.

[10] The Convention has no direct relation to monitoring, but regulates the rights of public to access the data/information related to environmental matters. TR is not party to it, however, in Turkey, the Law on the Right to Access to Information came into force in 2003 and the By-law was published in 2004 which determined the frameworks of providing information to the public. Based on this law, necessary amendments were made in the Environmental Law.

[11] Turkey became party to the Kyoto Protocol on 26 August 2009, after the deposit of instrument of accession to the United Nations following the adoption of the Law (No. 5836) approving Turkey's accession to the Kyoto Protocol to the United Nations Framework Convention on Climate Change by the Turkish Grand National Assembly on 5 February 2009 and adoption by the Council of Ministers of the Cabinet Decree (No. 2009/14979) on 13 May 2009.

EUROPEAN

Apart from the MSFD, for eutrophication, contaminants and contaminants in seafood the existing EU legislation is the WFD, the Nitrates Directive, the Urban Waste Water Treatment Directive, the revised Bathing Water Directive and the Hazardous Substances Directive. Habitats are covered by the Habitat and Bird Directives anf NATURE2000. Fishery's management is covered by the Common Fishery Policy (CFP).

Table 5. List of monitoring-related legislation/policy of the European level and its transposition into the national legislation of Bulgaria and Romania

N	Title of Convention, Directive or Agreement	Date of enforcement	Transposed to the national legislation	
			Bulgaria	Romania
1.	Euratom treaty art. 35, art. 36, art 30, art.31	25.03.1957		Law 111 /1996 republished in 2006
2.	COUNCIL DIRECTIVE 76/160/EC OF 8 DECEMBER 1975 concerning the quality of bathing water		08/03/2002 /in Ordinance N 11 for the quality of bathing water/	GD No 459/2002 for the approval of quality norms for bathing waters GD No 88/2004 approving the Norms for surveillance, sanitary inspection and control of the natural areas for bathing
3.	Directive 2006/7/EC of the European Parliament and the Council from15 February 2006 regarding the management of bathing water quality and repealing the Directive 76/160/EEC	15.02.2006	10/06/2008 /in ordinance N 5 for management of bathing water quality/	GD No 546/2008 concerning the management of bathing water quality
4.	Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (Water Framework Directive)		22/12/2003 /in the Bulgarian Water Act/ 08/05/2007 /in ordinance N 13 for characterization of surface water/ 05/06/207 /in ordinance N 5 for water monitoring, currently replaced by ordinance N 1 for water monitoring /	Law No 310/2004 amending Law No 107/1996 (WaterLaw)
5.	DIRECTIVE 2008/56/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)	17.06.2008	30/11/2010 /in ordinance for protection of the environment in marine water/	Emergency Government Ordinance (EGO) no. 71 of 30 June 2010 establishing marine strategy
6.	COUNCIL DIRECTIVE 91/676/EC OF 12 DECEMBER 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (Nitrates Directive)		16/10/2000 /in ordinance N 2 for protection of water from pollution from agricultural sources/	
7.	COUNCIL DIRECTIVE 2009/90/EC on the technical specification of chemical analysis and monitoring of water quality		Ordinance 1/2011 on monitoring, Chapter III (art. 84 - 86).	
8.	Common Fishery Policy (COUNCIL REGULATION (EC) No 199/2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy)	25.02.2008		

N	Title of Convention, Directive or Agreement	Date of enforcement	Transposed to the national legislation	
9.	COMMISSION DIRECTIVE 2009/90/EC of 31 July 2009 laying down, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, technical specifications for chemical analysis and monitoring of water status	31.07.2009	21/08/2011	
10.	DIRECTIVE 2008/105/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 (Priority substances) on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EC, 83/513/EC, 84/156/EC, 84/491/EC, 86/280/EC and amending Directive 2000/60/EC of the European Parliament and of the Council	16.08.2008	13/07/2010 Or N:256/01 November 2010 (State gazette 88 publ. on 9 Nov. 2010)	
11.	DIRECTIVE 2007/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2007on the assessment and management of flood risks	23.10.2007	26/11/2009 /date of transposition in Bulgarian water act/	
12.	DIRECTIVE 2006/113/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 (Directive for the valorisation of shellfish areas (2006/113/CE)) on the quality required of shellfish waters (codified version) /COUNCIL DIRECTIVE of 30 October 1979 on the quality required of shellfish waters (79/923/EEC)	30.10.1979 / 12.12.2006	20.10.2000 /date of transposition in Bulgarian ordinance N 4 for quality of water intended for fisheries and shellfish breeding/	
13.	Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 establishing the list of priority substances in the field of water policy and amending Directive 2000/60/EC		22/12/2003 /in the Bulgarian Water Act/ 08/05/2007 /in ordinance N 13 for characterization of surface water/ 05/06/2007 /in ordinance N 5 for water monitoring, currently replaced by ordinance N 1 for water monitoring / 09/11/2010 /in ordinance for ecological quality standards for priority and some other pollutants/ 05/06/2007 /in Ministerial ordinance N 321 for establishment of priority and priority dangerous substances in water area/	
14.	Council Directive 92/43/EC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora /Habitat Directive/	21.05.1992	09.08.2002 /in Biodiversity Protection Act	
	Council Directive 2001/81/EEC			

Turkey and EU legislation

The EU Integrated Environmental Approximation Strategy (2006) of Turkey for the period 2007-2023 sets the goals for harmonization of the national legislation with EU environmental acqua[12].
In Turkey, in the field of water quality management new legal instruments have been recently developed taking into consideration the "acquis communautaire":

- By-law on the urban waste water treatment (08.01.2006) aiming to protect the environment from the adverse effects of urban wastewater collection, treatment, and discharge wastewater from certain industrial sectors;
- By-law on Water Pollution Control (31.12.2004);
- By-law on protection of the waters against the nitrates originating from the agricultural sources (18.02.2004);
- By-law on the quality of water intended for human consumption (17.02. 2005);
- By-law on pollution caused by certain dangerous substances discharged into the aquatic environment (26.11.2005);
- By-law on the Quality of the Bathing Water (09.01.2006);
- Water pollution control Regulation (31.12.2004/modified 13.02.2008)
- Sensitive and Less Sensitive Water Areas Communique Concerning urban Wastewater Treatment Regulation (27.06.2009)

Note: see further Table 9.

Thus, the TR legislation on the control of water pollution was amended so as to regulate permit procedures. A regulation on environmental permits and licences (2009) was adopted to enhance the environmental inspectorates. However, there is no national environment agency. Environmental protection requirements are not yet fully taken into account in the framing of policies of other sectors (tourism, industry, agriculture, etc.).

A number of river basin protection action plans have been drafted, which will eventually be converted into integrated river basin management plans.

Less significant progress has been achieved on **nature protection**. The draft law on nature protection and biodiversity, submitted to the Turkish parliament, raises concerns, in particular as regards the abolition of the current protection status of many sites that would be a useful contribution to the Turkish NATURE2000 network. The national biodiversity strategy and action plan, and implementing legislation on birds and habitats remain to be adopted. The list of potential NATURE2000 sites has not yet been compiled. An amendment to the by-law on the protection of wetlands has weakened the protection status of wetlands (Ramsar sites).

The scope of the by-law on environmental impact assessment (EIA) has been extended and the EIA Directive is now transposed to a large degree. However, procedures for public and transboundary consultations have not been fully aligned and implemented. Transposition of the SEA Directive is at an early stage.

The main legal provision governing the **fisheries sector** is the Fisheries Law of 1971 (Law N° 1380 of 1971). On this basis, Turkey also adopted implementing regulations on fisheries (1995), on fishing ports (1996), on wholesale and retail fish markets (2004) and on aquaculture (2004). Other relevant

[12] EU Integrated Environmental Approximation Strategy (UÇES) contains the information pertaining to the technical and institutional infrastructure, and the environmental improvements that are required to be performed as well as the mandatory arrangements which are necessary to establish complete harmonization for compliance with EU Environmental Acquis Communautaire and the effective implementation of the legislation which are the two pre-conditions for Turkey to join the European Community. While preparing UÇES, outputs from "National Environmental Strategy and Action Plan" prepared previously and "Integrated Harmonization Strategy Project" implemented with EU resources and "Environmental Heavy Cost Investment Planning Project". In addition, it was taken into consideration that prepared strategy is coincided with the strategies and policies of the Development Plan, Annual Programs and National Programme of year 2003. UÇES document was prepared by the Ministry of Environment and Forestry (present Ministry o Environment and urban planning) due to its comprehensive coordination role in implementation and development of environmental policies with a lot of related institutions and organizations which have important roles and responsibilities in environmental issues, also by taking the targets of harmonization of Environment Acquis into consideration.

legal acts are Ministerial Communiqués, bi-annual Circulars on Fishing as well as Decree Law N° 441 on the Establishment and Functions of the Ministry of Agriculture and Rural Affairs, which is presently renamed into Ministry of Food, Agriculture and Livestock. The overall policy framework is provided by Development Plans. Turkey has prepared the 9th Development Pan for the period 2007-2013, approved by the Turkish parliament on 28 June 2006. The main objectives of the Plan are defined as the establishment of a resource management system based on stock assessment studies, ensuring environmentally friendly aquaculture production and strengthening administrative structures. A new draft law on fisheries has been sent to parliament which once adopted will provide the legal basis for a catch and registration system, the establishment of VMS, support to fishermen, fight against illegal fishing, marketing standards and consumer information as well as for further implementing regulations. Some of the fishery vessels are equipped already with VMS, and a Fisheries Information System has been established. Similar to BG and RO, this system contains information on logbook, landing declaration, storage declaration, transfer declaration, sales notes, vessel registry and licences and permission.

In the **field of air quality** assessment and management, the major improvement is the Draft By-law on Air Quality Assessment and Management prepared to cover four daughter directives (99/30/EC, 2000/69/EC, 2002/3/EC and 2004/107/EC) and the 96/62/EC, Air Quality Framework Directive. This draft by-law sets the calendar for implementation and harmonization for 13 pollutants that are defined under the Air Framework Directive and the daughter directives. It also aims to strengthen the monitoring, sanctioning and institutionalization in the area of controlling the pollution and air quality. At present, there are 11 laws for the protection of the ambient air quality and control of air pollution where most of them had been adopted in 1980s. The legislation relating to the sulphur content of certain liquid fuels has been fully aligned with the *acquis*. A by-law on waste incineration was adopted. Turkey became a party to the Stockholm Convention on persistent organic pollutants. The legislation on the control of industrial air pollution was amended in order to regulate the permit procedures. By-laws on large combustion plants and on the control of major-accident hazards were adopted. Introduction of an integrated permit system is at an early stage.

In the field of **waste management**, Turkey adopted its national waste management plan for 2009–2013. Legislation on the control of hazardous waste, on receipt of waste from ships and on control of waste has been amended in line with the *acquis*. Legislation on the sanitary landfilling of waste was adopted, including provisions from the Waste Framework Directive on reducing the percentage of biodegradables.

In the field of **bathing water** regulation (09.01.2009) related to the Bathing Water Directive has been adopted and implemented.

In the field of climate change, a national climate change strategy was adopted by the Ministry of Environment with UNDP/GEF support. Moreover, a climate change department was established within the Ministry of Environment. However, no preparations for the EU Emissions Trading Scheme have started yet.

Legislative alignment in the field of **noise** is well advanced. However, preparation of noise maps and action plans is still at an early stage.

Overall, Turkey is aligned with certain parts of the EU *acquis* and makes efforts for further progress. Important gaps remain in areas such as fishery and habitats protection. **Full List of TR relevant legislation/policy is provided by the Ministry of Environment and Urbanization in Annex III.**

REGIONAL AGREEMENTS

Major regional agreements in the field of Black Sea environment protection

Table 6. Major regional agreements

N	Title of Convention or Agreement or Policy	Bulgaria	Romania	Turkey
		Date of ratification		
1	Convention on the Protection of the Black Sea Against Pollution and its four Protocols[13] (Bucharest Convention) and Strategic Action Plan[14]	23.02.1992	29.09.1992	29.03.1994
2	International Convention on the Protection of the Danube River (ICPDR)[15]	1994	1994	Observer
3	Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic Area (ACCOBAMS)	23.09.1999	13.06.2000	N
4	Agreement between the Ministry of Environment and Water Management of Romania and Ministry of Environment and Water of the Republic of Bulgaria on Cooperation in the Field of Water Management signed at Bucharest on 12 November 2004	15.03.2005	12.11.2004	

The Ministry of Environment and Water in Bulgaria has summarized its international and regional legal/policy obligations in two documents posted at:
http://www3.moew.government.bg/?show=80
http://www3.moew.government.bg/files/file/KVESMS/conventions_resume/Bilateral_Agreement_En.pdf.

Other important documents at the regional level in relation to monitoring are the BS-ML-SAP (Strategic Action Plan for the Management and Abatement of Marine Litter in the Black Sea Region, http://www.blacksea-commission.org/_publ-ML.asp) and the Plan for Cetaceans conservation[16],

[13] The Bucharest Convention sets out the overall objectives and obligations of the contracting Parties (Bulgaria, Georgia, Romania, Russian Federation, Turkey and Ukraine), the actual implementation of each of these is to be ensured through more detailed and specific protocols. To date, the Black Sea States have ratified the following implementing protocols:

- Protocol on Protection of the Black Sea Marine Environment against Pollution from Land-based Sources (the revised Protocol has been signed in 2009, however, not yet ratified)
- 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
- Protocol on the Black Sea Biodiversity and Landscape Conservation (signed in 2003 and enforced in 2011).

[14] Strategic Action Plan for the Rehabilitation and Protection of the Black Sea, signed in 1996 by all Black Sea states, amended and re-signed on 17th of April 20009. The SAP recognizes the same environment threats as those identified by the MSFD (loss/degradation of biodiversity/habitats, contamination by dangerous substances/nutrients and impacts of climate change), however, sets no environment targets, but only operational according to four Ecosystem Quality Objectives formulated as follow:

- **Preserve commercial marine living resources through:**
  Sustainable use of commercial fish stocks and other marine living resources.
  Restore/rehabilitate stocks of commercial marine living resources.
- **Conservation of Black Sea Biodiversity and Habitats through:**
  Reduce the risk of extinction of threatened species. Conserve coastal and marine habitats and landscapes.
  Reduce and manage human mediated species introductions
- **Reduce eutrophication through:**
  Reduce nutrients originating from land based sources, including atmospheric emissions.
- **Ensure Good Water Quality for Human Health, Recreational Use and Aquatic Biota through:**
  Reduce pollutants originating from land based sources, including atmospheric emissions.
  Reduce pollutants originating from shipping activities and offshore installations

[15] The Danube River Protection Convention is the legal instrument for co-operation and transboundary water management in the Danube River Basin, signed by eleven of the Danube Riparian States and the EC, including three Black Sea states: Bulgaria, Romania and Ukraine. The International Commission for the Protection of the Danube River (ICPDR) is the implementing body under the .Convention on Cooperation for the Protection and Sustainable Use of the Danube River. (Danube River Protection Convention, DRPC) and serves as the platform for coordination to develop and establish the Danube River Basin Management Plan (DRBMP). The Danube River Basin District has been defined in the frame of the work of the ICPDR. It covers 1) the Danube River Basin, 2) the Black Sea coastal catchments on Romanian territory, and 3) the Black Sea coastal waters along the Romanian and partly the Ukrainian coast.

[16] Conservation Plan for Black Sea Cetaceans. prepared under the auspices of the ACCOBAMS and BSC Secretariats by international group of experts (2005). It was considered and supported by the Round Table on Conservation of Black Sea Cetaceans (May 2006), commended by the ACCOBAMS Scientific Committee (SC4) and the 15th Meeting of the Black Sea Commission (November 2006). The Plan was adopted by the ACCOBAMS Meeting of Parties (MoP3, Res. 3.11, October 2007). Later it was partly incorporated into the Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea (adopted in April 2009).

unfortunately both documents stay in draft and pending for adoption by the BSC. The draft Action Plan for the implementation of the Biodiversity Protocol to the Bucharest Convention contains provisions for monitoring and data collection, however, it is in need for a serious revision and thereafter adoption by the BSC.

NATIONAL

Environmental legislation is fully harmonized with the EU acquis, however, the actual implementation is yet far from satisfactory.

Table 7. Inventory of monitoring-related national legal/policy documents in Bulgaria

N	Title of National Legal Act/Policy	dd.mm.yy
1.	National Law for the biological diversity	24.04.2012 (last update)
2.	Act for protection of biodiversity	09.08.2002 /last amendment 24.04.2012/
3.	National Law for the protected areas	
4.	Protection Areas Act (http://www3.moew.government.bg/files/file/PNOOP/Acts_in_English/Protected_Areas_Act.pdf)	11.11.1998 /last amendment 08.03.2011
5.	Ordinance for elaboration of management plans for protected areas	15.02.2000
6.	National Water Act	11.08.2006/21.11.2012
7.	Fisheries and Aquaculture Act	24.04.2001 /last amendment 08.03.2011/
8.	Bulgarian national programme for collection, management and use of fisheries data (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:060:0001:0012:EN:PDF)	2011-2013
9.	Environmental protection act (http://www3.moew.government.bg/files/file/PNOOP/Acts_in_English/Environmental_Protection_Act.pdf)	25.09.2002 /last amendment 24.04.2012/
10	On EIA in transboundary aspect (http://www3.moew.government.bg/files/file/Industry/EIA/KONVENCIQ_za_ocenka_na_vyzdejstvieto_vyrhu_okolnata_sreda_v_transgranicen_kontekst.pdf)	
11.	http://www3.moew.government.bg/files/file/Industry/Legislation/Naredbi/NAREDBA_KR.pdf	
12.	On the rules for ecological assessments of plans and programmes (http://www3.moew.government.bg/files/file/Legislation/Naredbi/NAREDBA_za_usloviqta_i_reda_za_izvyrsvane_na_ekologicna_ocenka_na_planove_i_programi_Zagl_izm_DV_br_.pdf)	
13.	On EIA (http://www3.moew.government.bg/files/file/Legislation/Naredbi/NAREDBA_za_usloviqta_i_reda_za_izvyrsvane_na_ocenka_na_vyzdejstvieto_vyrhu_okolnata_sreda_Zagl_izm_D.pdf)	
14.	Water Act (http://www3.moew.government.bg/files/file/PNOOP/Acts_in_English/Water_Act.pdf)	28.01.2000 /last amendment 01.01.2011/
15.	Ordinance N 1 for water monitoring /repealing Order N 5 for monitoring of water/ (http://www3.moew.government.bg/files/file/Legislation/Naredbi/vodi/N1_monitvodi.pdf)	11.04.2011
16.	Ordinance N 2 for protection of water from pollution from agricultural sources /repealing Order N 2 for protection of water from pollution from agricultural sources since 16/10/2000 /http://www3.moew.government.bg/files/file/Legislation/Naredbi/vodi/N2_nitrati.pdf	13/09/2007
17.	http://www3.moew.government.bg/files/file/Water/Legislation/Naredbi/vodi/NAREDBA_2.pdf	
18.	http://www3.moew.government.bg/files/file/Legislation/Naredbi/vodi/N3_SOZ.pdf	
19.	http://www3.moew.government.bg/files/file/Water/Legislation/Naredbi/vodi/N-3predost_informaciq_naucni.pdf	
20.	http://www3.moew.government.bg/files/file/Legislation/Naredbi/vodi/N4_organizmi.pdf	
21.	Ordinance N 5 for management of bathing water quality http://www3.moew.government.bg/files/file/Legislation/Naredbi/vodi/N5_uprkypane.pdf	10/06/2008
22.	http://www3.moew.government.bg/files/file/Legislation/Naredbi/vodi/N6_opasni_v-va.pdf	
23.	Ordinance № 8, Quality of Marine Coastal Waters Ministry of Environment and Waters, Ministry of Health, Ministry of Regional Development (http://www3.moew.government.bg/files/file/Legislation/Naredbi/vodi/N8_kraibrvodi.pdf)	02/02/2001
24.	Ordinance for ecological quality standards for priority substances and some other pollutants (http://www3.moew.government.bg/files/file/Legislation/Naredbi/vodi/N_standarti_priorit_ve6t_zamyrsiteli.pdf)	09/11/2010
25.	http://www3.moew.government.bg/files/file/Legislation/Naredbi/vodi/N_morskite_vodi.pdf	
26.	http://www3.moew.government.bg/files/file/PNOOP/Acts_in_English/Clean_Ambient_Air_Act.pdf	

N	Title of National Legal Act/Policy	dd.mm.yy
27.	http://www3.moew.government.bg/files/file/PNOOP/Acts_in_English/Soils_Act.pdf	
28.	Ordinance N 11 for the quality of bathing water	25/02/2002
29.	Ordinance/Ministerial order No 273 for protection of the environment in marine water and implementation of MSFD http://www.ciela.net/freestategazette/OpenDocument.aspx?id=2135707230	30.11.2010
30.	Ordinance N 13 for the characterisation of surface water	08/05/2007
31.	Ministerial ordinance N 321 for establishment of priority and priority dangerous substances in water area	05/06/2007
32.	Ministerial order N 715	02. 08. 2010
33.	Plan for the water management in the Black Sea Region (Basin), Directive 2000/60/EC	22.03.2010

ROMANIA

In Romania, the environmental legislation is fully harmonized with the EU acquis, the actual implementation is reflected in numerous measures taken to improve the environment and various types of monitoring organized to provide the decision-makers with data/information needed for science-based management of environmental protection.

Table 8. Inventory of monitoring-related national legal/policy documents in Romania

N	Title of National Legal Act/Policy	dd.mm.yy
1.	Law no. 98/1992 ratifying the Convention on the Protection of Black Sea Against Pollution,	29.09.1992
2.	Law no 6 / 1993 ratifying the International Convention for the Prevention of Pollution from Ship from 1973	08.03.1993
3.	Law No. 82/1993 on the Constitution of the Biosphere Reserve "Danube Delta"	20.11.1993
4.	Law no. 30/1995 ratifying the Convention on the Protection and Use of Transboundary Watercourses and International Lakes	03.05.1995
5.	Law No. 137/1995 on Environmental Protection	29.12.1995
6.	Law no. 107/ 1996 (* updated * in 1 January, 2012) WATERS LAW Updated form of that legislation until 1 January 2012 to include all changes and additions made by: JUDGMENT no. 83 of March 15, 1997 repealed by Decision no. 948 of November 15, 1999, Law no. 192 of April 19, 2001, Emergency Ordinance no. 107 of September 5, 2002, Law no. 404 of October 7, 2003, Law no. 310 of June 28, 2004, Law no. 112 of May 4, 2006, Emergency Ordinance no. 12 of 28 February 2007, Emergency Ordinance no. 130 of November 12, 2007, Emergency Ordinance no. 3 of 5 February 2010, Law no. 146 of July 12, 2010, Emergency Ordinance no. 64 of 29 June 2011, Emergency Ordinance no. 71 of 31 August 2011.	08.10.1996
7.	Law no. 160 / 2000 approving Government Ordinance no. 14/2000 ratifying the Convention preparedness, response and cooperation in case of oil pollution	03.10.2000
8.	H.G. 472	15.06.2000
9.	O.U.G. 243	28.11.2000
10.	Law 462/2001 on the EC Habitats Directive transposition	2001
11.	Order No. 179/2001 regarding the Registering and transmission of the data related with the marine fishing activity	01.06.2001
12.	Technological Development and Innovation (2001-2005) approved by the Government Decision no. 556/2001. Government Decision no. 556/2001.	25.06.2001
13.	Order No. 262/2001 regarding the Preparation of the Directory of Vessels and Fishing boats	16.07.2001
14.	Order no. 422/2001 for approval of the Regulation on the conditions for development of the commercial fishing activities in the Black Sea waters	30.10.2001
15.	Law no. 746/2001 ratifying the Agreement on privileges and immunities of the Marine Environment Protection Committee of the Black Sea, signed in Istanbul on April 28, 2000 - Official Gazette no. 842/28.12.2001	28.12.2001
16.	NTPA001 - Norms for setting charging with pollutants of industrial and urban waste from disposal in natural receivers (Regulatory limits on pollutants discharges)	28.02.2002
17.	NTPA002 - Norms for wastewater discharge conditions in the local sewerage networks and treatment plants directly	28 .02.2002
18.	H.G. No. 459 from 16 May 2002 regarding the approval of quality norms for waters in natural areas arranged for bathing	16.05.2002
19.	GD No 352/2005 (OJ 398, 11.05.2005) amending GD No 188/2002 (OJ 187, 20.03.2002) for the approval of norms concerning the conditions of discharging the wastewater into the aquatic environment	11.05.2005
20.	O.M. 592	25.06.2002
21.	Law no. 148/2002 on water quality	08.07.2002
22.	H.G. 856	16.08.2002
23.	Law no. 17/1990 on the legal status of marine waters of the territorial sea and contiguous zone of Romania, supplemented and amended by Law 36/2002 and republished - Official Gazette no. 775/21.10.2002	21.10.2002

N	Title of National Legal Act/Policy	dd.mm.yy
24.	Emergency Ordinance no. 202/2002 on integrated coastal zone management, with subsequent amendments	In the Official Gazette published: 12.28.2002
25.	H.G. 1593 (Government Decision no. 1593/2002 on National Plan preparation, response and cooperation in case of marine pollution by oil and other harmful substances, with subsequent amendments)	18.12.2002 (In Official Gazette published: 02.01.2003)
26.	Law 271/2003 for ratifying the protocols of the Convention on Long-range Transboundary Air Pollution (CLRTAP)	2003
27.	Law no. 280/2003 approving Government Emergency Ordinance no. 202/2002 on integrated management of coastal areas - Official Gazette no. 454/26.06.2003	26.06.2003
28.	Order no. 818/2003 Procedure for issuance of integrated environmental permit	13.11.2003
29.	H.G. No. 88 from 29 January 2004 regarding the approval of norms for surveillance, sanitary inspection and control of natural areas used for bathing	29.01.2004
30.		12.11.2004
31.	Emergency Ordinance no. 152/2005 concerning integrated pollution prevention and control	30.11.2005
32.	Government Emergency Ordinance 195/2005 approved by Law 265/2006 on environmental protection, with subsequent amendments and completions	22.12.2005 (Official Gazette (published: 30/12/2005)
33.	Governmental Decision H.G no. 1856/2005 (MOf.23/11.01.2006) on the national allowable emissions limits for specific atmospheric pollutants	11.01.2006
34.	Order no 31 for the approval of the Manual (Handbook) of the Modernization and Development of the Integrated Monitoring System of Waters in Romania (SMIAR)	13.01.2006
35.	Order No. 161/2006 for the approval of the Normative for the classification of the quality of surface waters in order to establish the ecological status of water bodies	16.02.2006
36.	Order No. 161 for the approval of the Normative for the classification of the quality of surface waters in order to establish the ecological status of water bodies	16.02.2006
37.	Law /2006 for approving Government Emergency Ordinance no. 152/2005 concerning integrated pollution prevention and control	11.04.2006
38.	Order no. 262/2006 regarding conservation of the sturgeon populations from natural waters	18.04.2006
39.	Law 111/1996 republished in 2006, on the safe deployment, settlement, authorization and control of nuclear activities with subsequent amendments and completions	27.06.2006
40.	O.M. 661	28.06.2006
41.	O.M. 662 /2006 regarding the approval procedure and the powers to issue permits and licenses for water management)	28.06.2006
42.	Law no. 265 approving Government Emergency Ordinance no. 195/2005 on environmental protection	29.06.2006
43.	Law no. 27 approving Government Emergency Ordinance no. 61/2006 amending and completing Government Emergency Ordinance no. 78/2000 on waste	15.01.2007
44.	Law No 310/2004 (OJ 584, 30.06.2004) amending Law No 107/1996 (OJ 244, 08.10.1996) (Water Law)	28.06.2004
45.	O.M. 448	21.03.2007
46.	O.U.G. 68	28.06.2007
47.	Emergency Ordinance no. 57 of 20 June 2007 on the regime of protected natural habitats, flora and fauna	29.06.2007
48.	H.G. 568/2001 Decision establishing technical requirements for limiting volatile organic compounds resulting from the storage, handling and distribution of petrol at terminals and service stations	29.08.2007
49.	Decision no. 1284 of October 24, 2007 the declaration of Special Protection Areas as part of the European ecological network Natura 2000 in Romania	31.10. 2007
50.	O.M. 1798 /2007 Procedure for issuing the environmental permit)	19.11.2007
51.	Order No. 1888 for the approval of the list of organohalogenate substances and heavy metals, and the maximum admissible limits of the organohalogenate and heavy metals in water and sediments	28.11.2007
52.	Government Emergency Ordinance No. 23 /2008 on Fishing Fund, Fishery and Aquaculture	05.03.2008
53.	Order no. 342/2008 on minimal size of the aquatic living resources	12.03.2008
54.	H.G. No. 546 from 21 May 2008 regarding the management of bathing water	21.05.2008
55.	Order no. 344/2008 for approval of the operational and functional manner of fishing vessel and boats file	29.05.2008
56.	Order nr. 449/2008 on technical characteristics and practice conditions for fishing gears used in the commercial fishing	11.08.2008
57.	H.G. 445	08.04.2009
58.	Law 317/2009 approving Government Emergency Ordinance OUG 23/2008 on fishing and aquaculture	13.10.2009
59.	The Emergency Ordinance no. 71 (OUG 71/2010) for the establishment of the marine strategy	02.07.2010
60.	Law 146	19.07.2010
61.	O.M. 135	10.02.2010
62.	LAW. 205 of November 11, 2010 , approving Government Emergency Ordinance no. 40/2010 for the amendment the Government Emergency Ordinance no. 152/2005 concerning integrated pollution prevention and control	16.11.2010
63.	Ministry of Environment Order 1978/2010 on approval of the organization and functioning of the National Network of Environmental Radioactivity Surveillance	19.11.2010
64.	Order No. 1591/1110 from 30 December 2010 regarding the approval for carrying out the national health	30.12.2010

N	Title of National Legal Act/Policy	dd.mm.yy
	programs for 2011 and 2012	
65.	Order no. 183 of March 14, 2011 regarding the methodology for monitoring and evaluation of bathing areas	14.03.2011
66.	Law no.6/2011 for the approval OUG 71/2011 for the establishment of the marine strategy	7.03.2011
67.	The Emergency Ordinance no. 57 for marine protected areas, natural habitats, and wild flora and fauna conservation, approved with changes and completions by Law no. 49/2011	16.04.2011
68.	Emergency Ordinance no. 51 of June 8, 2011, amending and supplementing Law no. 17/1990 on the legal status of marine waters, territorial sea, the contiguous zone and exclusive economic zones of Romania	08.06.2011
69.	Law 211/2011 on waste	15.11.2011
70.	Law no.218/24 November 2011 for the ratification of the Protocol on preserving biodiversity and landscape in the Black Sea regarding the Convention on the Protection of Black Sea against pollution, signed in Sofia, in 14 June 2004	24.11.2011
71.	Norm on wastewater discharge conditions in the local sewerage network and sewage treatment plants directly approved by Government Decision no. 188/2002, amended by Government Decision no. 352/2005	20.03.2012
72.	Norm on wastewater discharge conditions in the local sewerage network and sewage treatment plants directly approved by Government Decision no. 188/2002, amended by Government Decision no. 352/2005	20.03.2012

There is a National Strategy for Fisheries and Aquaculture, which is not mentioned in the Table above. Romania together with Bulgaria started development and implementation of national data collection programs (EC 199/2008) for the same period: 2011-2013 (new programs). First program was initiated in 2008 for both BG and RO

TURKEY

Table 9. Inventory of monitoring-related national legal/policy documents in Turkey

N	Title of National Legal Act/Policy	dd.mm.yy
1.	Fisheries Law 1380	22.03.1971/amended in 1983
2.	National parks Law	1983
3.	Water Law N 831	
4.	Environment Protection Law	09.08.1983/amended in 2006 (26.04.2006)
5.	Building Law	03.05.1985
6.	Coastal Law	04.04.1990
7.	Regulation on Fisheries No.22223	10.03.1995
8.	Regulation on Environmental Impact Assessment	16.12.2003
9.	Regulation on the protection of waters against pollution caused by nitrates from agricultural sources	18.02.2004
10.	Regulation on Aquaculture No.25507	29.06.2004
11.	Regulation on CITES	06.08.2004
12.	Water Pollution Control Regulations	31.12.2004/modified 13.02.2008
13.	Law Pertaining to Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Harmful Substances	11.03.2005
14.	By-law of the Control of Hazardous Wastes	14.03.2005
15.	By-law of the Control of the Pollution in Water and the Water Environment caused by Hazardous Substances	26.11.2005
16.	Municipal Wastewater Treatment Policy (Regulation on the Urban Waste Water Treatment)	08.01.2006
17.	Regulation of Bathing Water Directive	09.01.2006
18.	By-law on control of air pollution from industrial plants	22.07.2006
19.	Packing Waste Control Legislation	24.06.2007
20.	Sensitive and Less Sensitive Water Areas Communique Concerning urban Wastewater Treatment Regulation	27.06.2009
21.	Control of Air Pollution from Industry Legislation	03.07.2009
22.	Sanitary Landfill of Waste Legislation	26.03.2010

Main achievements and gaps encountered at the legal/policy level

National policies of the beneficiary countries are based on the precautionary approach, use of low and non-waste technologies, integrated marine environmental protection with other areas of policy, development of economic incentives for environmentally-friendly industry and agriculture, as well as the polluter pays principle and user fees and application of environmental impact assessment procedures to all sectors.

Licensing-monitoring-enforcement-compliance mechanism is well developed in the beneficiary countries. Any water use is subject to authorisation in the form of a water management permit and water management license. Consequently the legal basis for compliance monitoring is in place.

In **Bulgaria**, regulations for the organization of monitoring activities in the Black Sea coastal waters have been available since 1998 and modified with additional regulations in 2005 and 2006 to have a wider scope to include biological quality elements considering the WFD requirements. There is a National Plan having a long-term strategic aim for the protection, recovery and sustainable management of biodiversity in the country for optimal conditions, environment and perspectives for human life, though it is not specifically designed to address the biodiversity decline in the Black Sea. The overall strategy is based on ecosystem approach and requires relevant monitoring. The Plan has been operational since 2000. All conservation measures and necessary actions for species, habitats and landscapes are considered within the Plan. Measures for protection of cetaceans, expansion of conservation areas etc. were also integrated in this Plan. The European Habitat directive have been implemented under NATURA2000, however, habitats monitoring is poorly regulated in practice. The EU Common Fishery Policy (CFP) is implemented and EUROSTAT methods in the area of fisheries statistics are used. In the field of inspection and control, resource and fleet management, the Bulgarian Fisheries and Aquaculture Act of 2001 was amended in 2005 and 2006 to provide the legal basis for granting fishing licenses and for the development of a vessel monitoring system (satellite-based fishing vessel monitoring is already in place). The EU legal requirements for catch and landings registration and for keeping logbooks at vessels have been transposed and are enforced. The main strategic targets (but not environmental) for the Bulgarian fishery have been developed in the National Strategic Plan for Fisheries and Aquaculture for the period 2007-2013.

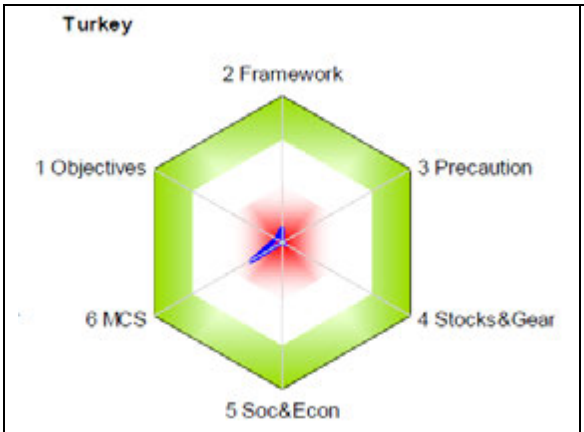
In **Romania**, Black Sea Monitoring System, including land-based point sources discharges, is legally regulated and organised since the early 1980s. The system was improved considering the WFD provisions since 2000. The National Strategy and Action Plan for the Biological Diversity Conservation and Sustainable Use of living resources in Romania (1996) are being implemented, and was improved in 2010. There is also a National Plan on protection of marine mammals (2004). NATURA 2000 and Emerald Site Networks are developed. National Black Sea Strategic Action Plan has been prepared but is not yet adopted by any national law. The Common Fisheries Policy (CFP) is implemented, national policies regulate the fishery inspections. National Strategic Plan (NSP) for Fisheries and Aquaculture in Romania was prepared according art. 15 of Council Regulation (EC) nr.1198/2006 of 27 July 2006 on European Fisheries Fund and Law. 192/2001 on fish, fisheries and aquaculture. Order no 31 for the approval of the Manual (Handbook) of the Modernization and Development of the Integrated Monitoring System of Waters in Romania (SMIAR, 2006) has been an important milestone paving improvements in the Romanian monitoring programmes.

In **Turkey** the EU Directives governing environment protection have been considered to a possible extent. The Constitution together with various laws, by-laws and international conventions regarding nature conservation makes up the legal framework for the conservation and sustainability of biodiversity in Turkey.

The NAP named Black Sea National Action Plan for land based pollutants has been approved in 2003. The river basin protection plans prepared (and some are still under preparation)[17] by TUBITAK for

[17] Action plans for 11 river basins, including Yeşilırmak and Kızılırmak, have been completed among the intended action plans for 25 basins in Turkey and action plans for the remaining river basins will be accomplished in 2013.

the Ministry of Environment may be considered as further work complementing the NAP (2003) for the Black Sea. Major gaps are still present in the field of fishery and habitats protection, however, monitoring, control and surveillance are well advanced, as demonstrated for the fishery sector below.



1. **Objectives:** Management objectives
2. **Framework**: Regulatory framework
3. **Precaution**: Precautionary approach
4. **Stocks&Gear**: Regulation of stocks, fleets and fishing gears
5. **Soc&Econ**: Social and economic factors
6. **MCS**: Monitoring, control and surveillance

Compliance of TR with the FAO Code of Conduct for Responsible Fisheries (extracted from Pitcher et al., 2006, http://www.fisheries.ubc.ca/publications/evaluations-compliance-fao-un-code-conduct-responsible-fisheries).

The inspection and control of sources of pollution and in fishery are well developed. However, monitoring in the Black Sea is regulated by no specific policy. List of Black Sea-priority substances is not yet fully developed. Standards for BS water quality are in place.

All beneficiary countries are part of BSIMAP (Black Sea Integrated Monitoring and Assessment Programme, http://www.blacksea-commission.org/_bsimap.asp), however, compliance with its requirements is not regulated in the national legislation.

There is a Joint **BG&RO Commission on Water Management**, which meets twice per year since 2004, when the Agreement was set (the last time on 20-21st Nov. 2012) and dealt with WFD, MSFD and Floods Directive implementation in a harmonized manner in Bulgaria and Romania. This Commission has approved a Joint Program for monitoring of coastal waters related to transboundary issues in the frames of the WFD. The sampling stations included are at Krapetz and Shabla in Bulgaria, and at Vama Veche in Romania[18]. This Commission planned to support joint BG&RO work in relation to the MSFD as well, such as discussions on Initial Assessments and harmonised approach for definition of GES, and environmental targets. The factual implementation of the BG&RO Agreement covered until present:

- Inter-calibration in the frames of the WFD (GIG Black Sea);
- First meeting to dicuss MSFD approach and harmonisation activities (20-21.11.2012).

Both parties (BG and RO) have agreed on exchanging information regarding the sampling and analysis methods as well as for the equipments used for general indicators, specific pollutants and priority substances analysis. The parties agreed to expand the assessment of biological quality elements from the coastal waters to marine waters.

[18] The following parameters have been identified for 4 times a tear sampling: pH, T °C, Secchi depth, Salinity, O2, oxygen saturayion, BOD5, ammonia, nitrates, nitrites, phosphates, Ntotal, Ptotal, Silicate, TOC. Among priority substances: Anthracene, Cadmium, Lead, Mercury, Nickel, PAHs, Naphthalane, Flouranthene, Hexachlorobenzene (sampled 2 times a year). Specific chemical parameters (sampled 2 times a year): polychlorinated bithenyles, DDD, Zink, Copper; BiologyL phytoplankton (taxonomy, Chl, biomass, seasonal), Macroinvertebrates (one a year for calculation of AMBI, M-AMBI and Diversity index H (bits/ind)).

To conclude on the major gaps of the legal/policy framework in relation to monitoring. In existing national legislation/policy there are:

1. No specific Action Plan for the Black Sea EEZ with clear operational targets[19];
2. No environment targets for pressures, state and impact which would allow designing a full-body monitoring program in line with the requirements of the MSFD (though they are in process of development in relation with the obligations stemming from the MSFD);
3. No regulations for monitoring NIS[20] and ballast water;
4. No Code of Practice to reduce fishing litter or any other litter on coast and in the Sea and monitor efficiency of measures;
5. No environment targets for control on the level of underwater noise[21];
6. No specific regulations for the development of operational monitoring to support environment protection and its integration into national monitoring programmes;
7. No regulations for coordinated and regular monitoring of pressures/impacts;
8. No regulations for inter-sectoral cooperation in monitoring and data management;
9. No regulations for exchange of data between sectors[22].

[19] For instance, the Bulgarian Plan for the Black Sea Basin covers only territorial waters of the Black Sea in line with the WFD obligations.
[20] The Ballast Water Convention 2004 has not been signed by BG, RO and TR.
[21] In TR there is a Regulation on management and assessment of environmental noise (published on 04.06.2010 dated and 27601 numbered Official Gazette), however, it does not deal specifically with underwater noise which environmental impact is not well know, in general, not only in the Black Sea region.
[22] Actually, in TR there is such a regulation stating that all marine data should be delivered to the National Data Oceanographic Center (Office of Navigation, Hydrography and Oceanography, http://www.shodb.gov.tr/osinografi/data_center.htm), however, in practice little is achieved in compliance with it.

2. Responsible organizations (those which provide the budget for monitoring and approve of the programs)

The inventory of responsible organizations in the field of monitoring management, provided below, does not mean that all of them are involved by a single uniform inter-departmental and approved monitoring program in a network, which would institutionally frame the integrated monitoring (arrange its institutional organization, in other words), including distribution of responsibilities and arrangements for data exchange.

In the beneficiary countries the national funding for the routine monitoring in the Black Sea itself (without bathing water compliance) does not exceed annually 300 000 Euro per beneficiary country, on the average. In all countries, funding needs to be substantially increased to cover the requirements of the MSFD. Besides, the funding should be ensured in time on an annual basis (often funding is provided with delay, if any).

BULGARIA

The list of responsible organizations is long, which does not mean that the monitoring required under the MSFD implementation has been funded in time to provide well for the Initial Assessment of the state of Bulgarian Black Sea waters. Besides, in the near past there was a general overlap between the monitoring activities in the Black Sea financed by the Ministry of Environment and Ministry of Agriculture. The poor coordination between these two ministries was leading to duplication of efforts of two scientific institutions – IFR, Varna and IO-BAS, Varna, which carried out observations in the same areas habitually and often at the same time. The expensive ship time was therefore not efficiently governed, as well as the existing capacity to improve monitoring in geographical coverage and frequency of observation was not properly managed. Presently, fisheries statistics collation is not sufficiently coordinated

Table 10. Organizations providing funding for monitoring in Bulgaria

Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail)
Ministry of Environment and Water	22 Maria-Louisa Blvd.q 1000 Sofia, Bulgaria http://www3.moew.government.bg/	**Ivelina Vassileva**, Deputy minister Tel: 00359 2/ 940 61 81 E-mail: ivvasileva@moew.government.bg
		Dipl. eng. **Asen Lichev** – Director of "Water management" Directorate 22 "Maria Louiza" bvd. http://www3.moew.government.bg phone: + 359 2 940 65 50
		Neli Mutafova – "International cooperation department" /for Bucharest Convention, Bonn Convention/ 67 "William Gladstone" str., Sofia, 1000 phone: + 359 940 62 58 fax: + 359 987 38 67 n.mutafova@moew.government.bg **Kalina Stoianova** – "National Service for the protection of the environment"/for CBD/ Sofia 1000, 22 "Maria Louiza" bvd. phone: +359 2 940 61 13 fax: +359 2 940 61 27 nnps@moew.government.bg
		Irina Ivanova "International cooperation department" /for CBD, Bern Convention, / 67 "William Gladstone" str., Sofia, 1000 phone: + 359 940 62 58 fax: + 359 987 38 67 itsivanova@moew.government.bg

Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail)
		Raina Hardalova "National Service for the protection of the environment", /for Bern Convention/ phone: +359 2 940 61 63 fax: +359 2 981 61 27 hardalovar@moew.government.bg **Ruslan Serbezov** "National Service for the protection of the environment", /for Bonn Convention/ phone: +359 2 940 61 29 fax: +359 2 988 59 13 serbezov@moew.government.bg **Marinka Bogdanova** -chief expert MSFD 00359 /2/ 940 61 81 bogdanovam@moew.government.bg
Black sea Basin Directorate	Varna 9000 33 "Alexander Diakovitch" str. http://www.bsbd.org/v2/	dipl. eng. **Ventsislav Nikolov** – Director 33 "Alexander Diakovitch" str. http://www.bsbd.org/v2/ e-mail: bdvarna@bsbd.org phone: +359 52 631 447 Monitoring experts: Phone: + 359 52 687 438
Agricultural Academy/Ministry of Agriculture and Forest	Sofia, 1373, Str. Suhodolska, 30	Prof. **Slaveykov**
National Agency for Fisheries and Aquaculture (NAFA), Bulgaria	Sofia 1606, Hristo Botev 17 www.iara.government.bg	office@iara.government.bg / tel. 00359 2/80 51 666 or + 359 2 80 51 663, fax. 02/ 80 51 686 Dr.**Dragomir Gospodinov** – executive director 17 Hristo Botev Blvd, 1606 Sofia
Bulgarian Academy of Science	Sofia,1040,1 15th November "Str., 02/979 53 33; 02/979 52 23	President: **Acad.Stefan Vodenicharov** Tel: (359 2) 981-66-22 presidentbas@cu.bas.bg
Ministry of Education, Youth and Science (Project Development Fund)	http://www.mon.bg, http://www.bulfund.com/ http://www.minedu.government.bg/left_menu/ministry/ Sofia 1000 2A Kniaz Dondukov Blvd	Minister: corr.member **Nikolay Miloshev**
Ministry of Health	5, Sveta Nedelja Square BG-1000 Sofia Bulgaria http://www.mh.government.bg	**Minister:Desislava Atanasova** 9301-239/101 minister@mh.government.bg
European Commission DG Maritime Affairs and Fisheries	J99- 05/1s, B-1049 Brussels	**Antonio Cervantes** Antonio.cervantes@ec.europa.eu

Note: Some of the contact persons were recently changed, as the government of the political Party 'Gerb' was suspended, extraordinary elections will take place in May 2013.

There was a proposal to include into this table additional column, where the responsibilities of the organizations, including coordination, against the different MSFD descriptors to be identified. This will be done for all beneficiary countries in a special position paper of the MISIS project on the institutional framework of monitoring, its weaknesses and strengths, as well as on the options of further development.

ROMANIA

Funding in Romania for monitoring activities is provided, in general, on a regular basis, though sometimes with delays, which hampers the sustainability of the observations in terms of frequency per year. Certain overlaps are also encountered, which could be avoided through improved cooperation between the Ministry of Environment, Ministry of Education and Dobrogea Littoral Water Basin Administration.

Table 11. Organizations providing funding for monitoring in Romania

Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail)
Ministry of Environment and Forests	Avenue Libertăţii 12, Sector5, Bucharest Web: http://www.mmediu.ro	**Otilia Mihail**, Avenue Libertăţii 12, Sector 5, Bucharest Phone: +40 21 4089641 Email: otilia.mihail@mmediu.ro
Ministry of Health	Intr. Cristian Popişteanu, No. 1-3, Sector 1, Cod 010024, Bucharest Web: http://www.ms.gov.ro	Dr. **Adriana Cârlan** Email: adriana.carlan@ms.ro
Ministry of Education, Research, Youth and Sports /National Authority for Scientific Research	Str. Mendeleev, no. 21-25, cod 010362, Sector 1, Bucharest Web : http://www.ancs.ro	**Viorel Vulturescu** Tel: +40-21-319.23.26 / +40-21-319.23.27 / +40-21-319.23.28; Fax: +40-21-312.66.17 viorel.vulturescu@ancs.ro; media@ancs.ro
National Environmental Protection Agency	Splaiul Independentei Bd. No. 294, Sector 6, Bucharest, code 060031 Web: http://www.anpm.ro	
National Administration "Romanian Waters" Bucharest	Str. Edgar Quinet no. 6, Sector 1, Code 010018, Bucharest Web: www.rowater.ro	**Elena Tuchiu** +4021 3110146 / +4021 3122174
National Administration “Dobrogea Littoral” Water Basin Administration	Bd. Mircea Cel Batran no. 127 Constanta Web: www.waterct.ro	**Camelia Pulbere** +40241 673036 / +40241 673025
Ministry of Transport and Infrastructure (for ports areas sampling?)	Bd. Dinicu Golescu no. 38 Sector 1, Code 010873 Bucharest Web: http://www.mt.ro	**Olea Viorel Ion** Naval Direction +40 21 319 61 24
Romanian Academy of Science		
Ministry of Environment and Climatic Change through National Agency for Fisheries and Aquaculture (NAFA) – 50%	Str Transilvaniei, no.2, Sector 1, Bucharest Web: http://www.anpa.ro	**Constantin Stroe** +40 21 634 44 29, constantin.stroe@anpa.ro
DG MARE – European Commission – 50%	http://ec.europa.eu/dgs/maritimeaffairs_fisheries/index_en.htm	**Antonio Cervantes** Antonio.cervantes@ec.europa.eu

In Romania, fishery monitoring is financed by the National Agency for Fishery and Aquaculture and through projects. Between 2008-2012 fishery monitoring was financed by the Ministry of Agriculture through NAFA, from 2013 it will be financed by the Ministry of Environment and Climate Change through NAFA again. NAFA is presently under the Ministry of Environment and Climate Change, not under the Ministry of Agriculture

Some of the stakeholders contacted did not specify the sources of funding for their monitoring activities. Therefore, the list provided in Table 12 is not full and insufficiently reflects the financial mechanism in Turkey. The Ministry of Environment and Urban Planning (Urbanization) and the Ministry of Food, Agriculture and Livestock are the main funding organizations of monitoring. Funding is not always provided on a regular basis and is not sufficient to conduct an integrated monitoring with a required frequency (e.g. seasonal for standard hydrochemistry, biological quality parameters, etc.).

Table 12. Organizations providing funding for monitoring in Turkey

Name of organization		**Postal address/webpage**	**Contact person (address, tel/fax, e-mail)**
Ministry of Food, Agriculture and Livestock	DG Agricultural Research and Policy	Istanbul Yolu Uzeri Tarım Kampusu, P.K.51, 06171 Yenimahalle/ANKARA Tel:+90(312) 315 76 23 Fax:+90(312) 315 34 www.tagem.gov.tr	**Erdinc VESKE**, Technical Coordinator Tel: +90 312 343 20 59 /+90 312 315 76 23 – 237 erdincveske@gmail.com eveske@tagem.gov.tr
	DG Fisheries and Aquaculture	Balıkçılık ve Su Ürünleri Genel Müdürlüğü Eskişehir Yolu 9. km Lodumlu /ANKARA Tel: 0312 287 33 60 www.bsgm.gov.tr	**Erdinç GÜNEŞ** Head of Department Tel: +90 312 286 4901 /3018 erdinc.gunes@tarim.gov.tr
Ministry of Environment and Urbanization	DG, Environmental Impact Assessment, Permits and Auditing/Inspections	Haymana Yolu 5. Km. Gölbaşı/Ankara www.lab-cevreorman.gov.tr; http://www.csb.gov.tr/gm/ced/	Mr. **Bilat Dikmen** (Head of department) +90 312 498 21 50/ 1335, hselamoglu.caglayan@csb.gov.tr
	DG Environmental Management	http://www.csb.gov.tr/gm/cygm/index.php	Mr. **Murat Turan,** murat.turan@csb.gov.tr huri.eyuboglu@csb.gov.tr
Ministry of Forest and Water Management		http://www.ormansu.gov.tr/	

Note: Research/monitoring is often funded by projects, where these projects might be financed by different ministries, private sector, EU, and by different countries. None of the universities or their overarching organizations (such as the Ministry of Science and Technology, Council of Science and Technology and the Council of High Education) provide funds for routine monitoring, but only limited funds for field surveys for research.

To conclude on deficiencies in financing of monitoring.

In all beneficiary countries the financial mechanism, sustaining environmental monitoring programmes, is in need for improvement. In the case of Turkey and Bulgaria, financing for the implementation of monitoring programs is through competitive bidding, and usually for short periods of time which hampers the long-term development of the networks and investments in capacity building, as there are no long-term guarantees.

3. Type of monitoring, geographical scope, stations, parameters, frequency

In the beneficiary countries there is no common understanding of the different types of monitoring. For the purposes of this report the following explanations were given in the Questionnaire distributed to the Stakeholders:

- Environment routine complex monitoring;
- Ecotoxicological monitoring;
- Surveillance monitoring - it is usually the environment monitoring for trends (complex and routine monitoring);
- Compliance monitoring - it is the one checking the relevance of water quality and level of discharges against certain norms (governmentally established);
- Operational monitoring - real time (satellites, radars, any automatic devices working for real-time collection of data).

The 'Diagnostic Report' of the BSC (named here the Diagnostic Report I) has briefly discussed the monitoring systems in BG, RO and TR until 2009. A lot of changes were expected to happen in relation with the WFD and MSFD implementation in the years to come. Major targets enlisted were:

- **Maintain frequency of observations** – in line with WFD and MSFD (usually insufficiently attended);

- **Ensure proper geographical coverage** – include open sea (usually missing in observations;

- **Sustain stations and transects with long-term observations** (and create network of Reference stations);
- **Cover mandatory parameters and improve:**
  1. Fish and other marine living resources stock assessments;
  2. Cetaceans surveys;
  3. Marine Litter in the sea;
  4. Contamination of sediments and biota;
  5. Habitats mapping, biodiversity assessments, etc.

- **Provide for harmonization** - inter-comparison exercises, further development of guidelines, common understanding of GES, indicators, etc.;

- **Keep quality control and assurance** – sustainable mode of implementation for monitoring and data management.

In the Diagnostic Report I, better coordination between authorities involved, less complicated organization and availability of a strategy for integrated monitoring were the main improvements recommended for the national level. The financial assistance provided in a sustainable way was reminded as vital to better coordinate and plan activities in monitoring and reporting.

Supporting activities mentioned to be taken into consideration were:

- Utilization of the **capacities of all Institutes** dealing with monitoring in the country (not only of those officially nominated by the Ministries of Environment or others to implement National Programmes).

- **Avoiding overlapping of activities and efforts** – often two or more Institutes undertake observations in the same area without proper coordination.

- **Capacity building** – regular trainings, bringing best available practices to the country, strengthening the collaboration between different authorities engaged in monitoring, further development of inter-ministerial mechanism, etc.

Further this Report describes the monitoring status quo as per 2012, reflecting the changes which happened compared to the time when the Diagnostic Report I was published (in 2010). It deals mainly with the first 4 categories of monitoring mentioned above (environment routine, ecotoxicological, surveillance and compliance monitoring). The operational monitoring development has been poorly described by the contacted stakeholders, it is dealt with in separate at the end of the Chapter.

BULGARIA

Environment (including compliance) monitoring and fisheries-related monitoring are under the responsibility of two different Ministries – Ministry of Environment and Water, and Ministry of Agriculture and Forests, respectively. The Ministry of Environment has no scientific institution affiliated and for the Black Sea monitoring (WFD and MSFD implementation) used to appoint responsible organizations through tenders. Since 2011, IO-BAS is officially appointed through a Ministerial order as the responsible organization for MSFD and WFD monitoring (www.stz.riew.e-gov.bg/files/file/.../NAREDBA_1_ot_11042011.doc : Ordinance No.1/11.04.2011 of the Minister of Environment and water, Bulgaria; Ordinance / Ministerial order No 273 for protection of the environment in marine water and implementation of MSFD, 30.11.2010).

The pollution monitoring (in the sea) *sensu* MSFD is under the responsibility of IO-BAS, according to the Ministerial order No 273, mentioned above, and the hydrophysical parameters are officially responsibility of NIMH (National Institute for Hydrometeorology), including atmospheric pollution and sea level.

The compliance monitoring for various sources of land-based pollution is conducted by the Environmental Agencies of the Ministry of Environment (namely, Regional Inspectorates of Environment and Waters in Varna and Bourgas, as the Black Sea Basin Directorate in Varna is the main responsible body for the consequent data management). The Ministry of Agriculture through the Agricultural Academy directs the work of many scientific institutions, *inter alia* of the Institute of Fisheries in Varna (IFR). However, fisheries research is conducted not only by IFR-Varna, but also by the Institute of Oceanology (IO-BAS, Varna) since 2010, which is a Bulgarian Academy of Science (BAS)-subordinated organization. The Ministry of Agriculture also manages monitoring through tenders, which are often won by IO-BAS. Bathing water monitoring is under the responsibility of the Ministry of Health, and is implemented by its regional inspections.

There is no permanently established National Monitoring Program which would encompass the obligations under the WFD[23], Habitat Directive and MSFD in an integrated manner, on an annual basis and would also specify the provisions of its regular implementation. IO-BAS was recently appointed as the main implementing organization of MSFD-related monitoring (Ref. to Ordinance 1/11.04.2011, MOEW), a Program was developed (sampling stations, parameters, frequency) and its implementation started in 2012, when the Ministry of Environment for the first time provided funding. For the WFD-related monitoring, IFR and IO-BAS participate. For the Habitat Directives, IBER-BAS is also involved (e.g. it has participated in a NATURE2000 national Project: “Extension of Natura 2000 Marine protected areas”).

Map of the BG EEZ (meant to be covered by the MSFD) is given in Fig. 2. For the first time in 2012, the geographical coverage of the IO-BAS monitoring allowed for inclusion of stations beyond the area 30-40-miles offshore (which otherwise has been monitored since 1953 on a regular basis) so that to study BG waters in the whole EEZ. All other organizations, involved in a routine Black Sea environment monitoring, cover basically coastal waters only, or in rare cases the 30-miles zone (e.g. IFR, Varna, however, their observations are not regular during the last 10 years, as they used to be in 1953-2002.

[23] The monitoring *sensu* WFD has started in 2006 with the first phase ended in 2011. Since 2012, the second cycle/phase has begun and a national Monitoring is well established at present (20 stations, 13 water bodies). The second cycle is designed to fill in the gaps in the parameters observed (mandatory but not monitored during the first cycle), and to comply with the frequency of sampling required by the WFD.

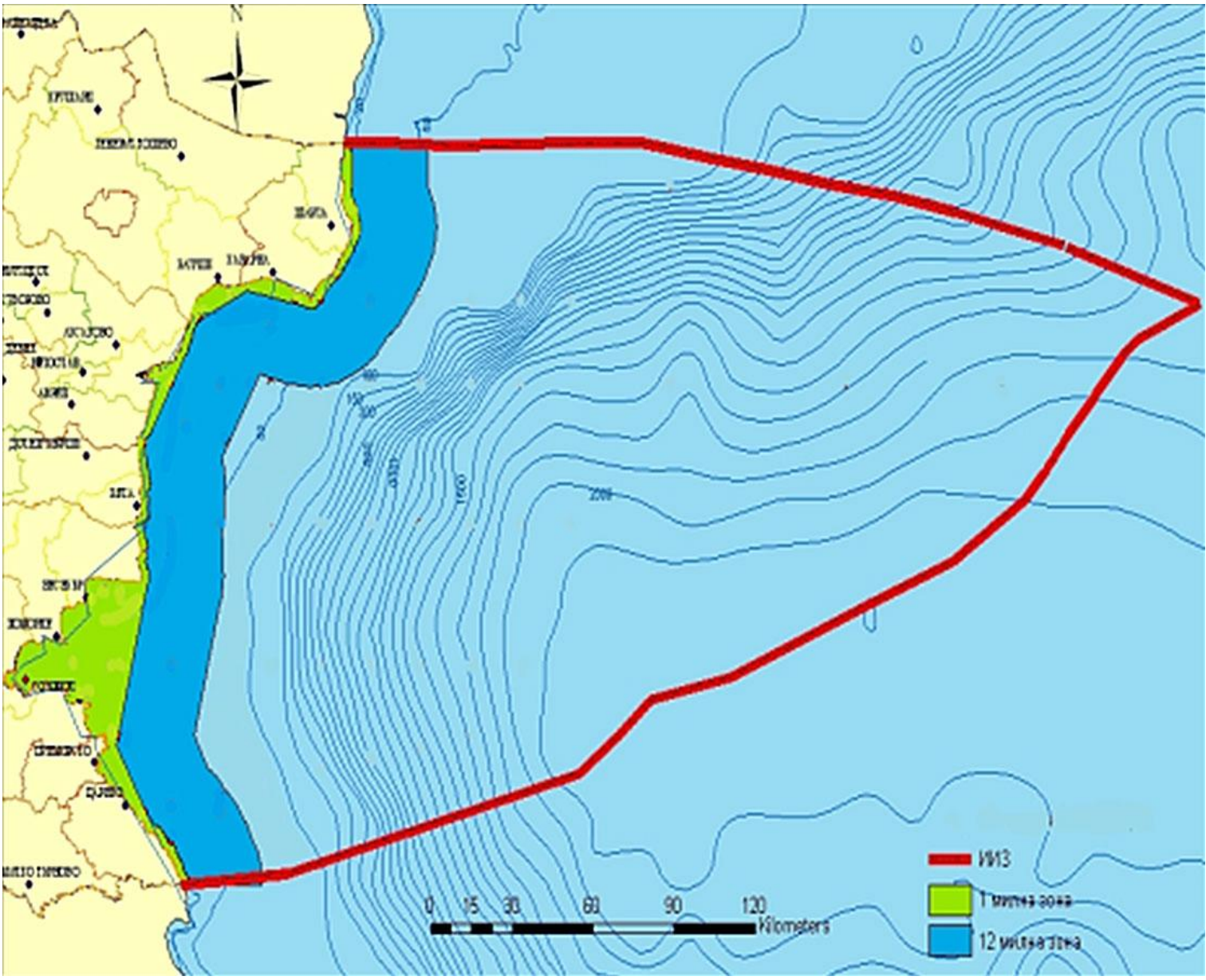


Figure 2. Bulgarian Black Sea waters (green - 1 mile zone, dark blue - 12 miles zone, red line - EEZ).

Table 13. Information on different types of Black Sea-related monitoring in Bulgaria

Responsible organization		Type of monitoring	Geographical scope	Number of stations	Parameters	Period Frequency	Related to human activity
Name	**National Monitoring Program[24]**						
Ministry of Environment and Water (MoEW)[25]	Yes[26]	Environmental routine and Compliance monitoring	Bulgarian, surface, ground and Black Sea waters				Public health, Coastal and urban development, marine and riverine traffic, fishery and aquaculture, tourism and recreation, offshore gas and oil exploitation, agriculture and farming, various branches of industries[27]
National Agency for Fishery and Aquaculture (NAFA)[28]	No[29]	Surveillance monitoring / demersal surveys and hydroacoustic survey /	Bulgarian Black Sea		Fishery	VMS – real time	Fishery and agriculture
Institute of Fishing Resources (IFR-Varna, NCAS)[30]	Yes	Environmental routine monitoring	Western Black Sea	15-35 (see Table 14, Fig. 3)	5-31 (see Table 15, 16)	1954-up to now (Seasonally, monthly)	Fishery and agriculture
	Yes	Trawl surveys	Western Black Sea	30	4-6	1980-2009 (1-2 times per year)[31]	
Institute of Biodiversity and Ecosystem Research-BAS, Laboratory of Marine Ecology (IBER-BAS)[32]	No	Surveillance monitoring (see Table 17)	South Bulgarian Black Sea (Bourgas Bay, Cape Maslen and Sozopol Bay)	1-10 (see Table 18, Fig. 4)	6-11 (see Table 19, 20)	Since 1983 (May-August basically) (see Table 19)	Public health, Coastal and urban development, marine and riverine traffic, fishery and aquaculture, tourism and recreation, agriculture and farming, various branches of industries
Institute of Oceanology-BAS (IO-BAS)[33]	Yes[34]	Environment routine complex monitoring	Bulgarian Black Sea area (coastal, EEZ, open sea)	69 +18 (see Table 21, 22, Fig. 5)	28 (see Table 23, 24)	irregular	Public health, Coastal and urban development, marine and riverine traffic, fishery and aquaculture, tourism and recreation, agriculture and farming
		Surveillance monitoring	Bulgarian Black Sea area	45 (Fig. 6, 7)	28	irregular	
		Operational monitoring	Bulgarian Black Sea area	1 + satellite	3		
National Institute of Meteorology and Hydrology, BAS (NIMH)[35]	Yes	Environment routine	Bulgarian Black Sea area	2 climatic coastal stations	Wind and other meteorological measurements	Since 1997	Various
		Environment routine	Black Sea[36]		Wind stress and shear; Salinity and temperature of the water column; Heat fluxes between the water column and the atmosphere; Precipitation and evaporation	Since 1991	
Regional Health Inspectorate[37]	Yes	Compliance	BG Black Sea coastal area	129	microbiology, hydrochemistry	Annually from May to September	Tourism and recreation

[24] Is the organization part of a National Monitoring Program?

[25] Governmental. Postal address: 22 Maria-Louisa Blvd.q 1000 Sofia , Bulgaria; http://www3.moew.government.bg/. Contact person: Ivelina Vassileva, Deputy minister, Tel: 00359 2/ 940 61 81; E-mail: ivvasileva@moew.government.bg

[26] The Ministry participates at the management level. It is responsible for the overall planning, operation, financing, IT assurance and methodological supervision of the National System for Environmental monitoring.

[27] Additionally: all human activities, where the EIA, SEA, IPPC permits and assessments according to Bird Directive and Habitats Directive are required.

[28] Governmental. National Agency for Fishery and Aquaculture. Postal address: Sofia, 1606, ul. Hristo Botev, 17; www.iara.government.bg; e-mail: office@iara.government.bg; Tel: 00359 2 80 51 666; Fax: 00359 2 80 51 686.

[29] The organization itself is not performing the monitoring, but financing and supervising the results, using them for decision-making. The policy document for the surveillance monitoring organised by NAFA is: Bulgarian national programme for collection, management and use of fisheries data. For the surveys, tenders are announced and they are carried out by different scientific institutions. Vessel Monitoring automated System (Fishing Vessel Monitoring System) is functional for vessels over 15 m overall length (Remark: in compliance with the EU legislation, all EU vessels with 12 m overall length or more should have installed on board equipment for VMS not later than 1st of January 2012). To serve the needs of management, NAFA has established and manages Information Statistics System (ISS).

[30] Governmental. Institute of Fishing Resources (subordinated to the National Center of Agricultural Sciences (NCAS), former Agricultural Academy of Science (AAS), which is affiliated to the Ministry of Agriculture and Forestry). Postal address: Bul. Primorksy, 4, PO Box. 72. Contact person: Vesselina Mihneva, e-mail: vvmihneva@yahoo.com

[31] Twice per year fisheries surveys since 2006-2010 under DCR (199/2008). Before that irregularly. Market sampling programs since 50s.

[32] Governmental. Subordinated to Bulgarian Academy of Science (BAS). Postal address: 2, Gagarin Str, 1113 Sofia, Bulgaria www.iber.bas.bg; Contact person: Dr Ventzislav Karamfilov; 2, Gagarin Str, 1113 Sofia, Bulgaria;Tel: +359 888514110; Fax: +359 2 8705498; E: karamfilov.v@gmail.com

[33] Governmental. Subordinated to Bulgarian Academy of Science (BAS). Postal address: Parvi Mai str.No 40, P.O. Box 152, 9000 Varna, Bulgaria; Contact person: Prof. Snejana Moncheva, Tel/fax: +359 52 370485; e-mail: snejanam@abv.bg

[34] Monitoring under WFD and MSFD.

[35] Governmental, subordinated to BAS. Postal address; 68, Tsarigradsko schausse, Sofia 1784. Contact person: Prawda Dimitrova, tel: 00359 2 462 46 10, e-mail: prawda.dimitrova@meteeo.bg. The Varna branch is with address: Sv.Nikola, No 10; 9005, Varna; Contact person: Ivan Ivanov (Director), Tel: +359 52 302 256; e-mail: ivan.ivanov@meteo.bg

[36] In NIMH, the Black Sea climatological data are compiled using almost all available data sources together with some model simulations. The grid is 1/9 deg.(zonal) x 1/12 deg.(meridional) degree - 133 x 76 grid points for 12 months. Start point (1,1) has coordinates 27.38E, 40.45N

The IFR, Varna, Bulgaria monitoring is described in detail below.

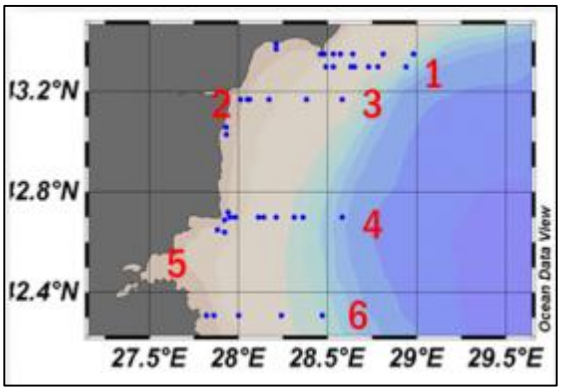
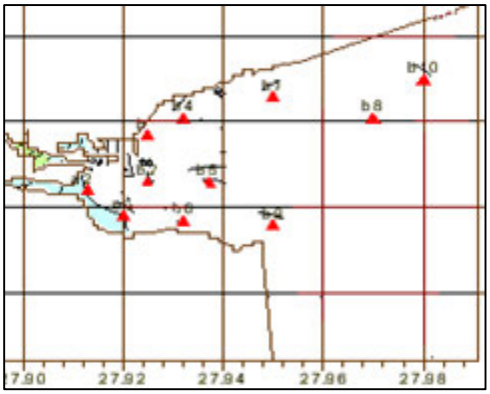
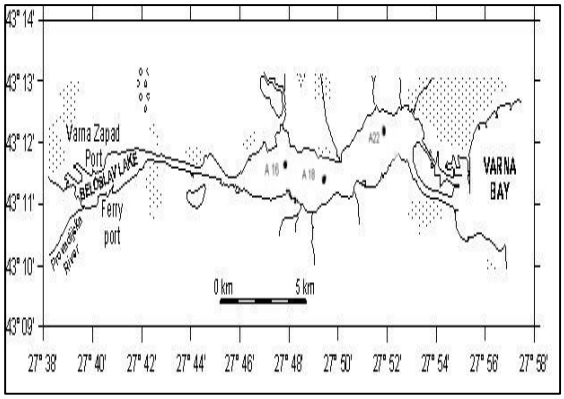
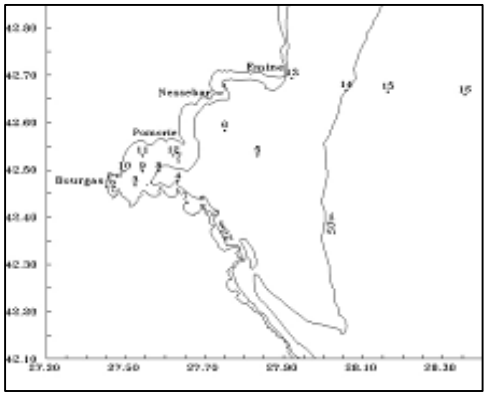
<table>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>The Bulgarian Black Sea: 1 – Cape Kaliakra; 2 – Varna Bay; 3 – Cape Galata; 4 – Cape Emine; 5 – Bourgas Bay; 6 – Cape Maslen (Maslen nos)</td><td>The Bay of Varna</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Beloslav and Varna Lakes
(connected to the Bay of Varna)</td><td>The Bay of Bourgas</td></tr>
</table>

Figure 3. Maps of sampling stations monitored by IFR-Varna, Bulgaria

[37] Subordinated to the Ministry of Health. Postal address: 9000, Varna, Bregalnitza 3 RZI, Bulgaria; webpage: www.rzi-varna.com; Contact person: Bozhanka Georgieva MD, Chief of Inspectorate; Tel/fax 00359 52 634019; 00359 52 634 648

Table 14. List of coordinates of stations monitored by IFR-Varna, Bulgaria

N of station	Coordinates		Area/name of transect*	Type of station**
K1	43◦ 21.00	28◦ 29.00	Kaliakra transect	Marine waters
K3	43◦ 19.60	28◦ 31.20	Kaliakra transect	Marine waters
K10	43◦ 15.00	28◦ 38.20	Kaliakra transect	Marine waters
K20	43◦ 08.60	28◦ 48.40	Kaliakra transect	Marine waters
K30	43◦ 02.00	28◦ 59.00	Kaliakra transect	Marine waters
G1	43◦ 10.00	27◦ 59.50	Galata transect	Marine waters
G3	43◦ 09.40	28◦ 01.00	Galata transect	Marine waters
G10	43◦ 07.50	28◦ 10.00	Galata transect	Marine waters
G20	43◦ 03.50	28◦ 22.60	Galata transect	Marine waters
G30	43◦ 00.00	28◦ 35.00	Galata transect	Marine waters
E1	42◦ 42.20	27◦ 55.50	Emine transect	Marine waters
E3	42◦ 42.20	27◦ 58.00	Emine transect	Marine waters
E10	42◦ 42.20	28◦ 08.00	Emine transect	Marine waters
E20	42◦ 42.20	28◦ 21.50	Emine transect	Marine waters
E30	42◦ 42.20	28◦ 35.00	Emine transect	Marine waters
M1	42◦ 12.20	27◦ 45.50	Maslen nos transect	Marine waters
M3	42◦ 12.20	27◦ 48.00	Maslen nos transect	Marine waters
M10	42◦ 12.20	27◦ 58.00	Maslen nos transect	Marine waters
M20	42◦ 12.20	28◦ 11.50	Maslen nos transect	Marine waters
M30	42◦ 12.20	28◦ 25.00	Maslen nos transect	Marine waters
V1	42◦ 12.84	27◦ 56.14	Varna Bay	Coastal waters
V2	42◦ 10.47	27◦ 53.12	Varna Bay	Coastal waters
V3	43◦ 11.28	27◦ 56.08	Varna Bay	Coastal waters
V4	43◦ 12.33	27◦ 56.28	Varna Bay	Coastal waters
V5	42◦ 12.23	27◦ 56.41	Varna Bay	Coastal waters
V6	43◦ 11.16	27◦ 37.03	Varna Bay	Coastal waters
V7	43◦ 12.13	27◦ 56.81	Varna Bay	Coastal waters
V8	43◦ 11.89	27◦ 56.98	Varna Bay	Coastal waters
V9	43◦ 12.43	27◦ 55.91	Varna Bay	Coastal waters
B1	42◦37.16	27◦53.43	Bourgas Bay	Coastal waters
B2	42◦34.41	27◦51.38	Bourgas Bay	Coastal waters
B3	42◦24.94	27◦45.85	Bourgas Bay	Coastal waters
B4	42◦29.05	27◦38.86	Bourgas Bay	Coastal waters
B5	42◦30.03	27◦33.59	Bourgas Bay	Coastal waters
B6	42◦34.90	27◦45.01	Bourgas Bay	Coastal waters
B7	42◦23.74	27◦50.31	Bourgas Bay	Coastal waters
B8	42◦29.20	27◦46.44	Bourgas Bay	Coastal waters
B9	42◦28.10	27◦26.17	Bourgas Bay	Coastal waters
B10	42◦31.01	27◦43.78	Bourgas Bay	Coastal waters

*e.g. Varna Bay, or Constanta / Mamaia transect, etc.
**transitional, coastal or marine waters;
Note: There are no Reference stations specified.

Table 15. List of parameters monitored by IFR-Varna, Bulgaria

Parameter	Analytical Method*	Frequency			
		Water (specify Surface/Depth/Layer**)	Sediment	Biota	On-Coast
Temperature *(sea water)*		Seasonally and monthly	N/A	N/A	N
Salinity		Seasonally and monthly	N/A	N/A	N/A
Density		Seasonally and monthly	N	N/A	N/A
Oxygen		Seasonally and monthly	N	N/A	N
Chlorophyll-a		Seasonally and monthly	N/A	N/A	N/A
Nitrite		Seasonally and monthly	N	N	N
Nitrate		Seasonally and monthly	N	N	N
Phosphate		Seasonally and monthly	N	N	N
Silicate		Seasonally and monthly	N	N	N
Ammonia		Seasonally and monthly	N	N	N
Total nitrogen		Seasonally and monthly	N	N	N
Total phosphorus		Seasonally and monthly	N	N	N
Suspended and organic matter		Seasonally and monthly	N	N/A	N
Transparency	Secchi Disk	Seasonally and monthly	N/A	N/A	N/A
Bacterioplankton density		Seasonally and monthly	N	N/A	N/A
Bacterioplankton biomass		Seasonally and monthly	N	N/A	N/A
Phytoplankton species composition	Moncheva 2010	Seasonally and monthly	N	N/A	N/A
Phytoplankton density	Moncheva 2010	Seasonally and monthly	N	N/A	N/A
Zooplankton species composition	Korshenko & Aleksandrov 2009	Seasonally and monthly	N/A	N/A	N/A
Zooplankton density	Korshenko & Aleksandrov 2009	Seasonally and monthly	N/A	N/A	N/A
Zooplankton biomass	Korshenko & Aleksandrov 2009	Seasonally and monthly	N/A	N/A	N/A
Benthic macrofauna diversity and abundance	Konsulova & Todorova 2005	Seasonally and monthly	Y	N/A	N/A
Benthic macrofauna wet weight biomass	Konsulova & Todorova 2005	Seasonally and monthly	Y	N/A	N/A
Planktonic larval fish		Seasonally and monthly	N/A	N/A	N/A
Fisheries investigations: Fish age, length (biological specimen length), Weight, Abundance, Fish stock density (some from acoustic records), Sex, Maturity, Growth, Recruitment. Biochemical and genetic analyses, Statistics for catches		Trawl surveys (1-2 times per year) and monthly samples	N/A	N/A	N/A
Marine mammals – sightings, stranding, anatomy, pathology, ecology		Seasonally and monthly	N/A	N/A	N/A

*Analytical methods are described in detail on the web page of the project UpGrade Black Sea Scene: www. blackseascene.net
** The observations in the water column are performed at standard depths: 0, 10, 25, 50, 75, 100 and 150 m.

The time-series data of IFR-Varna provide for long-term trends specified as follow:

Table 16. Time series data of IFR-Varna (Bulgaria) providing for trends

Parameter	Trend (Yes/No)			
	Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Temperature	Layers/Whole water column	N/A	N/A	N
Salinity	Layers/Whole water column	N/A	N/A	N/A
Nitrite	Layers/Whole water column	N	N	N
Nitrate	Layers/Whole water column	N	N	N
Oxygen	Layers/Whole water column	N	N/A	N
Phytoplankton	Layers/Whole water column	N	N/A	N/A
Zooplankton	Layers/Whole water column	N/A	N/A	N/A
Zoobenthos	Y	Y	N/A	N/A
Fish population parameters	Y	N/A	N/A	N/A

*on coast: monitoring at land-based point sources like at waste water discharges or at rivers

In 2011, part of the monitoring under the WFD was carried out by IFR-Varna. Cruises have been organised in July and August in the 1-miles zone along the Bulgarian Black Sea coast (Shabla to Koketraiz, coordinates are given below). The investigated parameters included – temperature, salinity, water transparency, oxygen concentration and saturation, nutrients – (N- and P- species), chl a, phytoplankton and benthos abundance and biomass.

- Albena - 43o21,9' N; 028o07,1'E
- Balchik -43o23,1' N; 028o08,7'E
- Cape Kaliakra -43o20,9' N; 028o27,5'E
- Ilandjik -43o03,4' N; 027o56,0'E
- Kamchia (river) -43o01,9' N; 027o54,7'E
- Dvoinica -42o43,3' N; 027o54,6'E
- Cape Emine -42o41,3' N; 027o55,0'E
- Nessebar -42o38,5' N; 027o44,0'E
- Koketrais -42o38,7' N; 027o52,9'E

The IBER-BAS, Bulgaria monitoring is described in detail below.

Table 17. Information on the surveillance monitoring carried out by IBER-BAS, Bulgaria

Type of monitoring*	Geographical scope	Time period (from-to)	Frequency (from-to)	Number of stations	Number of parameters
Surveillance monitoring	Sozopol Bay	1984-1997	May 1984 - August 1997	4	9
Surveillance monitoring	Sozopol Bay	2000-2001	May 2000 - August 2001	5	11
Surveillance monitoring	Sozopol Bay	2004-2005	May 2004 - December 2005	8	11
Surveillance monitoring	Bourgas Bay	2009-2011	June 2009 - June 2011	10	9
Surveillance monitoring	Bourgas- Cape Maslen Nos	05.2009-09.2011		7	6

*Environment routine complex monitoring; Ecotoxicological monitoring; Surveillance monitoring; Compliance monitoring; Operational monitoring (based on real-time observations

Figure 4. Map of sampling stations of IBER-BAS

left – Bourgas Bay;
right – Sozopol Bay.

Note: both Bays are in the South Bulgarian Black Sea

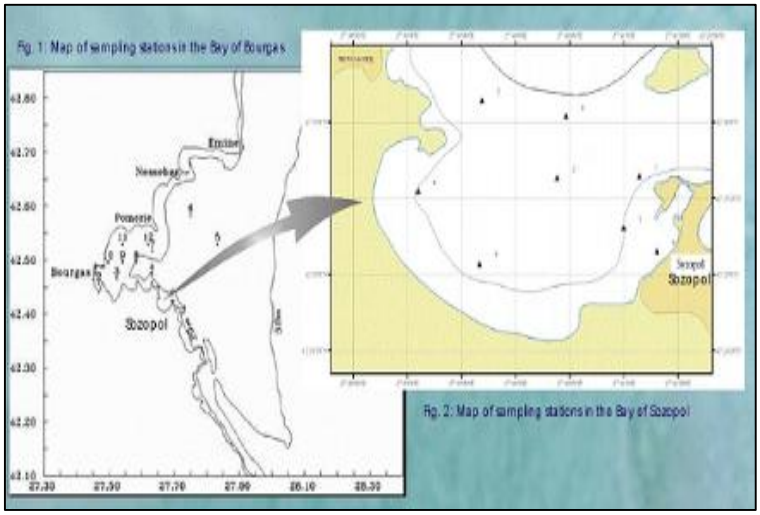


Table 18. Coordinates of stations of IBER-BAS. Bulgaria

N of station	Coordinates	Area/name of transect*	Type of station**
Sozopol01_1	42.423”N 27.699”E	Sozopol Bay	Coastal waters
Sozopol01_2	42.427”N 27.706”E	Sozopol Bay	Coastal waters
Sozopol01_3	42.434”N 27.721”E	Sozopol Bay	Coastal waters
Sozopol01_4	42.442”N 27.740”E	Sozopol Bay	Coastal waters
Sozopol02_1	42.423”N 27.699”E	Sozopol Bay	Coastal waters
Sozopol03_0	42.419”N 27.688”E	Sozopol Bay/Zl.ribka	Sewage waters
Sozopol03_1	42.422”N 27.683”E	Sozopol Bay/Zl.ribka	Coastal waters
Sozopol03_2	42.427”N 27.673”E	Sozopol Bay/Zl.ribka	Coastal waters
Sozopol03_3	42.426”N 27.652”E	Sozopol Bay/Zl.ribka	Coastal waters
Sozopol03_4	42.418”N 27.661”E	Sozopol Bay/Zl.ribka	Coastal waters
Sozopol04_0	42.419”N 27.688”E	Sozopol Bay/Zl.ribka	Coastal (nearby sewage disposal)
Sozopol04_1	42.422”N 27.683”E	Sozopol Bay/Zl.ribka	Coastal waters
Sozopol04_2	42.427”N 27.673”E	Sozopol Bay/Zl.ribka	Coastal waters
Sozopol04_3	42.427”N 27.686”E	Sozopol Bay/Zl.ribka	Coastal waters
Sozopol04_4	42.434”N 27.674”E	Sozopol Bay/Zl.ribka	Coastal waters
Sozopol04_5	42.436”N 27.661”E	Sozopol Bay/Zl.ribka	Coastal waters
Sozopol04_6	42.426”N 27.652”E	Sozopol Bay/Zl.ribka	Coastal waters
Sozopol04_7	42.418”N 27.661”E	Sozopol Bay/Zl.ribka	Coastal waters
Sozopol05_1	42.443”N 27.49”E	Bourgas Bay/Kraimorie	Coastal waters
Sozopol05_2	42.455”N 27.543”E	Bourgas Bay/Chukalq	Coastal waters
Sozopol05_3	42.459”N 27.595”E	Bourgas Bay/Atia	Coastal waters
Sozopol05_4	42.456”N 27.625”E	Bourgas Bay/Akin	Coastal waters
Sozopol05_5	42.424”N 27.703”E	Bourgas Bay/cape Sozopol nos	Coastal waters
Sozopol06_6	42.374”N 27.725E	Bourgas Bay/Agalina	Coastal waters
Sozopol05_7	42.306”N 27.79”E	Bourgas Bay/cape Maslen nos	Coastal, reference station
Sozopol05_8	42.409”N 27.675”E	Bourgas Bay/Zl.ribka	Coastal waters
Sozopol05_9	42.407”N 27.682”E	Bourgas Bay/Zl.ribka	Coastal waters
Sozopol05_10	42.427”N 27.687”E	Bourgas Bay/Zl.ribka	Sewage waters
1	N42.44401 E27.49830	Kraimorie	Coastal waters
2	N42.46203 E27.58741	Atia	Coastal waters
3	N42.42664 E27.69944	Sozopol N	Coastal waters
4	N42.42443 E27.69858	Sozopol S	Coastal waters
5	N42.37196 E27.71556	Agalina	Coastal, reference station
6	N42.31334 E27.78456	Maslen Nos N	Coastal, reference station
7	N42.30624 E27.79076	Maslen Nos S	Coastal, reference station

*e.g. Varna Bay, or Constanta / Mamaia transect, etc.
**transitional, coastal or marine waters.

Table 19. List of parameters with frequency of observations carried out by IBER-BAS, Bulgaria

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Nutrients (NH_4^+, NO_3^-, NO_2^-, N tot, PO_4^{3+})	Standard colorimetric analyses	0; 3; 9 m (depth in the water column)/Monthly			
Chlorophyll a	Extraction method	0; 3; 9 m (depth in the water column)/Monthly			
Suspended matter	Gravimetric method	0;3;9 m (depth in the water column)/Monthly			
Primary production	^{14}C method	0 ;5 ;10 m (depth in the water column)/Monthly			
Transparency	Secchi depth Underwater solar radiance-PAR	Monthly			
Temperature		0; 3; 9 m/Monthly			
Salinity		0; 3; 9 m/Monthly			
Dry Biomass of Chlorophyta, Rhodophyta, Phaeophyta	(Littler&Littler,1980)	0-12 m (bottom depth)/once during summer			
Wet biomass of Chlorophyta, Rhodophyta, Phaeophyta	(Kalugina-Gutnik, 1977)	0-12 m (bottom depth)/once during summer			
Horizontal projected cover of Chlorophyta, Rhodophyta, Phaeophyta	(Ballesteros, 1992)	0-12 m (bottom depth)/once during summer			
Surface to Weight index of Chlorophyta, Rhodophyta, Phaeophyta	Minicheva et al., 2003	0-12 m (bottom depth)/once during summer			
Ecological Evaluation Index of Chlorophyta, Rhodophyta, Phaeophyta	Panayotidis et al., 2004	0-12 m (bottom depth)/once during summer			
Ecological Evaluation Index - Continuous	Orfanidis et al. 2011	0-12 m/once during summer			

Table 20. Time series data of IBER-BAS (Bulgaria) providing for trends

Parameter	Trend (Yes/No)			
	Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Nutrients	0; 3; 9 m			
Chl-A	0; 3; 9 m			
Temperature (water)	0; 3; 9 m			
Primary production	0; 3; 9 m			

IO-BAS, Varna, Bulgaria monitoring is described in detail below:

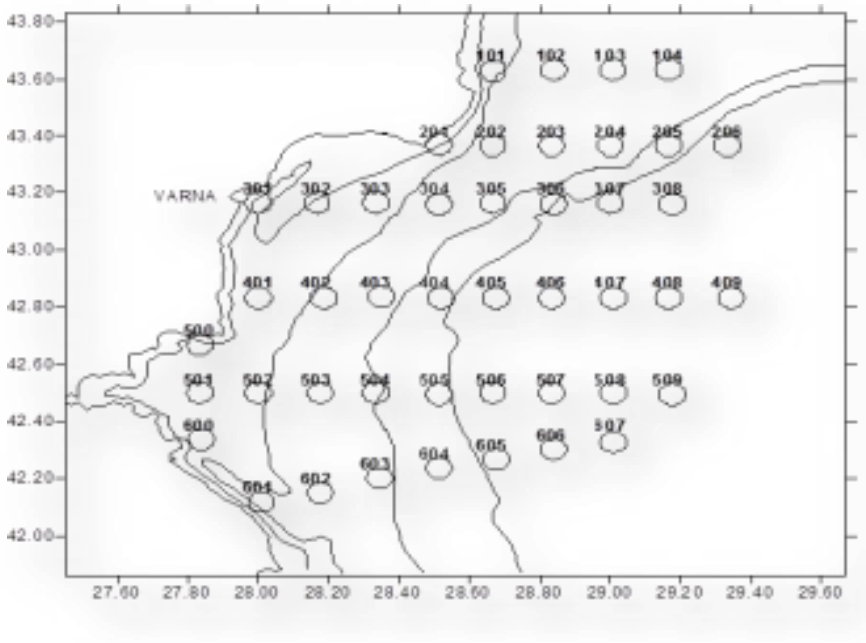


Figure 5. Map of IO-BAS, Varna, Bulgaria monitoring sampling stations (routine environment monitoring)

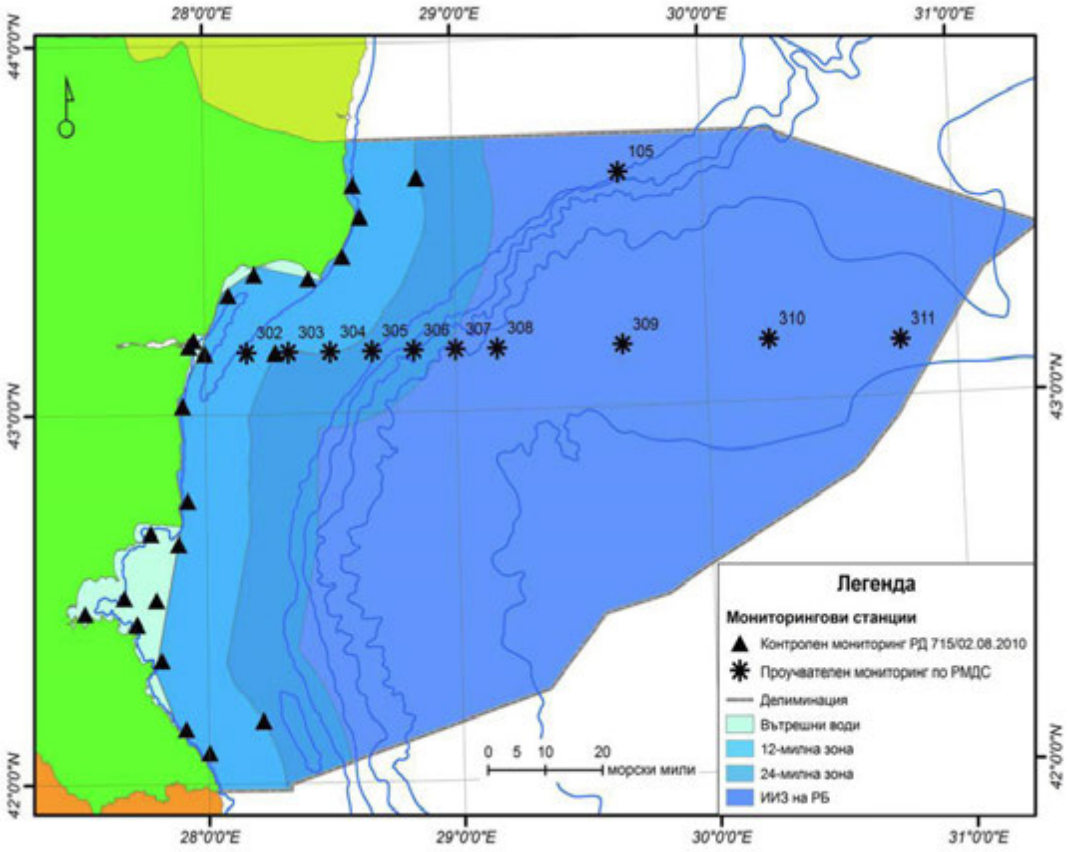


Figure 6. Map of coastal stations monitored for WFD and Galata transect stations monitored for MSFD in 2012 by IO-BAS, Varna, Bulgaria

Note: The coastal monitoring (WFD) is conducted starting 2006, 2008, 2010, 2011 and 2012.

Table 21. Coordinates of stations monitored by IO-BAS, Varna, Bulgaria under the MSFD (initiated in 2012)

No of station	Coordinates	Area/name of transect*	Type of station**
101	28˚ 40.00' E, 43˚ 38.00' N	Krapetz	coastal
102	28° 50.000' E, 43° 38.000' N	Krapetz	marine
103	29˚ 00' E, 43˚ 38' N	Krapetz	marine
104	29˚ 10' E, 43˚ 38' N	Krapetz	marine
105	29° 40.000' E, 43° 38.000' N	Krapetz	marine
201	28° 30.000' E, 43° 22.000' N	Kaliakra	coastal
202	28° 40.000' E, 43° 22.000' N	Kaliakra	marine
203	28˚ 50.00' E, 43˚ 22.00' N	Kaliakra	marine
204	29˚ 00' E, 43˚ 22' N	Kaliakra	marine
205	29˚ 10' E, 43˚ 22.00'N	Kaliakra	marine
206	29˚ 20' E, 43˚ 22.00'N	Kaliakra	marine
301	28° 00.000' E; 43° 10.000' N	Galata	coastal
302	28° 10.000' E; 43° 10.000' N	Galata	marine
303	28° 20.000' E; 43° 10.000' N	Galata	marine
304	28° 30.000' E; 43° 10.000' N	Galata	marine
305	28° 40.000' E; 43° 10.000' N	Galata	marine
306	28° 50.000' E; 43° 10.000' N	Galata	marine
307	29° 00.000' E; 43° 10.000' N	Galata	marine
308	29° 10.000' E; 43° 10.000' N	Galata	marine
309	29° 40.000' E; 43° 10.000' N	Galata	marine
310	30° 15.000' E; 43° 10.000' N	Galata	marine
311	30° 46.424' E; 43° 09.081' N	Galata	marine
401	28˚ 00' E; 42˚ 50.00' N	Emine	coastal
402	28˚ 10' E; 42˚ 50.00' N	Emine	marine
403	28˚ 20' E; 42˚ 50' N	Emine	marine
404	28˚ 30' E; 42˚ 50' N	Emine	marine
405	028˚ 40' E; 42˚ 50' N	Emine	marine
406	28˚ 50' E; 42˚ 50' N	Emine	marine
407	29˚ 00' E; 42˚ 50' N	Emine	marine
408	29˚ 10' E; 42˚ 50' N	Emine	marine
409	29˚ 20' E; 42˚ 50' N	Emine	marine
501	27˚ 50' E; 42˚ 30' N	Bourgas Bay	coastal
502	28˚ 00' E; 42˚ 30' N	Bourgas Bay	marine
503	28˚ 10' E; 42˚ 30' N	Bourgas Bay	marine
504	28˚ 20' E; 42˚ 30' N	Bourgas Bay	marine
505	28˚ 30' E; 42˚ 30' N	Bourgas Bay	marine
506	28˚ 40' E; 42˚ 30' N	Bourgas Bay	marine
507	28˚ 50' E; 42˚ 30' N	Bourgas Bay	marine
508	29˚ 00' E; 42˚ 30' N	Bourgas Bay	marine
509	29˚ 10' E; 42˚ 30' N	Bourgas Bay	marine
600	27˚ 50' E; 42˚ 20' N	Maslen nos	coastal
601	28˚ 00' E; 42˚ 07' N	Achtopol	marine
602	28˚ 10' E; 42˚ 09' N	Achtopol	marine
603	28˚ 20' E; 42˚ 12' N	Achtopol	marine
604	28˚ 30' E; 42˚ 14' N	Achtopol	marine
605	28˚ 40' E; 42˚ 16' N	Achtopol	marine
606	28˚ 50' E; 42˚ 18' N	Achtopol	marine
607	29˚ 00' E; 42˚ 20' N	Achtopol	marine
BG2BS00000MS001	28°35.50'; 43°35.25	Krapetz	coastal
BG2BS00000MS001”	28°36.788; 43°34.866	Krapetz’	coastal
BG2BS00000MS102	28°36.40; 43°32.00	Shabla	coastal
BG2BS00000MS002	28°33.202; 43°25.46	Rusalka	coastal
BG2BS00000MS003	28°25.00; 43°22.00	Kaliakra	coastal

No of station	Coordinates	Area/name of transect*	Type of station**
BG2BS00000MS104	28°12.00; 43°22.75	Balchik	coastal
BG2BS00000MS105	28°05.8; 43°19.50	Albena	coastal
BG2BS00000MS004	28°00; 43°10	Galata	coastal
BG2BS00000MS005	27°57.3; 43°12.10	Varna Bay - north	coastal
BG2BS00000MS006	27°56.2; 43°11.10	Varna Bay-South	coastal
BG2BS00000MS007	27°54.55; 43°01.50	Kamchia	coastal
BG2BS00000MS008	27°55.56; 42°46.10	Dvoinica	coastal
BG2BS00000MS009	27°46.7; 42°40.8	Nesebar	coastal
BG2BS00000MS011	27°31.00; 42°27.8	Rosenec	coastal
BG2BS00000MS010	27°40.33; 42°30.38	Sarafovo	coastal
BG2BS00000MS109	27°53.20; 42°38.8	Koketrais	coastal
BG2BS00000MS012	27°48.00; 42°30.019	Bourgas 2	coastal
BG2BS00000MS111	27°43.35; 42°26.00	Sozopol	coastal
BG2BS00000MS110	27°49.15; 42°20.17	Maslen nos	coastal
BG2BS00000MS112	27°54.75; 42°09.00	Varvara	coastal
BG2BS00000MS013	28°00.0; 42°05.00	Veleka	coastal

*e.g. Varna Bay, or Constanta / Mamaia transect, etc. **transitional, coastal or marine waters;
Note: No Reference stations are specified.

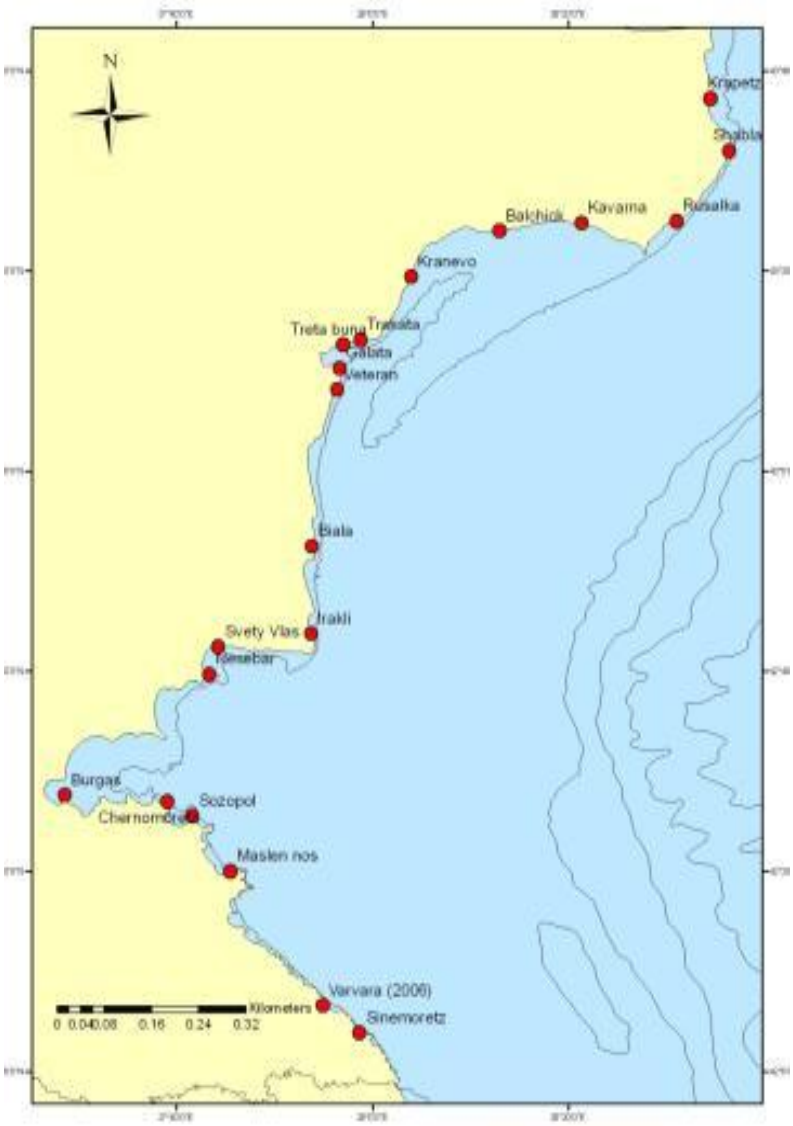


Figure 7. Map of coastal stations monitored for macrophytobenthos (WFD) by IO-BAS, Varna, Bulgaria

Table 22. Coordinates of stations monitored for macrophytobenthos (WFD) by IO-BAS, Varna, Bulgaria

N of transect	Coordinates	Area name of transect*	Type of transect**
1.	43.638656°N; 28.578322°E	Krapetz	coastal waters
2.	43°37' 15,84" N; 28°34' 21,48"E	Shabla	coastal
3.	43°24'58,74"N; 28°30'58,44"E	Rusalka	coastal
4.	43°24'47,16"N; 28°21'14,22"E	Kavarna	coastal
5.	43°24'09,6" N; 28°10'16,98"E	Balchik	coastal
6.	43°19'23,28"N; 28°03'59,52"E	Kranevo	coastal
7.	43°10'15,24"N; 27°56'36,42"E	Galata	coastal
8.	43°07'47,52"N; 27°56'49,56" E	Veteran	coastal
9.	43°13'06,22"N; 27°58'47,84"E	Trakata	coastal
10.	43°12'41,26"N; 27°57'29,52"E	Treta buna	coastal
11.	42°52'28,4"N; 27°53'51,36"E	Biala	coastal
12.	42°43'45,11"N, 27°54'4,94"E	Irakly	coastal
13.	42°39'27,24"N; 27°43'54,6"E	Nesebar	coastal
14.	42°27'14,16"N; 27°29'03,06"E	Bourgas	coastal
15.	42°25'33,6"N; 27°41'40,86"E	Sozopol	coastal
16.	42°19'58,2"N; 27°45'33,96"E	Maslen nos	Coastal, reference
17.	42°03'47,28"N; 27°59'21,36"E	Varvara	Coastal, reference
18.		Sinemoretz	coastal, reference

Table 23. List of parameters with frequency of observations carried out by IO-BAS, Varna, Bulgaria

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Phytoplankton Biodiversity Abundance [cells/l] Biomass[mg/m3] Chlorophyll a [mg/m3]	Moncheva, Parr (2010)	Frequency: irregular Depths: surface, thermocline, chl.a maximum, 90m			
Zooplankton Biodiversity Abundance [ind/m3] Biomass[mg/m3]	Alexandrov, Korshenko, (2006)	Frequency: irregular Depths: upper mixed layer (UML), layer of thermocline, Cold Intermediate layer (CIL), deeper layer from the depth of sigma theta = 16.2 to the lower boundary of CIL			
Macrophytobenthos Biodiversity Biomass Ratio of tolerant and sensitive species; Ecological index	Kalugina-Gutnik, 1975; Minicheva-Algae manual http://www.blacksea-commission.org/l Orfanidis et al. 2001,2011.Dencheva 2012 (in print)	Bottom/ Once per year			

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Macrozoobenthos Biodiversity Abundance [ind/m2] Biomass[g/m2]	Todorova, Konsulova, 2005	Down to 100 m depth, once per year			
Fish Stock abundance and biomass, CPUA; CPUE; MSY, TAC; Fopt Length, weight growth and age	Swept area method Beverton&Holt (1957); Prodanov, 1989 Spare et al., 1989; Hilborn&Waters, 1992	Twice per year			
Mammals	Standard counting method	irregular			
Chemistry (pH, DO, OS, N-NH_4, N-NO_3, N-NO_2, TN, P-PO_4, TP, Si, BOD_5, Fe, Mn, Suspended matter)	pH-meters; DO-Winkler method; Nutrients -Methods of Seawater Analysis, ed. by K. Grasshoff (1983) Organic carbon in sediments – Methods for analysis of the organic matter in the ocean ed by Romankevich (1980)	Frequency: irregular Standard depths:- 0, 10, 25, 50, 75, 100, 150, 200m; Thermocline; Sigma theta - 15.4-16.2 (2008-2010)	Frequency: irregular Surface sediments		

Table 24. Time series data of IO-BAS, Varna, Bulgaria providing for trends

Parameter	Trend (Yes/No)			
	Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Phytoplankton	Surface/Depths/Integrated water column			
Zooplankton	Layers/Integrated water column			
Macrozoobenthos				
Macrophytobenthos				
Chemistry	Surface/Depths/Integrated water column			

*on coast: monitoring at land-based point sources like at waste water discharges or at rivers

The Black Sea NGO Network[38] has specified collection of socio-economic data, the sources have not been specified.

In Bulgaria the Environment Protection Agencies of the Ministry of Environment have not been contacted, the same stands for the NGOs implementing monitoring in relation to Cetaceans strandings, Habitats and Birds Directives (e.g. NGO Green Balkans, http://greenbalkans.org/index.php?language=en_EN). The information further provided was extracted from EEA, BSBD (Black Sea Basin Directorate, Varna, Bulgaria) and other reports, or personal communications.

The Regional Laboratories (Varna and Bourgas)[39] of the Executive Agency (EA) for Environment (in BG – RIOSV) conduct irregular hydrochemical monitoring in the 1-miles zone (Shabla, Varna Bay, Obzor, Bourgas, Achtopol) and also regularly trace land-based sources of pollution (compliance

[38] Non-governmental. Not part of national monitoring network. Postal address: No 2 D-r L. Zamenhof Str., Varna 9000, Bulgaria; Contact person: Emma Gileva, Tel: +359 52 615856/602047, e-mail: bsnn@bsnn.org, or emma_gileva@abv.bg

[39] Governmental. In Varna: ul. Ian Palah, 4, Varna, Bulgaria, phone +359 52 678 848; +359 52 678 888; In Bourgas: phone +359 56 813 205; fax: +359 56 813 200; e-mail: riosvbs@unacs.bg.

monitoring). Hot spots monitoring is well developed in Bulgaria for point sources (municipal, industrial and rivers). Diffuse sources of pollution are poorly known as they are not adequately monitored.

For emmissions there are two types of monitoring in Bulgaria – state and self-monitoring sustained by the private sector/industry. The state monitoring for private industrial sources is conducted twice a year (diurnal stations, or more often two samples in the course of 2 hours)[40], the self-monitoring in industry – regularly, and the latter is used to calculate loads. The parameters observed are regulated in relevant policy documents (see Chapter 1.1. on Legislation/policy of Bularia, e.g. Ordinance 6/9 of Nov. 2000[41]).

Data Collection Framework for the Common Fisheries Policy

The first Bulgarian National data collection programme developed in relation with the Council Regulation (EC) No 199/2008 corresponding to the rules of the Commission Decision 2008/XXX/EC covered the period of 2009-2010. The National programme aimed to give an overview of the current state of the Bulgarian fisheries sector (fisheries, aquaculture and processing industry) and apart of that the recreational and commercial fishing in inland waters. The overall coordination of the implementation of the Programme was ensured by the National Agency of Fisheries and Aquaculture (NAFA[42]) of the Ministry of Agriculture and Food of the Republic of Bulgaria. Two scientific institutes have implemented the Program – IO-BAS and IFR-Varna. Coordination with Romania has been ensured. The area investigated is presented in Figure 8.

The Program included surveys (4, acoustic investigations and bottom, and pelagic trawl surveys, Fig. 9) and data collection (economic data – fleet, fishing enterprises, gross value of landings, logbooks data, various costs, etc.). An information collection network was created in various fishing ports. The species investigated were: sprat, - and turbot. In acoustic and pelagic surveys together with sprat, whiting (M.merlangius) abundance, biomass and biological parameters have been investigated and reported. Market sampling program include sprat, turbot, anchovy, horse mackerel and whiting[43]. There was a proposal to include ichthyoplankton studies, Rapa whelk, piked dogfish and gobies[44] as well, but they are not yet approved and funded accordingly.

Biological sampling included many different parameters (mainly from land), for instance:

Species		Area	Growth		Maturity		Fecundity		Sex Ratio	
			Length	Weight	Length	Age	Length	Age	Length	Age
European sprat	*Sprattus sprattus*	Black Sea	*Y*	*Y*	*Y*	*Y*	*No*	*No*	*Y*	*Y*
Horse mackerel	*Trachurus mediterraneus*	Black Sea	*Y*	*Y*	*Y*	*Y*	*No*	*No*	*Y*	*Y*
Anchovy	*Engraulis encrasicolus*	Black Sea	*Y*	*Y*	*Y*	*Y*	*No*	*No*	*Y*	*Y*
Turbot	*Psetta maxima*	Black Sea	*Y*	*Y*	*Y*	*Y*	*No*	*No*	*Y*	*Y*

Legend: Y – yearly; No – surveys won't be undertaken as part of this program

[40] Twice a year RIOSV (the Regional Inspections of the EA for Environment) carries out control sampling and if individual emissions/discharges are found higher than the standards established in regulations, and then sanctions are imposed. In separate, for any discharge permission is required (Ordinance 10 of 3.07.2001) and in these permissions the required frequency of control sampling for the self-monitoring is identified. For instance, for large WWTP the frequency should be monthly at least, for small WWTP – less frequent. Additionally, there are complex permissions, issued by EA and controlled by its local laboratories (RIOSV) for those sources, which produce various kinds of pollution.

[41] The Ordinance regulates the emission standards (norms) on the permissible level of harmful and toxic substances in discharges entering different water bodies, the list of those substances which should be monitored is given for each kind of human activity related.

[42] One of NAFA's main activities is research of sustainable catch levels and determination of the national quotas of commercially important species. The agency is financially involved in trawl survey projects and in data processing. The FMC (fishery monitoring center) provides information stored in the FVMS (fishery vessel monitoring system) to support the surveys' reports preparation.

[43] Targeted fish stocks are also piked dogfish and Rapa.

[44] The 2 of these species (Rapa and gobbies) are object of evaluation of the EWG STECF (working group of the Scientific, Technical and Economic Committee for Fisheries, EC) for the Black Sea assessements since 2011.

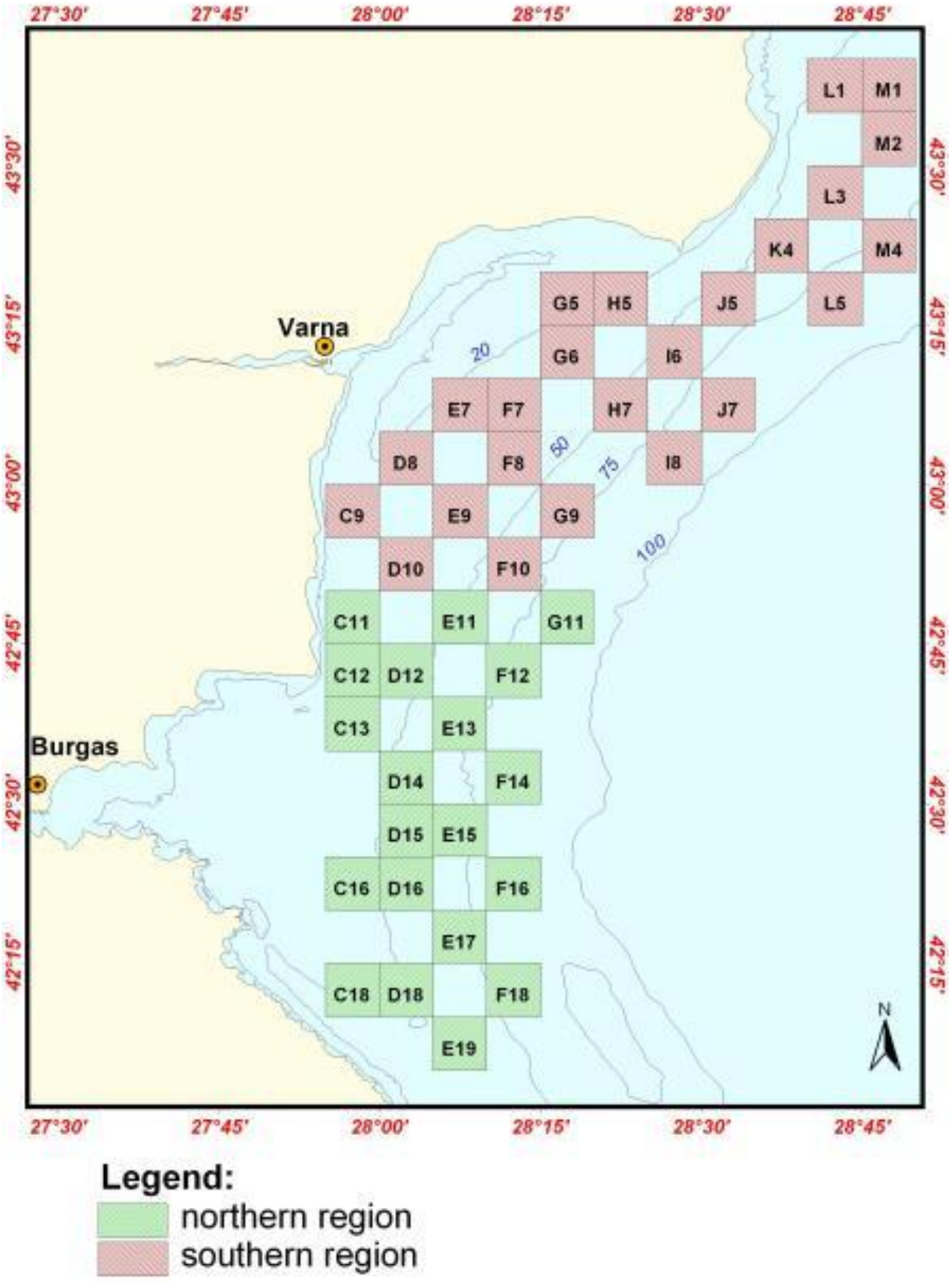


Figure 8. Fisheries research area in the Bulgarian Black Sea

Note: This is a map of a single survey, the areas are different each year depending on the fish species.

Figure 9. Example of a trawl survey in the Bulgarian Black Sea. Data from research survey in the Bulgarian BS marine area (tracks/trackpoints) from the VMS center of NAFA for observation and surveillance, Varna branch (WebOverMap module).

Note: IFR and IO-BAS have participated in the trawl surveys in 2007-2012, as the IFR data for sprat covers 2007-2009, IO-BAS – for 2010-2012; for turbot the IFR data are till 2010, then IO-BAS provided for the data collections.

Along the Bulgarian coast systematic surveys for habitat mapping are still lacking, some preliminary studies have been performed under the BBI MATRA Project 2006/031[45] and within a national NATURA 2000 Project 'Extension of Natura 2000 Marine protected areas" (Todorova *et al*., 2012[46]). Within these projects Todorova *et al.*
(2012, and http://www3.moew.government.bg/?show=top&cid=530) conducted studies and prepared inventory of Black Sea marine habitat subtypes in Bulgarian waters. They proved the boundaries of the currently existing sites under NATURE2000 should be redefined to encompass the habitat types of Annex I and Annex II species occurring in the Bulgarian Black Sea. Extension of the existing sites was proposed, details are provided in the MISIS MPAs report, prepared under PA4 (Ref: Conservation and Protection of the Black Sea Biodiversity, lead by GeoEcoMar, http://sharepoint.misisproject.eu/sharepoint).

The Common Bird Monitoring (CBM) scheme in Bulgaria started in 2004, following closely the methodology of Breeding Bird Survey in UK. It is the first nationwide program for assessing the condition of biodiversity in main habitat types across the country, including the BS coast. The scheme is based on a broad network of volunteers organized by the Bulgarian Society for the Protection of Birds (BSPB), the partner of BirdLife International in Bulgaria. The CBM scheme is part of the National System for Monitoring of Biodiversity, managed by the Executive Environmental Agency, Ministry of Environment and Water of Bulgaria. The CBM scheme in Bulgaria is funded by the Royal Society for the Protection of Birds (RSPB) and is part of the Pan-European Common Bird Monitoring Scheme (PECBMS). Information on the monitoring methodology applied, habitats investigated and data collected can be found at http://www.bspb.org/monitoring/ (in Bulgarian mainly).

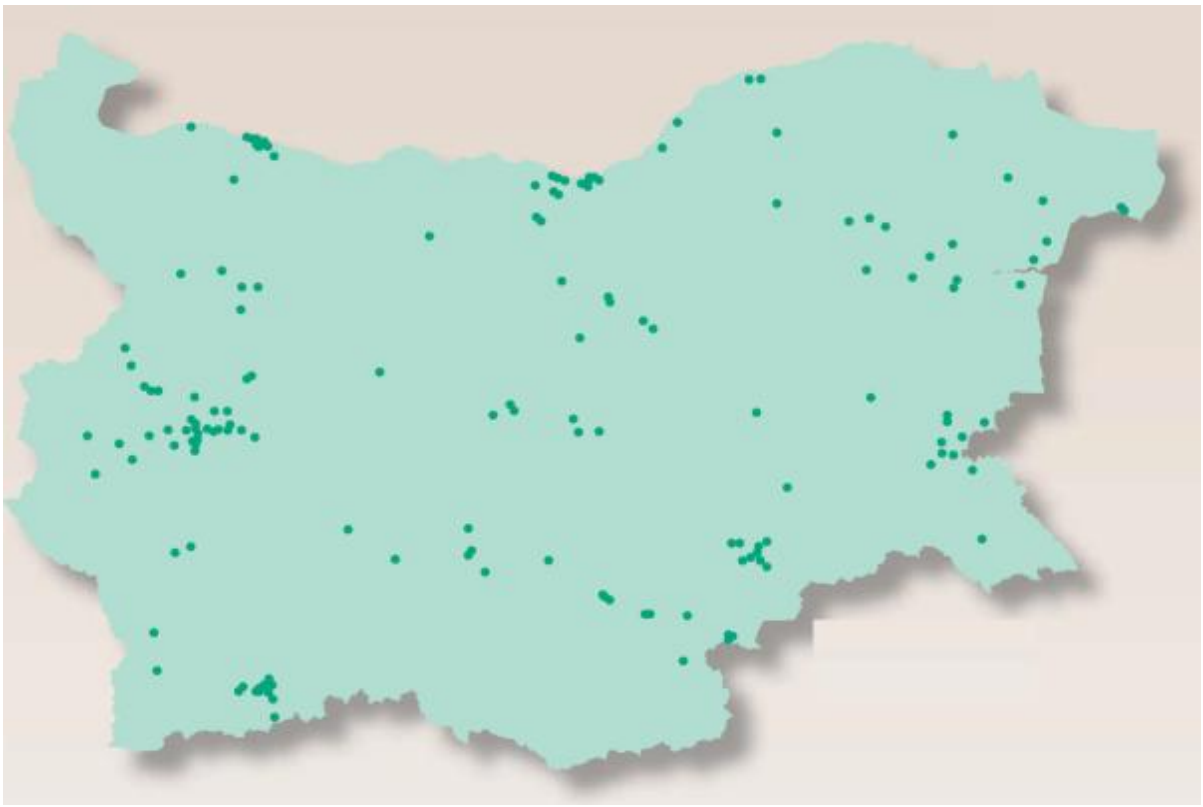


Figure 10. Map of sampling sites for birds monitoring in Bulgaria

[45] *See: www.eucc.nl/en/completed_projects/mpas.pdf*, "The development of an indicative, ecologically coherent network of sub-tidal Marine Protected Areas (MPAs) in Bulgaria and Romania", Project implemented in 2006-2008 by the EUCC-The Coastal Union, IO-BAS, Bulgaria and NIMRD, Romania. BBI MATRA funding programme of the Ministry of Agriculture, Nature and Food Quality and the Ministry of Foreign Affairs of the Netherlands.

[46] See: http://www3.moew.government.bg/?show=top&cid=530, general for NATURE2000: http://natura2000bg.org/natura/bg/index1.php (habitats) and http://natura2000bg.org/natura/bg/birds_map.php (birds).

Bathing water

The Regional Inspection for Protection and Control of Public Health (RIPCPH) traces the quality of bathing waters in the BG Black Sea (Figure 11).

- For Varna region samples are taken from 22 places, including 16 approved bathing areas and 1 unacknowledged bathing area.
- For Dobrich region, 18 bathing areas have been specified; these areas include 39 sea beaches.
- For Bourgas region, there are 39 bathing areas specified. Available are 68 sea beaches out of which 23 beaches labelled as “other places used for bathing in which bathing is not expressly prohibited”.

The parameters observed were:

- **Microbiological indicators**: number of coliform bacteria, faecal colibacteria, Salmonella and faecal streptococci.

- **Physical-chemical indicators**: pH, colour, mineral oils, SAS (Surface-active substances reacting with methylene blue), phenols, transparency, dissolved oxygen, standing or swimming objects, ammonic ions, cadmium, lead, nitrates, phosphates.

Under Directive 76/160/EEC, the parameters taken into account in assessments are reduced in number. They are: are microbiological (Total coliforms and Faecal coliforms) and physico-chemical (Mineral oils, SAS and Phenols). In 2012, the monitoring strategy has been upgraded with the introduction of Beach passports for every beach.

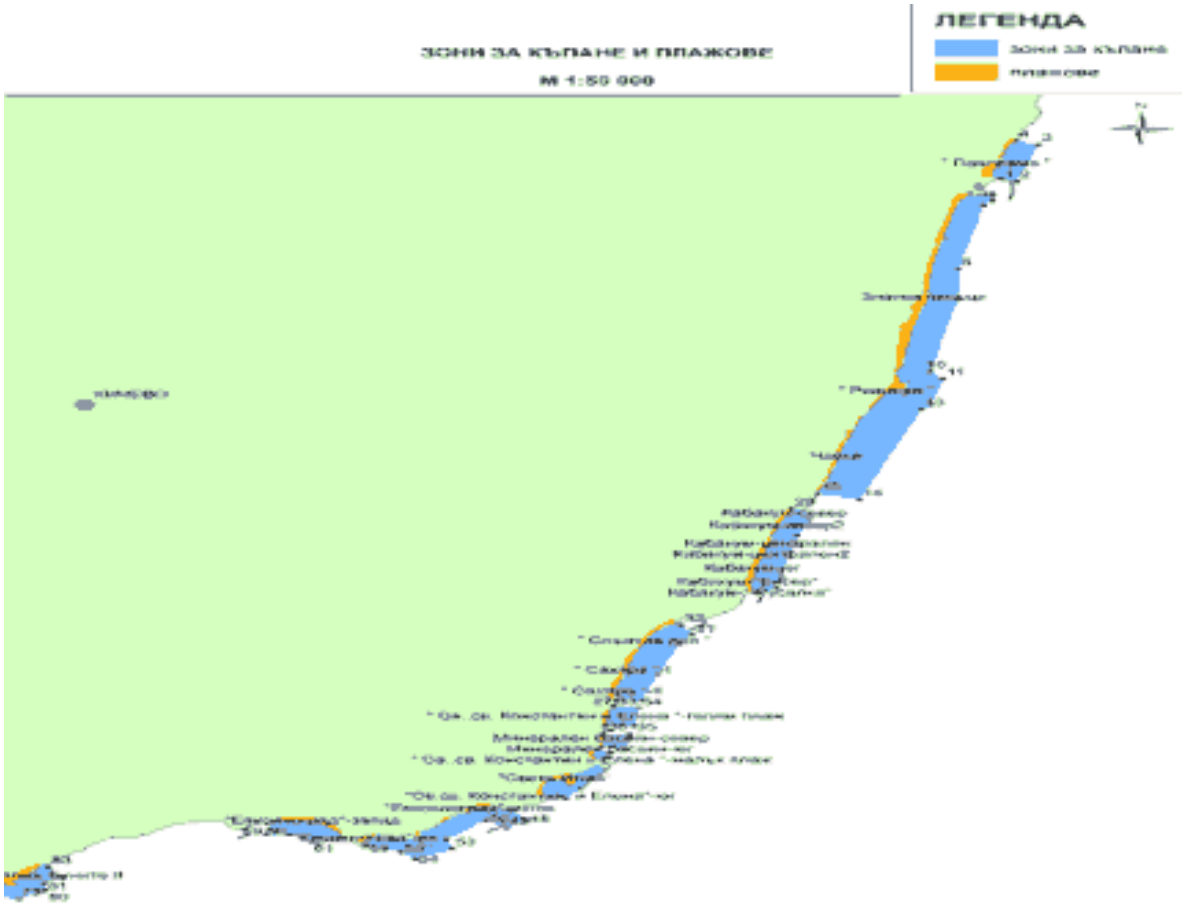


Figure 11. Map of bathing water monitoring areas in BG (example for the Northern part of the BG coast).

In Romania, the Ministry of Environment and Forests had previously an affiliated scientific Institute, which dealt with the monitoring under the country obligations related to the WFD and MSFD implementation – it was NIMRD (National Institute for Marine Research and Development 'Grigore Antipa', Constanta. However, the institutional framework of monitoring has been modified during the last year. The Ministry of Environment changed its name as well as functions. The new name is Ministry of Environment and Climate Change. NIMRD is presently affiliated to the Ministry of Education, and NAFA is not anymore under the Ministry of Agriculture (as mentioned already), but under the Ministry of Environment.

WFD monitoring is also conducted by Dobrogea Littoral Water Basin Administration, Constanta being affiliated to the Ministry of Water and Forests. Compliance monitoring for sources of pollution is also under the Ministry of Environment and is conducted by its Environmental Agencies (EPA, ANAR trace waste water discharges of municipal and industrial sources, NIMRD also monitors the Danube River discharges[47]). Bathing water monitoring is under the Ministry of Health, conducted by its regional inspections in Constanta and Tulcea. Fisheries monitoring was previously under the Ministry of Agriculture, since 2013 it will be under the Ministry of Environment and Climate Change.

NMA Meteo in Romania - National Meteorological Adminsitration has information stored in the National Fund of Meteorological Data as follows: direct sunlight and ultraviolet, opacity of the atmosphere, carbon dioxide, ozone, nitrogen dioxide, rainfalls and precipitation acidity (pH), atmospheric electricity, the total amount of ozone, frequency of monthly and annual wind directions and atmospheric calm. NMA Meteo provides real-time data for wind and feeds the circulation models in the region.

The Tulcea division of EPA conducts no monitoring in the Black Sea, but in the Danube Delta. Coast guard (border police) is also not involved in environment monitoring but supports the control on illegal fishing and illegal discharges from ships. The **Border Police General Inspectorate** informed on the availability of surveillance/tracking systems**,** such as **SCOMAR, BLUE BORDER MARGOT 8000**, where vessels are monitored[48], however, it is also possible to trace pollution sources located in the Romanian territorial sea and contiguous zone of Romania. SCOMAR (Complex System for Observance, Surveillance and Control of the Traffic at the Black Sea) is an operative surveillance system allowing early detection, pursuit, recognition and identification of ships which are carrying out illegal traffic activities at the Black Sea
(http://www.politiadefrontiera.ro/securizare/scomar_en.php)

[47] Main responsible organizations for the control on land-based sources of pollution in Romania:
- Ministry of Environment and Forests;
- Ministry of Transports;
- Ministry of Agriculture and Rural Development;
- National Administration "Romanian Waters";
- Environmental Protection Agency (EPA);
- National Environment Guard;
- National Institute for Marine Research and Development (NIMRD).

[48] Systems used for maritime safety and security, protection of the marine environment, fisheries control, control of external borders and other law enforcement activities

The map of Romanian waters (EEZ) is presented in Figure 12. The present geographical coverage of the monitoring system in RO does not cover the whole area of interest *sensu* the MSFD.

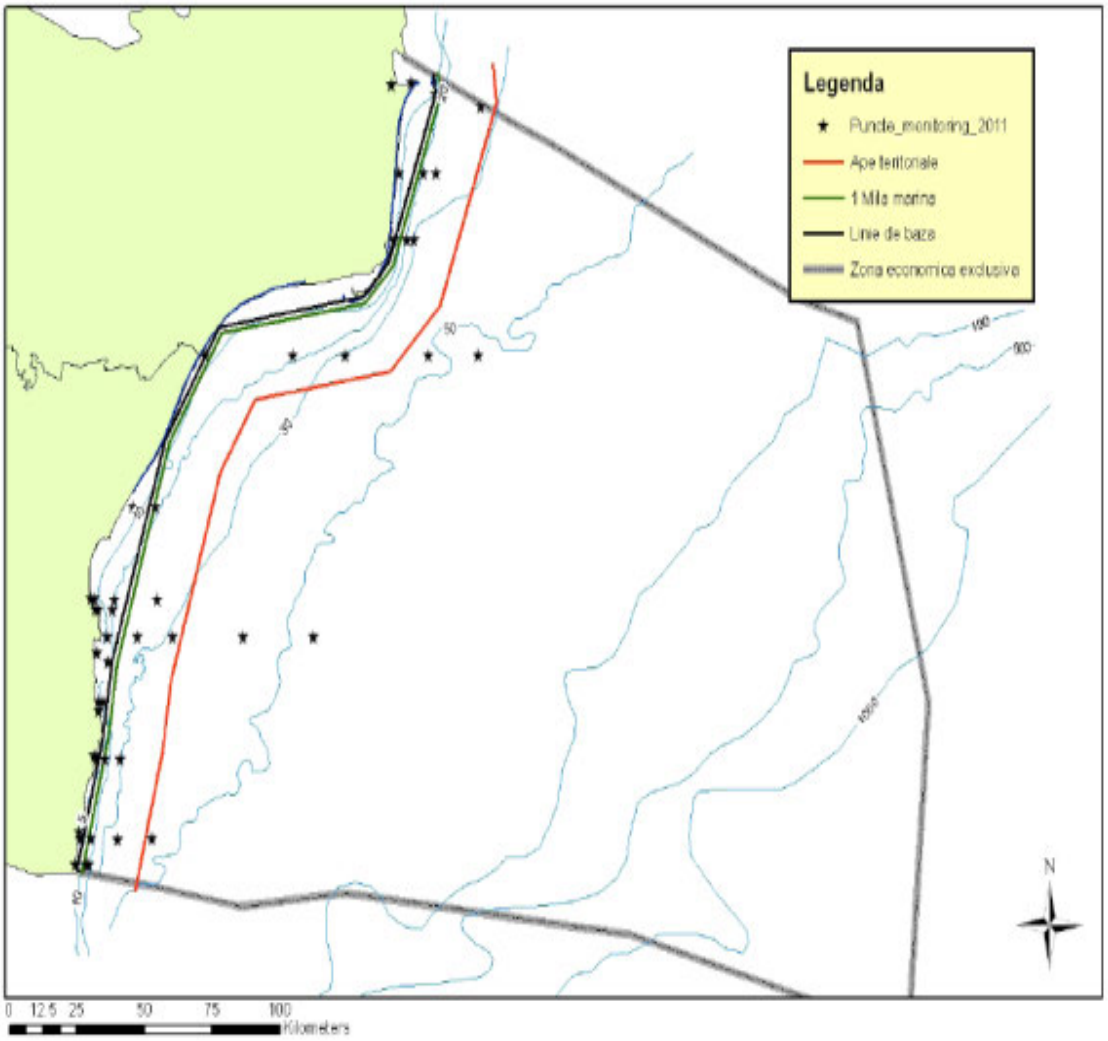


Figure 12. The Romanian EEZ (the contour in gray; the lines nearby the coast show baseline.

Note: the red line – territorial waters (12 NM) , the stars are the stations covered by the National Monitoring System supervised by the Ministry of Environment and Forests).

Table 25. Information on different types of Black Sea-related monitoring in Romania

Responsible organization		Type of monitoring [49]	Geographical scope	Number of stations	Parameters	Period/ Frequency	Related to human activity
Name	**National M.P.[50]**						
Constanta City Hall[51] (Data received from Water Supply Company RAJA Constanta)	Yes	Compliance monitoring			Waste waters discharge according to HG 188 for approval of rules on discharge conditions into the aquatic environment		
Constanta County Department of Public Health[52]	Yes (see Footnote 14)	Surveillance monitoring (Bathing water quality)[53]		48 (see Table 26, Fig 13)	4 bacteriological 7 chemistry (seeTable 27)	Twice a month in the period 14.05-10.09	Public Health, Tourism and recreation

[49] The Questionnaire asked for identification of the type of monitoring carried out by the contacted organization/stakeholder
[50] Is the organization part of a National Monitoring Program?
[51] Public Administration. Postal address: Bd. TOMIS No. 51, Constanta; Contact person: Octavia Pardasu, Phone: 0040241/488 132 Mobile: 0040721/488 146;
[52] Governmental. Subordinated to Ministry of Health. Postal address: St. Lăcrămioarei No.1, Constanta; Web: www.dspct.ro; Contact person: Dr. Luiza Caruceru, Phone: 00 40 241 480939, Fax: 00 40 241 480946, Mobile: 00 40 728111983, E-mail: secretariat@dspct.ro igiena_mediului_cta@yahoo.com
[53] II. NATIONAL PROGRAM FOR MONITORING THE DETERMINANT FACTORS IN LIVING AND WORKING ENVIRONMENT

Responsible organization		Type of monitoring [49]	Geographical scope	Number of stations	Parameters	Period/ Frequency	Related to human activity
Name	National M.P.[50]						
Tulcea County Department of Public Health[54]	Yes (see Footnote 16)	Surveillance monitoring (Bathing water quality)[55]	Freshwater, coastal and marine waters	6	4 bacteriological 7 chemistry (see Table 27)	Twice a month in the period 01.06-15.09	Public Health, Tourism and recreation
Environmental Protection Agency Constanta[56]	Yes[57]	Surveillance monitoring	Seaside area city of Constanta (coastal)	1 (44^0 13' 03.89''N 28^0 38'44.05'' E)	31 (see Table 28)	weekly	Public health
ExxonMobil Exploration & Production Romania Limited[58]	No	Compliance monitoring (during and after drilling operations)	Offshore Black Sea	4	17 (see Table 29)	Monthly (December 2011-March 2012)	Offshore gas and oil exploitation
S.C. Thermo-electric factory Midia S.A. (S.C. Uzina Termoelectrică Midia S.A.)[59]	No		Midia		Those identified by HG 188/2002 and NTPA - 001/2002 (T, pH, CBO5,CCOCr, NH4, Pt, Pb, Cd, Cr, Cu, Ni, Zn, Mn, Cl2, SOx, phenols, suspended matters)	Daily and monthly	Authorization of discharges
National Institute for Research and Development in Tourism[60]	No (Project based)	Socio-economy			3 (details on indicators derived are given in Chapter III.2)	Since 2012, annual	Tourism and recreation
National Company Maritime Ports Administration [61]	Yes	Compliance monitoring	Constanta Port Area***		24 (see Table.30)	Monthly or every six months	Marine traffic, port activities
Mare Nostrum NGO[62]	No (Project based)	Environment routine monitoring (not complex)	Cap Midia-Vama Veche (coastal area)	30	5 (Litter), (see Table 31)	Annual (1-31 Oct.)	Coastal and urban development
				30	1 (dolphins)	Twice a month (1.05-31.10)	
National Research and Development Institute for Marine Geology	No	Surveillance	NW Black Sea	45 (see Table 32)	48 (see Table 33)	1-2/year (in 1995,1997, 1998, 2003, 2006	Public health, Coastal and urban development, Shipping,

1. Subprogram on protecting public health by preventing diseases associated with risk factors of living and working environment
Objective 1. Protecting health and preventing diseases associated with risk factors of living environment; 2. Bathing water quality assessment (monitoring, laboratory tests). (based on HG 88/2004 for approving the surveillance, sanitary inspection and control of natural areas used for bathing modified and completed by HG 836/2007)

[54] Governmental. Subordinated to Ministry of Health. Postal address: St. Viitorului, No. 50, Tulcea, http://www.dspjtulcea.ro; Contact person: GHIGU GIORGIANA MARIA, Phone: 0040240 / 534134, Fax: 0040240 / 534290, Mobile: 0040755078540, Email: dspj.tulcea@x3m.ro / giaa_2004@yahoo.com

[55] II. NATIONAL PROGRAM FOR MONITORING THE DETERMINANT FACTORS IN LIVING AND WORKING ENVIRONMENT
1. Subprogram on protecting public health by preventing diseases associated with risk factors of living and working environment
Objective 1. Protecting health and preventing diseases associated with risk factors of living environment
2. Bathing water quality assessment (monitoring, laboratory tests).

[56] Governmental. Postal address: St. Unirii, No. 23, Code 900532, Constanta; http://apmct.anpm.ro; Contact person: Daniela Serban - St. Unirii, No. 23, Code 900532, Constanta, Phone: 0040241546596, Fax: 0040241 546696, Mobile: 0040746248525

[57] National Network of Environmental Radioactivity Surveillance (RNSRM); National Network Monitoring on Air Quality (RNMCA)

[58] Private company. Postal address: St. Floreasca 169 A, Building A, 4th floor, sector 1, Bucharest
Web: www.exxonmobil.com; Contact person: Alin Stirbu, Email: alin.stirbu@exxonmobil.com

[59] Governmental. Postal address: Năvodari, B-dul Năvodari no. 9A, Constanţa, www.utmidia.ro; Contact person: Eng. Dana Răşică, Inspector of Environmental Protection, Phone: 0040729994230, 0040241486235, Fax: 0040241486204
0040241694439; e-mail: cetmidia@utmidia.ro; dana.rasica@utmidia.ro

[60] INCDT Webpage: office@incdt.ro; Contact person: Teodorescu Ovidiu; Phone: 00 40 21 3162565; Fax: 00 40 21 3162535

[61] Governmental. National Company "Maritime Ports Administration" SA Constantza is a joint stock company assigned by the Ministry of Transports and Infrastructure to develop activities of national public interest in its capacity of port administration. Postal address: Constanta, Port, Maritime station; Contact person: Paul Ionescu; Tel: 0241601624; E-mail: pioncescu@constantza-port.ro

[62] NGO. Postal address: Bd. 1 Decembrie 1918, No. 3, Bl. F17, Sc. A, Ap. 3, Constanta
Web: www.marenostrum.ro; Contact person: Mihaela Candea., 0241.612422 / 0341.407432; Phone: 00 40 241 612422; Fax: 00 40 341 407432; Mobile: 00 40 723 710692; Email: office@marenostrum.ro; mihaela_candea@marenostrum.ro

Responsible organization		Type of monitoring [49]	Geographical scope	Number of stations	Parameters	Period/ Frequency	Related to human activity
Name	**National M.P.[50]**						
and Geoecology (GeoEcoMar)[63]						-2012	Fishery and aquaculture, Tourism and recreation, Offshore gas and oil exploitation
National Institute for Research and Development in Environmental Protection subunit: National Institute for Marine Research and Development "Grigore Antipa", Constanta (NIMRD)[64]	Yes[65]	Environment routine complex monitoring; Surveillance monitoring	Transitional, coastal and marine waters	45 (see Fig 14. and Table 34)	20; -General physico-chemical indicators; Eutrophication indicators; Contaminants; Biological indicators (Macrozoobenthos, Phytoplankton, Zooplankton)	2-4 times/year (2 times per year since 2010)	Public health, Coastal and urban development, Shipping, Fishery and aquaculture, Tourism and recreation, Offshore gas and oil exploitation
		Compliance monitoring		25	3	March – October (1997-2011)	
		Surveillance monitoring	Coastal waters	12 (see Fig 15)	Macroalgae	1-2 per month in summer time (Annually since 2010)	
		Surveillance monitoring		40	Fishes	Twice a year (Annually April – May and September – October for sprat and turbot) (Since 2008)	
		Surveillance monitoring		12	Fishes	Twice a year (May – October for trap nets fish)	
		Surveillance monitoring		3	Erosion/accretion	Every year, seasonal (since 2008-present)	
		Surveillance monitoring		In the early stages they were about 75 landmarks which declined over the time to about 60 landmarks	Shoreline changes	Annual/seasonal (1980-2007)	
Dobrogea Littoral Water Basin	Yes	Surveillance and compliance	Black Sea (coastal, transitional	35 (29 sections in coastal	Field of investigation-water: Physico-chemical	4 times a year (since 2010 – 2	No relevance to human activity has

[63] Governmental. Subordinated to Romanian Academy of Science. Postal address: 23-25 Dimitrie Onciul Street, RO-024053, Bucharest, ROMANIA; e-mail: headquarter@geoecomar.ro; webpage: www.geoecomar.ro; Contact person in the Constanta branch: Tatiana BEGUN; 304 Mamaia Blv., RO-900581, Constanta, Romania; Tel./Fax: +40 241 548420; e-mail: tatianabegun@yahoo.com, tbegun@geoecomar.ro

[64] Governmental. It was previously subordinated to Ministry of Environment and Forest. Presently the Institute is under the Ministry of Education. Postal address: 300 Mamaia Blvd. , Constanta, Romania; Tel: +40 241/543 288; Fax: +40 241/831 274; E-mail: office@alpha.rmri.ro; Web: www.rmri.ro; Contact person: Dr. Simion Nicolaev; Tel: 00 40 241 540870; Email: snicolaev@alpha.rmri.ro

[65] Integrated monitoring of the Black Sea ecosystem (annual) – Objective: assessment of marine environment status through investigations of physico-chemical and biological parameters evolution under the influence of anthropogenic and natural pressures; The National Fishery Data Collection Program.

Responsible organization		Type of monitoring [49]	Geographical scope	Number of stations	Parameters	Period/ Frequency	Related to human activity
Name	National M.P.[50]						
Administration [66]		monitoring[67]	waters)	waters, 6 sections in marine transitional waters) (see Table 36)	indicators = 63 Biological Indicators = 4 Field of investigation-sediment: Physico-chemical indicators = 8 (see Table 37)	times per year)	been specified
SC AQUASERV SA[68]	Yes	Water quality control, discharges of waste water (Compliance monitoring)	Danube (Y= 797214,17; X= 415918,58)		14 (see Table 38)	Daily to monthly	Public health, Coastal and urban development, Offshore gas and oil exploitation
Romanian Space Agency[69]	No	Operational					Coastal and urban development, Marine and riverine traffic, Agriculture and farming, Military activities
OMV Petrom SA - X Petromar constant production area[70]	No	Compliance monitoring	Continental shelf of the Black Sea - oil exploitation perimeter Istria XVIII	7 (see Table 39)	7 (see Table 40)	1st Jan-31 Dec/quarterly	Offshore gas and oil exploitation
Constanta Maritime Hydrographic Directorate[71]	No		Coast (Conatsnta and Midia)	4 in Constanta and 6 in Midia (coastal)	Noise level and salinity (0-50 m depth)		Military activity

*** In the Questionnaire of the Port Administration it is written that the observations on different chemical parameters are carried out on-coast. To be checked what parameters on coast – discharges of something else. No observations in the water of the Port area have been mentioned.

Climate-related monitoring (precipitation, wind, etc.) is under the NMA Meteo of Romania - National Meteorological Adminsitration

The Naval Academy has been contacted but it did not specify any type of Black Sea-related monitoring to conduct. They have well responded to the Questionnaire Part II and this is further reflected in the report (see Chapters IV-VI).

[66] Public institution with its own funds. It is under the Minsitry of Water and Forests. Postal address: Bd. Mircea Cel Batran no. 127 Constanta, www.waterct.ro; Contact person: Camelia PULBERE – Manager RAPM (Str. Mircea cel Batran no. 127, Constanta, cod 900592, Tel: 0241 673036 / 0241 673025, e-mail: camelia.pulbere@dadl.rowater.ro

[67] According to Order 31/2006 (SMIAR).

[68] State enterprise. Postal address: REZERVORULUI 2, TULCEA

[69] Public administration. Postal address: Str. Mendeleev, no. 21-25, Bucuresti, Sector 1, 010362, Romania; http://www.rosa.ro; Contact person: Dr. Marius-Ioan Piso, ph. +40-21-3168722, fax +40-21-3128804, e-mail: marius-ioan.piso@rosa.ro

[70] Private. Postal address: Constanta, the Port - Dana 34; Contact person: Wolfgang Leeb, Tel: 0372824366; Fax: 0241585420; E-mail: wolfgang.leeb @ omv.com

[71] Governmental. Postal address: St. Fulgerului , no. 1, Constanta; Contact person: Adrian Filip, e-mail: hidro@dhmfn.ro

Bathing water

Table 26. Bathing water quality monitoring: list of stations and coordinates (observed by the Constanta County Department of Public Health, Romania)

N of station	Coordinates		Area/name of transect*	Type of station
	NORTH	EAST		
1	44°18'59''	28°38'08''	NĂVODARI I	Coastal waters
2	44°17'16''	28°37'27''	NĂVODARI II	Coastal waters
3	44°17'13''	28°37'26''	NĂVODARI III – AREA I	Coastal waters
4	44°17'10''	28°37'26''	NĂVODARI III – AREA II	Coastal waters
5	44°16'48''	28°37'17''	NĂVODARI IV– AREA I	Coastal waters
6	44°16'27''	28°37'19''	NĂVODARI IV– AREA II	Coastal waters
7	44°16'03''	28°37'18''	MAMAIA I - AREA 1	Coastal waters
8	44°15'57''	28°37'17''	MAMAIA I - AREA 2	Coastal waters
9	44°15'46''	28°37'19''	MAMAIA II	Coastal waters
10	44°15'25''	28°37'18''	MAMAIA III	Coastal waters
11	44°14'56''	28°37'22''	MAMAIA IV	Coastal waters
12	44°14'19''	28°37'33''	MAMAIA V	Coastal waters
13	44°14'02''	28°37'41''	MAMAIA VI	Coastal waters
14	44°13'25''	28°38'02''	MAMAIA VII	Coastal waters
15	44°13'08''	28°38'17''	MAMAIA VIII	Coastal waters
16	44°12'36''	28°39'06''	CONSTANŢA I	Coastal waters
17	44°10'46''	28°39'31''	CONSTANŢA II	Coastal waters
18	44°04'08''	28°38'21''	EFORIE NORD I	Coastal waters
19	44°03'41''	28°38'29''	EFORIE NORD II	Coastal waters
20	44°03'13''	28°38'37''	CORDON EFORIE NORD-EFORIE SOUTH I	Coastal waters
21	44°02'56''	28°38'43''	CORDON EFORIE NORD-EFORIE SOUTH II	Coastal waters
22	44°02'07''	28°39'14''	EFORIE SOUTH I	Coastal waters
23	44°01'42''	28°39'25''	EFORIE SOUTH II	Coastal waters
24	43°57'03''	28°38'22''	COSTINEŞTI I	Coastal waters
25	43°56'43''	28°38'17''	COSTINEŞTI II	Coastal waters
26	43°53'54''	28°36'57''	OLIMP I	Coastal waters
27	43°53'17''	28°36'37''	OLIMP II-1	Coastal waters
28	43°53'04''	28°36'21''	OLIMP II-2	Coastal waters
29	43°52'38''	28°36'21''	NEPTUN I	Coastal waters
30	43°52'08''	28°36'21''	NEPTUN II	Coastal waters
31	43°51'37''	28°36'26''	JUPITER 1	Coastal waters
32	43°51'22,5''	28°36'26''	JUPITER 2	Coastal waters
33	43°51'12''	28°36'30''	JUPITER 3	Coastal waters
34	43°51'09,2''	28°36'30''	JUPITER 4	Coastal waters
35	43°51'04,4''	28°36'30''	CAP AURORA 1	Coastal waters
36	43°50'56,3''	28°36'12,3''	CAP AURORA 2	Coastal waters
37	43°50'52,5''	28°36'10''	CAP AURORA 3	Coastal waters
38	43°50'35''	28°36'06,2''	VENUS I-1	Coastal waters
39	43°50'44,5''	28°36'02,9''	VENUS I-2	Coastal waters
40	43°50'35''	28°35'59''	VENUS II	Coastal waters
41	43°50'27''	28°35'27''	VENUS	Coastal waters
42	43°49'58''	28°35'19''	CORDON VENUS-SATURN 1	Coastal waters
43	43°49'48''	28°35'19''	CORDON VENUS-SATURN 2	Coastal waters
44	43°49'37''	28°35'28''	SATURN I	Coastal waters
45	43°49'17''	28°35'03''	SATURN II	Coastal waters
46	43°48'32''	28°35'01''	MANGALIA	Coastal waters
47	43°47'08''	28°34'47''	2 MAI	Coastal waters
48	43°45'14''	28°34'27''	VAMA -VECHE	Coastal waters

The Tulcea County department of Public Health observes the following areas:

- Sfantu Gheorghe (St. George)- 2 points of sampling - beach East and West- St. George; Lat. -44 ° -8 N, Long. E-29 ° -5 '(about 2.5 km from the town of St. George); St. George beach length - L total range = 21 km, bathing area length: L = 800 m;

- Sulina - 2 point sampling - Beach North and South – Sulina; Lat. -45 ° -30 'N, Long. E-29 ° -11 '(about 2.5 km from Sulina) Length range: - Sulina - L total = 12 km beach, swimming area length: 800 m;

- Jurilovca - holiday village Gura Portitei - 2 point sampling - Beach North and South; Length of beach: total L = 1.8 km beach, swimming area length: L = 275 m.

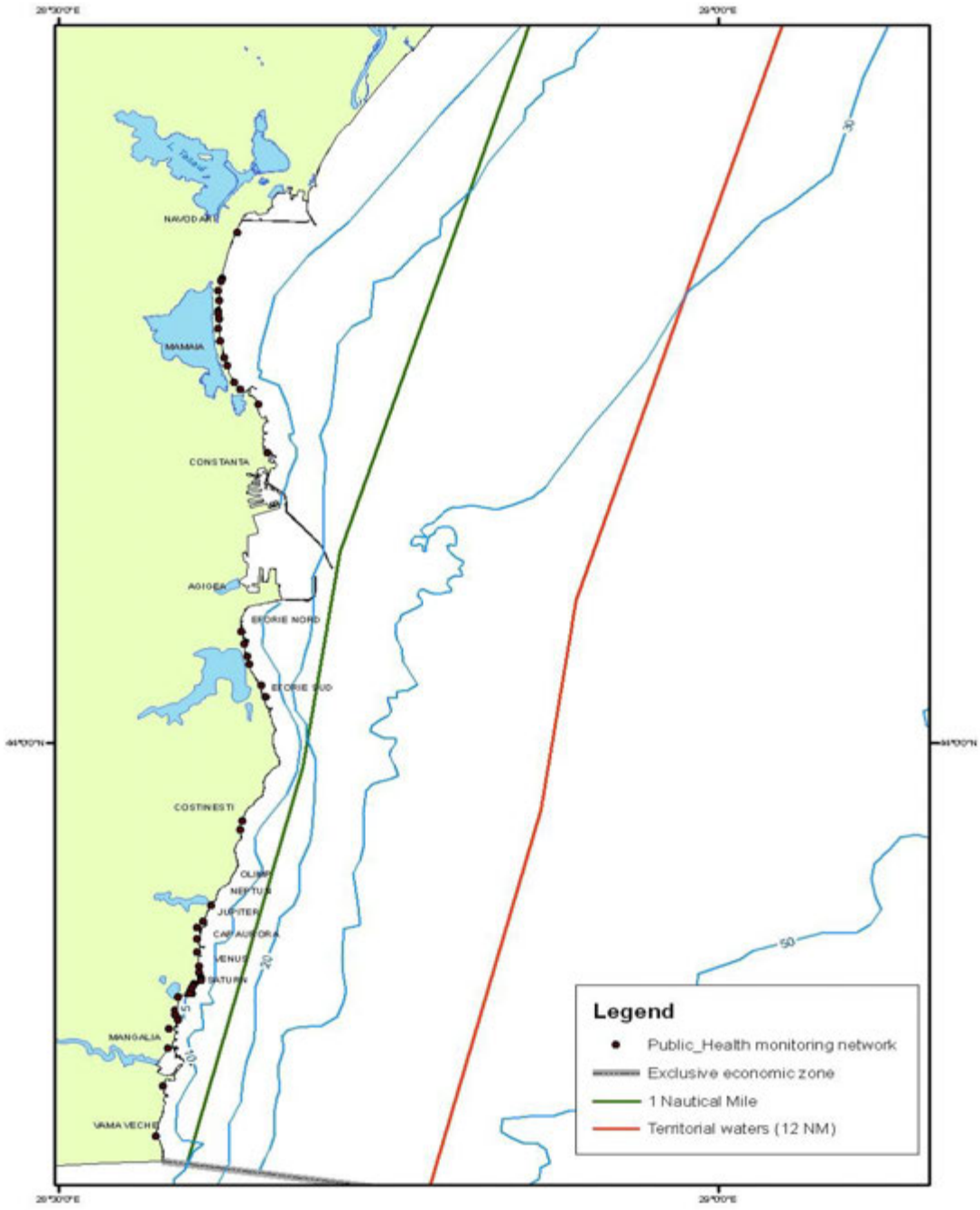


Figure 13. Map of the Romanian coast covered by bathing water monitoring (black dots).

Table 27. Bathing water monitoring: parameters observed by the Constanta and Tulcea County Departments of Public Health, Romania

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Coliforms	ISO 9308-1/ HG 459/2002[72]	Twice a month[73]			
Escherichia coli	ISO 9308-1	Twice a month			
Enterococci intestinal	ISO 7899-2	Twice a month			
Salmonella	ISO 19250/ HG 459/2002	Twice a month			
pH	SR ISO 10523:2009/ SR ISO 10523/1997	Twice a month			
Dissolved oxygen	SR EN 25813:2000	Twice a month			
Saturation level in O_2 %	SR EN 25813:2000	Twice a month			
BOD_5	SR EN 1899-2:2002/ SR ISO 6060/1996	Twice a month			
Phenol	SR ISO 6439 : 2001 SR ISO 6439 :2001/C 91: 2006	Twice a month			
Mineral oils	SR 7587 :1996	Twice a month			
Surfactants	SR EN 903 : 2003/ SR ISO 7875-1/1996	Twice a month			
Pathogenic bacteria, candida, intestinal parasites					In sand
Additional parameters observed by the Tulcea County Department of Public Health[74]					
Ammonium	SR ISO 7150-1/2001	Twice a month			
Nitrates	SR ISO 7890-3/2000	Twice a month			
colour	SR EN ISO 7887/2002	Twice a month			

Note: to be checked whether Constanta and Tulcea use different analytical methods, as reported.

[72] Note: different analytical methods are reported by Constanta and Tulcea.
[73] Samples collected from a depth of 30 cm under the surface water.
[74] Tulcea county does not observe phenols and mineral oils.

Table 28. Monitoring of radionuclides carried out by the Environmental Protection Agency of Constanta, Romania

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Global beta specific activity	ISO 9697:2008	Surface water / weekly			
Specific activity of gamma emitting radionuclides: Be-7, K-40, Pb-210, Bi-212, Pb-212, Ac-228, Bi-214, Pb-214, Th-234, U-235, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Ru-103, Ru-106, Sb-124, Sb-125, I-131, Cs-134, Cs-137, Ce-139, Ce-141, Ce-144, Eu-152, Gd-153, Eu-154,Eu-155	ISO-10703: 2007	Surface water / weekly			

Note: the available data provides for long-term trends.

The Environmental Protection Agency stated: The questionnaire is completed only from the point of view of Black Sea radioactivity monitoring; that is the only activity developed by EPA Constanta that is relevant for the "Marine Strategy". **The Air quality monitoring should be also considered as the atmosphere is a serious source of pollution to the Black Sea.**

Table 29. Monitoring related to drilling operations (ExxonMobil, Romania (no trends are mentioned to be derived from data collected)

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Temperature	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Salinity	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
pH	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Dissolved oxygen	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Oxidability	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Total suspensions	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Chlorophyll a	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Total hydrocarbons content	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Polynuclear aromatic hydrocarbons content	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Cu	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Cd	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Pb	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Ni	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Cr	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Ba	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Phytoplankton	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No
Zooplankton	NIMRD	0, 10, 25, 50, 100 m / North, south, east, west	No	No	No

Note: NIMRD undertakes all sampling and processing based on the methodologies applied in the Institute, see for details Table 35.

Table 30. Monitoring related to Port Operations (National Company Maritime Ports Administration, Romania, no trends are mentioned to be monitored)

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
pH, BOD_5, CCO – Cr, MTS, total nitrogen, NH4+,nitrate, nitrite, SET, detergents, oil products, phenols, total phosphorus					monthly

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Sulphide, H_2S, cyanide, Cd, Cr, Ni, Pb, Zn, Fe, As, Cu, Hg					Every six months

Note: The organization is monitoring discharges into the harbour waters.

Table 31. Monitoring carried out by Mare Nostrum, Romania (marine litter, marine mammals)

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/ Layer)	Sediment	Biota	On-Coast
Waste -glass	Coastwatch method				X
Waste-metal	Coastwatch method				X
Waste -Paper / Cardboard	Coastwatch method				X
Waste - plastic	Coastwatch method				X
Biodiversity-dolphins (especially stranded dolphins on the beach)					X

Table 32. Coordinates of stations monitored by GeoEcoMar, Romania

N of station	Coordinates		Area/name of transect*	Type of station
	Latitude	Longitude		
SU015	45,07361	29,73472	Sulina transect	Transitional waters
SU025	45,06666	29,80861	Sulina transect	Transitional waters
SU035	45,03861	30,07250	Sulina transect	Transitional waters
SU045	44,95166	30,26805	Sulina transect	Marine waters
SU065	44,82083	30,64972	Sulina transect	Marine waters
SU090	44,68527	31,02277	Sulina transect	Marine waters
SU120	44,49611	30,99722	Sulina transect	Marine waters
SG01	44,83880	29,66083	Sf. Gheorghe transect	Transitional waters
SG02	44,82669	29,66315	Sf. Gheorghe transect	Transitional waters
SG03	44,82431	29,67627	Sf. Gheorghe transect	Transitional waters
SG04	44,66944	29,81558	Sf. Gheorghe transect	Marine waters
SG05	44,58860	30,10161	Sf. Gheorghe transect	Marine waters
SG14	44,46496	30,31187	Sf. Gheorghe transect	Marine waters
SG06	44,33969	30,52811	Sf. Gheorghe transect	Marine waters
SG07	44,29327	30,61033	Sf. Gheorghe transect	Marine waters
SG08	44,25697	30,62161	Sf. Gheorghe transect	Marine waters
SG09	44,14572	30,78819	Sf. Gheorghe transect	Marine waters
SG10	44,13166	30,80083	Sf. Gheorghe transect	Marine waters
SG11	44,12500	30,79777	Sf. Gheorghe transect	Marine waters

N of station	Coordinates		Area/name of	Type of station
SG12	44,12416	30,79222	Sf. Gheorghe transect	Marine waters
SG13	44,12233	30,80241	Sf. Gheorghe transect	Marine waters
PO01	44,66297	29,02731	Portita transect	Transitional waters
PO02	44,62103	29,13093	Portita transect	Transitional waters
PO03	44,58816	29,22166	Portita transect	Transitional waters
PO05	44,57734	29,24366	Portita transect	Transitional waters
PO04	44,50945	29,37534	Portita transect	Marine waters
CT01	44,15244	28,70266	Constanta transect	Coastal waters
CT02	44,15250	28,72166	Constanta transect	Coastal waters
CT03	44,13972	28,77305	Constanta transect	Marine waters
CT04	44,08352	29,03361	Constanta transect	Marine waters
CT05	43,97449	29,51093	Constanta transect	Marine waters
CT09	43,90888	29,68222	Constanta transect	Marine waters
CT06	43,79916	30,00722	Constanta transect	Marine waters
CT07	43,77383	30,07713	Constanta transect	Marine waters
CT08	43,75583	30,13230	Constanta transect	Marine waters
MA05	43,77475	28,60385	Mangalia transect	Coastal waters
MA06	43,77220	28,63898	Mangalia transect	Coastal waters
MA07	43,77297	28,65816	Mangalia transect	Marine waters
MA08	43,77415	28,73375	Mangalia transect	Marine waters
MA04	43,76602	29,40017	Mangalia transect	Marine waters
MA03	43,75594	29,96708	Mangalia transect	Marine waters
MA02	43,74836	30,02083	Mangalia transect	Marine waters
MA01	43,75802	30,13488	Mangalia transect	Marine waters
MA09	43,73516	30,16081	Mangalia transect	Marine waters
MA10	43,73814	30,18911	Mangalia transect	Marine waters

The **GeoEcoMar** Institute performs investigations in Romanian waters, marine geology and sedimentology, geo-ecology, bio-chemistry, physics, and others. Detail information is provided further.

Table 33. Monitored parameters by GeoEcoMar, Romania

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Pressure/depth temperature, conductivity/salinity, sigma theta, dissolved oxygen/oxygen saturation, pH, Eh, light transmission/absorption, fluorescence (chlorophyll a), turbidity	CTD sensors/rosette sampler (Note: Trends can be derived)	1-2/ year (within water column)			
Nutrients (PO_4, SiO_2, NO_3, NO_2)	Spectrophotometer (Note: Trends can be derived)	1-2/year (within the water column and sediment/water interface)			

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
H_2S	Spectrophotometer (Note: Trends can be derived)	1-2/year (sediment/water interface, anoxic water column)			
Chlorophyll *a*, b, c	spectrophotometer, Jeffrey – Humphrey (1975) equations (Note: Trends can be derived)	1-2/year (within the water column)			
Greenhouse gases (CO_2, NH_4, N_2O)	Infrared photoacoustic method (Note: Trends can be derived)	1-2/years (air-water interface)			
Phytoplankton N.sp, Density (cel.l^{-1}), Biomass (mg.l^{-1})		1-2/year (within the water column)			
Zooplankton N.sp, Density (cel.m^{-3}), Biomass (mg.m^{-3})		1-2/year (10-0m, 25-10m, 50-25m, 100-50m, 150-100m, 200-150m)			
Macrobenthos N.sp, Density (ind.m^{-2}), Biomass (g.m^{-2})		1-2/year			
Meiobenthos N.sp, Density (ind.m^{-2}), Biomass (g.m^{-2})		1-2/year			
Non-indigenous species		1-2/year			
Gran size composition of sediments	Sieving and settling tubes, laser diffraction		1-2/year		
Major and minor components ($CaCO_3$, Fe_2O_3 – total, TiO_2, MnO)	Volumetric (Black, 1965), XRF spectrometry		1-2/year		
Trace elements (Ba, Sr, Rb, Zr, Co, Ni, Cr, V, Cu, Pb, Zn, Cd)	XRF spectrometry, FAAS – Co, Ni, Cu, Pb, Zn and GFAAS – Cd (Secrieru and Secrieru, 2002)		1-2/year		

Note: From coast, reference station/s are sampled for various parameters (Pressure/depth temperature, conductivity/salinity, sigma theta, dissolved oxygen/oxygen saturation, pH, Eh, light transmission/absorption, fluorescence (chlorophyll a), turbidity; Nutrients (PO_4, SiO_2, NO_3, NO_2); H_2S; Chlorophyll *a*, b, c; Phytoplankton, N.sp, Density (cel.l^{-1}), Biomass (mg.l^{-1}); Zooplankton, N.sp, Density (cel.m^{-3}), Biomass (mg.m^{-3}); Macrobenthos and Meiobenthos, N.sp, Density (ind.m^{-2}), Biomass (g.m^{-2}); and Non-natives.

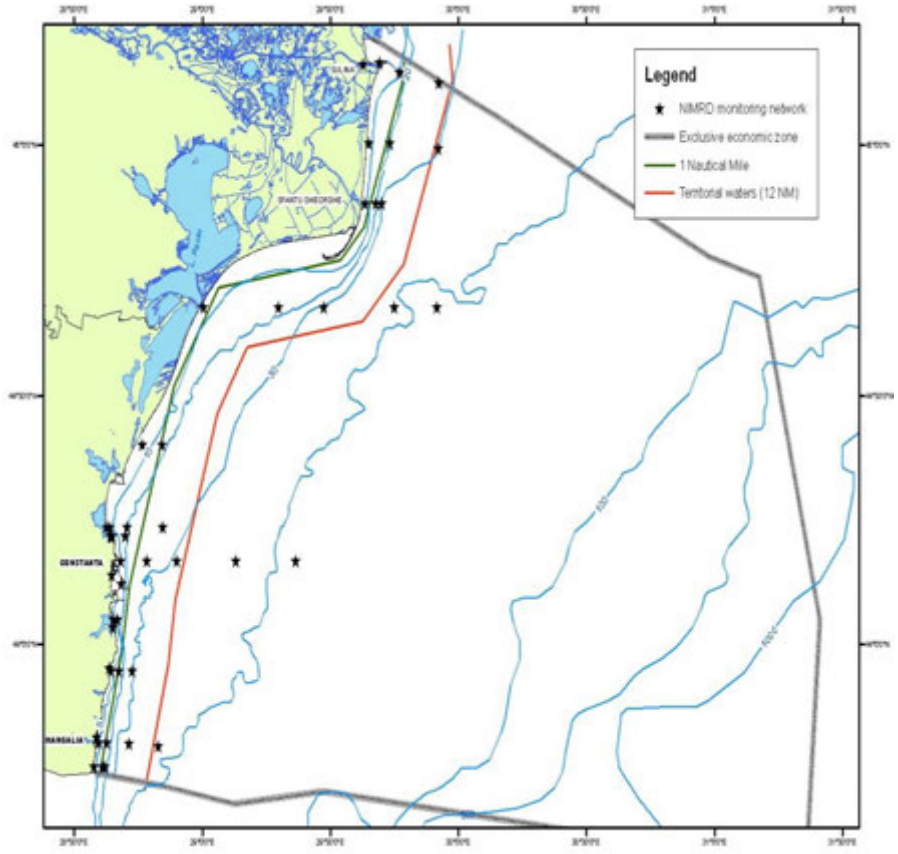


Figure 14. Map of sampling stations (45 in total) of the environment routine monitoring carried out by NIMRD, Romania

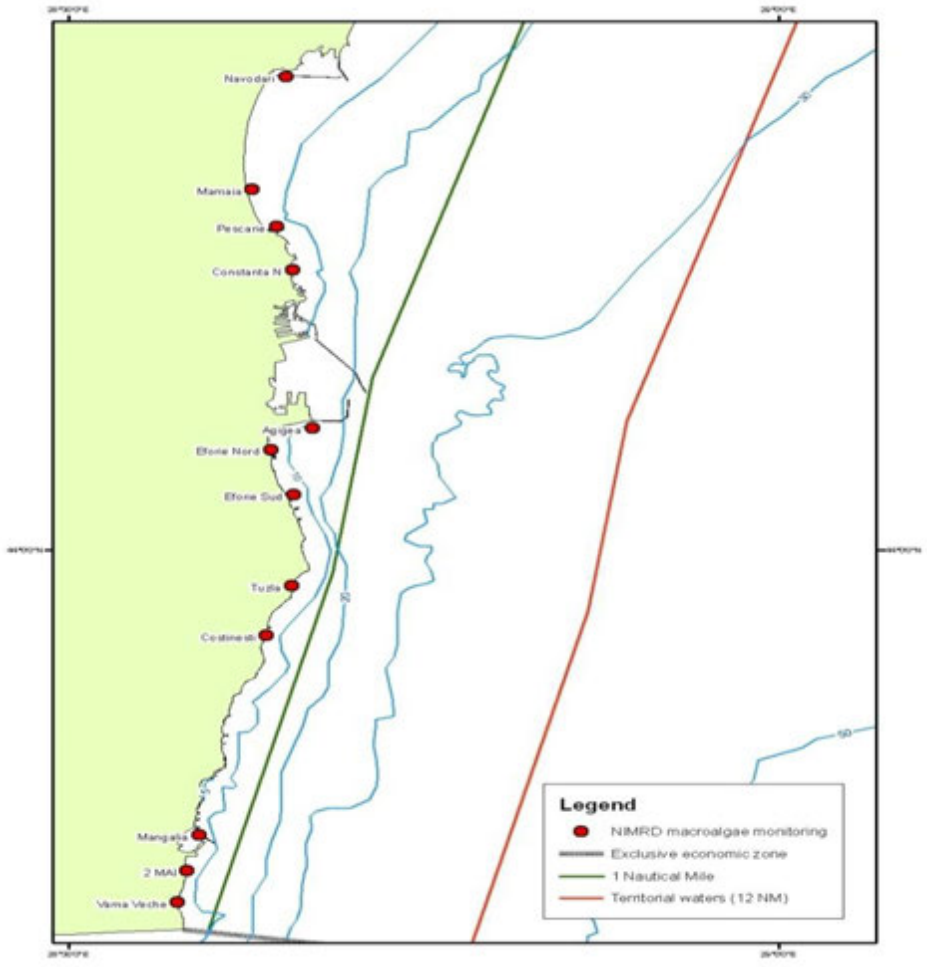


Figure 15. Map of macroalgae sampling stations of NIMRD, Romania

Table 34. Coordinates of sampling stations of NIMRD, Romania

Nr.	N of station	Depth (m)	Latitude	Longitude	Area/name of transect*	Type of station[75]
	Monitoring network					
1	Sulina	10	45,1422	29,7744	Sulina	T
2	Sulina	20	45,1333	29,8050	Sulina	T
3	Sulina	30	45,1228	29,9242	Sulina	M
4	Mila 9	5	45,0033	29,6517	Mila 9	T
5	Mila 9	20	45,0033	29,7333	Mila 9	T
6	Mila 9	30	45,0033	29,7750	Mila 9	M
7	Sf. Gheorghe	5	44,8836	29,6364	Sf. Gheorghe	T
8	Sf. Gheorghe	20	44,8836	29,6783	Sf. Gheorghe	T
9	Sf. Gheorghe	30	44,8836	29,7018	Sf. Gheorghe	M
10	Portita	5	44,6767	29,0067	Portita	T
11	Portita	20	44,6767	29,2992	Portita	T
12	Portita	30	44,6767	29,4742	Portita	M
13	Portita	50	44,6767	29,7500	Portita	M
14	Portita	57	44,6767	29,9167	Portita	M
15	G. Buhaz	5	44,4015	28,7673	G. Buhaz	M
16	G. Buhaz	20	44,4015	28,8433	G. Buhaz	M
17	Cazino Mamaia	0	44,2358	28,6284	Cazino Mamaia	C
18	Cazino Mamaia	5	44,2358	28,6395	Cazino Mamaia	C
19	Cazino Mamaia	20	44,2349	28,7061	Cazino Mamaia	C
20	Cazino Mamaia	30	44,2346	28,8471	Cazino Mamaia	M
21	Constanta Nord	0	44,2178	28,6417	Constanta Nord	C
22	Constanta Nord	5	44,2167	28,6500	Constanta Nord	C
23	Constanta Nord	20	44,2167	28,7003	Constanta Nord	C
24	Constanta Est	14	44,1667	28,6833	Constanta Est	C
25	Constanta Est	28	44,1667	28,7833	Constanta Est	M
26	Constanta Est	36	44,1667	28,9000	Constanta Est	M
27	Constanta Est	47	44,1667	29,1333	Constanta Est	M
28	Constanta Est	54	44,1667	29,3667	Constanta Est	M
29	Constanta Sud	5	44,1383	28,6489	Constanta Sud	C
30	Constanta Sud	20	44,1218	28,6850	Constanta Sud	C
31	Eforie Sud	0	44,0333	28,6539	Eforie Sud	C
32	Eforie Sud	5	44,0493	28,6534	Eforie Sud	C
33	Eforie Sud	20	44,0493	28,6692	Eforie Sud	C
34	Costinesti	0	43,9500	28,6387	Costinesti	C
35	Costinesti	5	43,9450	28,6442	Costinesti	C
36	Costinesti	20	43,9450	28,6740	Costinesti	C
37	Costinesti	30	43,9450	28,7267	Costinesti	M
38	Mangalia	0	43,8112	28,5873	Mangalia	C
39	Mangalia	5	43,8002	28,5946	Mangalia	C
40	Mangalia	20	43,7988	28,6277	Mangalia	C
41	Mangalia	39	43,7985	28,7156	Mangalia	M
42	Mangalia	53	43,7999	28,8322	Mangalia	M
43	Vama Veche	0	43,7512	28,5771	Vama Veche	C
44	Vama Veche	5	43,7512	28,5950	Vama Veche	C
45	Vama Veche	20	43,7512	28,6211	Vama Veche	C

[75] T – transitional; C- coastal; M - marine

Nr.	N of station	Depth (m)	Latitude	Longitude	Area/name of transect*	Type of station[75]
	Stations for macroalgae					
1	Năvodari		44.3237	28.6528	Navodari	C
2	Mamaia		44.2468	28.6293	Mamaia	C
3	Pescărie		44.2214	28.6463	Pescarie	C
4	Constanta N		44.1917	28.6575	Constanta N	C
5	Agigea		44.0833	28.6718	Agigea	C
6	Eforie Nord		44.0689	28.6422	Eforie Nord	C
7	Eforie Sud		44.0381	27.6583	Eforie Sud	C
8	Tuzla		43.9755	28.6568	Tuzla	C
9	Costinesti		43.9413	28.6391	Costinesti	C
10	Mangalia		43.8043	28.5919	Mangalia	C
11	2 MAI		43.7797	28.5835	2 MAI	C
12	Vama Veche		43.7580	28.5769	Vama Veche	C

Table 35. Parameters observed by NIMRD, Romania

Note: No measurements of physical parameters (e.g. currents, wave dynamics, sea level, etc.) have been specified.
Note: trends can be derived from certain time-series data, they are specified accordingly.

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Transparency		Seasonally			
Total suspended solids		Seasonally			
Nutrients (P, N and Si compounds)		Seasonally (Trends can be derived for surface/depth/layer)			
Dissolved oxygen		Seasonally (Trends can be derived for surface/depth/layer) from monitoring network and daily from Mamaia station			
pH		Seasonally (Trends can be derived for surface/depth/layer)			
Temperature		Seasonally (Trends can be derived for surface/depth/layer)			
Salinity		Seasonally			
BOD_5		Seasonally			
TOC		Seasonally	Occasionally		
OCP's		twice/year (Trends can be derived for surface)	twice/year	twice/year	
PCB's starting with this year (2012)		twice/year	twice/year	twice/year	
PAHs		twice/year (Trends can be derived for surface)	twice/year	twice/year	

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
TPH (Total petroleum hydrocarbons)		twice/year (Trends can be derived for surface)	twice/year		Occasionally
Heavy metals		Seasonally (Trends can be derived for surface)	Seasonally	Few observations annually	Occasionally
Total coliforms TC, (contamination)	Most Probable Number (MPN) method	Surface Layer : almost monthly between March to October, every year since 1997 (Trends can be derived for surface)	Occasionally	mussels	
Faecal coliforms FC, (contamination)	Most Probable Number (MPN) method	Surface Layer : almost monthly between March to October, every year since 1997 (Trends can be derived for surface)	Occasionally	Mussels: once per season, every year since 2009	
Faecal streptococci FC, (contamination)	Most Probable Number (MPN) method	Surface Layer : almost monthly between March to October, every year since 1997 (Trends can be derived for surface)	Occasionally		
Phytoplankton (species, abundance, biomass)	Moncheva, 2010	Data starting from 1960; twice a week data from Mamaia monitoring station – starting from 1975		Seasonally	twice/week
Chlorophyll a	spectrophotometer, Jeffrey – Humphrey (1975) equations	Seasonally – starting from 2000			twice/week
Macroalgae (species, abundance, biomass)		Summers (Trends can be derived for changes in depth distribution)		Seasonally	
Rates of shoreline changes	BMAP software				Annual/ seasonal
Slope section	BMAP software				Annual/ seasonal
The sedimentary stock section	BMAP software				Annual/ seasonal
Shoreline	GPS measurements				Every year
Vegetation line	GPS measurements				Every year

Note: among the parameters zoobenthos, zooplankton and fishes are not mentioned.

Table 36. Coordinates of stations monitored by Dobrogea Littoral, Romania

N of station	Coordinates		Area/name of transect*	Type of station**
Gura Buhaz				
shore	28. 3753	44. 18 48		
5m	28. 3842	44. 18 53		
20m	28. 4123	44. 1847		
Cap Midia				
Shore area exhaust mixture UT Midia				
Fertilchim Navodari				
shore				
5m	28. 37 50	44. 18 09		
20m	28. 44 22	44. 17 46		
Constanta Nord Pescarie				
shore	28. 3858	44. 1248		
5m	28. 3911	44. 1252		
20m	28. 4307	44. 1323		
Constanta Sud				
Port Constanta Dana 34 shore	28. 3818	44. 0927		
Port Constanta Dana 69 shore – the mixture area discharge safety pipeline APC	28. 38 21	44. 0935		
Port Constanta Dana 78 shore – the mixture area evacuation SE APC	28. 3903	44. 0856		
Port Cta Dana 84-86 shore	28. 39 02	44. 0851		
Port Cta Sud Inland 5m	28. 3849	44. 0756		
Entry Port Cta 20 m	28. 4026	44. 0904		
Eforie Nord Belona 1				
5m	28. 3834	44. 0334		
10m	28. 3908	44. 0339		
20m	28.4011	44. 0344		
Eforie Sud Dig Sud				
shore	28. 4123	44. 0119		
Costinesti				
shore	28.4016	43. 5634		
Avamport Mangalia				
shore	28. 36 22	43.4807		
Vama Veche				
shore	28. 34 48	43.4458		
5m	28. 34 55	43.44 59		
10m	28. 35 00	43. 45 00		
20m	28. 35 29	43. 44 57		
12 marine mile	28. 36 36	43.44 58		
Mangalia				
Entry SN Mangalia –Cap Dig	28. 34 38	43.4755		
Coada lac sarat-Pod Vechi-Zona Pescarie	28. 3135	43.4819		

N of station	Coordinates		Area/name of transect*	Type of station**
Golf Musura –Bara Sulina				Transitional to marine waters
shore	29. 4106	45. 0854		
5m	29. 4013	45.1503		
20m	29. 4643	45. 1523		
12 marine mile	30. 0203	45.14 21		
Sf.Gheorghe				Transitional to marine waters
5m	29.37 39	44. 5329		
20m	29. 39 54	44. 5325		

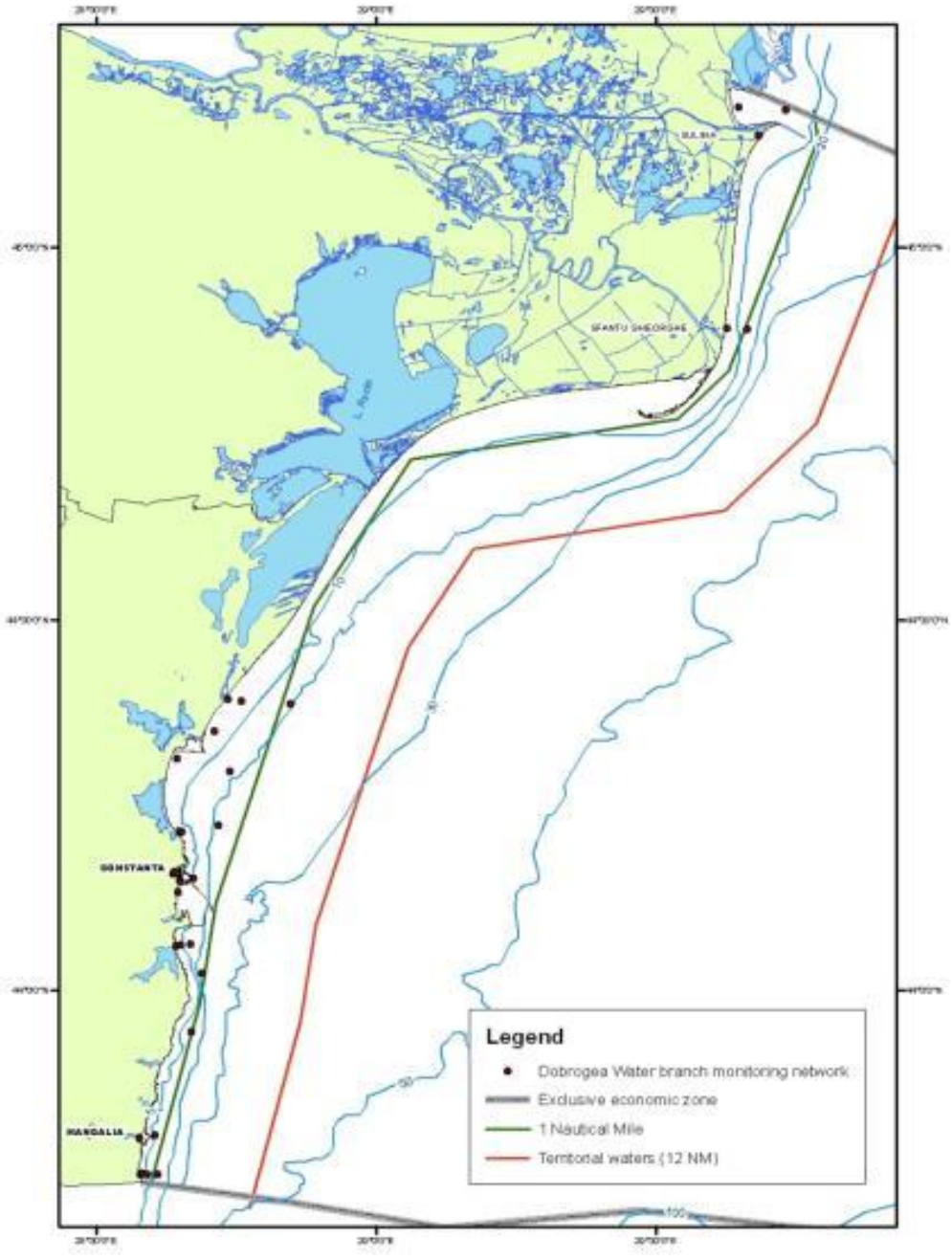


Figure 16. Map of sampling stations of the environment routine monitoring carried out by Dobrogea Water Branch, Romania

Table 37. List of parameters and frequency of observations carried out by Dobrogea Littoral, Romania

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
phytoplankton	Morozova Vodianitzskaia-1954(agreed by the Black Sea Commission)	4 times/year, collected from shore, 5m, 10m, 20m, 12 marine mile isobaths	-		
macrozoobentos	Manualul TSENKA Konsulova , Valentina Todorova-2005 (agreed by the BSC)	1 time /year, surface - 600 cm^2, sampling from the bottom			
macrophytes	EEI method –being tested		-		
macroalgae	EEI method –being tested		-		
Cadmium and compounds	SR EN ISON 17294-2-05	4	1		1
Nickel and compounds	SR EN ISON 17294-2-05	4	1		1
Mercury and compounds	SR EN ISON 17294-2-05	4	1		1
Lead and compounds	SR EN ISON 17294-2-05	4	1		1
As	SR EN ISON 17294-2-05	4			1
Ba	SR EN ISON 17294-2-05	4			
Be	SR EN ISON 17294-2-05	4			
B	SR EN ISON 17294-2-05	4			
Cr	SR EN ISON 17294-2-05	4			1
Co	SR EN ISON 17294-2-05	4			
Cu	SR EN ISON 17294-2-05	4			1
Se	SR EN ISON 17294-2-05	4			
Zn	SR EN ISON 17294-2-05	4			1
PAH	EPA 6440 A	1	1		
Herbicides, insecticides and fungicides with N and P	SR EN ISO 10695: 2002	1			
organochlorine pesticides	SR ISO 6468:2000	1	1		
CLORBENZENI	SR ISO 6468:2000	1	1		
VOLATILE CHLORINATED SOLVENTS	SR EN ISO 10301:2003	1			
Brominated diphenylethers		1			
chlorinated hydrocarbons	SR EN ISO 10301:2004	1	1		
PESTICIDES UREIC	SR ISO 11369:2004	1			
PHENOLS	SR ISO 6439-01	1			1
2ETILHEXIL-DIFTALAT COMPOUNDS tributyl		1			
BTEX	SR ISO 11423/1-:2000				

Danube River, waste water discharges

Table 38. List of parameters monitored by SC AQUASERV SA, Romania

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Suspension					x
Extractable					x
Substances					x
Sulphates					x
Total					x
Phosphates					x
Chlorides					x
Phenols					x
Detergents					x
pH					x
BOD5					x
Total Fe					x
Zn					x
C CO - Cr					x
Total					x

Table 39. Coordinates of stations monitored by OMV Petrom SA, Romania

N of station	Coordinates Latitude Longitude	Area/name of transect*	Type of station**
1	N: 44° 31' 23,0" E: 29° 33' 55,4''	PFCP	Marine waters
2	N: 44° 31' 38,6'' E : 29° 32' 55,5''	PFS 3	Marine waters
3	N: 44° 32' 02,1'' E : 29° 32' 50,1''	PFS 4	Marine waters
4	N: 44° 31' 56,9'' E: 29° 28' 05,6''	PFS 6	Marine waters
5	N: 44° 32' 42,6'' E: 29° 26' 48,6''	PFS 7	Marine waters
6	N: 44° 35' 59,7'' E: 29° 21' 32,2''	PFS 8 (Gloria)	Marine waters
7	N: 44° 28' 51,9'' E: 29° 38' 43,3''	PFSSU	Marine waters

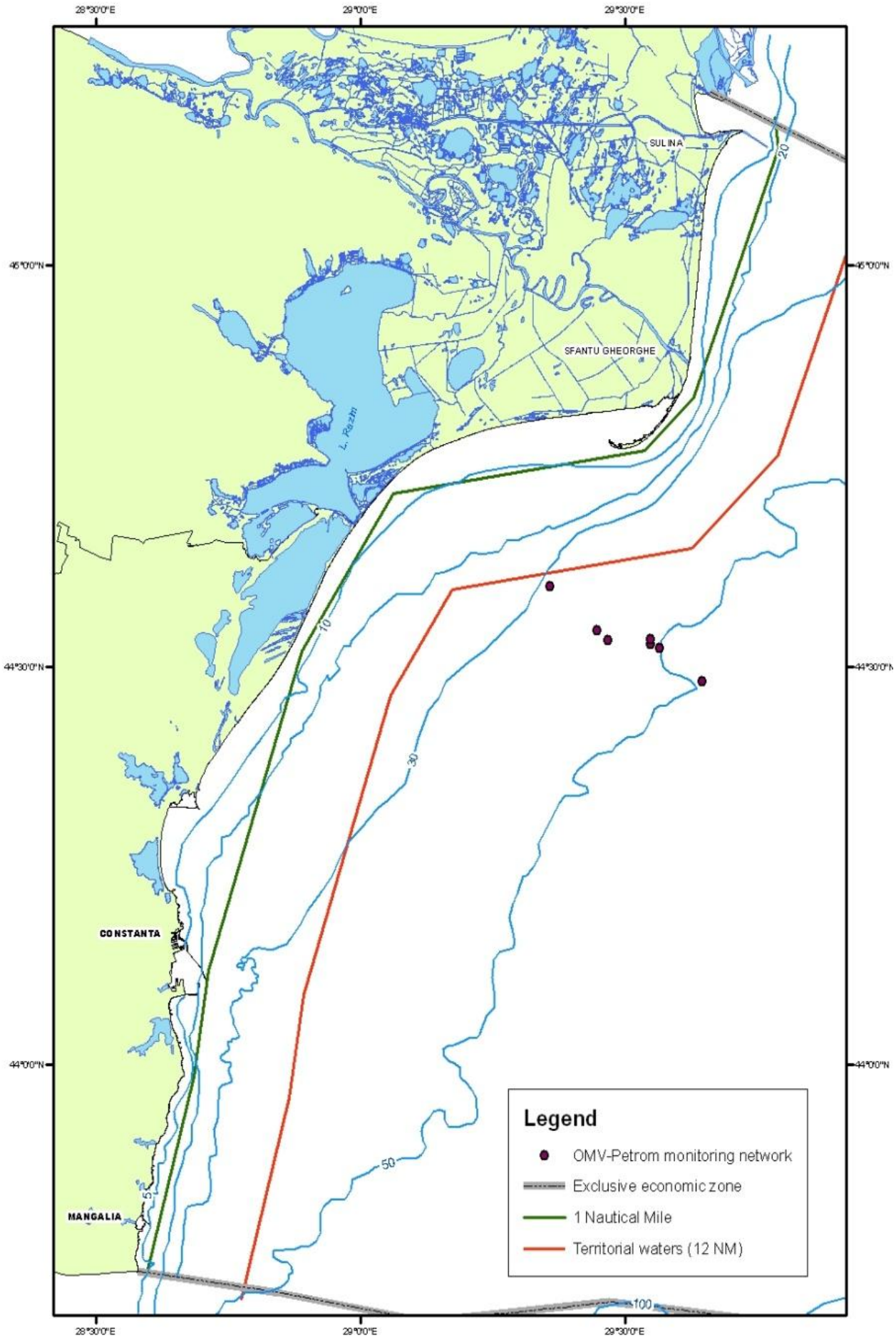


Figure 17. Map of sampling stations of the environment monitoring carried out by OMV-Petrom, Romania

Table 40. List of parameters* monitored by OMV Petrom SA, Romania

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Contaminants - total hydrocarbons	In house PS-06 Ed. 2(accredited laboratory DAC)		quarterly		
Contaminants - total hydrocarbons	In house, PS-06 Ed. 2	Surface/Permanent (quarterly)			
Contaminants - BOD5	S REN 1899-1/2003	Surface/Permanent (quarterly)//evacuation			
Contaminants - substances extractable	In house PS-06 Ed. 2DAC (accredited laboratory)	Surface/Permanent (quarterly)//evacuation			
Contaminants CCoCr	LCK 1014	Surface/Permanent (quarterly)//evacuation			
Contaminants - suspension	STAS 6953-81	Surface/Permanent (quarterly)//evacuation			
Contaminants - detergents	LCK 332	Surface/Permanent (quarterly)//evacuation			

*__Note:__ the data allows for deriving long-term trends.

Constanta County Department for Statistics[76] (www.constanta.insse.ro) performs no monitoring.

Data Collection Framework for the Common Fisheries Policy

The National Agency for Fisheries and Aquaculture (NAFA) is designated for the implementation of the National Data Collection Programme 2011-2013 (NDCP 2011-2013). NIMRD Constanta is involved in the following activities:

- Evaluation of the fishing sector;
- Data collection and processing on economic variables, on metier related variables, on recreational fisheries, on stock related variables and on transversal variables;
- Research surveys at sea;
- Evaluation of effects of the fishing sector on the marine ecosystem;
- Management and use of data;
- Participation with specialists in the co-ordination meetings, planning groups on data collection, planning groups on surveys at sea and stock assessment working groups.

However, NIMRD Constanta has historical data (obtained from own projects) on qualitative and quantitative structure of the catches and landings, structure of fish populations, growth parameters and mortality rates, state of stocks, distribution of fishing agglomerations, spawning and recruitment intensity, etc.

Monitoring related to the Habitats and Birds Directives has not been specified.

[76] Governmental. Contact person: Nicoleta Trandafir, Bd. Tomis, No. 51, Constanţa, Phone/Fax: 0040 241 614293/00 40 241 672032; E-mail: nicoleta.trandafir@constanta.insse.ro; tele@constanta.insse.ro; webpage : www.constanta.insse.ro

TURKEY

The TR EEZ is shown in Fig. 18. This is the target area for the MSFD and environment protection under the jurisdiction of TR. The monitoring system in TR fairly well covers part of the EEZ.

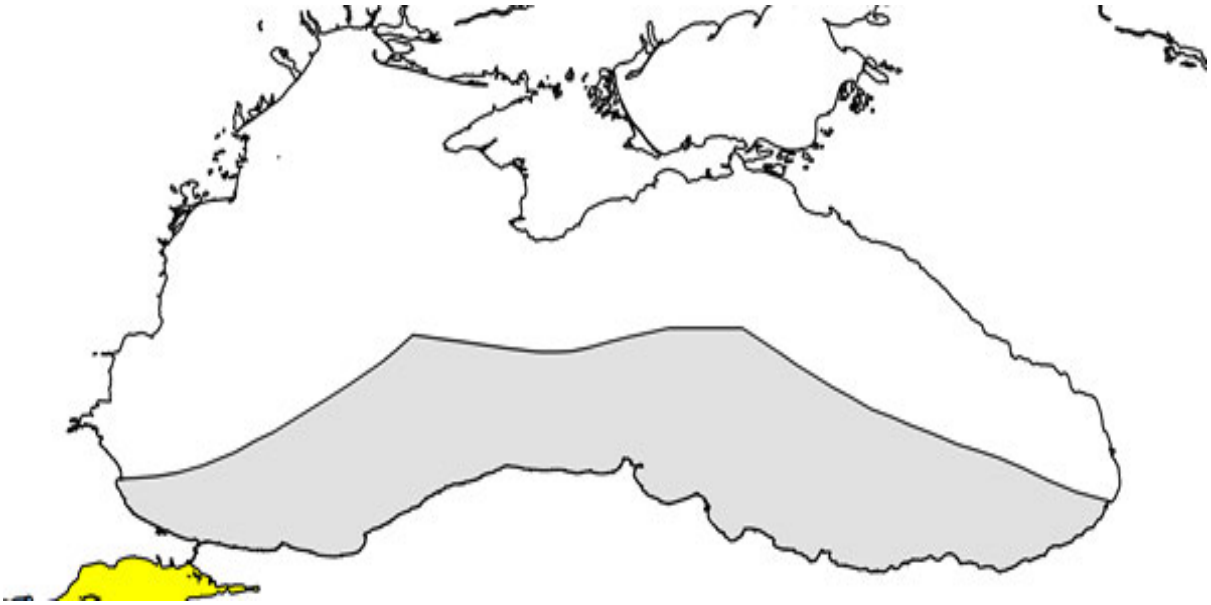


Figure 18. Turkish EEZ (marked in gray)

The TR Black Sea Pollution Monitoring Programme (BSPMP) in the Black Sea[77] has been operational since 2004. Biological quality elements have been incorporated in 2009 and the Programme applied until 2010 (In 2011 and 2012, not implemented). The implementing organization is the Istanbul University (Institute of Marine Science and Management, on a procurement basis of services), and the Ministry of Environment and Urbanization (former Ministry of Environment and Forests, MoEF) is the responsible/funding organization, participating also in the monitoring activities with its experts. The network of stations is sustained and the monitoring is carried out in transitional, coastal and marine waters taking into consideration the requirements of the Bucharest (BSIMAP) and Barcelona Conventions (MEDPOL) for the Mediterranean, as well as of EEA.

Ongoing water quality monitoring in the Strait of Istanbul (Bosphorus) area since 1996 is carried out in the context of long-term project of ISKI[78] (1996-2009) by the Istanbul University as well. Cruises have been performed regularly once per month. There is one station at the Black Sea-Bosphorus junction which is a long-term station covered also by studies of IMS/METU in the period 1986-1996. This station is not observed as to produce time series data but is visited frequently.

The compliance monitoring for point and diffuse sources of pollution is also under the Ministry of Environment. Other responsible organizations for the compliance monitoring (land-based sources of pollution) are: General Directorate of Environmental Management, Provincial Directorates, General Directorate of State Hydraulic Works, and Universities participate in the monitoring itself. There is no formal coordination between the BSPMP and the compliance monitoring, and especially pressures-impact for biological quality elements are poorly studied. Though, the locations of important land-based sources are mapped (see the arrows in the Fig. 19) and the environment monitoring around them recognises their influence in terms of water quality changes. The monitoring network covers TR waters up to **5** miles offshore (stations are located at transects**:** 1mile (app. 20m depth), 3 miles (app. 50m depth) and 5 miles (app. 100m depth) away from the coast).

[77] The National Marine Monitoring Program of TR covers all TR seas and is implemented by different organizations, e.g. the Istanbul University, TUBITAK, IMS/METU (Erdemli), etc.
[78] Metropoliten authority of Istanbul.

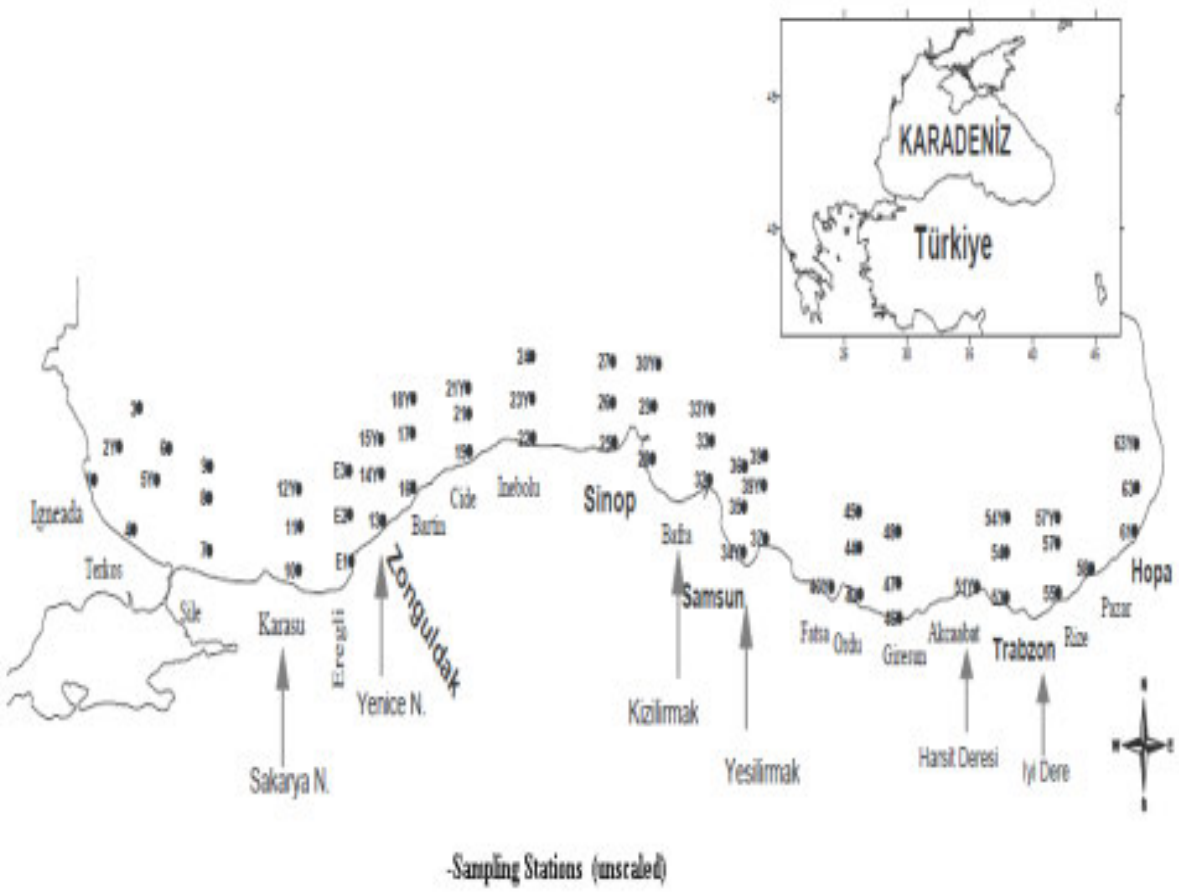


Figure 19. Map of sampling stations along the Turkish coast (National Monitoring Program implemented by the Istanbul University[79] in 2004-2010).

The fisheries-related monitoring-control-surveillance is fully under the responsibility of the Ministry of Food, Agriculture and Livestock (former Ministry of Agriculture and Rural Affairs, MARA). Coast Guard Command performs inspections for enforcement having the tools to apply fines and reporting criminal cases to the prosecuting authorities.

The MISIS Questionnaire on monitoring and data management has been distributed to many different organizations in Turkey. Among them, two Municipalities have been contacted – of Kastamonu and Zonguldak. However, they have given only contact details (see Annex II) and identified them as entities having no relation to monitoring or data management.

Among the Universities contacted, the Canakkale Onsekiz Mart University, Fisheries Faculty (Canakkale)[80] pointed relation of its research to human activities in the field of Public Health, Coastal and urban development, Fishery and Aquaculture and Agriculture and farming. In this University two Faculties have been contacted – the Fishery one and the Faculty of Marine Sciences and Technology, both are not part of National monitoring programmes. The Fishery Faculty has specified no monitoring, whereas the Faculty of Marine Sciences submitted relevant information and it is described in the Tables further.

From the Istanbul University two Faculties have been contacted – of Fishery and of Marine Sciences and Management, both responded. The Faculty of Fishery[81], is not part of a national monitoring

[79] PRESENT SITUATION: For 2011-2013 a harmonized programme was approved for the Turkish coastal waters monitoring, keeping almost all the BS stations at their previous coordinates. However, the BS monitoring tender in 2011 was not successful and in 2012 there was no tender.

[80] Governmental University Postal address: Terzioglu Campus, 17100, Çanakkale, Turkey; http://suurunleri.comu.edu.tr/. Conatct person: A. Suat Ates, Yesim Buyukates, Çanakkale Onsekiz Mart University, Fisheries Faculty, Terzioglu Campus, 17100, Çanakkale, Turkey, e-mail: asuatates@yahoo.com e-mail: ybuyukates@yahoo.com, FaX: +90 286 218 0543

[81] Governmental. Postal address: Ordu cad. No 200 Laleli- İstanbul/TURKEY; http://suurunleri.istanbul.edu.tr/; Contact person: Prof. Dr. Bayram ÖZTÜRK, Tel: 00902124555700-16404, e-mai: ozturkb@istanbul.edu.tr

program, and has specified activities only in the 'Tropical Sygnals Programme" of CIESM[82], which is relevant to the Mediterranean Sea mainly. Though, north-ward movement of species, related to climate change, has been also investigated for the Black Sea by the scientists of this Faculty. The activities of the Fishery Faculty of the Istanbul University are related also to fishery and aquaculture, as well as to agriculture and farming. The monitoring sustained by the Faculty of Marine Sciences is described in the Tables below.

The Recep Tayyip Erdoğan University (Faculty of Fisheries) in Rize[83] is an organization with activities related to fishery and aquaculture, however, it is not involved in national monitoring programmes and has not specified any monitoring or data collection.

Note: in Part II of the Questionnaire they have provided though information on data availability, as reflected in Chapter VI of this report.

Among NGOs, the Turkish Sturgeon Conservation Society[84] has been contacted, however, the organization has not specified anything about its activities in monitoring or data collection/management. Another NGO identified as an important stakeholder was the Turkish Marine Environment Protection Association (TURMEPA), which identified its activities as being related to Public Health, Coastal and urban development, Marine and riverine traffic, Fishery and aquaculture, Tourism and recreation, Offshore gas and oil exploitation, and Various branches of industry. TURMEPA did not mention any monitoring activities, or any data collection to justify its broad range of engagement in environment protection. TUDAV (Turkish Marine Research Foundation[85]) is a well-known NGO in Turkey, it is not part of a national monitoring program, however, it is well involved in ACCOBAMS activities in the BS region supporting by its investigations the BS Marine mammals Strandings and By-catch networks. The NGO also participates in an ecological monitoring programme of the Istanbul Strait, as well as in different international projects (e.g. EC FP7/MARLISCO related to marine litter, etc.). The activities of this NGO are related to Marine and riverine traffic and to Fishery and aquaculture.

The Nature Conservation Center has been also contacted and their response was quite comprehensive. The organization deals with on-coast observations of flora and fauna (freshwater fish, mammals, birds, dragonflies, butterflies and herpetofauna). Their projects are under 4 national programmes: Forest, Species Conservation, Climate Change and Systematic Conservation Planning.

Among all identified Fishery Cooperatives, the one in Trabzon[86] has been contacted. The Cooperative specified relation of its activities to Public Health, Agriculture and farming, but not to Fishery and aquaculture. No further information has been provided.

In Turkey private companies are involved in environment protection, e.g. MEKE[87] and SESMEKE[88], KOSEQ[89], MARE[90] and others deal with oil spill accidents in the Black Sea, participating in clean-up operations. DenArOcean Engineering Ltd[91] has been contacted, among other identified stakeholders (Annex II), and they distinguished their activities as being related to Public health, Coastal and urban development, Marine and riverine traffic, Fishery and aquaculture, Tourism and recreation, Offshore gas and oil exploration, and Military activities. The company carries out no monitoring and no data collection/management has been specified to demonstrate specific environment protection-related actions.

---

[82] The Mediterranean Science Commission, http://www.ciesm.org/

[83] Governmental. Postal address: Zihni Derin Kampüsü 53100 /Rize, http://suf.rize.edu.tr/tr/; Contact person: Dr. Göktuğ DALGIÇ, Recep Tayyip Erdoğan University, Faculty of Fisheries Zihni Derin Kampüsü 53100 /Rize; Tel +90 464 223 33 85 /1450, Fax +90 464 223 4118 goktug.dalgic@erdogan.edu.tr, Skype: godalgic

[84] NGO. Postal address: Gelincik mah. Orkide Sok. No:3 57000 SİNOP, www.merkoder.org; Contact person not specified, Tel: 0 541 698 35 32, info@merkoder.org

[85] NGO. Postal address: P.O.Box: 10 , Beykoz, 81650, İSTANBUL – TURKEY; http://www.tudav.org; Contact person: Prof. Dr. Bayram ÖZTÜRK, Phone : + 90 216 424 07 72, Fax: + 90 216 424 07 71, e-mail: info@tudav.org

[86] Regional Union of Fisheries Cooperatives. Postal address: Yali Mah. Foroz Balıkçı Barınağı İçi TRABZON; Contactperson: Ahmet Mutlu, Tel: 0090 505 963 61 07.

[87] Meke Marine Environmental Protection Services Ltd deals with marine and inland pollution response. Among its clients are the Turkish Ministries of Env. And Transport, and Istanbul Municipality. Webpage: http://www.mekemarine.com/HTML/profile.htm

[88] SESMEKE is a joint venture formed between SES and MEKE Marine Environmental Services (MEKE), an experienced Turkish oil spill response contractor. Webpage: http://www.sesi.seacorholdings.com/ses_meke.htm

[89] http://www.koseq.com/

[90] MARE Sea Cleaning Service : Kartal iş merkezi E-5 No:63 34876 Yakacık/istanbul / TURKEY phone: +90 216 3772700

[91] Priavate. Postal address: Gazeteciler Sitesi, Hikaye Sokak No:1/4 34394 Şişli İSTANBUL; Tel: (212) 216 64 82; e-mail: info@den-ar.com; www.den-ar.com

Table 41. Information on different types of Black Sea-related monitoring in Turkey

Responsible organization*		Type of monitoring[92]	Geographical scope	Number of stations	Parameters (from-to)	Period/ Frequency	Related to human activity
Name	National M. P.[93]						
Environmental Problems Research Centre of Ondokuz Mayis University[94] (Samsun)	No	Routine pollution monitoring in the vicinity of land-based sources of pollution	Turkish coastal Black Sea	≥25	Not specified/Trends can be derived for different depths and layer	1997-2012/ Seasonal	Coastal and urban development, various branches of industry, Military activities
Ataturk University, Faculty of Fishery[95] (Erzurum)	No	Not specified	Tortum Lake** (40°40'18"N 41°40'20"E)		O2, pH, Total phosphorus, ammonia, biota		Public health, Fishery and Aquaculture, Tourism and recreation
Institute of Marine Science and Technology (Izmir)[96]	No	Routine (hydrochemistry)	Western part of the Black Sea Turkish waters (41º - 43.5º N; 28º - 35º E)	76	7, trends cannot be derived (Table 42)	1992-1995/ Twice a year	Public health, Coastal and urban development, Fishery and Aquaculture, Tourism and recreation, Offshore gas and oil exploitation
Central Fisheries Research Institute (Trabzon)[97]	No[98]	Surveillance and Compliance monitoring, Pelagic and demersal fisheries	TR Black Sea	1-8 (Table 43, 44)	2-8 (Table 45)	Daily to Seasonal since 1993 (Table 45)	Fishery and Aquaculture
Istanbul University, Institute of Marine Science and Management[99]	Yes***	Environment routine monitoring/Pollution monitoring	TR Black Sea	71 (Table 46)	34 (Table 47)	Twice a year in 2004-2010	Public health, Coastal and urban development, Tourism and recreation
Sinop University Faculty of Fisheries[100]	No	Hydrobiology, Fishery	Southern Black Sea-Sinop (Fig. 20)	1-8 (Table 49, 50)	10-20 (Table 51)	Monthly since 1990	Fishery and aquaculture
TUBITAK - Marmara Research Center- Environment Institute / Marine and Inland Waters Unit[101]	Yes[102]	Surveillance and Compliance monitoring	Marmara Sea	6-55 (Table 52)	8-50 (Table 53)	From monthly to twice per year since 2008	Public health, Coastal and urban development, Marine and riverine traffic, Fishery and Aquaculture, Tourism and recreation,

[92] The Questionnaire asked for identification of the type of monitoring carried out by the contacted organization/stakeholder: the types of monitoring are specified on p. 38-39.

[93] Is the organization part of a National Monitoring Program? Yes/No

[94] Governmental University. Postal address: Ondokuz Mayis University, Engineering Faculty, Department of Environmental Engineering, 55200 Samsun/TURKEY; Contact person: Prof.Dr. Hanife Buyukgungor, E-mail: hbuyukg@omu.edu.tr

[95] Governmental University; webpage: http://www.atauni.edu.tr/#birim=su-urunleri-fakultesi; e-mail: suurunlerifak@atauni.edu.tr

[96] Governmental Institute. Postal address: Bakü Bul, No. 100, 35340, İnciraltı, İzmir, Türkiye/web.deu.edu.tr/deuimst; Contact person: Doç. Dr. Erdem Sayın (erdem.sayin@deu.edu.tr)

[97] Governmental Institute, subordinated to the Ministery of Food, Agriculture and Livestock General Directorate of Agricultural, Research and Policy; Postal address: Vali Adil Yazar Cad. No:14 Kaşüstü, Yomra 61250 Trabzon-TURKEY, www.sumae.gov.tr; Contact person: Dr. Atilla ÖZDEMİR, Phone:+90 462 3411053, Fax:+90 462 3411152, e-mail: aozdemir@sumae.gov.tr; Dr. Ilhan AYDIN, Director; e-mail: iaydin@sumae.gov.tr; Dr. Yaşar GENÇ (ygenç@sumae.gov.tr); Dr. Mustafa ZENGİN (mzengin@sumae.gov.tr);
Dr. Nimet Selda BAŞÇINAR (sbascinar@sumae.gov.tr)

[98] Or may be Yes, as National Data collection to determine BS anchovy stock, applying also acoustic model or methods for monitoring, is in place and the institute takes part.

[99] Governmental University. Postal address: Molla Hüsrev Mah., Müşküle Sk., No: 1, 34134, Vefa - Eminönü, Istanbul, 34134, TURKEY, http://www.istanbul.edu.tr/enstituler/denizbilimleri/denizbilimleri.htm Tel : +90 212 5112070; Contact person: Seyfettin Taş, Müşküle sk. No:1 Vefa İstanbul, Tel. 0212 440 00 00/26034, Fax: 02120526 84 33, e-mail: stas@istanbul.edu.tr.

[100] Governmantal University. Postal address: Sinop University Faculty of Fisheries, 57000 Sinop, TURKEY, www.sinop.edu.tr; Contact person: Prof. Dr. Levent Bat (leventb@sinop.edu.tr), Assoc. Prof. Dr. Murat Sezgin (msezgin@sinop.edu.tr), Assist. Prof. Dr. Fatih Sahin (fsahin@sinop.edu.tr)

[101] Governmental, subordinated to the Ministry of Science and Technology. Postal address: P.O.Box 21, 41470, Gebze Kocaeli Turkey, www.mam.gov.tr; Contact person: Çolpan Polat Beken, Tel: +90 262 6772977, Fax: +90 262 6412309

Responsible organization*		Type of monitoring[92]	Geographical scope	Number of stations	Parameters (from-to)	Period/ Frequency	Related to human activity
Name	National M. P.[93]						
							Offshore gas and oil exploitation, Various branches of industry
Nature Conservation Center[103]	Yes	Biodiversity[104]	Not specified	N/A	N/A	N/A	Coastal and urban development, Fishery and aquaculture, Tourism and recreation, Agriculture and farming, Various branches of industry
Ministry of Environment and Urbanization[105]	Yes[106]	Surveillance	TR Black Sea (Fig. 19)	71 (Table 46,)	34 (Table 47)	Twice a year since 2004	Public health, Coastal and urban development, Various branches of industry
Karadeniz Technical University, Faculty of Marine Sciences[107]	No	Env. routine complex	Sürmene Bay	2	6	Since 1987/monthly	Coastal and urban development, Marine and riverine traffic, Fishery and aquaculture
Institute of Marine Sciences, METU (Erdemli)[108]	Yes	Env. routine complex	TR Black Sea	In total 4922 stations for all the years of observation	70	Since 1985. Btw 1985&1999: more frequent (6 times/ year) Btw 2000&2012 less frequent (~1-2 times/year)	Public health, Fishery and aquaculture
Çanakkale Onsekiz Mart University, Faculty of Marine Sciences and Technology[109]	No	Env. routine complex and Ecotoxicological	Dardanelles area, Gallipoli	5-10	25-30	Annually/monthly	Public health, Coastal and urban development, Fishery and Aquaculture

*Note: The Marine Science Institutes are usually affiliated to the universities (like METU /IMS, for instance) and the universities are affiliated with the Council of Higher Education (which is related with the Ministry of Education). TUBITAK is the Council of Science and Technology, affiliated with the Ministry of Science and technology.

**Note: Tortum Lake monitoring is not related to the BS monitoring.

*** Note: In the Questionnaire the Istanbul University identified itself as not being part of a National Monitoring System. However, they have carried out in 2004-2010 the observations in the Black Sea and reported to the Ministry of Environment. Besides, the type of monitoring was identified as Pollution only, but in 2009-2010 biology was added also.

[102] TUBITAK mostly deals with the revision of monitoring programmes according to the emerging needs (regional and EU accession) working together with the Ministry of Environment and Urbanization. The organization also deals with assessments of monitoring data and data/information from research projects.

[103] NGO. Postal address: Aşağı Öveçler Mah. 1065. Cad. 1293 Sok. No:9/32 (06460) Ankara, Tel: 0312 287 81 44, Faks: 0312 286 68 20, www.dkm.org.tr; E-mail: dkm@dkm.org.tr. The organization deals with Ssytematic Conservation Planning, however, coastal habitats are meant, no those in the Black Sea.

[104] Biodiversity on coast is meant, there are no monitoring activities in the Black Sea.

[105] Governmental. Postal address: DG Environmental Management; Ehlibeyt Mah. 1271. Sok. No:13 Balgat Ankara 06520; www.csb.gov.tr Contact person: Mr.Murat TURAN, Head of Marine and Coastal Management Department, e-mail: murat.turan@csb.gov.tr, Tel: +90 0312 586 30 44

[106] This is the same Program, stations (from Igneada to Hopa, Fig. 14, covering transitional, coastal, and marine waters), parameters and frequence, described by the Istanbul University, Faculty of Marine Science and Management, as the Program is implemented in cooperation between the two organizations, and funded by the Ministry of Environment and Urbanization.

[107] Governmental. Postal address: 61530 Çamburnu, Trabzon, Turkey; Contact person: Dr. Kadir SEYHAN; e-mail: seyhan@ktu.edu.tr; Tel: +90 462 7522419; Fax: + 90 7522158

[108] Governmental. Postal address: P.O.Box 28, 33731, Erdemli-Mersin, TURKEY; web: http://www.ims.metu.edu.tr; Contact person: Prof. Ahmet Erkan Kideys
kideys@ims.metu.edu.tr

[109] Governmental. Postal address: Terzioglu Campus, 17100, Çanakkale, Turkey; webpage: http://suurunleri.comu.edu.tr; Conatct person: Assoc. Prof. Dr. Yeşim Büyükateş; e-mail: asuatates@yahoo.com; ybuyukates@comu.edu.tr

Table 42. Information on the monitoring carried out by the Institute of Marine Science and Technology, Izmir, Turkey

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
PO_4, NO_3, NO_2, Si, Chl-a	Spectrophotometric	Twice a year/ 0-100 (10m interval) 100-300 (100 m interval) 300-2000 (500 m interval)			
DO, H_2S					

Table 43. Information on the monitoring carried out by the Central Fisheries Research Institute, Trabzon, Turkey

Type of monitoring*	Geographical scope	Time period (from-to)	Frequency (from-to)	Number of stations	Number of parameters
Surveillance Monitoring (CTD)	Trabzon, Yomra	2000-2012	Weekly-Monthly	2	8
Compliance Monitoring	Rize, Çayeli	1993-2012	Seasonal	7	19
Surveillance Monitoring	Samsun / Hopa	2012-2014	Monthly	River (13) Black Sea (3)	33
Surveillance Monitoring (ADCP)	Trabzon, Yomra	2010 Mart 2012	Daily	1	2
Pelagic fisheries	Eastern Black Sea Coast	2006 - 2014	Seasonal	8	4
Pelagic fisheries	Black Sea coast (Igneada/Hopa)	2011-2015	Weekly	(Acoustiv survey)	8
Demersal Fisheries	Black Sea	2009-	Seasonal	3	4

*Environment routine complex monitoring; Ecotoxicological monitoring; Surveillance monitoring[110]; Compliance monitoring[111]; Operational monitoring (based on real-time observations)[112].

[110] **Surveillance monitoring** is usually the environment monitoring for trends (complex and routine monitoring);
[111] **Compliance monitoring** is the one checking the relevance of water quality and level of discharges against certain norms (governmentally established);
[112] **Operational monitoring** - real time (satellites, radars, any automatic devices working for real-time collection of data).

Table 44. Coordinates of stations monitored by the by the Central Fisheries Research Institute, Trabzon, Turkey

N of station	Coordinates	Area/name of transect*	Type of station**
1	40°58.385'N 39°50.982'E	Trabzon, Yomra Bay	Coastal[113]
2	40°58.662'N 39°51.275'E	Trabzon, Yomra Bay	Coastal
1	40°57.935'N 39°51.738'E	Trabzon, Yomra Bay	Coastal
1	41°05.980' N 40°41.590' E	Rize / Çayeli	Coastal
2	41°06.020' N 40°41.240' E	Rize / Çayeli	Coastal
3	41°05.880' N 40°40.930' E	Rize / Çayeli	Coastal
4	41°06.210' N 40°40.570' E	Rize / Çayeli	Coastal
5	41°06.260' N 40°41.400' E	Rize / Çayeli	Coastal
6	41°06.210' N 40°41.900' E	Rize / Çayeli	Coastal
7	41°06.830' N 40°41.410' E	Rize / Çayeli	Coastal (Reference)
Acoustic monitoring	41°53' N - 27°59' E (Igneada) to 41°23' N - 41°26' E (Hopa)	Igneada / Hopa	Coastal and marine waters

*e.g. Varna Bay, or Constanta / Mamaia transect, etc.
**transitional, coastal or marine waters; Please indicate which stations are Reference stations.

[113] In Turkey the following definitions for different types of waters are specified:
"Transitional waters" are bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows.
"Coastal water" means water on the landward side of a line every point of which is at a distance of one nautical mile on the seaward side from the nearest point of the baseline from which the breadth of territorial waters is measured. "Territorial waters" means all waters designated as such by countries pursuant to the United Nations Convention on the Law of the Sea (UNCLOS).
"Marine waters" means all waters designated by countries as falling within the exclusive economic zone pursuant to the United Nations Convention on the Law of the Sea.

Table 45. List of parameters monitored[114] by the Central Fisheries Research Institute, Trabzon, Turkey

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer) - 0-200m	Sediment	Biota	On-Coast
CTD[115]	SBE 25 CTD	X			
Water Temperature	SM 2550	X			
Salinity					
pH	4500- H^+ B.	X			
Conductivity	SM 2510	X			
Dissolved Oxygen	4500-O.G	X			
Density					
Turbidity	SM 2130.B	X			
Light transmission					
TSS	SM 2540 D	X			
Chlorophyll-a	SM 10200 H.	X			
Nitrate	SM 4500 NO_3^-.F	X			
Nitrite	SM 4500 NO_2^-.F	X			
Ammonia	SM 4500 NH_3 H	X			
Phosphate	SM 4500 P.G	X			
Silicate	SM 4500SiO2.F	X			
Total Phosphate	SM 4500 P J.	X			
Total Nitrogen	SM 4500 P J.	X			
Metals	SM 3125 B	X	X	X	
Current Velocity/Direction	ADCP	X			
Mercury	SM 3112 B.	X			
Arsenic	SM 3115 C.	X			
Anchovy	Biological sampling				
Mackerel	Biological sampling				
Turbot	Biological sampling				
Whiting	Biological sampling				
Red mullet	Biological sampling				

*on coast: monitoring at land-based point sources like at waste water discharges or at rivers

Note: For all commercial species the Central Fisheries Research Institute, Trabzon, provides: estimation of growth parameters and natural mortality, Cohort analysis, estimation of selectivity, Beverton and Hold yield per recruit analysis, VPA, XSA. The data of this institute provides for long-term trends (layer 0-200m) for: water temperature, salinity, conductivity, density, pH, dissolved oxygen, Chl and light transmission.

[114] Biodiversity/biological elements are also studied, but information on these has not been provided.
[115] The parameters have not been specified.

Table 46. Coordinates of stations monitored by the Istanbul University, Institute of Marine Science and Management, Turkey (National Program of Turkey implemented with and funded by the Ministry of Environment and Urbanization)

No	Name of station	Coordinates		Area/name of transect*
1	TRK-1	41.52.23 N	28.03.498 E	İğneada and Danube R.
2	TRK-4	41.22.11 N	28.37.47 E	Western Black Sea
3	TRK-7	41.11.562 N	29.35.586 E	Şile
4	TRK-10	41.08.07 N	30.37.656 E	Sakarya River
5	TRK-E1	41.16.428 N	31.23.94 E	Karadeniz Ereğlisi
6	TRK-13	41.27.606 N	31.46.308 E	Zonguldak
7	TRK-16	41.35.208 N	32.02.622 E	Bartın
8	TRK-19	41.41.388 N	32.13.194 E	Cide
9	TRK-22	41.59.214 N	33.47.154 E	İnebolu
10	TRK-25	42.03.84 N	34.55.074 E	Sinop
11	TRK-28	42.01.032 N	35.09.372 E	Sinop
12	TRK-32	41.44.598 N	35.57.372 E	Kızılırmak River
13	TRK-34Y	41.18.09 N	36.21.612 E	Samsun
14	TRK-37	41.23.61 N	36.39.186 E	Yeşilırmak River
15	TRK-43	40.59.814 N	37.53.13 E	Ordu
16	TRK-46	40.55.362 N	38.24.138 E	Giresun
17	TRK-53	41.00.936 N	39.44.076 E	Trabzon
18	TRK-55	41.02.112 N	40.32.388 E	Rize
19	TRK-58	41.11.634 N	40.54.24 E	Pazar
20	TRK-61	41.30.96 N	41.30.996 E	Hopa
21	TRK-SK1	41.15.168 N	36.27.384 E	Samsun
22	TRK-SK2	41. 15.318 N	36.29.046 E	Samsun
23	TRK-TY1	40. 58.092 N	39.52.146 E	Yomra
24	TRK-AR1	40. 56.802 N	40.03.516 E	Araklı
25	TRK-ÇY1	41.05.682 N	40.43.05 E	Çayeli
26	TRK-51Y	41.02.316 N	39.35.22 E	Akçaabat
27	TRK-10A	41.08.08 N	30.39.13 E	Sakarya River
28	TRK-13A	41.27.606 N	31.46.308 E	Zonguldak
29	TRK-19A	41.41.11 N	32.13.35 E	Bartın Stream
30	TRK-31A	41.44.42 N	35.57.40 E	Kızılırmak River
31	TRK-37A	41.23.43 N	36.39.37 E	Yeşilırmak River
32	TRK-2Y	41.50.88 N	28.19.638 E	İğneada and Danube R.
33	TRK-3	41.49.512 N	28.36.174 E	İğneada and Danube R.
34	TRK-5Y	41.28.410 N	28.44.202 E	Western Black Sea
35	TRK-6	41.35.178 N	28.50.922 E	Western Black Sea
36	TRk-8	41.14.22 N	29.36.24 E	Şile
37	TRK-9	41.20.55 N	29.38.808 E	Şile
38	TRK-11	41.10.044 N	30.38.466 E	Sakarya River
39	TRK-12Y	41.12.816 N	30.39.018 E	Sakarya River
40	TRK-E2	41.17.25 N	31.22.416 E	Karadeniz Ereğlisi
41	TRK-E3	41.18.858 N	31.19.602 E	Karadeniz Ereğlisi
42	TRK-14Y	41.29.202 N	31.45.558 E	Zonguldak
43	TRK-15Y	41.31.686 N	31.43.536 E	Zonguldak
44	TRK-17	41.35.454 N	32.03.03 E	Filyos
45	TRK-18Y	41.37.32 N	32.01.728 E	Filyos
46	TRK-21	41.41.85 N	32.13.182 E	Bartın
47	TRK-21Y	41.43.092 N	32.12.48 E	Bartın
48	TRK-23Y	42.00.99 N	33.46.032 E	İnebolu

No	Name of station	Coordinates		Area/name of transect*
49	TRK-24	42.04.92 N	33.47.19 E	İnebolu
50	TRK-26	42.04.92 N	33.47.19 E	Sinop
51	TRK-27	42.04.92 N	33.47.19 E	Sinop
52	TRK-29	41.45.222 N	35.56.718 E	Sinop
53	TRK-30Y	41.57.054 N	35.12.246 E	Sinop
54	TRK-33Y	41.47.316 N	35.56.28 E	Kızılırmak
55	TRK-33	41.45.222 N	35.56.718 E	Kızılırmak
56	TRK-35	41.20.808 N	36.23.316 E	Samsun
57	TRK-36	41.22.578 N	36.24.726 E	Samsun
58	TRK-39Y	41.28.398 N	36.39.192 E	Yeşilırmak River
59	TRK-39	41.25.23 N	36.39.192 E	Yeşilırmak River
60	TRK-40Y	41.03.018 N	37.30.522 E	Fatsa
61	TRK-44	41.01.218 N	37.54.48 E	Ordu
62	TRK-45	41.04.128 N	37.59.862 E	Ordu
63	TRK-47	40.55.98 N	38.24.636 E	Giresun
64	TRK-48	40.56.622 N	38.24.702 E	Giresun
65	TRK-51Y	41.02.316 N	39.35.22 E	Akçaabat
66	TRK-54	41.01.842 N	39.43.494 E	Trabzon
67	TRK-54Y	41.03.606 N	39.43.482 E	Trabzon
68	TRK-57	41.03.414 N	40.31.956 E	Rize
69	TRK-57Y	41.04.638 N	40.32.22 E	Rize
70	TRK-63	41.26.094 N	41.24.222 E	Hopa
71	TRK-63Y	41.27.546 N	41.23.622 E	Hopa

Table 47. Parameters monitored by the Istanbul University, Institute of Marine Science and Management, Turkey (National Monitoring Program of Turkey implemented with and funded by the Ministry of Environment and Urbanization)

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer) (twice a year)	Sediment (once a year)	Biota (once a year)	On-Coast
Metals (Al, Cd, Cu, Cr, Zn, Pb, Hg, V)	AAS (Kuvvetli Asit Çözünürleştirmesi ve AAS'de okuma)	x	x	x	
Water temperature, Salinity, Density	CTD Manual	x			
Secchi depth		x			
pH		x			
O_2 (and saturation)	Winkler	x			
Chl-a	Spektrofotometrik	x			
NO_2	Sepektrometrik	x			
NO_3	Otoanalizör	x			
NH_4	Otoanalizör (Berthelot reaksiyonu metodu ve Bran+Luebbe AA3 otoanalizörde)	x			
TON, TN	Otoanalizör (Bazik persülfat Kadmium indirgeme metodu,	x			

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer) (twice a year)	Sediment (once a year)	Biota (once a year)	On-Coast
	Bran+Luebbe AA3 otoanalizörde)				
P-PO4, TP	Otoanalizör (Bazik persülfat parçalaması sonrası Askorbik asit metodu ve Bran+Luebbe AA3 otoanalizörde)	x			
SiO_4	Otoanalizör (Bran+Luebbe AA3 otoanalizörde)	x			
TOC	Yüksek ısıda parçalama metodu TOC cihazında	x	x		
TSS		x			
Pesticides		x			
Detergents		x			
Phytoplankton	bolluk, tür kompozisyonu	x			
Zooplankton	bolluk, tür kompozisyonu	x			
İhthyoplankton	bolluk, tür kompozisyonu	x			
Total coliforms	CFU/100 ml	x			
Fecal coliforms	CFU/100 ml	x			
Streptococcus	CFU/100 ml	x			
Macrozoobenthos	bolluk, biyokutle tür kompozisyonu				
Total carbonates			x		
PAH and total hydrocarbons		x	x	x	

Trends can be derived based on the data collected by the Istanbul University (Institute of Marine Science and Management), as specified in the Table 48:

Table 48. Parameters monitored by the Istanbul University, Institute of Marine Science and Management, Turkey (National Monitoring Program of Turkey implemented with and funded by the Ministry of Environment and Urbanization)

Parameter	Trend (Yes/No)			
	Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
TSS, TN,TP,SO4, chlorophyl-a,TOC	Surface, bottom/for all the transects			
Trace metals(Hg,Cu,Cd,Pb), PAH,TPH		yes		

*on coast: monitoring at land-based point sources like at waste water discharges or at rivers

The Sinop University, Faculty of Fisheries carries out monitoring in the Black Sea. Its monitoring was designed as a time-series study, however, sustained only by short-term TUBITAK projects, therefore, needs special attention to operate it in the long-term. Since 1990, monitoring has been held almost monthly, collecting hydrobiological, fishery, hydrochemical and chlorophyll data.

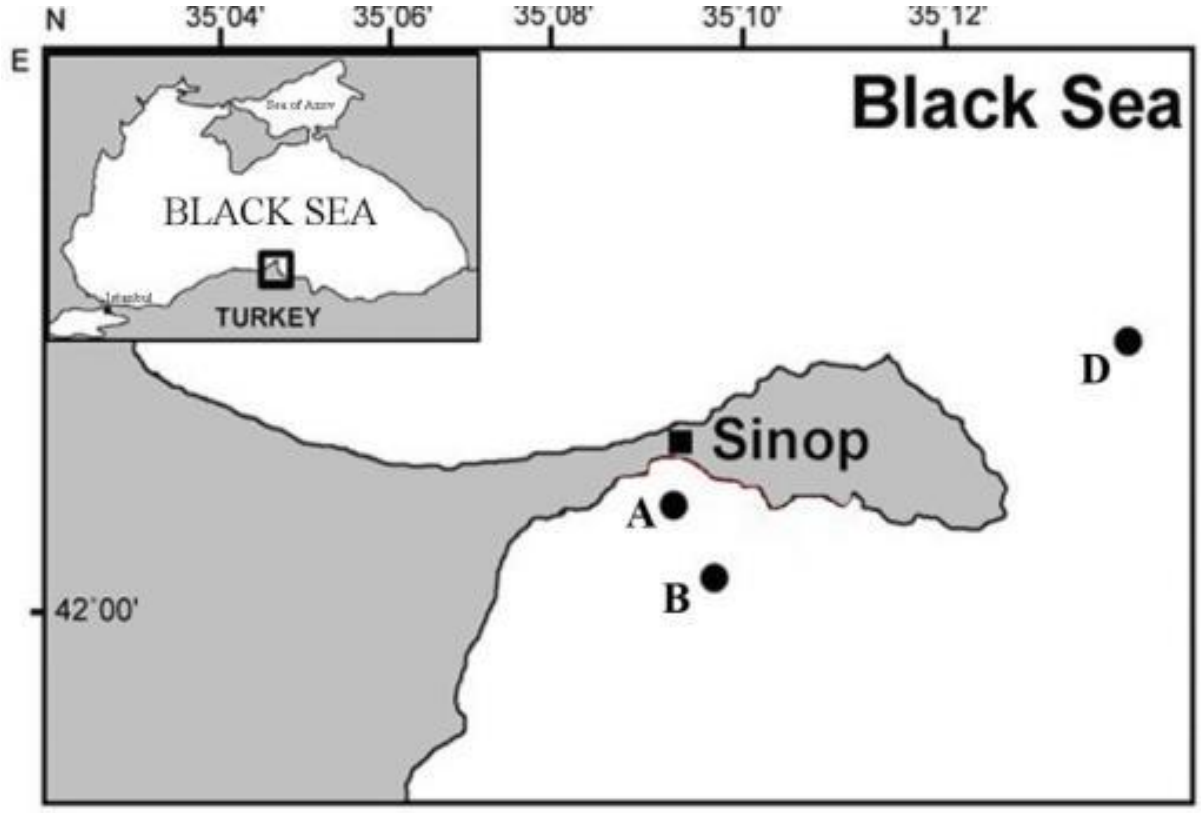


Figure 20. Map of sampling stations in the vicinity of Sinop

Table 49. Information on the monitoring carried out by the Sinop University, Faculty of Fishery, Turkey

Type of monitoring*	Geographical scope	Time period (from-to)	Frequency (from-to)	Number of stations	Number of parameters
Plankton (Phyto, Zoo, Macrozoo, Ichthyo) Sampling	Southern Black Sea-Sinop Region	1990-2006	Monthly	4	13
Plankton (Phyto, Zoo, Macrozoo, Ichthyo) Sampling	Southern Black Sea-Sinop Region	2006-2009	Monthly	3	12
Plankton (Phyto, Zoo) Sampling	Southern Black Sea-Sinop Region	2009-2012	Monthly	1	10
Zoobenthos (Macrozoobenthos)	Southern Black Sea-Sinop Region	2000-2012	Monthly	3	15
Zoobenthos (Meiobenthos)	Southern Black Sea-Sinop Region	2009-2012	Monthly	8	20
Fisheries and Dolphin	Southern Black Sea-Sinop Region				

Table 50. Coordinates of stations monitored by the Sinop University, Faculty of Fishery, Turkey

N of station	Name of Station	Coordinates	Area/name of transect*	Type of station**
1	A	35.1588E-42.0058N	Sinop Region	Coastal Waters
2	B	35.1700E-41.9908N	Sinop Region	Coastal Waters
3	D	35.1500E-42.0405N	Sinop Region	Open Waters

Table 51. List of parameters observed by the Sinop University, Faculty of Fishery, Turkey

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Temperature	YSI 6600-Probe	X			
pH	YSI 6600-Probe	X			
Conductivity	YSI 6600-Probe	X			
Dissolved Oxygen	YSI 6600-Probe	X			
Turbidity	YSI 6600-Probe	X			
TSS	YSI 6600-Probe	X			
Chlorophyll-a	YSI 6600-Probe	X			
Nitrate	Spectrometric	X			
Nitrite	Spectrometric	X			
Ammonia	Spectrometric	X			
Phosphate	Spectrometric	X			
Silicate	Spectrometric	X			
Heavy metals	Spectrometric		x	x	
Granulometry (sediment)	Titration		x		
Organic matter	Burning method		x		
Species number					
Habitat type					x
Abundance					
Biomass					
Frequency					
Population parameters					

Table 52. Information on the monitoring carried out by TUBITAK – the Marmara Research Center, Turkey

Type of monitoring	Geographical scope	Time period (from-to)	Frequency (from-to)	Number of stations	Number of parameters
Surveillance Monitoring (water and sediment quality)	İzmit Bay of the Sea of Marmara	2008-2012	Monthly	6	20

Type of monitoring	Geographical scope	Time period (from-to)	Frequency (from-to)	Number of stations	Number of parameters
Compliance Monitoring	Rivers and river mouths of the İzmit Bay	2008-2012	Seasonal	12	8
Surveillance Monitoring* (physicochemical, pollution, biological elements)	Marmara Sea	2011	Twice per year	55	40-50 (incl.biological elements)

* This type of monitoring was planned for all seas surrounding Turkey for 2011-2013. However, the plan for the Black Sea in 2011-2012 was not implemented.

The Table below includes parameter groups of the monitoring programme of 2011-2013 (for all TR seas)

Table 53. Parameters observed by TUBITAK – the Marmara Research Center, Turkey

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Biodiversity (Phytoplankton, macroalgae, benthic communities, fish)		X			
Eutrophication (nutrients, chl, phyto and other biological parameters)		X			
Contamination (All priority substances in biota and sediments. Not in seawater)			X	X	
Litter is included in 2012					

Table 54. Information on the geographical coverage of the monitoring carried out by the Karadeniz Technical University, Faculty of Marine Science, Trabzon, Turkey

N of station	Coordinates	Area/name of transect*	Type of station**
Sürmene Bay	40° 56’ 43’’ N-40° 12’ 01’’ E 41° 06’ 43’’ N- 40° 10’ 05’’ E	Camburnu transect	Coastal

Table 55. Parameters observed by the Karadeniz Technical University, Faculty of Marine Science, Trabzon, Turkey

Parameter	Analitical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
CTD (water temperature, salinity, density)		Surface to 200 m	-	-	-
Chlorophyll-a	Sepectrophotometric	Surface to 50 m	-	-	-
Phytoplankt.	Direct count	Surface to 50 m	-	-	-
Zooplnkt.	Direct count, Microcopy	Surface to 120 m	-	-	-

Note: the data of the Karadeniz Technical University, Faculty of Marine Science, Trabzon, provides for deriving trends: salinity and water temperature (0-200m), as well as for the phytoplankton in the layer 0-50m.

The Institute of Marine Sciences/Middle East Technical University, Erdemli-Mersin (IMS/METU) described monitoring activities, which since 1985 covered 4922 stations in total, the geographical coverage is between the latitudes of 41°&46° N and longitudes of 28°&42° E (coastal and marine waters).
Full list of the cruises of this Institute can be found at:
http://www.ims.metu.edu.tr/index1.php?sayfa=activities_cruises. During the last years, IMS/METU carries out monitoring in the Black Sea mainly in the frames of different EC projects.

Largest integrated projects of IMS/METU (cruises carried out/data compiled) were: of ISKI (1986-1994; regular), TUBITAK (1990-2000, less regular) and SESAME Project (2007-2008). Current projects of IMS METU are enlisted at: http://www.ims.metu.edu.tr/Sayfa.php?icerik=Makale&mid=19.

Full set of stations covered by IMS METU are presented for 1986-2008 as follow (Figure 21):

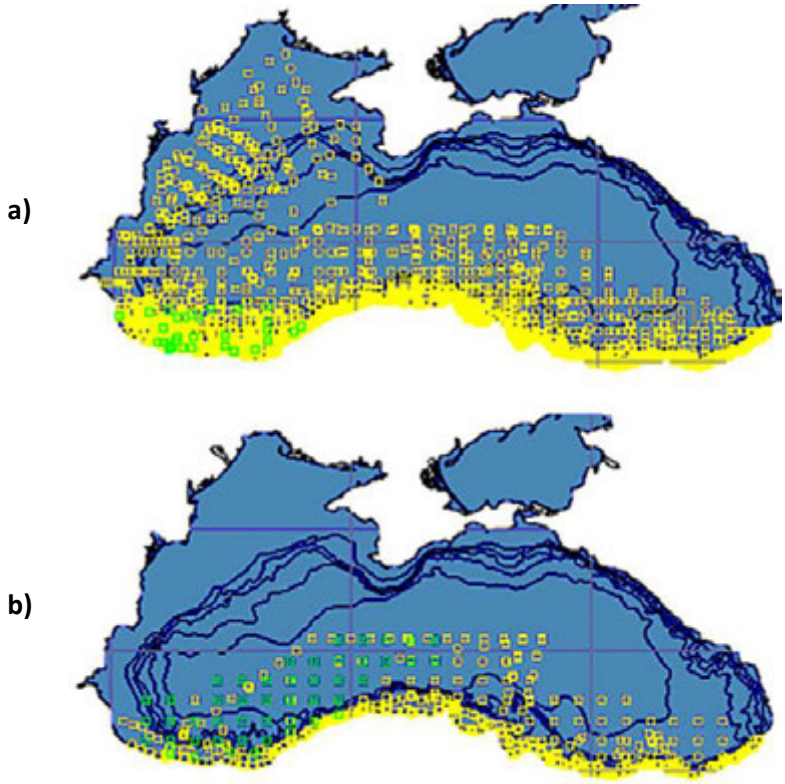


Figure 21. Map of sampling stations observed by IMS/METU (Erdemli) in Turkish Black Sea waters since 1985 (a) and in the period 2006-2011 (b).

The parameters observed by IMS/METU (Erdemli) are presented in the Table below:

Table 56. Parameters observed by IMS/METU (Erdemli), Turkey

Parameter	Analytical Method	Period/Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Biodiversity	Microscopic analysis	For pelagic communities about once or two times a year btw 1989 to 2000; two times a year in 2008&2010. Benthic communities – on 1988-89 only.			
Eutrophication	Autoanalyzer for nutrients, CHN analyzer	Btw 1985&1999: more frequent (~6 times in a year) Btw 2000&2012 less frequent (~1-2 times in a year)			
Contamination	GC and/or AA analysis	No regular data		No regular data	
Commercial fish	Lenght-weigth measurements	Once a year btw 1988-1992 and 2011-2012			
Hydrological data	CTD measurements	Btw 1985&1999: more frequent (~6 times in a year) Btw 2000&2012 less frequent (~1-2 times in a year)			
Aerosol data	Particles size measurements	2009-2010, 2012			

The Canakkale University, Faculty of Marine Sciences and Technology specified monitoring activities in the TR Straits (Dardanelles area, Gallipoli). The geographical coverage described is between the latitudes of 40.07.49 N – 40.40.01 N and longitudes of 26.35.20 E – 26.66.09 E. The parameters observed are as follow:

Table 57. Parameters observed by Canakkale Univ., Faculty of Marine Sciences and Technology, Turkey

Parameter	Analitical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast
Biodiversity		Water column, bottom			
Eutrophication		Water column			
Contamination		Water column	x		
Commercial fish		Pelagic, demersal			

No organizations dealing with bathing water have been contacted. The information provided further has been extracted from the archive of the BSC.

Bathing water monitoring

In total, 14 Provinces have swimming areas in the Black Sea. Every 15 days samples are collected at the selected points. Total and faecal coliforms and faecal streptococci are analysed. This kind of monitoring is under the Ministry of Health and is conducted byt its subordinated laboratories.

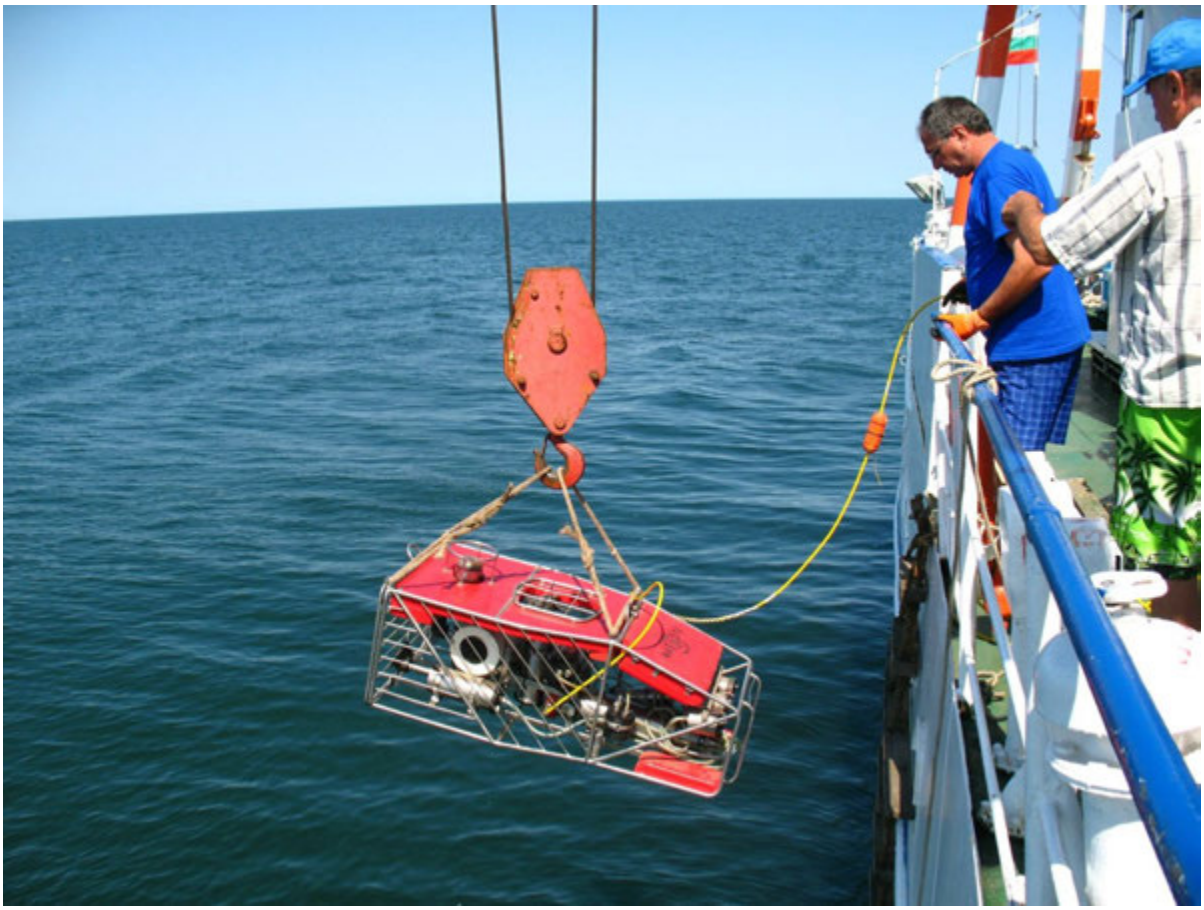
To conclude on the performance of the beneficiary countries in the field of monitoring. Going back to the recommendations of the Diagnostic Report I in relation to monitoring, the following conclusions can be made as per the following important issues:

Table 58. State of the monitoring in BG, RO and TR – main findings on achievements and gaps

N	Issue		Bulgaria	Romania	Turkey
1	**Maintain frequency of observations** – in line with WFD and MSFD		**Since 2012**	**Mostly Yes**	**No**
2	**Ensure proper geographical coverage** – include open sea to cover the EEZ		**Since 2012, partially**	**No**	**Yes**
3	**Sustain stations and transects with long-term observations** (and create network of Reference stations)		**Mostly Yes, but with no network of Reference stations**	**Yes**	**No such stations and transects, no Reference stations**
4	**Cover mandatory parameters**		**No**	**Mostly Yes**	**Partially**
5	**Improve**	**Yes**	**Yes**	**Yes**	**Yes**
		No	**Partially**	**Partially**	**No**
		No	**Partially (not in the sea)**	**Partially**	**No**
		No	**Yes**	**Yes**	**Yes**
		No	**Partially**	**Partially**	**Partially**
		Poor	**Poor**	**Mostly No**	**Mostly No**
		Partially	**Partially**	**Partially**	**Partially**
6	Utilization of the **capacities of all Institutes** dealing with monitoring in the country (not only those, which are officially nominated by the Ministries of Environment or others to implement National Programmes)		**No**	**No**	**No**
7	**Avoid overlapping of activities and efforts**		**No**	**No**	**No**

The issue on Capacity building (regular trainings, bringing best available practices to the country) will be dealt with in **Chapter V**. The **Harmonization** process will be discussed in **Chapter VII**. The status of QA/QC in the field of monitoring is discussed further.

4. Procedures of QA/QC in monitoring (Field and Laboratory works)



The regulators in all countries of the region have defined quality control and quality assurance requirements for laboratories involved in marine monitoring programmes. However, the main regulatory requirements that are in place relate to standardization and certification of analytical instruments, but these requirements do not cover procedures and methodologies, which could only be tested through regular participation in internal and external inter-laboratory calibration programs (proficiency testing) in accordance with ISO 17025 and other ISO procedures.

BULGARIA

References of major guiding documents used by IFR-Varna and IO-BAS, Varna, Bulgaria are provided below:

- Alexandrov B. and Korshenko A. 2006. Manual for zooplankton sampling and analysis in the Black Sea Region (Draft), http://www.blacksea-commission.org/
- Cochrane S.K.J., D.W. Connor, P. Nilsson, I. Mitchell, J. Reker, J. Franco, V. Valavanis, S.Moncheva, J. Ekebom, K. Nygaard, R. Serrão Santos, I. Naberhaus, T. Packeiser, W. van de Bund & A.C. Cardoso. 2010. Marine Strategy Framework Directive – Task Group 1 Report: Biological diversity. N. Zampoukas [ed]. Luxembourg: Office for Official Publications of the European Communities, 111 pp. EUR 24337 EN – Joint Research Centre, EUR – Scientific and Technical Research series – ISSN 1018-5593, ISBN 978-92-79-15650-2, DOI 10.2788/86653
- Coleman, D., Wiebe, W. 1998. First-ever scientific estimate of total bacteria on Earth shows far greater numbers than ever known before. In Proceedings of the National Academy of Sciences, University of Georgia.
- Dimov, I. 1959. Improved Quantitative Zooplankton Sampling Method. Rep.BAS, vol. 12, no. 5,pp. 427-429.
- Grimes, D.J., Singleton, F.L., Colwell, R.R. 1984. Allogenic succession of marine bacterial communities in response to pharmaceutical waste. J. Appl. Bacteriol. 57: 247-261.
- HITACHI Model U-2001 UV/Vis Spectrophotometer, (1995). Users Manual.
- http://documents.blacksea-commission.org/Downloads/BlackSea-Non_Native_Species_List.pdf
- http://documents.blacksea-commission.org/Downloads/Guidlines-Phytoplankton-QC-QA.pdf
- http://documents.blacksea-commission.org/Downloads/IUCN_Status_BS_states.pdf
- http://documents.blacksea-commission.org/Downloads/Phytoplankton_%20Mannual-Final-1.pdf
- http://phyto.bss.ibss.org.ua/wiki/List_checked
- http://www.blacksea-commission.org/_publ-BSFishList.asp
- ICES/HELCOME steering group of quality assurance of biological measurements in the Baltic Sea.ICES SGQAB report, 2005. http://www.ices.dk/reports/ACME/2005/SGQAB05.pdf - for macrophytes
- Kogure, K., Simidu, U., Taga, N. 1979. A tentative direct microscopic method for counting living marine bacteria. Can. J. Microbiol. 25: 415-420.
- Konsulov, A., Dencheva, K., Petrova-Karadjova, V., Konsulova, T., Moncheva, S., Prodanov, K., Shterev, I., Temniskova-Topalova, D., Velikov, A., Krastev, A., Stojanova, A., Solakov, D., Kamburska, K. (1998). Black Sea Biological Diversity – Bulgaria. Bulgarian National Report, GEF, Black Sea Environmental Programme. Black Sea Environmental Series, UN Publ., New York, v. 5, 131 pp.
- Korshenko A., Aleksandrov B., 2009. Manual for zooplankton sampling and analysis in the Black Sea Region.
- Lund, J.W.G., Kipling, C. and Le Cren, E.D. 1958, 'The inverted microscope method of estimating algal numbers and the statistical basis of estimations by counting', *Hydrobiologia*, 11, 143–170.
- Marinov, T. (1990). The zoobenthos from the Bulgarian Sector of the Black Sea, Publishing House of the BAS, 195 pp.
- Methodology of hydrochemical research of the ocean, (1978). Nauka, Moscow, 269. (in Russian).
- Moncheva S. 2010. Guidelines for QC/QA of Biological Data-Phytoplankton. 18 pp. Black Sea Commission/UPGRADE BLACK SEA SCENE Project, GA 226592, FP7, EC
- Moncheva S., B. Par. 2005 (updated-2010). Manual for Phytoplankton Sampling and Analysis in the Black Sea. GEF/UNDP Black Sea Ecosystem Recovery Project (BSERP)-RER/01/G33/A/1G/31 & UPGRADE BLACK SEA SCENE Project, GA 226592, FP7, EC, BSC electronic publication. 68 p.
- Moncheva, 2010. An updated and WoRMS revised phytoplankton checklist from studies in Bulgarian Black Sea area- a contribution to Black Sea phytoplankton check-list (published on-line):
- Morduhai-Boltovskii et al. 1968. The identification book of Black and Azov Seas fauna, Naukova Dumka, Kiev , vol. I, II, III.
- Protocols for the joint global ocean flux study (JGOFS) core measurements, (1994). UNESCO, 15-83.
- Tabor, P.S., Neihof, R.A. 1984. Direct determination of activities for microorganisms of Chesapeake Bay populations. Appl. Environ.Microbiol. 48: 1,012-1,019.

▪ Throndsen, J. 1978, 'Preservation and storage', in A. Sournia (ed) *Phytoplankton Manual*, UNESCO, Paris.
▪ Todorova V., Konsulova T., 2005. Manual for quantitative sampling and sample treatment of marine soft-bottom macrozoobenthos, 38p.
▪ UNESCO 1974, *A review of methods used for quantitative phytoplankton studies*, Final report of SCOR Working Group 33, UNESCO Technical Papers in Marine Science, 18, Paris.
▪ Utermöhl, H. 1958, 'Zur Vervollkommung der quantitativen Phytoplankton Methodik' (Towards a perfection of quantitative phytoplankton methodology), *Mitteilungen der Internationale Vereinigung für Theoretische und Angewandte Limnologie*, 9, 1–38.
▪ Warwick, R. M. 1986. A new method for detecting pollution effects on marine macrobenthick communities, Marine biology, Volume 92, Number 4
▪ Yankova, M., Raykov,V., Ivanova, P., Meladze, M., Diasamidze, R., Radu, G., Nikolaev, S., Agapov, S., Grinchenko, M., Öztűrk, B., Oral, M., Bat, L., Dűzguneş, E., Slyakhov, V., Boltachov, A., Karpova, E. 2010. Black Sea fish check-list. Black Sea Commission Publication, 58 pp.
▪ Zubov N. (1957). Oceanological tables. Gidrometeoizdat, Leningrad, 406. (in Russian).
The manuals for phytoplankton (Moncheva, Parr, 2010) and marine soft-bottom macrozoobenthos (Todorova, Konsulova, 2005) are those cited by both institutions as guidance for monitoring and processing of samples. The Reference to the same manuals does not impose the use of same methods. For instance, for phytoplankton the two institutions use different methods of processing of samples and calculation of qualitative parameters (biomass, density), which means that the data are hardly comparable.

IFR-Varna has participated in the following inter-calibrations during the last 10 years:
▪ 09.2004-The methodologies applied for gelatinous zooplankton estimations was agreed between IFR-Varna and University of Bergen, Norway, under the frame of EU FP 5 project EUROGEL.
▪ 08.2005 – Harmonization and intercalibration of methodologies applied in IFR-Varna and NIMRD-Constanta for field estimations of young fish, larvae and eggs distribution and qualitative analysis. Unified methodology has been applied regarding morphology measurements for small pelagics, population parameters estimation, stock assessment, and measures for sustainable utilization.
▪ 05.2006-The benthos laboratory has participated in the instruction and practical training program leaded by the representatives from the Faculty of Marine Biology to the University of Groningen.
▪ 06.2006-The benthic and phytoplankton laboratories have participated in the intercalibration procedure, organized by the Basin Directory-Varna.
▪ 02.2007-The mesozooplankton laboratory have participated in the international inter-calibration of sample analysis procedures, as this calibration includes most of the Black Sea countries.

IO-BAS, Varna has participated in the following inter-calibrations during the last 10 years:
▪ Intercalibaration (phyto- and zooplankton) among the Black Sea countries Institutes - UNDP/GEF, 2005;
▪ Proficiency Test (Analytical performance study for the Black Sea /Bulgaria, Romania, Russia, Ukraine/ on the determination of nutrients in seawater) organized for BSEP by the International Atomic Energy Agency, Marine Environment Laboratory, Monaco, 2006;
▪ Intercalibaration (phyto- and zooplankton, chemistry) among the Black Sea countries Institutes (without Turkey and Georgia) – Project SESAME, 2009;
▪ JRC/EC intercalibration for BQE (phytoplankton, zoobenthos, macrophytobenthos) 2012, WFD.

IBER-BAS has specified a single guideline document in QA/QC for monitoring:
Korshenko, A., Denga, Y., Lisovsky, R., Gavrilova, T., Velikova, V., Zodiatis, G., Iona, S. (2011).Quality Assurance and Quality Control of Chemical Oceanographic Data Collections (Regional Procedure for QA/QC)[116].

No inter-calibrations have been specified by IBER-BAS, Bulgaria.

[116] This Guideline has been recently updated and is still under further development. Its last draft version is cited as: Korshenko, A., Denga, Y., Velikova, V. (2012). Quality Assurance and Quality Control of Chemical Oceanographic Data Collections (Regional Procedure for QA/QC). When finalised it will be electronically published on the webpage of the BSC.

ROMANIA

The issue of QA/QC in monitoring is well attended in Romania as reported by the stakeholders contacted.

Table 59. Radionuclides QA/QC documents used by the Environmental Protection Agency of Constanta, Romania

N	Title of Document	dd.mm.yy
1.	The sampling, processing, measurement and calculation of global beta activity of water samples -PL-004	01/05.2007
2.	ISO 9697:2008 –Determination of global beta activity of water samples	2008
3.	The sampling and processing water samples for measuring gamma spectrometry - PL- 010	01/05/2006
4.	ISO 10703: 2007 -Determination of specific activity of radionuclides in water by high resolution gamma spectrometry	2007
5.	S505QA Software Genie	

Note: The Software Genie was reported by the Environment Protection Agency of Constanta, no explanation on it has been provided.

Environmental Protection Agency of Constanta - Radionuclides proficiency tests

- Intercomparison Exercise IAEA[117]-437 Radionuclides in Mediterranean Mussel;
- IAEA-CU-2007-03 World-wild open proficiency test;
- IAEA-2008-03 proficiency test on the determination of natural radionuclides in phosphogypsum and spiked water;
- IAEA-CU-2009-03 World-wild open proficiency test;
- IAEA-CU-2010-03 World-wild open proficiency test on the determination of natural radionuclides in water and Ra-226 in soil;
- EC interlaboratory comparison on 90Sr, 137Cs and 40K in bilberry powder;
- IAEA-TEL-2011-03 World-wild open proficiency test.

Note: Frequency of participation in testing/international exercises is usually annual.

Bathing water monitoring proficiency tests of Constanta and Tulcea County Departments of Public Health (Romania) take place as follow. Once per year, 3 samples are collected for „Drinking Water Microbiology" according to the same ISO references standards - for Coliforms, E.coli and Enterococci – with LIVMEDLS WERKET SUEDIA. Participation to these proficiency tests since 2005.

List of Guiding documents in **environment monitoring** of GeoEcoMar and NIMRD is presented below (**Note:** only a couple of manuals repeat those pointed as used in Bulgaria, and they are the manuals developed for phytoplankton (Moncheva, Parr, 2010; Moncheva, 2010) and zooplankton (Alexandrov, Korshenko, 2009 (draft)): developed under the hat of the BSC and with the financial assistance of projects (BSERP/UNDP/GEF and Upgrade BS Scene/EC FP7).

- Bacescu M., 1951 – Cumacea. Crustacea. Fauna RSR. IV, Fasc. 1. Ed. Academiei RSR, 91pp.
- Bacescu M., 1954 – Mysidacea. Crustacea. Fauna RSR. IV, Fasc. 3. Ed. Academiei RSR, 124 pp.
- Bacescu M., Muller G. I., Gomoiu M.-T., 1971 – Researches of benthic ecology in the Black Sea. Quantitative, qualitative and comparative analyses of the Pontic benthal fauna. Ecologie marina, 4, Ed. Academia Romana, Bucharest, 357 pp.
- Biovolumes and size classes of phytoplankton in the Baltic Sea 2006. HELCOM. Baltic Sea Environment Proceedings, No. 106. 142 pp.

[117] IAEA- International Atomic Energy Agency, http://www.iaea.org/

- Report of the third ICES/HELCOM Workshop on quality assurance of Biological measurements Warnemunde, Germany, 1996.
- Clarke K. R. and Warwick R. M., 1994 – Changes in marine communities: an approach to statistical analysis and interpretation. Natural Environmental Research Council, Plymouth.
- EA-4/16:2003 (RO) - EA Guidelines on the expression of uncertainty in quantitative testing.
- Fauvel P., 1923 – Polychaetes errantes. Fauna de France. Vol. 5. Paris.
- Fauvel P., 1927 – Polychaetes sedenteires. Fauna de France. Vol. 16. Paris.
- Ghid ISO/CEI – 2:1996- Termenii generali şi definiţiile lor privind standardizarea şi activităţile conexe. ISO/CEI Guide – 2:1996 „General terms and their definitions concerning standardization and related activities".
- Guide EURACHEM/ CITAC, edition 2 1999 - Quantifying of uncertainty in analytical measurements.
- Holme N. A. and McIntryre A., 1984 – Methods for the Study of Marine Benthos. Oxford, 387 pp.
- IAEA – MEL, Monaco, 1999. Proceduri standard de laborator pentru determinarea metalelor grele ,, Standard laboratory procedures for determination of heavy metals".
- IAEA, 1995. Manual pentru analizele geochimice ale sedimentelor marine şi a suspensiilor. Metode de referintã pentru studiul poluãrii marine nr.63 NEP/FAO/IOC. ,,Manual for geochemical analysis of marine sediments and suspensions. Reference methods for marine pollution study no.63 NEP/FAO/IOC".
- ICES 2004 – Report of the ICES/OSPAR Steering Group on Quality Assurance of Biological Measurements in the Baltic Sea. 59 pp.
- ICES 2005 - Report of the ICES/OSPAR Steering Group on Quality Assurance of Biological Measurements in the Northeast Atlantic. 59 pp.
- ICES Zooplankton Manual, Eds: R. Harris, P. H. Wiebe, J. Lenz, H-R. Skjoldal and M. Huntley, Academic Press, 2000.
- ILAC-G17:2002 (RO) - Introducing the Concept of Uncertainty of Measurement in Testing in Association with the Application of ISO / IEC 17025.
- ISO 16665:2005 (E). Water quality – Guidelines for quantitative sampling and sample processing of marine soft-bottom macrofauna.
- Korshenko A., Alexandrov B., 2009 (draft) - Manual for zooplankton sampling and analyses in the Black Sea Region.
- Manual for Marine Monitoring in the COMBINE Programme of HELCOM 2003. Part C. Programme for monitoring of eutrophication and its effects. Annex C-8 Soft bottom macrozoobenthos. http://sea.helcom.fi/Monas/CombineManual2/PartC/CFrame.htm
- Manual for Marine Monitoring in the COMBINE Programme of HELCOM. Annex C-6. Phytoplankton species composition, abundance and biomass. 21 pp.
- Manual for Marine Monitoring in the COMBINE Programme of HELCOM. Annex C-7. Mesozooplankton.
- Manualul pentru analiza apei de mare "Methods of Seawater Analysis", GRASSHOFF, 1999.
- Method EPA 3051, 1992 ,,Microwave acid digestion of sediments, sludge and soil. Physico-chemical testing of solid waste" SW-846, 3rd Ed., US EPA.
- Metode chimice standard pentru monitorizarea mediului "Standard chemicals methods for marine environmental monitoring", UNESCO, 1983.
- Metode chimice standard pentru monitorizarea mediului marin „Standard chemical methods for marine environmental monitoring", UNEP, 1988.
- Milchakova N., 2011 – Marine plants of the Black Sea. An illustrated field guide, 144.
- Moncheva, 2010 - Guidelines for Quality Control of Biological Data Phytoplankton, UPGRADE BLACK SEA SCENE, 18 pp.
- Morduhai-Boltovskii et all., 1968 – The identification book of Black and Azov Seas fauna. Naukova Dumka, Kiev, vol. I, II, III.
- Morduhai-Boltovskii F. D., 1968; 1969; 1972 – Opredeliteli fauni Chernogo i Azovskogo morey, Naukova Dumka, Vol. I, II, III.
- NOAA Memorandum Tehnic NOS ORCA 130, 1998. Prelevare si metode analitice in cadrul programului national de stare si tendinte "Mussel Watch" 1993-1996 (233 pp).
- NOAA Technical Memorandum NOS ORCA 130, 1998 ,,Sampling and analytical methods in the national program status and trends "Mussel Watch 1993-1996 (233 pp)"

- Procedures - Estimation of uncertainty test, control and traceability of sampling, handling of testing objects, reporting test results, quality assurance testing and interlaboratory comparisons, control test equipment, measurement traceability, Methods validation, Uncertainty estimation.
- Quality manual for Laboratory of Measurement and Analysis, NIMRD „Grigore Antipa"
- Quevauviller, Maier and Griepink Eds., 1995, Quality assurance for environmental analysis
- Sava D., 2006 – Algele macrofite de la Littoralul romanesc. Ghid ilustrat, 147 pp. ,,The macrophytes from the Romanian Coast. An illustrated field guide, 147 pp."
- Sava D., 2006 – Lucrari practice de botanica sistematica - Partea 1, 140 pp. ,,Practical work of systematic botany", First part, 140 pp.
- SR 13251:1996 - International vocabulary of basic and general terms in metrology
- SR 13434:1999 - Guidelines for evaluating and expressing measurement uncertainty.
- SR EN ISO 9001: 2008 – Sisteme de management a calităţii. ,,Quality management systems".
- SR EN ISO/CEI 17025: 2005 – Cerinţe generale pentru competenţa laboratoarelor de încercări şi etalonări. ,,General requirements for competence of testing and calibration".
- Todorova V., Konsulova T., 2005 – Manual for quantitative sampling and sample treatment of marine soft-bottom macrozoobenthos.
- Training manual on measuring organochlorine compounds and petroleum hydrocarbons in environmental samples, IAEA-MEL/Marine Environmental Studies Laboratory, September 1995."
- Tratat de algologie - eds. Peterfi S. and Ionescu A., vol. 2, 3. ,,Treaty algologie"

Dobrogea Littoral specified QA/QC under **SR ENISO 17025:2005. www.renar.ro.**
SC AQUASERV SA specified own procedures for QA/QC for monitoring of physical-chemical parameters, and also listed the following guiding documents:

ISO 9001:2008 - Quality Management System Certification
ISO 14001:2005 - Environmental Management System Certification
OHSAS 18001:2007 - Certification Management System Safety Management of Health and occupational safety
ISO 28000:2005 - Food Safety Management System
ISO 27001:2005 - Certified Information Security Management System

The private company **OMV Petrom SA** (oil and gas exploitation) works with accredited laboratories specified as follow:

- SRAC laboratory accredited to ISO 9001:2008 for quality assurance
- DAC accredited laboratory to ISO 17025: 2005 for sampling water, soil and gas
- DAC accredited to ISO 17025: 2005 for determination of water, soil and gas

SRAC is the Romanian certification body with the largest recognition of the marks and certificates nationwide.
DAC (Dubai Accreditation Department, http://www.dac.dm.ae) provides the following Accreditation services to all types of conformity assessment bodies including laboratories (testing, calibration, medical), inspection bodies and certification bodies:
- Proficiency testing programs for laboratories.
- Trainings to staff of conformity assessment bodies on various accreditation related subjects.
- Mandatory registration services to all types of conformity assessment bodies including laboratories (testing, calibration), inspection bodies and certification bodies.

Proficiency tests in environment monitoring undertaken in Romania are specified below. The intercalibrations in hydrobiology of NIMRD are those in which IO-BAS, Bulgaria has also participated.

Table 60. Proficiency tests in Romania

N	Name of organization	Proficiency tests in hydrochemistry	Proficiency tests in hydrobiology
1.	GeoEcoMar	IAEA-0140 (1997), IAEA-407 (2003), IAEA-433 (2004), IAEA-436 (2006), IAEA-158 (2008), IAEA-457 (2011)	
2.	NIMRD	QUASIMEME, IAEA-MEL annually.	Intercalibration (phyto and zooplankton) among the Black Sea countries Institutes - UNDP/GEF, 2005 Intercalibration (phyto and zooplankton, chemistry) among the Black Sea countries Institutes (without Turkey and Georgia) – Project SESAME, 2009 JRC/EC intercalibration for BQE (phytoplankton, zoobenthos, macrophytobenthos) 2012, WFD
3.	National Administration "Dobrogea Littoral"	Since 1997, 4 times / year QUALCO - VITUCI BUDAPEST program (in the org. ICPDR) and once / year organized by the National Testing Laboratory of the National Administration Romanian Waters National Bucharest	
4.	SC AQUASERV SA	Quarterly testing and daily checks are made with Local Public Health	

Note: Needs in wider participation in intercalibration exercises is specified by GeoEcoMar.

TURKEY

The Ministry of Environment and Urbanization has specified the following policy documents: Regulation on Qualifying Environmental Measurements and Analytical Labratories (published on 05.09.2008 in 26988 Official Gazette); Regulation on Control of Water Pollution Communique on Sampling and Analystical Methods (published on 10.10.2009 in 27372 Official Gazette).

The rest of the contacted organizations have informed on the following:

Table 61. Monitoring QC/QA manuals/guidelines in Turkey

N	Name of organization	QA/QC Manuals/Guidelines
1.	Ondokuz Mayis University (Samsun)	Not specified
2.	Ataturk University (Erzerum)	Not specified
3.	Canakkale Onsekiz Mart University	Not specified
4.	Institute of Marine Science and Technology (Izmir)	Not specified
5.	Central Fisheries Research Institute (Trabzon)	Standard methods for examination of water and wastewater, ISO 17025
6.	Istanbul University, Institute of Marine Science and Management	Standard methods
7.	Sinop University, Faculty of Fishery	Not specified
8.	TUBITAK – the Marmara Research Center	All external and internal QA/QC procedures and Standard methods for examination of water and wastewater (2005) and ISO 17025 are applied.TS EN ISO/IEC 17025 “general requirements for the competence of testing and calibration laboratories are conducted.)
9.	IMS/METU (Erdemli)	Not specified

Table 62. Proficiency tests in Turkey

N	Name of organization	Proficiency tests in hydrochemistry	Proficiency tests in hydrobiology
1.	Ondokuz Mayis University(Samsun)	No	
2.	Ataturk University (Erzurum)	No	
3.	Canakkale Onsekiz Mart University	No	
4.	Institute of Marine Science and Technology (Izmir)	Intercalibration exercises organized by IAEA-Monaco	
5.	Central Fisheries Research Institute (Trabzon)	No	FAPAS[118]/First time in 2012 CRM/intercalibrations
6.	Istanbul University, Institute of Marine Science and Management[119]	Quasimeme (annually since 2006, incl for Chl)	
7.	Sinop University, Faculty of Fishery	No	No
8.	TUBITAK –Marmara Research Center	External: IAEA/MEL intercalibration (less frequently), QUASIMEME (since 2007 once or twice per year for nutrients and DOC and only once in 2008 for chl), accredited lab procedures applied Internal: Accredited lab control procedures applied	
9.	IMS/METU (Erdemli)	Quasimeme and IAEA (annually)	

To conclude on QA/QC in the field of monitoring and laboratory work. QA/QC in monitoring is well advanced in BG and RO. However, a few common guidelines are used in BG and RO in conducting monitoring. In TR the issue is either not paid due attention in all Institutions or the stakeholders insufficiently reflected their efforts.
Proficiency tests in the field of chemistry (limited list of parameters though) are carried out on a relatively regular basis in all beneficiary countries, but not the case for the biological monitoring. In the latter, insufficient number of inter-calibration exercises have been organised by different projects only (e.g. phytoplankton and zooplankton) at the national and regional level.

In the frames of the BSC, only a nutrients and trace metals monitoring has been discussed so that to make sure that the data obtained are of equal quality and comparable. QUASIMEME exercises include only nutrients, trace metals and PAHs in sediments and/or water, and Chlorophyll-a.

None of the stakeholders has mentioned Guidelines in the field of Marine Litter monitoring. The UNEP/IOC Guidelines on Survey and Monitoring of ML (2009)[120] has been recommended by the BSC for use in the Black Sea states, however, neither this kind of monitoring is well attended, nor is quality control ensured.

[118] Proficiency tests for water analysis.
[119] The laboratory has ISO 17025 accreditation.
[120] Cheshire, A.C., Adler, E., Barbière, J., Cohen, Y., Evans, S., Jarayabhand, S., Jeftic, L., Jung, R.T., Kinsey, S., Kusui, E.T., Lavine, I., Manyara, P., Oosterbaan, L., Pereira, M.A., Sheavly, S., Tkalin, A., Varadarajan, S., Wenneker, B., Westphalen, G. (2009). *UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter.* UNEP Regional Seas Reports and Studies, No. 186; IOC Technical Series No. 83: xii + 120 pp.

5. Reporting of data (to whom, kind of formats used)

Reporting of data (not assessments) has been indicated by the stakeholders contacted, however, no formats have been specified with a few exceptions. Obviously, the reporting is mostly organized through Excel sheets sent by e-mail, but not through on-line data bases. The reporting to international organizations, such as BSC, EEA, and UNEP/FAO is in Formats developed by these organizations. Usually, all EC FP7, EC DG Env, EC DG Mare, etc. projects develop their own formats as well. And the Institutions reporting use them. Most famous are the formats of the projects SeaDataNet (shared with Black Sea Scene and UpgradeBlackSeaScene), EmodNET, SESAME (shared with PERSEUS), etc. Information on the quoted projects here is given in the sub-chapter I.7. Thus, in the Tables below (63 - 65), the phrase 'As per project' means that the organization submittes data to the data base created by the project, using the project's formats.

Table 63. Information on data reporting in Bulgaria

Type of data reported	Reporting organization	To whom the data are reported		
		Name of organization	Postal address/webpage	Contact person (address, tel/ fax, e-mail)
Environmental (BSIMAP related)	MOEW	Black Sea Commission	www.blacksea-commission.org	Secretariat
Environmental (Danube River related)		ICPDR	www.icpdr.org	Secretariat
Environmental (WFD and MSFD related)		WISE&WISE Marine	www.eea.europa.eu	European Environment Agency
Fishery data	NAFA	European Commission DG Maritime Affairs and Fisheries JRC	J99- 05/1s, B-1049 Brussels	Not specified
Environmental data (chemistry, biology, fishery)	IFR-Varna	Agricultural Academy	Str. Suhodolska 30, Sofia, 1373	Not specified
		To EC DG Research in the frames of FP Projects	Upgrade BS Scene (www.blackseascene.ne)	Not specified
Environmental data (hydrology, geology, chemistry, biology, fishery)	IO-BAS, Varna	Ministry of Environment and water,-BSBD	Alexander Diakovich str. 33 , Varna, 9000	Ventzislav Nikolov Phone/fax: +359 52 631447 e-mail:
		Ministry of Agriculture /National Agency of Fisheries and Aquaculture	Hristo Botev str., 17 Sofia, 1606	Dr. Dragomir Gospodinov +359 2 80 51 666; +359 2 80 51 674 office@iara.government.bg ;
		Black Sea Commission	www.blacksea-commission.org	Secretariat, secretariat@blacksea-commission.org
		To EC DG Research in the frames of FP Projects	As per project	As per project
		JRC – EC	As per project, GIG Black Sea	As per Project, GIG Black Sea
Environmental data (chemistry, biology)	IBER-BAS			
		To EC DG Research in the frames of FP Projects	As per project	As per project
Socio-economy	BS NGO Network	As per projects		

IBER-BAS has specified no reporting to any organization. However, they also report data to Projects, to BAS annual reports with achievements, publish papers etc. There is no data reporting to Ministry of Education the same, IBER-BAS, as mentioned already, are not officially part of the national monitoring program for the Black Sea (only for inland waters and terrestrial).

The data flow system of NAFA is visualised below:

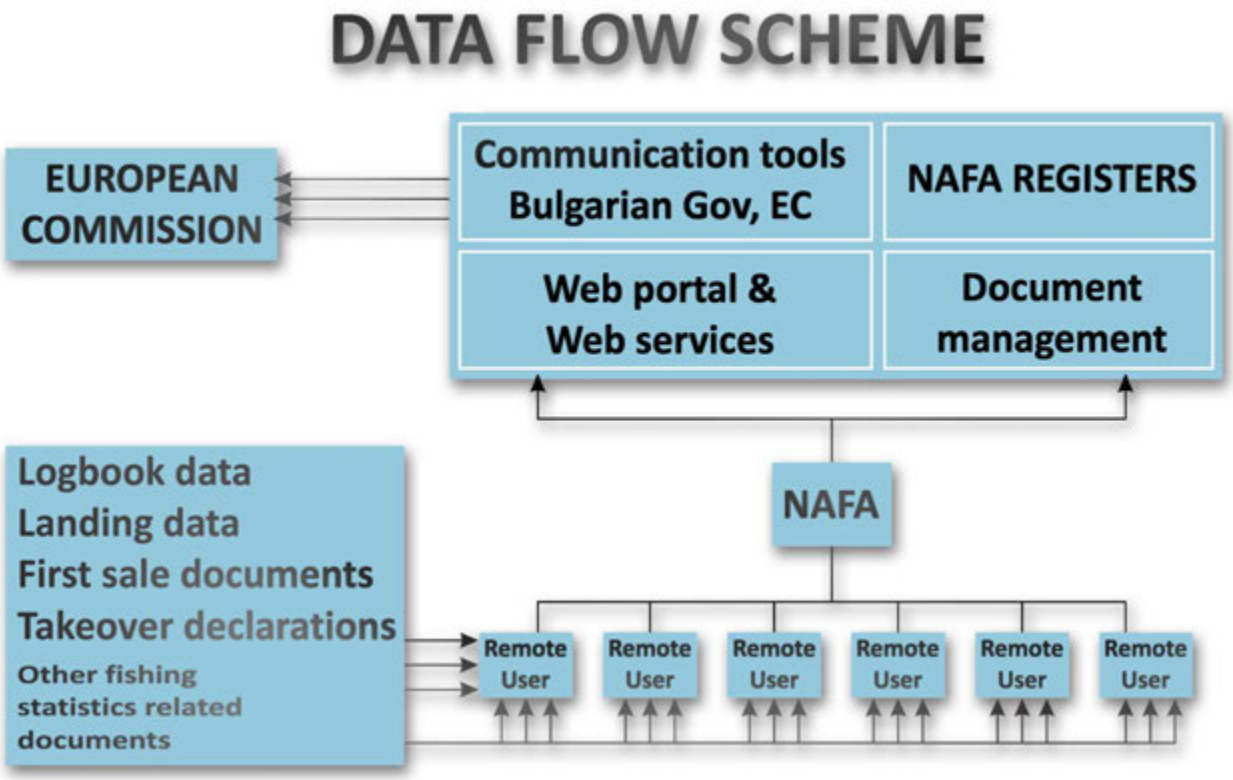


Figure 22. Data flow system of NAFA

ROMANIA

Table 64. Information on data reporting in Romania

Type of data reported	Reporting organization	To whom the data are reported		
		Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail)
Bathing water monitoring data	Constanta and Tulcea County Departments of Public Health	Ministry of Health, Department for Public Health and Public Health Control	Intr. Cristian Popişteanu, No. 1-3, sector 1, Cod 010024, Bucharest Web: http://www.ms.gov.ro	Dr. Adriana Cârlan St. Cristian Popisteanu, no. 1-3, 010024, Bucuresti Phone: 0040 21 3072667 Fax: 004021 3031452 Email: adriana.carlan@ms.ro
		Public Health Institute Bucharest (National Institute of Public Health)	St. Dr. Leonte Anastasievici No.1-3, Sector 5, Bucharest Web: http://www.insp.gov.ro	Dr. Anca Tudor St. Dr. A. Leonte, no. 1-3, 050483, Bucuresti Phone: 004021 3183620 Fax: 004021 3123429 Phone: 00 40 21 3183620 Email: anca.tudor@insp.gov.ro Email: directie.generala@insp.gov.ro

Type of data reported	Reporting organization	To whom the data are reported		
		Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail)
Radionuclides monitoring data	Environment Protection Agency of Constanta	National Environmental Protection Agency (Bucharest)	Splaiul Independentei No. 294, Sector 6, Bucharest, Code 060031 Web: http://www.anpm.ro	Elena Simion Splaiul Independentei No. 294, Sector 6, Bucharest, code 060031, Phone: 00 40 21 2071117 Fax: 00 40 21 2071129 Email: lrm@anpm.ro elena.simion@anpm.ro
		Regional Environmental Protection Agency Galati	St. Regimentul 11 Siret, No. 2, Galaţi, Code 800322 Web: http://arpmgl.anpm.ro	Phone: 00 40 236 460049 Fax: 00 40 236 471009 E-mail: office@arpmgl.anpm.ro
Environmental data (chemistry, biology) collected during drilling operations	ExxonMobil (through NIMRD)	Environment Protection Agency of Constanta	Unirii Str, No. 23, Constanta, Romania Web: http://apmct.anpm.ro	Monitorig/compliance Department
Not specified	S.C. Thermo-electric factory Midia S.A.	Water Basin Administration „Dobrogea-Littoral”, Constanta		
		Environmental Protection Agency Constanta	Unirii Road, no. 23, Constanta, Romania apmct.anpm.ro	Monitoring/compliance Department
Statistical on the flow of tourists	National Institute for Research and Development in Tourism	Ministry of Regional Development and Tourism		
Environmental data (chemistry) collected in the Constanta Port	National Company Maritime Ports Administration	Water Basin Administration „Dobrogea-Littoral”, Constanta		
		Environmental Protection Agency Constanta	Unirii Road, no. 23, Constanta, Romania apmct.anpm.ro	
Marine litter, dolphins	Mare Nostrum NGO	To the funders/donors depending on the type of project implemented		
Environmental data (geology, chemistry, biology)	GeoEcoMar	As per project		

Type of data reported	Reporting organization	To whom the data are reported		
		Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail)
Environmental data (chemistry, biology, fishery, sedimentology)	NIMRD	Ministry of Environment and Forests		
		Black Sea Commission (Excel template)	www.blacksea-commission.org	Permanent Secretariat secretariat@blacksea-commission.org
		National Agency for Fisheries and Aquaculture (NAFA)	http://www.anpa.ro	Constantin Stroie constantin.stroie@anpa.ro
		National Agency Romanian Waters (Excel template)		
		DG MARE – European Commission	http://ec.europa.eu/dgs/maritimeaffairs_fisheries/index_en.htm	Antonio Cervantes Antonio.cervantes@ec.europa.eu
		EEA/ WISE-EIONET (Excel template)[121]	www.eea.europa.eu	
		As per project		
Fishery data	NAFA	DG MARE – European Commission	http://ec.europa.eu/dgs/maritimeaffairs_fisheries/index_en.htm	Antonio Cervantes Antonio.cervantes@ec.europa.eu
Environmental (hydrochemistry and hydrobiology)	Dobrogea Littoral	AN "Romanian Waters" Bucharest (through ARQ Program)	Str. Edgar Quinet no. 6, sector 1, code 010018, Bucurest. Web: http://www.rowater.ro	Phone: 00 40 21 3110146 Fax: 00 40 21 3122174
Danube water chemistry, waste water discharges	SC AQUASERV SA	Public Health Tulcea	Tulcea, Future Street no.50, County Tulcea	
		Romanian Waters National Administration	Constanta, str.Mircea cel Batran, no.127, jud. Constanta	
Contaminants	OMV Petrom SA	Environmental Protection Agency Constanta	Constanta, Str. Unirii No. 23	Phone: 00 40 241 546696 Fax: 00 40 241 543717
		National Guard environmental - Constanta County Commissioner	Constanta, B-dul Mamaia No. 300	Phone: 00 40 241 698555 Fax: 00 40 241 690990
		Administration water basin - Dogrogea - Seaside	Constanta, Str. Mircea cel Batran No. 127	Phone.: 00 40 241 673036 Fax: 00 40 241 673025
Noise and salinity	Constanta Maritime Hydrographic Directorate	General Staff of Naval Forces		

[121] EIONET Central Data Repository (CDR) (cdr.eionet.europa.eu/ro/eea/me1)

No data reporting has been specified by the Ataturk University and Canakkale Onsekiz Mart University.

Table 65. Information on data reporting in Turkey

Type of data reported	Reporting organization	To whom the data are reported		
		Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail)
Hydrochemistry, biology, fishery, microbiology [122]	Ministry of Environment and Urbanization	BSC	www.blacksea-commission.org	
		EEA		
Pollution	Ondokuz Mayis University	See the Note below this Table		
Hydrochemistry	Institute of Marine Science and Technology, Izmir	TUBITAK	Ankara/Turkey	
		IBES	Brussels/Belgium	
		EC DG Research in the frames of FP Projects	e.g. Upgrade BS Scene	
Hydrology, hydrochemistry, fishery	Central Fisheries Research Institute, Trabzon	Tarımsal Araştırmalar ve Politikalar Genel Müdürlüğü (DG Agricultural Research and Policy)	Istanbul Yolu Uzeri Tarım Kampusu, P.K.51, 06171 Yenimahalle/ANKARA Tel:+90(312) 315 76 23 Fax:+90(312) 315 34 48/www.tagem.gov.tr	Erdinc VESKE, Technical Coordinator İstanbul Yolu Üzeri Tarım Kampüsü 06171 Yenimahalle – Ankara Tel: +90 312 343 20 59 / +90 312 315 76 23 – 237 erdincveske@gmail.com eveske@tagem.gov.tr
		Balıkçılık ve Su Ürünleri Genel Müdürlüğü (DG Fisheries and Aquaculture)	Balıkçılık ve Su Ürünleri Genel Müdürlüğü Eskişehir Yolu 9. km Lodumlu /ANKARA Tel: 0312 287 33 60/www.bsgm.gov.tr	Erdinç GÜNEŞ Head of Department erdinc.gunes@tarim.gov.tr Tel: +90 312 286 49 01/3018
		Çayeli Bakır İşletmeleri A.Ş.	Çayeli-Rize İnfo@cayelibakir.com 90 312 440 84 46 0464 544 15 44 www.cayelibakir.com	Mehmet EĞRİBOYUNOĞLU
Hydrochemistry, biology, fishery, microbiology	Istanbul University, Institute of Maritime Sciences and Management	Ministry of Environment and Urban Planning [123]	http://www.deniz.cevreorman.gov.tr/kirlilik/2010%20karadeniz.xls (Excel files)	
Hydrochemistry, hydrobiology, fishery	Sinop University, Faculty of Fishery	As per project	EMODNET Project http://bio.emodnet.eu/component/imis/?module=dataset&dasid=3086	

[122] The Ministry reports to the BSC on much broader scale: ICZM, ESAS, LBS, CBD, FOMLR, and pollution monitoring as well (PMA)

123 The same as Ministry of Environment and Urbanization

Type of data reported	Reporting organization	To whom the data are reported		
		Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail)
			http://bio.emodnet.eu/component/imis/?module=dataset&dasid=3085 http://bio.emodnet.eu/component/imis/?module=person&persid=8990 http://bio.emodnet.eu/component/imis/?module=dataset&dasid=2931 http://bio.emodnet.eu/component/imis/?module=dataset&dasid=3129 http://bio.emodnet.eu/component/imis/?module=dataset&dasid=291 SEADATANET Project http://seadatanet.maris2.nl/webservices/edmerp/get_detail/n_code/11426	
Environment data	TUBITAK – the Marmara Research Center	Municipality of Kocaeli		
		Ministry of Environment and Urbanization		
		As per project		
Environment data	IMS/METU (Erdemli)	TUBITAK	www.tubitak.gov.tr/	
		Ministry of Environment and Forestry		
		UNEP/FAO		
		NATO SfP		
		As per project	SeaDataNet, PERSEUS, etc.	
Hydrochemistry, biology, fishery	Canakkale Univ., Faculty of Marine Sciences and Technology	TUBITAK	Tunus Cad. No:80, Kavaklıdere, Ankara, Turkey	Zeynep Okay Durmuş

Note: The Ondokuz Mayis University has not specified reporting.

To conclude on data reporting.

The data of different organizations are reported to various end-users, however, the bulk of them remains for internal use only. At the national level in the beneficiary countries, there was no real effort to create a single Data/Information Center where all Black Sea-related data would be stored and used for ecosystem-based management. This gap in data accessibility became especially evident while preparing the Initial Assessments in BG and RO for the MSFD.

6. Operational monitoring

The aim of operational oceanography is to provide in "real time" reliable information and forecasts for the marine environment in order to support human activities at sea, exploitation of resources and the protection of the environment. The development of forecasting based on operational oceanography tools improves the understanding of the processes contributing to the actual state of the ocean in the short-term, because better predictions require these processes to be adequately and precisely represented, while it is also most likely that the long-term response is also represented by the same processes averaged over time.

Operational oceanography encompasses (i) specialized observing systems such as repeated transects and mooring arrays (ii) multi-disciplinary observatories to monitor short-term as well as multi-decadal patterns in specific areas (iii) general operational oceanographic tools such as ships of opportunity, XBT's, floats, drifters, ferry-boxes, AUV's and gliders used to monitor significant ocean variables through continuous campaigns; (iv) remote sensing.

The last 30 years have seen an increasing number of actions dedicated to estimate the ocean state or observe how climate change has unfolded in the ocean. International programs such as the GOOS and ARGO[124] have been instrumental in spreading and making available the observational tools of operational oceanography on a global scale, and also at regional. Despite the Black Sea regional

[124] The international Argo programme was initiated in 1999 as a pilot project endorsed by the Climate Research Programme of the World Meteorological Organisation (WMO), Global Ocean Observing System (GOOS), and the Intergovernmental Oceanographic Commission (IOC) that aims to measure the physical properties of the ocean at any given time using an array of 3000 floats in the global ocean, each float provides the temperature and salinity profiles from the upper ocean, once in few days. The name Argo is chosen to be in synergy with the satellites Jason-1 and 2 which has been providing maps of sea surface height (SSH) anomaly since 2001. The application of Argo data in oceanographic and climatic studies falls into three categories [1]:

1. To provide a global description of the upper ocean thermohaline state at spatial and temporal scales;
2. To generate the datasets required by numerical models for ocean analysis and forecast;
3. To complement the satellites in monitoring the climate.

The European contribution to the global Argo project is Euro-Argo programme (www.euro-argo.eu) that was initiated in 2008. The project aims at developing a European Argo fleet to the level where the European partners (France, UK, Germany, Italy, Spain, Greece, Portugal, Norway, Bulgaria, Poland, Ireland, Netherlands) have the capacity to procure and deploy about 250 floats per year, to monitor these floats and ensure all the data can be processed and delivered to users (both in real-time and delayed-mode).

initiatives such as Black Sea GOOS and occasional uses of ARGO and other drifters in the Black Sea, as well as participation in the MyOcean program, there is still much ground to be covered through regional cooperation.

The main impediment to development of operational monitoring by the Black Sea states is the assumption that relatively high cost is required. Though, not always this is the case. For instance, the price of an Argo float is 14-17 000 Euro, and the cost to sustain a Regional Black Sea Argo Infrastructure (through distributed national facilities and a central facility (C-RI) Full members of EuroArgo contribute annually by 30 000 Euro fee for sustaining of the central European facilities in UK and France. If the BS states sustain status of observers (no commitments for floats, minimum funding for the C-RI, no voting rights but can use the C-RI (coordination, data processing, float procurement), the contribution is 10 000 Euro per year. Members commit for a minimum of 5floats/year.

Refined estimations of costs for deploying Argo floats in the North, Baltic, Mediterranean and Black Seas together are given in Table 66.

Table 66. EuroArgo refined estimation of costs (European level)

Category	Unit cost (k€)	Number	Cost (k€)
Float procurement			
Global (assumes standard Argo float)	14	200	2800
Regional (assumes enhanced floats)	17	50	850
Operations			
Telecommunications	0.4	800	320
Personnel () for management/coordination	100	5	500
Personnel () for technical/logistic support	100	6	600
Misc (e.g. freighting)	0.2	250	50
Equipment and consumables			50
Dedicated ship time			300
Data management			
Personnel ()	100	19	1900
Equipment, other			100
Euro-Argo central infrastructure (CI)			
Personnel () for management/coordination	100	2	200
Personnel () for technical/logistic support	100	3	300
Missions (users workshops, board, council), equipment, etc.			100
International infrastructure support			
Support to Argo Information Centre			40
Support for Argo Project Office/Director			30
TOTAL			**8 140**

So far, from the BS region only Bulgaria participates in EuroArgo, Russian Federation is an observer. Thus the BulArgo project is the Bulgarian contribution to the Euro-Argo programme. The project is funded by the Bulgarian National Science Fund of the Bulgarian Ministry of Education, Youth and Science. The main objective of the BulArgo is to deploy and makes operational an array of 5 floats for the duration of the project. The first autonomous profiling float was deployed by Bulgaria in the Black Sea on 8th of Dec. 2009[125]. In 2011, 3 Argo floats (one of which with oxygen sensor) were deployed in the western open-sea part of the Black Sea (sites marked on Fig. 23).

Figure 23. BulArgo floats deployment locations

Operational monitoring in the field of air pollution has been specifically well attended by Turkey. The EC PROMOTE project (http://www.gse-promote.org/) created a dedicated web page for the Black Sea region in the field of atmospheric pollution (http://db.eurad.uni-koeln.de/promote/RLAQS/riu_rlaqs.php?force=BSC). However, this webpage was not further sustained, though there were such plans in the frames of the follow-up projects (PASODOBLE and MACC).

Bulgaria developed a national project (cooperation of IO-BAS and Varna Maritime Administration) to operationally monitor the Bulgarian BS coastal area by buoys. Four buoys have been deployed in the Bourgas Bay and they automatically register the following parameters:

Table 67. Parameters measured automatically *in situ* in the air and in BG coastal waters of the Black Sea (Bourgas Bay – stations B1, B2, B3, B4, coordinated have not been specified in the information provided)

Parameters	**B1**	**B2**	**B3**	**B4**
Marine water				
pH	X		X	X
Water temperature, °C	X		X	X
Dissolved oxygen (O_2)	X		X	X
Turbidity	X		X	X
Specific conductivity	X		X	X
Salinity	X		X	X
Chl	X		X	X
Currents (velocity, direction)	X		X	X
Cyanophyceae	X		X	X

[125] In the frames of MedArgo 3 floats have been deployed in the BS in June 2006, which were performing 170 cycles every 7 days.

Parameters	B1	B2	B3	B4
$N\text{-}NH_4$	-		-	X
$N\text{-}NO_2$	-		-	X
$N\text{-}NO_3$	-		-	X
$P\text{-}PO_4$	-		-	X
Petroleum hydrocarbons	X		X	X
In the air				
Particulate matter		X		
Wind (velocity, direction)		X		
Temperature, ^oC		X		
NO_2		X		
CO		X		
SO_2		X		
H_2S		X		

There was a special webpage, where the data used to be displayed, however, it had not been sustained.

Remote sensing

The EC project MONRUK (http://monruk.nersc.no/) has developed and implemented satellite Synthetic Aperture Radar (SAR) monitoring of the Black Sea marine environment as a component of GMES.

The project IMAGIS in Romania (Complex application of GIS and remote sensing techniques to support integrated management activities Romanian coastal area, source of funding: PNCDI II, period: 2008-2011), states the following objectives: developing a complex information system, operational, dedicated application techniques GIS and remote sensing to support implementation of the ICZM process in Romania, reaching sustainability indicators, namely the sustainable use of coastal resources and the conservation / reconstruction Romanian coastal ecosystem.

In Romania the Space Agency develops also satellite-based monitoring of land-based sources of pollution and accidental oil spills in the Black Sea (e.g. TanDEM-X Project).

For oil spills (including illegal discharges), EMSA (European Maritime Security Agency) provides satellite images to BG and RO, and there was an attempt to arrange this service for Turkey as well (MONINFO Project, EC DG Env., 2009-2011). However, no sustainable practice has been established in this aspect.
Turkey develops actively satellite monitoring in support of environment protection and human safety. The Istanbul Technical University - Center for Satellite Communications and Remote Sensing (ITU-CSCRS, http://www.cscrs.itu.edu.tr/content/uzaktanalgilamaing.php) is one of the forecoming institutions around the world with a highly capable ground receiving station unit. It is the first center established in Turkey to conduct application oriented projects in remote sensing and satellite communications technologies and serve national/international civil/military companies in their research, development, and educational activities. After successful design, assemble and test stages of the receiving station through the years 1996-2000, ITU-CSCRS was established for operational working under the name ITU-SAGRES (Satellite Ground Receiving Station) in 2000 as a wide range communications and remote sensing integrated system. In the second half of the year 2003, it was restructured into ITU-CSCRS. ITU-CSCRS has the capabilities of acquiring images from remote sensing satellites, processing data, and sending the products *via* satellite links to resident and foreign users. The station can receive images of the Earth's surface within a radius of 3000 km, which covers from Sweden to Sudan, and England to Kazakhstan. In the center the data acquired from SPOT-2, SPOT-4, RADARSAT-1, ERS-2, NOAA-11, NOAA-14, METEOSAT satellites is archived, formatted and processed with the state-of-the-art technology. These successful studies were

certificated with Operational and Product Certificate by the Radarsat Inc., Canada in November 2002.
The IMS/METU (Erdemli, Turkey) HRPT (high-resolution-picture transmission) station is an authorized station[126] and was receiving SeaWiFS data since September 1997 till 2004. The remote sensing data flow has reached to a considerable volume together with the data received from METEOSAT satellite through SSB radio. The Remote-Sensing Group of IMS/METU upgraded the station to assure the reception of data from MODIS (http://modis.gsfc.nasa.gov/data/) since 2002.

MODIS and SeaWifs[127] data were examined by the experts of METU-IMS, as follow:
(Ref.: SST, http://www.ims.metu.edu.tr/SeaDataNet/indexsat.asp?doc=pageSSTday.htm, and for Chl, http://www.ims.metu.edu.tr/SeaDataNet/indexsat.asp?doc=pageChl-A.htm)

Table 68. Remote sensing data collected by IMS/METU (Erdemli)

Year	Months												Seasons				Annual
SEAWIFS																	
1997									9	10	11	12				aut	
1998	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
1999	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
2000	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
2001	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
2002	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
2003	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
2004	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
MODIS																	
2002							7	8	9	10	11	12			sum	aut	an
2003	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
2004	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
2005	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
2006	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
2007	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an
2008	1	2	3	4	5	6	7	8	9	10	11	12	win	spr	sum	aut	an

METU-IMS (Erdemli, Turkey) participated in MOMA (Meteorology and Oceanography Pilot Network, http://moma.ims.metu.edu.tr/), aiming at:

- Improvement of remote and local observing systems
- Real time data acquisition and Modeling
- Forecasting and disaster planning
- End user data services

Satellite based vessel monitoring system (VMS) in support of fisheries control is developed in all beneficiary countries (though vessels over 10 and/or 12-m are not all equipped with the VMS device), as well as vessel traffic monitoring system (VTMS) based on AIS (Automatic Identification System[128]) is in place. There is no official exchange of AIS data in the Black Sea region, however, BG, RO and TR are members of the Common Mediterranean AIS Network.

126 One of the 128 authorised NASA (national Aeronautics and Space Administration of the USA) research stations.
127 Mission of SeaWIFS has finished in February 2011 due to instrument failure. As a result, earlier elaborated Black Sea regional algorithms and related methodologies became unusable for future application requiring adjustment to other instruments (MODIS, MERIS). The ongoing NATO SfP project "Bio-Optical Characterization of the Black Sea for Remote Sensing Applications" (http://www.natosps.io-bas.bg/) targets development of Black Sea regional algorithms for MODIS, expected to be delivered by the end of 2012. Black Sea satellite data and parameters obtained with standard algorithms can be extracted from NASA OceanColorWEB (http://oceancolor.gsfc.nasa.gov/), ESA MERIS products web site (http://www.enviport.org/meris/lv3_main.htm) and GMES MyOcean web site (http://www.myocean.eu/).
128 The Automatic Identification System (AIS) is an automatic tracking system used on ships and by vessel traffic services (VTS) for identifying and locating vessels by electronically exchanging data with other nearby ships and AIS Base stations. AIS information supplements marine radar, which

VMS (Vessel Monitoring System)

The system visualises the movement of fishery vessels. The data are stored (name of vessel, coordinates, date, time…), checked and analysed. The system has a module designed for communication between the Monitoring Center and the Master of the fishing vessel (transfer of text messages). Suspecting IUU fishing activity the operator from the VMS center could generate request for reporting the current position, which will be responded automatically by the vessel's equipment, preventing data corruption by third parties.

Example of an VMS is given below (the system in Bulgaria, sustained by NAFA).

Figure 24. The Bulgarian Fishery VMS (sustained by NAFA)

The system (VMS) provides an indication of the fishing activity and records the vessel's track pattern. It enhances control efficiency and is a tool for detailed analysis of the vessels fishing activities. The fish catch could be checked and registered even in case that the vessel is not discharged at it's homeport.

Conclusion:
Further development of operational observing systems and networks in the Black Sea is much needed to better address diagnosis and prognosis of circulation and ecosystem state, in general, under climate and anthropogenic forcing of various temporal and spatial scales. VMS is a powerful tool for control over IUU fishing activities, its capacities should be further developed and integrated within MSFD monitoring programmes.

continues to be the primary method of collision avoidance for water transport. An AIS-equipped system on board a ship presents the bearing and distance of nearby vessels in a radar-like display format. Information provided by AIS equipment includes unique identification, position, course, and speed of a vessel. Thus, AIS is intended to assist a vessel's watchstanding officers and allow maritime authorities to track and monitor vessel movements. Vessels fitted with AIS transceivers and transponders can be tracked by AIS base stations located along coast lines or, when out of range of terrestrial networks, through a growing number of satellites that are fitted with special AIS receivers.

7. On-going projects with monitoring component

Black Sea cooperation in the field of monitoring and data management has been supported by many projects funded by different donors like EU, UNDP/GEF, NATO, WB, EBRD, UNEP, IMO, OSCE, ACCOBAMS, and SIDA. Herewith, in the beneficiary countries monitoring is often better planned in the frames of such projects as they provide clear time-frame and the needed funding. Previous overviews of monitoring-related projects have been provided in the SAP Implementation Report of the BSC (http://www.blacksea-commission.org/_publ-BSSAPIMPL2009.asp) and in the Diagnostic Report I (http://www.blacksea-commission.org/_publ-BSDiagnosticReport2010.asp).

Recently finalised projects and those still acting in the Black Sea region are mainly EU-funded, they are 48 (Table 60, as re-drawn from Milieu Ltd[129] and complemented by missing important projects) out of about 100 projects financed by EC DG Research since 2003 under FP5, FP6 and FP7, Life+, Intereg, etc. EC DG DEVCO (EuropeAid), EC DG MARE and EC DG Env. Projects have also financed a number of projects, which substantially contributed to the Black Sea environmental protection, such as ECBSea (http://81.8.63.74/ecbsea/en/documents/relevant/index.html), SASEPOL (www.sasepol.eu), EMODNET (http://ec.europa.eu/maritimeaffairs/emodnet_en.htm)[130], MONINFO (http://www.blacksea-commission.org/_projects_MONINFO.asp)[131], etc.

As mentioned above, operational monitoring has been further developed under EC EuroARGO project (part of GOOS[132], Global Ocean Observing System, http://www.ioc-goos.org/) deploying argo (robotic) floats in the Black Sea to support GMES (Global Monitoring for Environmental Security, http://www.gmes.info/) services. Combining *in situ* and satellite data, with models, the project delivers regular and systematic reference information on the state of the oceans and regional seas, including the Black Sea. The Black Sea Argo program is published at: http://www.euro-argo.eu/news_and_events/euro_argo_black_sea_meeting.

[129] Private company. Postal address: Milieu Ltd, Rue Blanche n° 15, 1050 Brussels, Belgium, Tel: +32 (0)2 506 1000 Fax: +32 (0)2 514 3603; webpage: http://www.milieu.be/

[130] The European Marine Observation and Data Network (EMODNET) is an initiative of the EC to assemble fragmented and inaccessible marine data into interoperable, contiguous and publicly available data streams for complete maritime basins.

[131] The project aimed to enable the Black Sea coastal states to better prevent and respond to operational/accidental/illegal oil pollution. One of the objectives was to establish operational Regional Database and Information Platform (RDIP), as a component of BSIS, including expert system for oil pollution mitigation and counteraction activities.

[132] At the Eighteenth Session of the Intergovernmental Oceanographic Commission of UNESCO (IOC), the Assembly adopted a resolution (Resolution XVIII-17, UNESCO, Paris, 7-9 June 1995) which established an IOC Black Sea Regional Committee (BSRC). The First Session of the BSRC was held in Varna, Bulgaria, (10-13 September 1996). Two Pilot Projects "The Assessment of Sediment Fluxes in the Black Sea" and "The Black Sea GOOS (Global Ocean Observing System)" were discussed extensively and programs were developed. The Black Sea GOOS MoU was signed by all Black Sea countries, in 2001.This MoU serves as the initial document for the Black Sea GOOS, as an informal association whose members seek to foster co-operation with the Global Ocean Observing System. The Black Sea GOOS was established with the participation of Bulgaria, Georgia, Romania, Russia, Turkey and Ukraine with the recognition of the importance of existing systems in research and operational oceanography. By signing, the MoU, countries become members of the Black Sea GOOS, and agree to co-operate in promoting the GOOS in the Black Sea basin. Black Sea GOOS activities are designed to foster cooperation in operational oceanography in the Black Sea basin. To collaborate with and to maximise the benefits from the existing activities of the EuroGOOS and the Med-GOOS, promoting the integration of these activities within the framework of the GOOS. The first Black Sea GOOS Strategic Action and Implementation Plan (IOC/INF-1176) was adopted in 2003 and the second in 2010.

Operational monitoring has been also supported by NATO, in the frames of the project „Bio-optical Characterization of the Black Sea for Remote Sensing Applications", NATO SfP project no. 982678, period: 2010-2013, objective: to implement a support tool for remote sensing applications aimed at operational environmental monitoring and climate studies in the Black Sea. Partner organizations from – Bulgaria (IO-BAS, Varna), Romania (Romanian Space Agency), etc.

Monitoring of ML and marine mammals has been also supported by various projects, most of them small-scale. For instance, ACCOBAMS and UNEP financed a couple of projects implemented in the beneficiary countries to sustain the Black Sea Cetaceans Stranding Network and to investigate the ML problem (ML Report, http://www.blacksea-commission.org/_publ-ML.asp). The BSC supported in 2009-2010 the project "Cetacean strandings on the TR Black Sea western coast between September 2009 and August 2010'. Mainly NGOs have been very active in implementing of ML and Cetaceans-related projects (e.g. Green Balkans in Bulgaria (Federation of Nature-conservation NGOs, http://greenbalkans.org/index.php?language=en_EN), TUDAV in Turkey (Turkish Marine Research Foundation, http://www.tudav.org/) and Mare Nostrum in Romania (http://www.marenostrum.ro/).

MATRA Projects[133] supported environment protection/monitoring in the Black Sea and contributed to investigations on habitats. For instance, the project 'Development of an Indicative Ecologically Coherent Network of sub-tidal Marine Protected Areas (MPAs) in Bulgaria and Romania' was implemented under the leadership of the EUCC-the Coastal Union (http://www.eucc.net/en/index.htm) in 2006-2008.

Projects related to operational monitoring developed in the field of air pollution were PROMOTE, PASODOBLE, MACC, etc. These projects provided ATMOSPHERIC MONITORING SERVICES as part of the EARTHWATCH GMES SERVICES. For instance from PROMOTE, through the BSC, the Black Sea region was receiving on a regular basis the following information:

Table 69. Air Quality Records

Criterion	Performance level to be achieved
Information content	O3, CO, NO2, SO2, PM10
Service level	1 year: 12 month record 2002-2005 2 year:36 month record 2002-2005 3 year:36 month record 2006-2008

Table 70. Black Sea –related scientific projects under EC DG Research Framework Programmes

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
1	ARENA (A Regional Capacity Building and Networking Programme to Upgrade Monitoring and Forecasting Activity in the Black Sea)	ARENA initiated a co-operative ocean programme to assess and identify the Black Sea resources, the needs for operational oceanography, to formulate a Data-Base Management System and to build capacity through training and improving the communication and other essential facilities, for the monitoring, understanding, modelling/prediction and forecasting for the entire basin.	Biological oceanography, Environment, Physical oceanography	Multiple		Capacity building, information exchange	2003	2006		Black Sea

[133] Matra is an assistance programme of the Netherlands that aims to support social transformation and environment protection in countries neighbouring the European Union.

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
2	ASCOBOS [134](A Supporting Programme for Capacity Building in the Black Sea Region Towards Operational Status of Oceanographic Service)	ASCABOS increased public awareness and stimulated and motivated the utilization of operational oceanographic information in management and decision-making practices. Considerable work has been performed on compiling meta-databases on the Black Sea environmental data, information and research within previous international initiatives and projects. To support and to strengthen the exchange between scientists, governmental managers and other users ASCABOS developed a Black Sea information system, containing all available metadata, validated and efficiently updated through the Internet. ASCABOS organized a cost-effective VOS pilot programme, applying modern technologies and developments for data collection, transmission, storage, use and dissemination. The VOS programme responded to the GOOS demand for long-term monitoring of the marine ecosystems.	Operational monitoring	Multiple		Capacity building, information exchange	2005	2008		
3	CLAMER [135](Climate Change Impacts on the Marine Environment: Research Results and Public Perception), (Netherlands, UK, Greece, France, Belgium, Spain, Norway, Denmark, France, Ireland, Norway)	Compilation and summary of all existing scientific material & outreach products on the topic of the gap between what is known through research and what policy makers and the public know and understand about the effects of climate change on the oceans; Carrying-out a pan-European poll to investigate the awareness/perception in various European coastal regions.	Climate Change	Multiple		Awareness Raising	2010	2011	991,357.00	All European marine regions
4	CLIMSAVE[136] (Climate change integrated assessment methodology for cross-sectoral adaptation and vulnerability in Europe), (UK; Belgium; Germany; Austria; Czech Republic; Greece; Netherlands; Spain; Sweden; Hungary; China; Romania; Australia)	The overall aim of the CLIMSAVE project is to deliver an integrated methodology to assess cross-sectoral climate change impacts, adaptation and vulnerability. It will put science in the service of stakeholders and policy-makers by providing a common platform for an improved integrated assessment of climate change impacts, vulnerability and related cost-effective adaptation measures covering key sectors in Europe.	Climate Change	Multiple	Adaptation	Impact assessment	2010	2013	3,150,000	N/A
5	COCONET[137] (Towards coast to coast network of marine protected areas coupled with Sea-based Wind Energy)	The project proposes large scale env. Protection and management considering the establishment of MPAs networks and Offshore Wind Farms. It develops a scheme of maritime spatial planning aimed at maximizing gains and minimizing losses for both humans and environment.	MPAs	Multiple	Wind farms	Capacity building, exchange of information	2012	2015		Med and Black Sea

[134] http://www.ascabos.io-bas.bg
[135] http://www.clamer.eu/component/clamerprojects/?search=
[136] http://www.climsave.eu/climsave/index.html
[137] http://www.coconet-fp7.eu/

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
6	CONSCIENCE[138](Concepts and Science for Coastal Erosion Management), (Netherlands, Spain, Ireland, UK, Romania, Poland, Croatia)	Aims to develop and test concepts, guidelines and tools for the sustainable management of coastal erosion based on the best available scientific knowledge and on existing practical experience. It will contribute to the implementation of a common European coastal erosion management policy. We will use and define four coastal management concepts: coastal resilience, coastal sediment cell, strategic sediment reservoir and favourable sediment status. Relevant parameters and thresholds to qualify and quantify coastal resilience and favourable sediment status will be developed.	Coastal erosion	Multiple	Coastal management	Capacity building	2007	2010	609,970	N/A
7	CREAM[139] (Coordinating research in support to application of EAF (Ecosystem Approach to Fisheries) and management advice in the Mediterranean and Black Seas), (Spain, Greece, Italy, France, Morocco, Tunisia, Turkey, Romania, Bulgaria, Russia, Ukraine, Egypt, Croatia, Lebanon, Malta, Cyprus)	CREAM will establish an effective collaboration network among key role players in Mediterranean and Black Sea fisheries research and management. The project will have a strong training and capacity building component in order to help harmonize data collection and methodologies used in fisheries assessment and management in the Mediterranean and Black Sea. The project will serve to establish the guidelines for the application of the Ecosystem Approach to Fisheries in the Mediterranean and Black Sea, both in EU member states and third countries.	Research coordination	Fisheries	Ecosystem Approach	Capacity building	2011	2014	999,137	Mediterranean and Black Sea
8	DEDUCE[140] (Sustainable development of European Coastal Zones)	Its main objective is to evaluate the utility of indicators for optimal decision making on the coast, following the principles and criteria established by the EU Recommendation on ICZM.	Research coordination	ICZM	Ecosystem approach	Capacity building	2004	2007		All European regions
9	ECOOP[141] (European Coastal-shelf sea Operational observing and forecasting system), (Denmark, Germany, Greece, France, Norway, Turkey, Italy, UK, Belgium, Bulgaria, Spain, Israel, Finland, China, Malta, Ireland, Croatia, Georgia, Tunisia, Mongolia, Portugal, Romania, Ukraine, Estonia, Netherlands, Russia, Sweden, Cyprus, Poland)	Consolidate, integrate and further develop existing European coastal and regional seas operational observing and forecasting systems into an integrated pan-European system targeted at detecting environmental and climate changes, predicting their evolution, producing timely and quality assured forecasts, providing marine information service's (including data, information products, knowledge and scientific advices) and facilitate decision support needs.	Climate Change	Multiple		Forecasting	2007	2010	6,990,251	All European marine regions

138 http://www.conscience-eu.net/
139 www.cream-fp7.eu
140 http://www.deduce.eu/
141 http://www.ecoop.eu

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
10	ELME[142] (European Lifestyles and Marine Ecosystems), (UK, the Netherlands, Spain, Belgium, Germany, Portugal, Lithuania, Italy, Norway, Sweden, Finland, Poland, Greece, Bulgaria, Romania)	Model the consequences of alternative scenarios for human development in post-accession Europe on the marine environment, through improved understanding of the relationship between European lifestyles and the state of marine ecosystems. Multidisciplinary approach integrating relevant information on: the current major state changes affecting Europe's marine ecosystems in four major sea areas; the pressures (anthropogenic and from natural variability) on the environment producing these state changes; the underlying social and economic drivers that lead to these pressures; and the plausible scenarios for social and economic change across Europe during the next two decades.	Sustainability	Multiple	Ecosystem approach	Modelling	2003	2006	2,499,989	All European marine regions
11	ENCORA and ENCORA TTC[143] (European Network for Coastal Research), (Netherlands, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Poland, Portugal, Spain, Sweden, UK, Ukraine, Russia, Morocco)	Strengthening the interaction between science, policy and practice is another important objective of the ENCORA networking mechanisms. These services include, firstly, sharing knowledge among research institutes, to increase the quality and efficiency of research programmes and to stimulate cooperation. Secondly, sharing expertise among coastal management organisations, to spread best coastal practices throughout Europe. Thirdly, sharing experience among policy organisations, to harmonise coastal policies in Europe for sustainable development.	Research coordination		Coastal management	Information Exchange	2006	2009	3,440,000	All European marine regions
12	ENVIROGRIDS[144] (Building Capacity for a Black Sea Catchment Observation and Assessment System supporting Sustainable Development)	The project is to assemble an observation system of the Black Sea catchment that will address several GEO Societal Benefit Areas within a changing climate framework. This system will incorporate a shared information system that operates on the boundary of scientific/technical partners, stakeholders and the public. It will contain an early warning system able to inform in advance decision-makers and the public about risks to human health, biodiversity and ecosystems integrity, agriculture production or energy supply caused by climatic, demographic and land cover changes on a 50-year time horizon.	Shared observation systems	Multiple		Capacity building, information exchange	2009	2013		Danube catchment, Black Sea

142 http://www.elme-eu.org/
143 http://www.encora.eu/
144 http://envirogrids.net/

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
13	ESONET[145] (European Seas Observatory Network), (France, Belgium, Bulgaria, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Serbia, Turkey, UK)	To create an organisation capable of implementing, operating and maintaining a network of ocean observatories in deep waters around Europe from the Arctic Ocean to the Black Sea connected to shore with data and power links via fibre optic cables. The fundamental scientific objective is to make continuous real-time observations of environmental variables over decadal, annual, seasonal, dial and tidal time scales.	Oceanographic research	Hydrographical conditions		Information Exchange	2007	2011	7,000,000	All European marine regions
14	EUROARGO (A new European Research Infrastructure), (	Focus on the development of global in-situ ocean observing system, deploying robotic floats worldwide measuring water temperature and salinity to a depth of 2000 m.	Oceanographic research	Hydrographical conditions						
15	EURO-OCEANS[146] (European network of excellence for Ocean Ecosystems Analysis), (Algeria, Belgium, Denmark, Estonia, France, Germany, Greece, Italy, Latvia, Netherlands, Norway, Poland, Russia, Spain, Switzerland, Turkey, UK, Chile, Finland, Morocco, Portugal, South Africa, Tunisia, Mauritania, Peru)	Focus on the impact of climate/global change on marine ecosystems and biogeochemical cycles, and the construction of scenarios relevant to the emerging International Platform on Biodiversity and Ecosystem Services (ipBes). Funds projects/activities (activities, workshops, training, etc.)	Climate Change	Biodiversity	Ecosystem services	Modelling	2005	2009	10,000,000	N/A
16	EUROGEL[147] (EUROpean GELatinous zooplankton: mechanisms behind jellyfish blooms and their ecological and socio-economic effects)	Focus on basic biological and ecological factors that govern reproduction, growth, and survival for a number of different gelatinous species, commonly occurring in high abundance.	Hydrobiology	Non-natives, biodiversity		Information exchange	2002	2005		All European marine regions
17	EUROMARINE[148](Integration of European Marine Research Networks of Excellence), (Sweden, Germany, Portugal, Netherlands, Belgium, France, Denmark, UK, Italy)	Develop and implement an agreed framework for the long-lasting and durable co-operation between research institutions that were partners in FP6 marine Networks of Excellence in order to achieve further integration of marine research in Europe. Particular areas for cooperation will be: research programming, joint development and use of data bases, training and mobility of researchers, joint programming and use of research infrastructures. The ultimate aim will be the sustainable integration of marine research and a significant contribution to the structure of the ERA.	Research coordination			Information Exchange	2011	2013	999,636	N/A

[145] http://www.esonet-noe.org/
[146] http://www.eur-oceans.eu/
[147] http://www.bio.uib.no/eurogel/
[148] http://www.euromarineconsortium.eu/vision

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
18	GEO-SEAS[149] (Pan-european infrastructure for management of marine and ocean geological and geophysical data), (UK, Belgium; Denmark; Germany; Bulgaria; Estonia; France; Greece; Ireland; Italy; Lithuania; Netherlands; Poland; Portugal; Spain; Norway; Latvia)	To effect a major and significant improvement in the overview and access to marine geological and geophysical data and data-products from national geological surveys and research institutes in Europe by upgrading and interconnecting their present infrastructures.	Geology	Seafloor integrity		Information Exchange	2009	2012	4,976,476	N/A
19	HERMES[150] (Hotspot Ecosystem Research on the Margins of European Seas)	(1) Understand better the natural drivers that control ocean margin ecosystems and forecast changes in biodiversity and ecosystem functioning linked to global change. (2) Understand better the biodiversity and ecosystem function of "hotspot" ecosystems and develop concepts and strategies for the sustainable use of marine resources. (3) Provide an integrated framework for data management, training, education and outreach	Ecosystem research	Biodiversity	Hotspots	Information Exchange	2005	2009	15,000,000	All European marine regions
20	HYPOX[151] (In situ monitoring of oxygen depletion in hypoxic ecosystems of coastal and open seas, and land-locked water bodies), (Germany, Switzerland, Ukraine, Italy Turkey, UK, Romania, Greece, France)	A better understanding of global changes in oxygen depletion requires a global observation system continuously monitoring oxygen at high resolution, including assessment of the role of the seafloor in controlling the sensitivity of aquatic systems to and recovery from hypoxia. Hypox will monitor oxygen depletion and associated processes in aquatic systems that differ in oxygen status or sensitivity towards change: open ocean, oxic with high sensitivity to global warming (Arctic), semi-enclosed with permanent anoxia (Black Sea, Baltic Sea) and seasonally or locally anoxic land-locked systems (fjords, lagoons, lakes) subject to eutrophication.	Pollution	Eutrophication		Monitoring	2009	2012	3,500,000	All European marine regions
21	IASON[152] (International Action for Sustainability of the Mediterranean and Black Sea), (Greece, Turkey, Norway, Bulgaria, Germany, UK, Romania, Denmark, Russia, Israel, Italy, Cyprus, Ukraine, USA)	Two main objectives: (1) Provide comprehensive state-of-the-art information regarding (i) the current state of the marine and coastal environment of the Mediterranean and Black Sea system; (ii) the carrying capacity of the system and (iii) the marine resources and (2) contribute to the preparation of future activities (FP 7 etc.) with a view to build a platform for cooperation with partners from EU Member States, Associated States and Newly Independent States.	Sustainability	Multiple		Capacity building	2005	2006	452,550	Mediterranean and Black Sea

[149] http://www.geo-seas.eu/
[150] http://www.eu-hermes.net
[151] http://www.hypox.net/
[152] www.iasonnet.gr

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
22	INCOFISH[153] (International Research Cooperation Restores Ecosystems for Sustainable Fishing)	To conduct specifically targeted strategic research suitable to contribute to the goals set by the World Summit for Sustainable Development in Johannesburg, such as restoring healthy fish stocks and ecosystems by 2015. Use of new research tools (large fish databases, interactive maps, and ecosystems modelling, etc.) to implement concrete solutions, including the extension of marine protected areas and the promotion of sustainable fish markets and selective fishing activities	Sustainability	Fisheries	Stock recovery	Modelling	2005	2008		N/A
23	KNOWSEAS[154] (Knowledge-based Sustainable Management for Europe's Seas), (UK, Germany, Sweden, Italy, Spain, Netherlands, Portugal, Bulgaria, Turkey, Denmark, Poland, Norway, Finland, France, Ireland)	Comprehensive scientific knowledge base and practical guidance for the application of the Ecosystem Approach to the sustainable development of Europe's regional seas	Sustainability	Multiple	Ecosystem approach	Modelling	2009	2013	5,764,200	All European marine regions
24	LifeWatch[155] (Life Watch e-Science and Technology Infrastructure for biodiversity data and observatories), (Netherlands; Belgium; United Kingdom; Romania; Sweden; Norway; Hungary; Germany; Finland; Slovakia; Slovenia; Italy; France; Greece; Denmark; Poland; Spain)	The Life Watch e-Science and Technology Infrastructure for biodiversity data and observatories will be a large-scale European research infrastructure bringing together: -a system of marine, terrestrial and freshwater observatories; -common access to a huge amount of interlinked, distributed data from databases and monitoring sites; -computational facilities in virtual laboratories with analytical and modelling tools; -targeted user and training support and a programme for public services.	Research coordination	Biodiversity		Information Exchange	2008	2011	5,000,000	All European marine regions
25	MACC[156] (Monitoring Atmospheric Composition and Climate)	Mission: To deliver the Atmosphere GMES Service Element a sustainable and reliable operational service to support informed decisions on the atmospheric policy issues of stratospheric ozone depletion, surface UV exposure, air quality and climate change. (Follow-up of PROMOTE)	Operational monitoring/atmosphere	Multiple		Capacity building	2010	2013		All European marine regions

153 http://cordis.europa.eu/fetch?CALLER=FP6_PROJ&ACTION=D&DOC=1&CAT=PROJ&QUERY=0134422e2e93:4a7a:25391f07&RCN=79797
154 www.knowseas.com
155 http://www.lifewatch.eu/
156 http://www.gmes-atmosphere.eu/services/raq/raq_nrt/

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
26	MARBEF[157] (Marine Biodiversity and Ecosystem Functioning), (Netherlands, France, Germany, UK, Norway, Estonia, Croatia, Russia, Lithuania, Bulgaria, Romania, Italy, Spain, Ireland, Poland, Portugal, Denmark, Slovenia, Sweden, Belgium, Finland, Ukraine, Greece, Malta)	MarBEF unites eminent marine scientists under one network to: 1) Understand how marine biodiversity varies across spatial and temporal scales, and between levels of biological organisation, in order to develop methods to detect significant change; 2) Further understand the relationship between marine biodiversity (at different levels of organisation) and ecosystem functioning and functions through the integration of theoretical and modelling exercises, comparative analyses and carefully designed experimental tests; 3) Understand the economic, social and cultural value of marine biodiversity.	Ecosystem research	Biodiversity	Socio-economic analysis	Modelling	2004	2009	8,707,000	All European marine regions
27	MARCOM+[158](Towards an Integrated Marine and Maritime Science Community), (Denmark, Monaco, Netherlands, France, Belgium, Greece)	The goal is to establish a sustainable and long-lasting partnership forum (European Marine and Maritime Forum), based on shared interests and shared leadership, and to test it on regional seas and pan-European basis. The process will contribute to developing interactions between partners (the research community, industry, regional authorities, civil society and other stakeholders) starting from regional scales to broader issues shared with EU-neighboring countries.	Research coordination		Governance	Information Exchange	2010	2012	998,455	All European marine regions
28	MARLISCO[159] (MARine Litter in Europe Seas: Social Awareness and CO-Responsibility), (Belgium, UK, Ireland, Portugal, Greece, Netherlands, Turkey, Bulgaria, France, Germany, Slovenia, Cyprus, Romania, Denmark)	The project will develop and evaluate an approach that can be used to address the problems associated with marine litter and which can also be applied more widely to other societal challenges where there are substantial benefits to be achieved through better integration among researchers, stakeholders and society.	Marine Litter	Marine Litter		Capacity building	2012	2015		All European regions
29	MEECE[160] (Marine Ecosystem Evolution in a Changing Environment), (UK, Germany, Greece, Norway, Italy, Denmark, Spain, France, Lithuania, Netherlands, Turkey)	Combination of data synthesis, numerical simulation and targeted experimentation to further knowledge of how marine ecosystems will respond to combinations of multiple climate change and anthropogenic drivers, in a holistic manner, rather than driver by driver as has been done in the past. Exploration of the impacts of climate drivers (acidification, light, circulation and temperature) and anthropogenic drivers (fishing, pollution, invasive species and eutrophication).	Climate change	Multiple		Impact assessment	2008	2012	6,500,000	All European marine regions

[157] http://www.marbef.org
[158] www.marinemaritimescienceforum.eu
[159] http://cordis.europa.eu/search/index.cfm?fuseaction=proj.document&PJ_LANG=EN&PJ_RCN=12868673&pid=5
[160] http://cordis.eu/search/index.cfm?fuse action=proj.document@PJ RCN=10373739

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
30	MESMA[161] (Monitoring and Evaluation of Spatially Managed Areas), (Netherlands, UK, Germany, Belgium, Greece, Norway, Italy, Denmark, Malta, Spain, Ireland, Bulgaria)	Production of guidance and tools to support the implementation of maritime spatial planning in Europe's seas. These will include advice, tools and information on human uses, biotope classifications / distributions (including examples of geospatial data systems), governance processes and different approaches to conflict management. Firm basis for implementation of marine spatial planning policies, in particular MSFD.	Maritime Spatial Planning	Biodiversity	Governance	Monitoring	2009	2013	6,568,842	All European marine regions
31	MONRUK[162] (Aeronautics and Space project developing marine monitoring services for Russia, Ukraine and Kazakhstan)	The overall objective was to develop and implement satellite Synthetic Aperture Radar (SAR) monitoring of the marine environment in Russia, Ukraine and Kazakhstan (the RUK area) as a component of GMES. Satellite SAR images for the three study areas were collected in order to develop and validate retrieval algorithms for ocean and sea ice parameters. The SAR data collection was done by: (a) using existing ERS and ENVISAT SAR data retrieved from ESA archives; (b) new acquisition of ENVISAT ASAR data, including alternating polarization images, and (c) RADARSAT SAR images.	Operational monitoring	Pollution		Capacity building	2007	2009		Black Sea and Caspian
32	MYOCEAN[163] (Development and pre-operational validation of the "Ocean Monitoring and Forecasting" component of the future GMES Marine Core Service), (France; Israel; Ukraine; Russia; Canada; Poland; Lithuania; Spain; Slovenia; Greece; Belgium; United Kingdom; Romania; Malta; Ireland; Italy; Estonia; Denmark; Germany; Cyprus; Norway; Latvia; Finland; Sweden; Bulgaria; Morocco; Netherlands; Portugal; Turkey)	- To set up infrastructures, services and resources to prepare the operational deployment of first Marine Core Services (MCS) - To provide the major building blocks and umbrella to allow the operational deployment of a full MCS in cooperation with external providers (National Met services, EMSA).	Oceanographic research		Marine Core Service	Monitoring	2009	2013	33,800,000	N/A
33	ODEMM[164] (Options for Delivering Ecosystem-Based Marine Management), (UK, Netherlands, Greece, Denmark, Bulgaria, Finland, Ireland, Romania, Denmark, Israel, Ukraine, Turkey, Poland)	Development of a set of fully-costed ecosystem management options that would deliver the objectives of the MSFD, the Habitats Directive, the European Commission Blue Book and the Guidelines for the Integrated Approach to Maritime Policy. Creation of meta-database of environmental assessment reports summarizing current knowledge based on environmental, ecological and socioeconomic issues or factors prepared for regional seas across Europe.	Sustainability	Multiple	Ecosystem Approach	Information Exchange	2010	2013	6,499,132	All European marine regions

[161] www.mesma.org
[162] http://monruk.nersc.no/
[163] http://www.myocean.eu/
[164] www.liv.ac.uk/ODEMM

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
34	PASODOBLE[165] (PROMOTE Air Quality Services Integrating Observations - Development of Basic Localised Information for Europe), (Germany, Bulgaria, UK, France, Italy, Finland, Netherlands, Belgium, Ireland)	In the context of Europe's initiative for Global Monitoring of Environment and Security (GMES), the PASODOBLE project seeks to provide information and support for regions and cities that are affected by air pollution. By combining space-based data, in-situ measurements and modelling, the Myair service portfolio is being developed and demonstrated in 4 thematic areas: Health community support Public forecasting and assessment Compliance monitoring support Local forecast model evaluation support	Atmospheric pollution	Multiple		Capacity building	2010	2013		
35	PEGASO[166] (People for Ecosystem Based Governance in Assessing Sustainable Development of Ocean and Coast), (Spain, France, UK, Tunisia, Egypt, Switzerland, Greece, Malta, Romania, Croatia, Egypt, Italy, Turkey, Belgium, Lebanon, Ukraine)	To build on existing capacities and develop common novel approaches to support integrated policies for the coastal, marine and maritime realms of the Mediterranean and Black Sea Basins in ways that are consistent with and relevant to the implementation of the ICZM Protocol for the Mediterranean.	Sustainability	Multiple	Coastal management	Capacity building	2010	2014	6,999,684	Mediterranean and Black Sea
36	I. PERSEUS[167] (Protecting European Seas and borders through intelligent use of surveillance), (Spain, France, Italy, Portugal, Greece, Finland, Ireland, Luxembourg, Norway, Sweden, Switzerland, Netherlands)	Its purpose is to build and demonstrate an EU maritime surveillance system integrating existing national and communitarian installations and enhancing them with innovative technologies. By means of two large scale demonstrations PERSEUS will prove its feasibility and will set the standards and grounds for the future development of EU maritime surveillance systems.	Novel security system		Smart use of technologies	Innovation	2012	2015		
37	II. PERSEUS (Policy-orientated marine Environmental Research for the Southern European Seas)(21 countries)	It is a research project that assesses the dual impact of human activity and natural pressures on the Mediterranean and Black Seas. PERSEUS merges natural and socio-economic sciences to predict the long-term effects of these pressures on marine ecosystems. The project aims to design an effective and innovative research governance framework, which will provide the basis for policymakers to turn back the tide on marine life degradation.	MSFD	Multiple		Capacity building	2012	2015		Mediterranean and Black Sea
38	PlanCoast[168] (Spatial Planning in Coastal Zones), (Germany; Bulgaria; Italy; Poland; Ukraine; Romania; Slovenia; Croatia; Albania; Serbia and Montenegro; Bosnia and Herzegovina)	To develop the tools and capacities for an effective integrated planning in coastal zones and maritime areas in the Baltic, Adriatic and Black Sea regions: Introduce Maritime Planning; Link ICZM and Maritime Planning with the processes of statutory spatial planning in selected number of pilot projects; Spread the use of modern	Sustainability	Multiple	Coastal management	Capacity building	2006	2008	1,488,000	Baltic, Mediterranean and Black Sea

[165] www.myair-eu.org
[166] http://www.pegasoproject.eu
[167] http://www.perseus-fp7.eu/
[168] http://www.plancoast.eu/index.php?id=1#

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
		geographical information systems (GIS) for an effective transnational planning; Contribute to the creation and implementation of EU policy on coastal zones and maritime areas, such as the Green Book and Blue Book, and led to creation of numerous national laws and strategies.								
39	PROMOTE[169] (PROtocol MOniToring for the GMES Service Element:Atmosphere)	Mission: To deliver the Atmosphere GMES Service Element a sustainable and reliable operational service to support informed decisions on the atmospheric policy issues of stratospheric ozone depletion, surface UV exposure, air quality and climate change.	Operational monitoring/atmosphere	Multiple		Capacity building	2006	2009		All European marine regions
40	SeaDataNet[170] (Pan-European Infrastructure for Ocean & Marine Data Management), (France, Netherlands, United Kingdom, Germany, Sweden, Spain, Greece, Italy, Russia, Turkey, Belgium, Norway, Denmark, Ireland, Portugal, Iceland, Finland, Poland, Estonia, Latvia, Lithuania, Ukraine, Bulgaria, Romania, Georgia, Morocco, Croatia, Albania, Slovenia, Malta, Cyprus, Israel, Lebanon, Algeria, Tunisia)	Construction of a standardized system for managing the large and diverse data sets collected by the oceanographic fleets and the new automatic observation systems. Network and enhance currently existing infrastructures, i.e. the national oceanographic data centres and satellite data centres of 35 countries, active in data collection. Provide integrated data sets of standardized quality on-line.	Oceanographic research			Data management	2006	2011	8,750,000	All European marine regions
41	SEAS-ERA[171] (Towards Integrated Marine Research Strategy and Programmes), (Spain, Georgia, Romania, Belgium, France, Ukraine, Bulgaria, Greece, Italy, Portugal, Turkey, UK, Iceland, Norway, Ireland, Netherlands, Malta, Germany)	SEAS-ERA will constitute a platform for developing a European integrated policy oriented structure to promote knowledge and expertise in any sea related area; the overarching element of SEAS-ERA, its ambition to embrace the whole spectrum of marine and maritime research, makes it an open forum for knowledge sharing, a real arena where all the sea related knowledge can meet.	Research coordination			Information Exchange	2010	2014	2,000,000	All European marine regions
42	SESAME[172] (Southern European Seas: Assessing and Modelling Ecosystem Changes), (Greece, France, Russia, Turkey, Belgium, Spain, Italy, Bulgaria, Israel, Lebanon, Italy, Romania, France, Ukraine, Croatia, Tunisia, Slovenia, Egypt, Cyprus, Germany, UK, Georgia, Denmark, Malta)	Assess and predict changes in the Mediterranean and Black Sea ecosystems as well as changes in the ability of these ecosystems to provide goods and services. Study the effect of the ecosystem variability on key goods and services with high societal importance like tourism, fisheries, ecosystem stability through conservation of biodiversity and mitigation of climate change through carbon sequestration in water and sediments. Close merging of economic and natural sciences to study the changes in the western and eastern Mediterranean and the Black Sea within	Ecosystem research	Multiple		Modelling	2006	2011	10,000,000	Mediterranean and Black Sea

[169] http://www.gse-promote.org/
[170] http://www.seadatanet.org/
[171] www.seas-era.eu
[172] http://www.sesame-ip.eu/public/SESAME-public-home

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
		the period from 50 years in the past to 50 years in the future.								
43	SIMORC[173] (System of Industry Metocean Data for the Offshore and Research Communities), (Netherlands, UK, Belgium)	Development, together with the oil & gas industry, of a sustainable SIMORC internet service, which manages and operates a central index and database of metocean data sets, collected by the oil & gas industry at various sites on the globe in the past and continuing at present.	Oceanographic research			Information Exchange	2005	2007	500,000	All European marine regions
44	SPICOSA[174] (Science and Policy Integration for Coastal System Assessment), (Norway, Spain, France, Denmark, Estonia, Italy, UK, Greece, Belgium, Poland, Netherlands, Denmark, Bulgaria, Latvia, Turkey, Sweden, Ireland, Israel, Romania, Ukraine)	To develop a self-evolving, holistic research approach for integrated assessment of Coastal Systems so that the best available scientific knowledge can be mobilized to support deliberative and decision-making processes aimed at improving the sustainability of Coastal Systems by implementing Integrated Coastal Zone Management (ICZM) policies.	Sustainability	Multiple	Coastal management	Assessment	2007	2011	10,000,000	All European marine regions
45.	THESEUS[175] (Innovative technologies for safer European coasts in a changing climate), (Italy, Spain, UK, Denmark, Netherlands, Germany, France, Poland, Bulgaria, Greece, Latvia, Belgium, Ukraine, Russia, Mexico, China, Taiwan)	THESEUS will develop a systematic approach to reduce the risks to the coasts and maintain their benefits for human use together with healthy coastal habitats. Risk assessment, policy management and planning strategies will be worked out in cooperation with stakeholders and local authorities through applications in eight study sites, with specific attention to the most vulnerable environments such as estuaries, wetlands and deltas.	Climate Change	Biodiversity	Coastal management	Assessment	2009	2013	6,530,000	All European marine regions
46	THRESHOLDS[176] (Spain, France, Bulgaria, Italy, Denmark, Norway, Finland, Germany, Belgium, Sweden, Estonia)	The project THRESHOLDS emphasized the formulation of a generic theory of thresholds in nature, encompassing the understanding of alternative stable states and regime shifts in ecosystems, nonlinear and cascading responses in ecosystems. It brought together leading researchers in an attempt to develop integrated approaches to coastal zone management. Thresholds contributed to the development of Sustainability Science by developing, improving and integrating tools and methods that can deal with complex behaviour of ecosystems. The tools developed will be applied to several case studies in the European coastal zone.	Integrated approaches to coastal zone management	Multiple	Regime shifts	Research	2005	2008		All European marine regions

[173] www.simorc.org
[174] http://www.spicosa.eu
[175] www.theseusproject.eu
[176] http://www.thresholds-eu.org

N	Acronym	Topic / Objectives	Classification				Timescale		EC Contribution (€)	Marine Regions
			Main Topic	MSFD Descriptor	Additional Key word	Function	Start Year	End Year		
47	UP-GRADE BS-SCENE[177] (Up-Grade Black Sea Scientific Network), (Netherlands; Belgium; Bulgaria; Greece; Poland; Russia; United Kingdom; Ukraine; Romania; Turkey; Cyprus; Georgia)	The project implemented the results of the Joint Research Activities of the FP6 RI SeaDataNet project (common communication standards and adapted technologies to ensure the datacenters interoperability). Objectives: - To network the existing and new Black Sea datacenters, active in data collection, and provide integrated databases of standardized quality on-line. - To realize and improve on-line access to in-situ and remote sensing data, meta-data and products.	Research coordination	Multiple	Capacity building	Information Exchange	2009	2012	3,400,000	Black Sea
48	WISER[178] (Water bodies in Europe: Integrative Systems to assess Ecological status and Recovery)	WISER supported the implementation of the Water Framework Directive (WFD) by developing tools for the integrated assessment of the ecological status of European surface waters.	WFD	Multiple	Capacity building	Information Exchange	2009	2012		All European regions

[177] http://www.blackseascene.net/
[178] www.wiser.eu

Information is further provided on the most important initiatives which are currently taking place at the national or international level in the beneficiary countries.

BULGARIA

Table 71. Ongoing projects in Bulgaria

Implementing organization	Name of Project	Financed by	Duration	Cruises (Stations/Parameters)	Reporting and storage of data
IFR-Varna	Investigations on the winter breeding fish species and their trophic base		2011-2013	15 stations/ Fish, plankton, benthos, water chemistry	Detail given in footnote[179]
	Investigations on the summer breeding fish species and their trophic base		2011-2013	15 stations/ Fish, plankton, benthos, water chemistry	
	Marine cetaceans off the Bulgarian Coast		2011-2013	Cetaceans strandings	
	Changes in the Varna Lake ecosystem		2011-2013	6 stations/ Plankton, benthos, water chemistry	
IO-BAS, Varna	National monitoring for MSFD and WFD	MOEW	2012-2013	Detail given in Table 62	Hydrophysics, chemistry, biology data are reported to the corresponding ministry/Project in the respective format, stored at IO-BAS/ corresponding data-base
	DEVOTES	FP7	2012-2016	No details	
	PERSEUS, EC FP7[180]	FP7	2012-2016	Detail given in Table 62	

[179] In IR-Varna a standard procedure is followed for all steps in creating, transferring and storing of reported data. On board each sample is given a unique and permanent identification number which allows the staff to link all records to the relevant sample from its arrival to issue of a final report. A *standard counting worksheets* (initial sampling protocol, hardcopy and electronic form) are used for all samples to be recorded. The hardcopy (protocols, tables) gives full information about the sample and contains record of the species composition and counting results (date and site of collection, number of the counting chamber used, magnification used, the volume of sub-sample for sedimentation or filtration, area counted and factors used to calculate the final cell count etc.). The sheets also contain the name of the person identifying and counting the sample and of the person entering the counting results onto the database. The worksheet provides a space for general comments and records from the database. Since 1991 the most of the data have been computerized in a special data base. For every step of transferring data from one medium to another (from hardcopy to electronic form), a person other than the operator verifies the step. For example, count results, recorded on paper, are transferred from the original data sheet to the electronic database for storage and reporting. A person other than the data entry operator verifies the correctness of the data entered. Typing errors during data entry of count results are minimised by this careful check of all entries. *The database is established with the help of experienced specialists to ensure an adequate taxonomic system is used and special considerations for algal enumeration are incorporated. Effective data storage is provided by permanent database maintenance,* including regular back-up, checks for correctness of entries, and incorporation of changes in taxonomy. Such maintenance is critical during our long-term monitoring program, in particular, in order to keep the data accessible and useful for data analysis and comparisons.

[180] The overall scientific objectives of PERSEUS are to identify the interacting patterns of natural and human-derived pressures on the Mediterranean and Black Seas, assess their impact on marine ecosystems and, using the objectives and principles of the Marine Strategy Framework Directive as a vehicle, to design an effective and innovative research governance framework based on sound scientific knowledge. Well-coordinated scientific research and socio-economic analysis will be applied at a wide-ranging scale, from basin to coastal. The new knowledge will advance our understanding on the selection and application of the appropriate descriptors and indicators of the MSFD. New tools will be developed in order to evaluate the current environmental status, by way of combining monitoring and modelling capabilities and existing observational systems will be upgraded and extended. Moreover, PERSEUS will develop a concept of an innovative, small research vessel, aiming to serve as a scientific survey tool, in very shallow areas, where the currently available research vessels are inadequate. In view of reaching Good Environmental Status (GES), a scenario-based framework of adaptive policies and management schemes will be developed. Scenarios of a suitable time frame and spatial scope will be used to explore interactions between projected anthropogenic and natural pressures. A feasible and realistic adaptation policy framework will be defined and ranked in relation to vulnerable marine sectors/groups/regions in order to design management schemes for marine governance. Finally, the project will promote the principles and objectives outlined in the MSFD across the SES.

Table 72. Cruises planned in the projects of IO-BAS, Varna, Bulgaria

Project	Number of cruises planned	Timing	Stations	Parameters
National monitoring for MSFD (Ministry of Environment)[181]	6 cruises in 2012-2013	V-IX	35	Hydrophysics, chemistry, biology
National monitoring for WFD (Ministry of Environment)	2 cruises in 2012-2013 (macrophytobenthos)	V; VII	25 transects	Species structure, biomass, percent coverage, proportion of tolerant and sensitive species
PERSEUS, EC FP7	2 cruises in 2012-2016	VII-VIII	2	Hydrophysics, chemistry, biology

ROMANIA

Table 73. Ongoing projects in Romania

Implementing organization	Name of Project	Financed by	Duration	Cruises (Stations/Parameters)	Reporting and storage of data
Mare Nostrum NGO	Dolphins conservation			N/A (observations on dolphin strandings)	Excel, www.delfini.ro
GeoEcoMar	GeoEcoMar's core program – Project PN 09 41 01 01 Geoecological monitoring of the Romanian shelf	Ministry of Education, Research, Youth and Sports /National Authority for Scientific Research	2009-2013	30 stations/Parameters - Temperature, salinity, sigma theta, dissolved oxygen, oxygen saturation, pH, Eh, light transmission/ absorption, fluorescence, turbidity, nutrients, H_2S, chlorophyll a, seabed substrate, biodiversity (phytoplankton, zooplankton, benthos):	
	BSERA-NET – MARCY	EC	2011-2013	31 stations/ Parameters - Temperature, salinity, sigma theta, dissolved oxygen, oxygen saturation, pH, transparency, nutrients, chlorophyll a	
	FP7 – COCONET	EC	2012-2015	20 stations/Parameters - Temperature, salinity, sigma theta, dissolved oxygen, oxygen saturation, pH, Eh, light transmission/absorption, fluorescence, turbidity, nutrients, H_2S, chlorophyll a, seabed substrate, biodiversity (phytoplankton, zooplankton, benthos)	

[181] Under MFSD monitoring IO-BAS conducted on 32 stations in front the BG coast fisheries survey; Under this monitoring in June-November 2012 Cetaceans sightings have been carried out as well.

Implementing organization	Name of Project	Financed by	Duration	Cruises (Stations/Parameters)	Reporting and storage of data
NIMRD	PERSEUS	EC			
	COCONET	EC			
	MISIS	EC			
	CBC Programme/Fishery project	EC			
SC AQUASERV SA	Rehabilitation and extension of water and wastewater in Tulcea County ".[182]	EC		No cruises	
Romanian Space Agency	IMAGIS - Complex application of GIS and remote sensing techniques to support integrated management activities Romanian coastal area	PNCDI II	2008-2011	No cruises	IMAGIS: http://www.rmri.ro/RMRI/National Programs/IMAGIS/index.html
	OCEAN COLOUR – „Bio-optical Characterization of the Black Sea for Remote Sensing Applications"	NATO SfP	2010-2013	No cruises	
	TanDEM-X DATA FOR ENVIRONMENTAL AND DISASTER MONITORING	???	2009	No cruises	TanDEM-X: https://tandemx-science.dlr.de/
Environmental Protection Agency, Constanta	No name	National	continuous	52 (1 station and 1+31 parameters)	The data are stored on HDD in Excel sheets, DVD, printed on paper

Note: More details on the EC FP7 Projects can be found on their webpages, which are included in the Table 70.

The national programme called NUCLEU, financed by the Ministry of Research and Education, includes project dedicated to fisheries, which is presently ongoing.

[182] The overall objective is to improve water and wastewater infrastructure to benefit the environment and population to meet compliance obligations established by the Treaty of Accession and SOP Environment, Priority Axis 1. The project mainly consists of: measures for drinking water sector, which refers to rehabilitation abstraction from surface and underground culvert pipes, transport and water distribution, water treatment plant (rapid sand filters, sedimentation units by coagulation-flocculation, granular activated carbon filters, ozonation and chlorination units, sludge treatment systems), rehabilitation and construction of storage reservoirs and pumping stations, implementation of SCADA systems and implementation of water metering system and rehabilitation and expansion of collection system and wastewater treatment, including the establishment of three wastewater treatment plants - equivalent to a population of 100,000, 5,000 and 10,000 respectively. Project beneficiary population will be about 106,000 inhabitants in the county of Tulcea.

No ongoing projects have been specified by Ondokuz Mayis University, Ataturk University, Canakkale Onsekiz Mart University, Institute of Marine Science and Technology (Izmir), and Istanbul University (Faculties of Marine Sciences&Management and of Fishery).

The IMS METU projects are presented at: http://www.ims.metu.edu.tr/Sayfa.php?icerik=Makale&mid=19. The main projects they participate are EC FP7 (COCONET, PERSESUS) and a national one, named: "National Fisheries Data Collection Programme. Acoustic Method for the Determination of the Black Sea anchovy stocks and Continuous Monitoring - Model Creation", financed by TUBITAK (TÜBITAK 110G124 project).

Table 74. Ongoing projects in Turkey

Implementing organization	Name of Project	Financed by	Duration	Cruises (Stations/Parameters)	Reporting and storage of data
Central Fisheries Research Institute (CFRI, Trabzon)	Black Sea and Büyükdere Environmental Monitoring Project	Not specified	Not specified	4 per year /7 to 20 stations/ Water temperature, pH, salinity, conductivity, sigma-t, light transmission, chlorophyll-a, alkalinity, hydrogen sulphide, TSS, metals (cupper, iron, zinc, lead, cadmium, mercury, arsenic, manganese), nutrients	Raw data and graphs
Sinop University, Faculty of Fishery	COCONET	EC	2012-2015	Pilot area: Şile coast :	
TUBITAK – the Marmara Research Center	DECOS	Ministry of Environment and Urbanization		The Project DEKOS focuses on the assessment and classification of coastal (transitional) and marine waters, including data mining, gaps identification and filling them through field surveys.	http://dekos.mam.gov.tr/ (In Turkish and under development. By 2013 it is planned to have a data link and English version). The data are reported as raw and graphs, reports can be achieved at the Institute
IMS/METU (Erdemli)	COCONET	EC FP7	2012-2015	2 cruises in 2013/ Physical, chemical, biological, meteorological	Raw data to the project data base
	PERSEUS	EC FP7	2012-2015	2 cruises in 2013/ Physical, chemical, biological	Raw data to the project data base
	TÜBITAK 110G124 project	TUBITAK		2 cruises in 2012-2013/ Physical, Fish morphology, abundance, biomass, reproduction, fishing by-catch, acoustic backscatter	

Note: TUBITAK – the Marmara Research Center will soon start a new Project on Beach quality and prepare a database to respond to the needs of the Beach Profile Scheme of EU.

Note: The Trabzon Institite (CFRI) has specified additional 24 cruises, fortnight (fortnight is not clear) at 2 stations to study: water temperature, pH, salinity, conductivity, density, light transmission, chlorophyll-a and oxygen.

To conclude on the contribution of projects.

The projects are a powerful tool, addressing specific questions, and advancing scientific knowledge, in general, however, most of them share none of their data compiled, and often the reports prepared under their activities are available for the partner-organizations only (password protected).

8. Gaps, missing monitoring requirements

BG, RO and TR have strong legal/policy and scientific foundations on to develop integrated monitoring/assessment programmes following the DPSIRR model. Much of the work will involve building on, or adapting already existing monitoring arrangements. Additional monitoring requirements are listed in the Table below.

Table 75. Specification of additional monitoring requirements

Descriptor	Additional monitoring requirements
Descriptor 1, 4 and 6 – functional groups	Marine mammals: 5 yearly census of dolphins populations
	Birds: seabirds colonies and seabird by-catch
Descriptor 1, 4 and 6 - habitats	Deep sea biogenic structures
	Improving information on the seabed, mapping of habitats, tracing of habitat change and loss
Descriptor 2 - NIS	Abundance and distribution of NIS, especially in high risk locations
Descriptor 5 - eutrophication	Primary production (phytoplankton and macroalgae), areas of hypoxia, change in macroalgal communities
Descriptor 7 – hydrographical conditions	Changes in water temperature and salinity related to human activities
Descriptor 8 - contaminants	Screening for new pollutants
Descriptor 9 – contaminants in seafood	Commercial fish
Descriptor 10 – marine litter	Floating and seafloor litter, microplastics
Descriptor 11 – underwater noise	Underwater noise level

Note: There was a recommendation to detail this Table 'exactly like in the Directive', however, such details should go to the revised Monitoring Programmes, based on expets opinion, the objective of this report was to gather stakeholders opinions on gaps, in general. About data availability as per the MSFD Descriptors (to cover their indicators) details are given in Chapter VI.

In all beneficiary countries land-based pressures are defined as part of pollution source monitoring programs. These programmes are well financed and implemented. However, the methods and results of the pressures monitoring programs are seldom coordinated with, or used in, the ambient monitoring programs in the same areas. Hence, impacts are poorly related to pressures, and especially scarce is the knowledge on cumulative effects.

The destruction of habitats represents a serious threat to the biological diversity in the Black Sea and needs special attention. It affects the water quality and status of living resources and is due to activities in various sectors of economy. The construction activities and the infrastructure projects cause serious damages to the habitats. They include the transport corridor constructions – highways around the Black Sea, platforms (exploitation of gas and petrol resources), dredging for transport purposes; ports development; construction of large touristic complexes and facilities on the seaside; incorrect management of the wetlands areas; extraction of inert material from the sea bed, illegal bottom trawling and others. **Hot spots of habitats destruction** should be identified (similar to hot spots of land-based sources of pollution) and relevant monitoring should be developed.

Biodiversity of the Black Sea is insufficiently attended in the routine monitoring programmes. Especially important is to better study: bacteria, phytoplankton, Protozoa and meiobenthos.

Genetic investigations are scarce. Better knowledge of the Black Sea gene pool is required. Acidification and carbon storage studies need to be advanced.

Operational monitoring development is basically poorly attended. There is much to desire in the introduction of automated systems of observation in the sea, as well as in the development of remote sensing.
There are domains of the Black Sea-related monitoring which are covered by several organizations, sometimes overlapping their observations. The capacities of different institutions are not properly used. Frequency of observations might be hampered due to delays in providing funding. Proper geographical coverage is not ensured due to insufficient funding. Mandatory parameters are not covered due to lack of capacity. The few institutions involved in national monitoring programmes are overloaded and unable to properly manage the data produced. Networking of institutions controlling pressures with those which deal with state and impacts observed in the Black Sea is crucial, yet obviously absent in the beneficiary countries.

No ecosystem-based management is possible without inter-sectoral cooperation, including such cooperation when building the National Monitoring Programme, following the scheme of the DPSIR model, as shown below on the example for Eutrophication and Fishery decline (being priorities among other important Black Sea environmental problems):

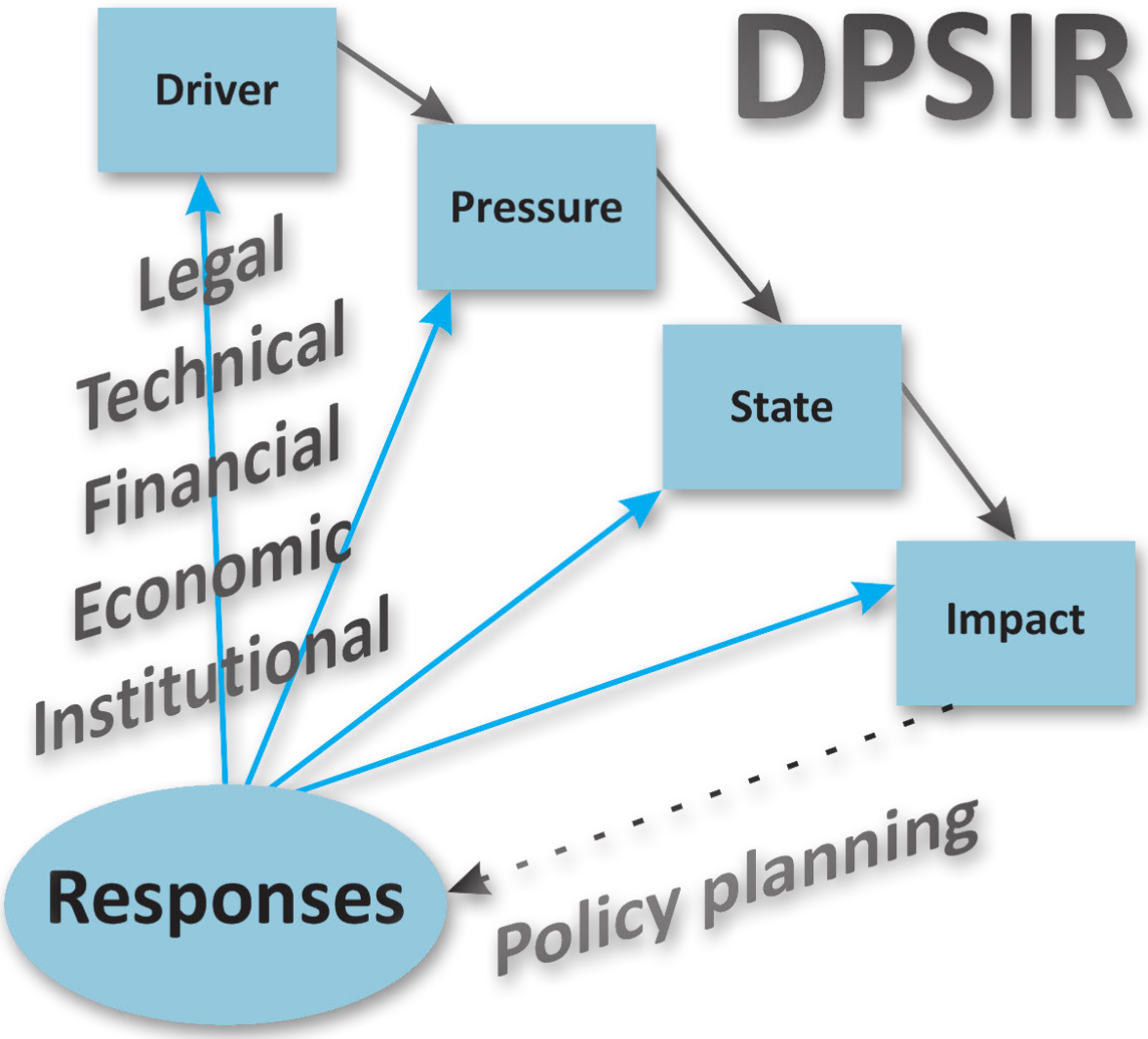


Figure 25. The general DPSIR Scheme

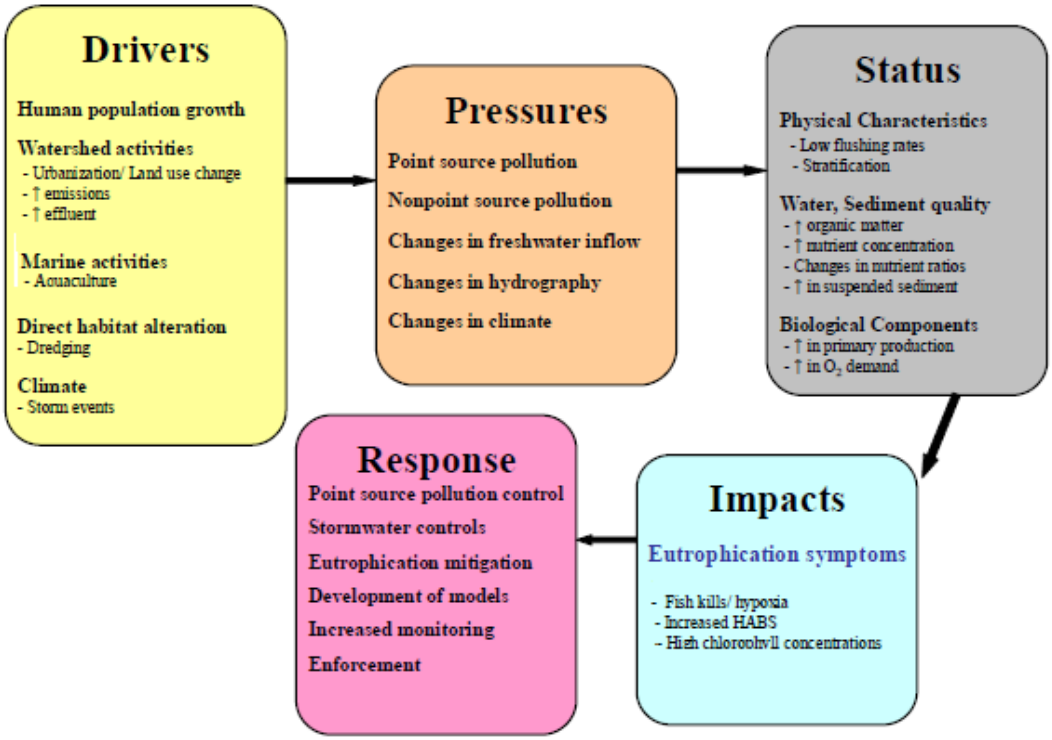


Figure 26. DPSIR: Eutrophication

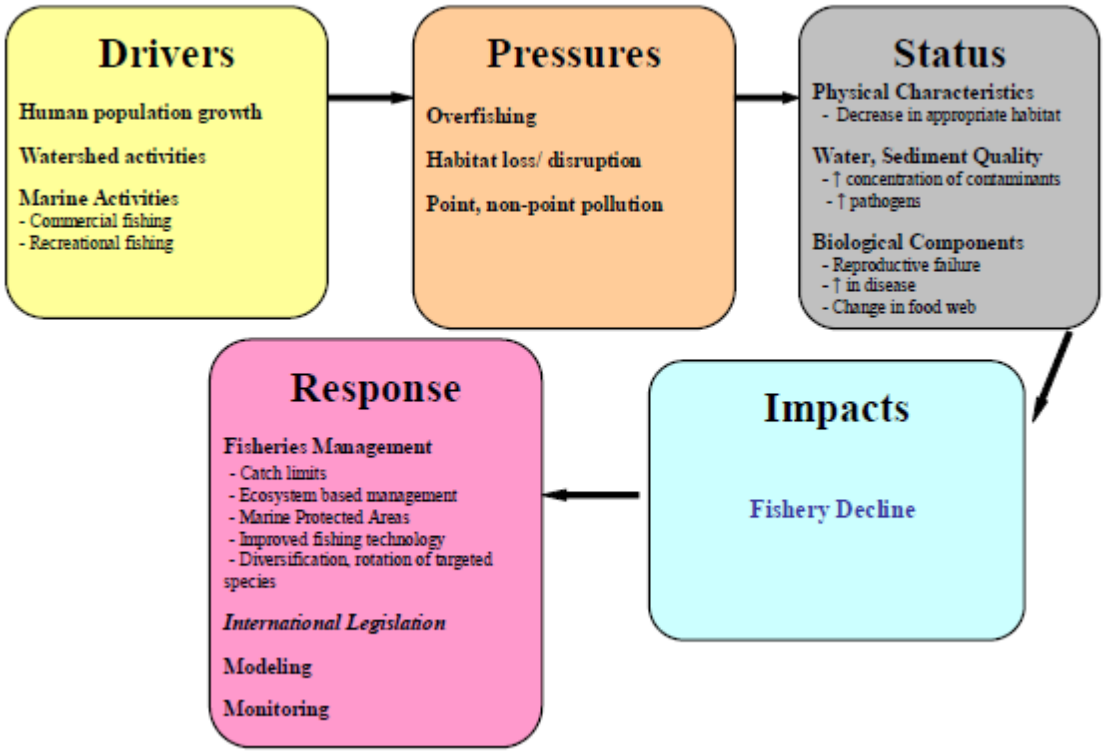


Figure 27. DPSIR: Fish decline

II. Data management, data products, QA/QC, assessments

The generation of data in itself by various monitoring activities is not sufficient, there must be an associated data management, generation of data products, and communication infrastructure. This infrastructure needs to provide data/information freely and within certain time limit to both researchers and policy makers. Unfortunately, there is no regional on-line data base for the Black Sea which would provide comprehensive information on the availability and accessibility of data/information collected and managed in the beneficiary countries. BSC BSIS is not on-line, the data bases of different projects are either inaccessible or provide only scarce meta-data.

The only regional free data bases are the NATO –NATO SfP ODBMS Black Sea Data base, which contains historical data collected prior 1997[183] and the Black Sea Oceanographic Data Base (BSOD)[184].

The *Mnemiopsis leidyi* Data Base (http://ps-blacksea-commission.ath.cx/MLDB/), created under the umbrella of the BSC, is also not completely free for access (there are terms specified).

Global and European level data bases containing data/information and data products for the Black Sea, have been described in the Diagnostic Report I, Annex I, http://www.blacksea-commission.org/_publ-BSDiagnosticReport2010.asp. To this list CleanSeaNet[185] and SafeSeaNet[186] should be also added.

---

[183] Link: http://sfp1.ims.metu.edu.tr/
Brief description: Black Sea inter-disciplinary multivariable historical database was created in framework of the NATO TU-Black Sea project in 1994-1997 and is maintained in framework of the NATO SfP ODBMS Black Sea Projects. It includes all main physical, chemical and biological variables for the entire Black Sea basin. Database covers the most crucial period in the history of the Black Sea ecosystem starting from the "background" situation in 1960 till the drastic changes occurred in 90s. All data included into the database were quality checked by qualified groups of regional experts, well acquainted with the Black Sea data. Each value of physical, chemical and bio-optical data is accompanied with the quality flag.
Released: 2002
Time period: 1956-2001
Resolution: stations
Coverage: Black Sea
Areas of application: ecosystem studies and assessment
Accessibility: free
Format: ASCII (csv)
Data source link: http://sfp1.ims.metu.edu.tr/ODBMSDB/

[184] **Brief description**: The Black Sea Oceanographic Database (BSOD) was compiled on the base of the NATO TU-Black Sea database and MEDAR-MEDATLAS. The BSOD includes main physical, chemical and biological variables for the entire Black Sea basin (148 variables). The database includes data obtained at 74,532 oceanographic stations.
For more information contact: Sukru Besiktepe, Director of IMS METU, sukru@ims.metu.edu.tr.
Released: 2005
Time period: 1890 - 2003
Resolution: stations
Coverage: Black Sea
Areas of application: ecosystem studies and assessment
Accessibility: free, provided by request by Institute of Marine Sciences, Middle East Technical University (www.ims.metu.edu.tr)
Format: Paradox Database distributed on CD

[185] CleanSeaNet is a near-real-time satellite-based oil spill and vessel monitoring service. It entered into operation on 16 April 2007. The service is continually being expanded and improved and provides a range of different products to the Commission and to EU Member States, and to other governmental and institutional partners as appropriate. Webpage: http://cleanseanet.emsa.europa.eu/

[186] SAFESEANET (https://safeseanet-sso.emsa.europa.eu/ssn-login/login.jsp), is a European Platform for Maritime Data Exchange between Member States' maritime authorities, is a network/Internet solution based on the concept of a distributed database. The SAFESEANET system has been developed for supporting the requirements of the Directive 2002/59/EC of the European Parliament and of the Council of 27 June 2002 establishing A Community vessel, traffic monitoring and information system. The system is accessible to the National administration of the Member States of the European

1. Availability of permanent data bases and terms of access

National level

BULGARIA

IO-BAS is the National Oceanographic Data Center (NODC)[187]. The Institutions in Bulgaria do not have unified data bases, which would store all the various types of data collected. The data bases of different projects have been quoted, however, the on-line accessible ones contain meta data only, not the data themselves. There is no national data base which would provide for free access to historical and recent environmental data.

Table 76. Permanent data bases in Bulgaria

Theme	Owner	Name of the data base (if any)	Link (if any)	Year of launch	Type of data base	Is the data base linked to models?	Terms of access
Oceanography data[188]	IO-BAS	National Oceanographic Data base	http://www.bgodc.io-bas.bg/	2002	MSSQL2008	YES, hydro physical	Upon request
Hydrochemistry	IFR-Varna	No name	No	1994	dbf	No	negotiation
Hydrobiology (phytoplankton and zooplankton)		Amfora (for phytoplankton)	No	1993	dbf	No	negotiation
CTD		CTD data base	http://seadatanet.maris2.nl/v_cdi_v2/search.asp	2001	ODV	no	negotiations
Bacteria biomass		Bacteria C-biomass	http://seadatanet.maris2.nl/v_cdi_v2/search.asp	2001	ODV	no	negotiations
Zooplankton biomass		Zooplankton wet biomass	http://seadatanet.maris2.nl/v_cdi_v2/search.asp	1968	ODV	no	negotiations
Macrozooplankton abundance		Macrozooplankton	no	2002	excel	no	negotiations
Water Temperature		Surface water temperature	no	1968	ODV	no	negotiations
Fish abundance		Sprat trawl surveys 2007-2009	http://seadatanet.maris2.nl/v_cdi_v2/search.asp	2007	ODV	Yes, MSY calculations	negotiations

Community and of the European Free Trade Association States. SAFESEANET main objective is to aid the collection, dissemination and harmonised exchange of maritime data. The network assists communication between authorities at local/regional level and central authorities thus contributing to prevent accidents at sea and, by extension, marine pollution, and that the implementation of EU maritime safety legislation will be made more efficient.

[187] The IODE Ocean Data Portal is at: odp.oceandataportal.ne. At the Nineteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE-XIX, Trieste, Italy, 12-16 March 2007) a project document for the establishment of the Ocean Data and Information Network for the Black Sea Region (ODINBLACKSEA, a network of NODC, in other words) was adopted. Recognising that the lives of at least 160 million people are profoundly influenced by the Black Sea and considering that all riparian countries depend to a large extent on marine and coastal resources, the ability to acquire, manage, archive and disseminate data, as well as the capacity to generate products and services in support of decision making and management of the Sea and Coastal Zones is of vital importance. The Ocean Data and Information Network for the Black Sea Region (ODINBLACKSEA) Project is proposed to respond to these needs through: (i) providing assistance in the development, operation and strengthening of National Oceanographic Data (and Information) Centres and to establish their networking in the region; (ii) providing training and education in marine data and information management, taking into account the requirements of operational oceanography; applying standard formats and methodologies as defined by the IODE; (iii) enhancing national and regional awareness of Marine Data and Information Management; (iv) assisting in the development and maintenance of national and regional marine data, metadata and information databases; (v) assisting in the development and dissemination of marine data and information products and services, meeting the needs of user communities at the national and regional levels, and responding to national and regional priorities; (vi) undertaking the ODINBLACKSEA activities in close collaboration and networking with other relevant organizations, programmes and projects operating in the Black Sea region; and (vii) undertaking the above activities applying modern technologies for data collection, processing, storage and dissemination.
Information on the Bulgarian National Oceanographic Data Center (BGODC), Institute of Oceanology can be found at: http://www.bgodc.io-bas.bg/ and https://www.bodc.ac.uk/data/information_and_inventories/edmed/org/692/

[188] There are data sets provided by IO-BAS (metadata of monitoring physical, chemical and biological parameters) to the Black Sea SCENE/SeaDataNet database, the Geo-SEAS data base is hosted by IO-BAS, chemical data is reported to EMOD-Net.

Fishing vessels database (NAFA)

A special database is created within the VMS (fishery vessel monitoring system) to serve the operators and inspectors, allowing faster identification of the fishing vessel. In this database are stored such vessel's characteristics like:

- Name of the vessel
- Registration number
- Call sign (vessel's main identification elements)
- MMSI (vessel's main identification elements)
- Technical parameters like length, width, etc.
- Actual picture of the fishing vessel
- Contact details of the Master of the vessel
- Contact details of the vessel's owner

Additional software products are incorporated in the NAFA database, such as WebOverMap and 'ZoneMaker". The number of inspections at sea are recorded and the data is used to improve and/or expant control, where necessary. 'ZoneMaker' displays forbidden fishing areas and allows monitoring offence. The offenders appear in red (in the VMS system) and sound signalization is also provided.

Thus the NAFA information system is web server based system, working in real time and the data stored is renewed up to date by authorized operators. The access to the system is secured by individual password assigned to the relevant authorized operator. The system is a combination of information modules related to the different directions in the fishing statistics. The data collected could be transferred from one information module to another automatically or depending on the user's classification criteria.

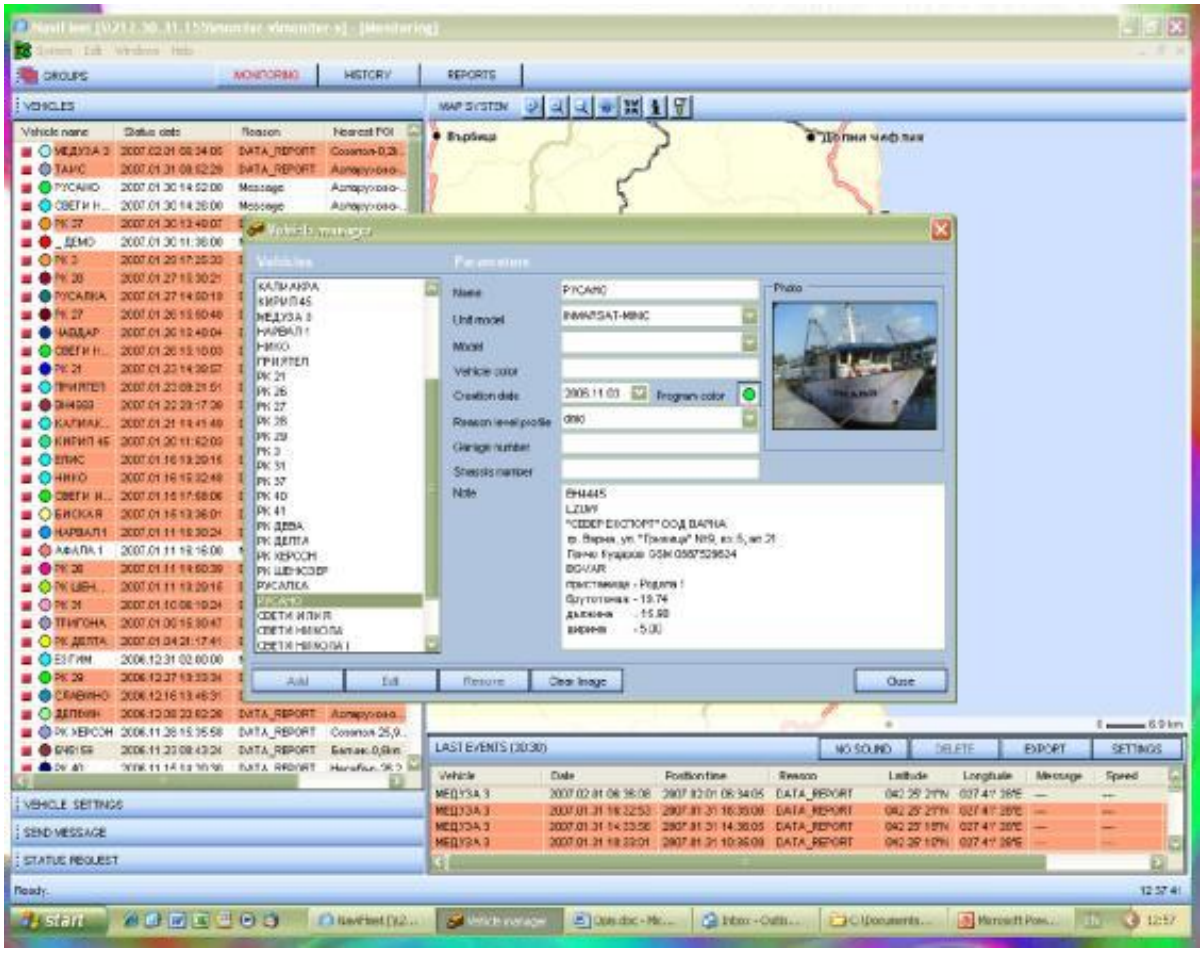


Figure 28. The Fishing vessels data base of NAFA

Information modules

- Fishing fleet register: the data collected includes registration number, name of the vessel, technical parameters, producer information, personal details of the vessel's owner;
- Commercial Fishing licenses register – the information collected in this information module is for the fishing licenses issued by the agency: the number of the license, the type of the fishing gears, the number of the logbooks etc. This module corresponds with the fleet register automatically;
- Recreational fishing register
- Catch register: contains information like: landing declarations, take over declarations, transport documents – corresponds with Commercial Fishing licenses register;
- Branch organizations register. Contains: list of main data of branch organizations and operational program list of projects;
- Register of Producer Organizations. Contains: Registration of Producer organizations. Production and processing data. Operational program list of projects.

Subsystems of the NAFA database:

- Quota expiry reports
- Scientific data – available resources and catches
- effected
- Fishing effort
- Catches effected (different species)
- Fishing fleet capacity
- Warning for delayed submission of landing declarations and sales notes

Note: Log books of fishery vessels and VMS data are not freely accessible.

IFR-Varna gives reference to the data bases created under the Upgrade BS Scene project:

Name of the data base (if any)	Link (if any)	Year of launch	Type of data base	Is the data base linked to models?	Terms of access
Abiotic Data series	www.blackseascene.net	2006	Excel		negotiations
Biotic Data Series	www.blackseascene.net	2006	Excel	yes	negotiations
Ichthyology Data	www.blackseascene.net	2006	Excel	yes	negotiations
Marine Cetaceans	www.blackseascene.net	2006	Excel		negotiations

IBER-BAS gives reference to the data bases created under the SeaDataNet project and NATURE2000 data base. The organization also mentioned keeping data in Excel sheets, however, they are not organized in a specialized data base.

Name of the data base (if any)	Link (if any)	Year of launch	Type of data base	Is the data base linked to models?	Terms of access
Sozopol 01-05	http://seadatanet.maris2.nl/v_cdi_v2/result.asp	2010	Data View ASCII	No	negotiation
Natura 2000 MPA GIS database		2011	Excel, DBF	No	negotiation

The **Black Sea NGO Network** gives references to the data bases created under SeaDataNet and Upgrade BS Scene projects.

Name of the data base (if any)	Link (if any)	Year of launch	Type of data base	Is the data base linked to models?	Terms of access
Socio economic data	scene.bsnn.org	2009	Excel	No	No
EDMERP	SeaDataNet (http://www.seadatanet.org/)	2009	Excel	No	No

IO-BAS gives reference to regional data bases created under different projects, such as follow:

Name of the data base (if any)	Link (if any)	Year of launch	Type of data base	Is the data base linked to models?	Terms of access
NATO –NATO SfP ODBMS Black Sea Data base	http://sfp1.ims.metu.edu.tr/texts/database.htm	1997[189]		No	free
SESAME data-base	No link provided	2011		YES - 3-D Hydrophysical and Ecological model	Upon request
Black Sea *Mnemiopsis leidyi* database	http://ps-blacksea-commission.ath.cx/MLDB	2011			Upon request

Data bases for habitats and for birds data storage have not been reported.
None of the Institutions has reported on a data base, which would store all meta data and data stemming from observations under national monitoring programmes and projects together. Besides, there is no mechanism for exchange of data between different institutions.

ROMANIA

In Romania, there are data bases in the different Institutions, however, they are with restricted access.

Table 77. Permanent data bases in Romania

Theme	Owner	Name of the data base (if any)	Link (if any)	Year of launch	Type of data base	Is the data base linked to models?
Bathing waters	Constanta county department of public health	REGISTRATIONS	No	2010	Word Excel	No
Radioactivity	Environment Protection Agency of Constanta	BD_RNSRM	No	2000	Excel	No
Statistics on flow of tourists	National Institute for Research and Development in Tourism	No name[190]	No	2011	Excel	No
	National Company Maritime Ports Administration					

[189] The Data base has been created in 1997 and collected historical data, however, it has been never sustained. It is distributed on CD and contains scarce data from Black Sea Bulgarian waters.
[190] For internal use only

Theme	Owner	Name of the data base (if any)	Link (if any)	Year of launch	Type of data base	Is the data base linked to models?
Dolphins, Litter	Mare Nostrum NGO	Dolphins[191]	www.delfini.ro	2011	Excel	No
		Litter Coastwatch[192]		2003	Doc	No
Chemistry, geology, biology	GeoEcoMar	GEM-MN[193]		2011	MS Access	No
Chemistry, geology, biology	NIMRD	Beach dynamics[194]		2007- data have been stored electronic ally	Excel	No
		IMAGIS [195]	http://www.rmri.ro/RMRI/NationalPrograms/IMAGIS/index.html	2011	geodatabase	No
Chemistry, biology	Dobrogea Littoral	No name specified[196]	On-line with limited access	2010	ARQ Program (Excel sheets)	No
		GIS		2011	SQL SERVER 2008-R2	GEOMEDIA PROFESSIONAL; GEOMEDIA MH G.1
		SCADA		2013	SQL SERVER 2008 – R2	
Aerial imagery, imagery (the optical / radar) data in vector format.	Romanian Space Agency	IMAGIS[197]	http://www.rmri.ro/RMRI/NationalPrograms/IMAGIS/index.html	2011	geodatabase	No
Noise, salinity	Constanta Maritime Hydrographic Directorate	BD DHM		1963	Initially ACCES library data, in 2011 ORACLE	
Statistical data	Constanta County Department for Statistics	No data base specified				

Note: Tulcea County Department of Health reports data stored in Word, with links to www.dspjtulcea.ro, www.ispb.ro and www.ms ro, updated annually. NAFA, Romania has not reported on data base availability. The private companies OMV Petrom SA and ExxonMomilExploration&Production Romania Ltd have not specified any data bases as well.

[191] User and password
[192] On request
[193] On request based on access flags
[194] Upon request
[195] Free for maps
[196] Limited access (only for the Administrations water basins that realise the monitoring and ANAR Bucharest)
[197] Free for maps

TURKEY

There is a National Data Inventory in Turkey, published at the web page of the IMS/METU: http://www.ims.metu.edu.tr/inventory/.

No data bases were mentioned in the completed Questionnaires by Ondokuz Mayis University (Samsun), Ataturk University (Erzerum), Canakkale Onsekiz Mart University, Institute of Marine Science and Technology (Izmir), Central Fisheries Research Institute (Trabzon), Sinop University, and by the Istanbul University.

However, all marine science institutes have their own data bases and IMS METU sustains a national data base (not frequently updated, though). Ministry of Environment has its own database storing monitoring data. The TR National Oceanographic Data Center (recognized by IOC/IODE) is the Office of Navigation, Hydrography and Oceanography (ONHO) storing all types of data submitted to them. By Law all the organizations collecting marine related data have to annually submit data to ONHO. In practice the performance requires much improvement. ONHO is a partner to the SeaDataNet II Project as the subcontractor of the TUBITAK Marmara Research Center. Under the Project DeKoS (the TR national project for the WFD and MSFD transposition/initial implementation, funded by the Ministry of Environment and coordinated by TUBITAK-MRC) a special data base with mapping and reporting tools (ARC Marine Structure) is under preparation. It will include all data collected from monitoring projects, other projects carried out for the Ministry of Environment and Urbanization and data submitted by different institutes (already published). This will be delivered by TUBITAK to the Ministry of Environment and Urbanization by the end of 2013.

Table 78. Permanent data bases in Turkey

Theme	Owner	Name of the data base (if any)	Link (if any)	Year of launch	Type of data base	Is the data base linked to models?
Environment data	Ministry of Env. and Urbanization	No name (Coastal/territorial waters monitoring database)	No link	2004	Excel	No
Environment data	Institute of Marine Sciences/ Middle East Technical University (IMS/METU)	No name	http://www.ims.metu.edu.tr/ims_inventory/invsrv.dll/queryds. (meta data)			
Biodiversity (on coast)	Nature Conservation Center	National biodiversity database, Noah's Ark National Biodiversity Database transfers	Not specified		GIS?	Statistical models
Environment data	TUBITAK – the Marmara Research Center	No name	Under development	2013		
Land-based sources of pollution		LBS				
Ballast water		Ballast water Risk Assessment System				

Theme	Owner	Name of the data base (if any)	Link (if any)	Year of launch	Type of data base	Is the data base linked to models?
Environmental Safety aspects of Shipping		Decision support tool for emergency situations[198]				Oil spill modelling
Environmental	IMS/METU (Erdemli)	Black Sea Database[199]	http://sfp1.ims.metu.edu.tr/ODBMSDB/	2002	PARADOX	No
Oceanography		IMS METU Oceanographic Data Inventory[200]	http://www.ims.metu.edu.tr/IMS_Inventory	2002	MS Access	No
Hydrology		Database of CTD data[201]		1988	Excel, ASCII files, ODV	Yes (ecosystem model including following MSFD indicators: 1.2.1, 1.6.3, 1.7.1, 3.1.1, 3.2.1,4.1.1, 4.2.1, 4.3.1, 5.1.1, 5.2.1, 5.2.2)
Chemistry		Database of chemical data[202]		1986	Excel, ASCII files, ODV	Yes (ecosystem model - see above)
Fishery		Database of fisheries data[203]		1986	Excel, ASCII files	Yes (fish stock assessment)
Mnemiopsis		IMS METU contribution to Mnemiopsis Leidyi Database[204]	The regional Black Sea Mnemiopsis leidyi database (http://documents.blacksea-commission.org/MLDB) hosted by the Permanent Secretariat of the Black Sea Commission	2008	SQL server	No

Note: TUBITAK – the Marmara Research Center plans to develop data base for the needs of the Beach Profile Scheme of EU.

[198] YAKAMOZ. YAKAMOZ is a GIS based decision support system, developed for the management of oil spills within the Turkish seas. YAKAMOZ is able to querying, analysing and generating reports using available data as well as the integration of new data when necessary. YAKAMOZ has both stand alone and network modes. In the network mode, user is able to share maps and reports over the internet. The data base includes oil spill modeling, risk assessment, ESI (environment sensitivity index) mapping for all TU coasts and decision support system.
[199] Free
[200] Free
[201] SeaDataNet OG type: unrestricted to members of organization but restricted to anybody else.
[202] OG
[203] OG
[204] Free

Regional, European and International level

Two EC DG Research Projects, namely, SeaDataNet and Black Sea Scene (with its follow-up for 2008-20011) provide for inventories of data in the Black Sea region incorporating partner-institutions involved in monitoring of the Black Sea from the beneficiary countries, as shown in Table 79. It is not clear how Bulgaria participates in Wise-EIONET, in Romania NIMRD provides to it data. BSIS (Black Sea Information System, BSC data base) is well sustained by the beneficiary countries, however, it is not on-line and its data are not accessible or exchanged between the organizations providing data. The attempts to develop BSIS in the frames of several projects (BSERP, MONINFO, Baltic2Black, see http://www.blacksea-commission.org/_projects_observers_partners.asp) have actually failed. The project Baltic2Black of the BSC is still ongoing, however, the progress made is far from the expected. BSIS is neither operational, no providing data products which would support indicator-based reporting and consequent decision-making.

Table 79. Regional, European and International data bases

Country	Organization	SeaDataNet (on-line)	BSIS	Wise-EIONET (on-line)	Black Sea Scene Network/Up Grade BS Scene (on-line)	Others
Bulgaria	IFR-Varna	Yes (Link not provided)	Yes		Yes (www.blackseascene.net; ODV Format)	
	IBER-BAS	Yes (http://seadatanet.maris2.nl/v_cdi_v2/result.asp)			Yes (Link not provided)	LTER (no detail provided)
	Black Sea NGO Network	Yes (Link not provided)			Yes (www.scene.bsnn.org)	
	IO-BAS	Yes (Link not provided)	Yes		Yes (Link not provided)	Sesame/Perseus data base; BSC Mnemiopsis data base; NATO –NATO SfP ODBMS Black Sea Data base, ODINBLACKSEA
Romania	S.C. Thermo-electric factory Midia S.A. (S.C. Uzina Termoelectrică Midia S.A.)	Yes (Link not provided)				
	NIMRD	Yes (Link not provided)	Yes	Yes (cdr.eionet.europa.eu/ro/eea/me1)	Yes (Link not provided)	Sesame/Perseus data base; BSC Mnemiopsis data base; NATO –NATO SfP ODBMS Black Sea Data base
	GeoEcoMar				Yes (Link not provided)	
urkey	Ministry of Env. and Urbanization		Yes	Yes		

Country	Organization	SeaDataNet (on-line)	BSIS	Wise-EIONET (on-line)	Black Sea Scene Network/Up Grade BS Scene (on-line)	Others
	Institute of Marine Science and Technology (Izmir)	Yes (Link not provided)			Yes (Link not provided)	
	Central Fisheries Research Institute (Trabzon)					
	Istanbul University		Yes			
	Sinop University	Yes (http://seadatanet.maris2.nl/webservices/edmerp/get_detail/n_code/11426)			Yes (Link not provided)	Emodnet
	TUBITAK-the Marmara Research Institute	Yes[205]				
	IMS/METU (Erdemli)	Yes	No	No	Yes (Link not provided)	Sesame/Perseus data base; BSC Mnemiopsis data base; NATO – NATO SfP ODBMS Black Sea Data base

Euroocean data base is existent, however, no information was provided by the stakeholders on reprtng to it.
EMODNET, a pilot component for a final operational European Marine Observation and Data Network launched by the European Commission (DG MARE) aims to assemble fragmented and inaccessible marine data into interoperable, continuous and publicly available data streams for complete maritime basins. In the Black Sea, a consortium of five riparian countries has assembled data on marine pollution in order to facilitate access to data by all users. More consortia should be created in the next phase of the project from 2011 and 2013 covering bathymetry, geological sediments and the distribution of marine life as well as chemical pollution.

In the field of operational monitoring EuroArgo created centers for data/information management and quality control. The data are freely and easily accessible for science and other uses. The communication system is presented in Fig. 29.

[205] Together with the National Oceanographic Data Center.

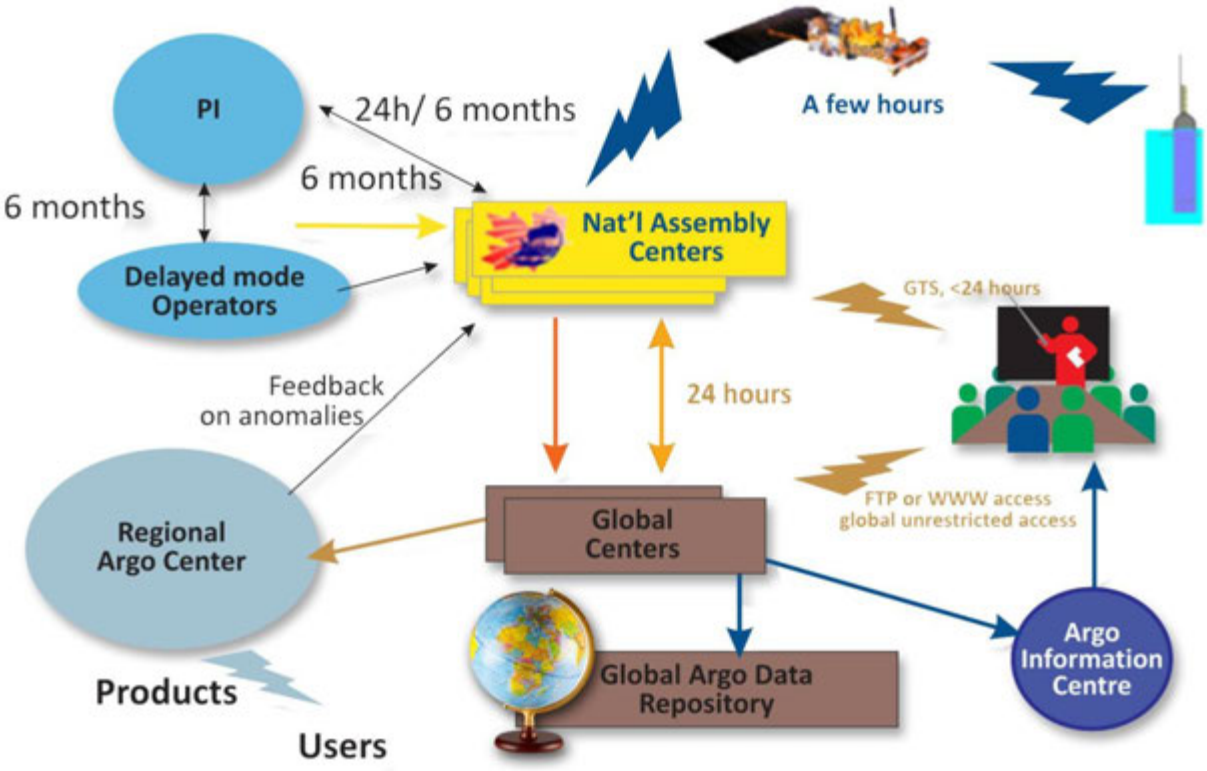


Figure 29. Communication system of EuroArgo.

The Argo Data Management System, as endorsed by the International Argo Science Team and its Data Management Group, is based on three levels of data centers:

a) National Data Centres (NDC) in each country, which deploy Argo floats, receive the real-time quality-controlled data from Global Data Centers, perform delay mode quality check of Argo profiles and distribute the data to the users;
b) Regional Data Centres (RDC) at selected locations for addressing each basin (Atlantic, Indian, Pacific, Southern Oceans, Mediterranean Sea);
c) Global Data Centres (GDC) located in France and USA which received data from Global Telecommunication System (GTS), process Argo data, perform real-time quality control (RTQC) to remove spurious signals and spikes and disseminate the data to the NDACs and end users.

BulArgo data are received, stored and archived at the Bulgarian Oceanographic Data Center (BGODC), which plays the role of NDC, by automatic download from Coriolis database. Special efforts were made for the establishment and development of effective local tool for publishing of Argo data. The BulArgo management system (DMS) is based on relational database which provides an efficient way to manage and retrieve data. The local portal integrate also geographic information system (GIS) interface. During realization of the BulArgo DMS the existing information technologies and scientific standards are used. In the centre of the web portal general data dissemination architecture is a Web based middle-tier layer report server which receives incoming end users report requests, generates, renders, and delivers reports.

To conclude on the lack of modern data bases with easy access.
Those which are available on-line such as SeaDataNet (incl. BS Scene Network) contain meta data, which is not regularly updated (depending on projects, not on regular financial assistance) and contain little information which would be useful for most of the MSFD descriptors and parameters in Annex III.

In Bulgaria and Romania the Ministries of Environment have not specified availability of data bases, though the scientific Institutions reported on data delivered to the Ministries.

2. Data products, indicators calculated, statistical methods used, models developed

The reporting on the subject has been poorly attended by all stakeholders contacted. This is partly due to the lack of data bases (if any) which would not only store electronically data/information but also work to generate data products (graphs, maps, etc.), and to automatically calculate indicators or provide input to models developed. Partly it is due to the busy schedule of the scientists involved in monitoring. Too many samples are usually collected, their processing is time-consuming, and too little time is left for data management. Most of the institutes do not have data centers where all the data would go for further

There are few examples of data products provided on a regular basis with free access. For instance, Black Sea climatic maps (T °C, Salinity, Density, O2, H2S) and satellite averaged maps for SST (surface water temperature) and Chl_a can be found at:
http://www.ims.metu.edu.tr/SeaDataNet/indexclimat.asp?doc=inSituProductDescription.htm

Black Sea level anomalies are displayed at: http://www.aviso.oceanobs.com/en/data/products/sea-surface-height-products/regional/m-sla-black-sea/index.html

The project MyOcean provides on a daily basis through the web page of the BSC maps of Black Sea water temperature, salinity and current velocity. More products can be found at: http://myocean.org.ua/ (Basin-scale analysis and forecast products for the Black Sea circulation and stratification (temperature, salinity, currents and sea level).

BULGARIA

Statistical softwares used: Brodgar (2009), Excel , PRIMER, etc.

Softwares used for spatial and temporal visualization of data: ODV(2011)

Models developed: Ecopath (http://www.ecopath.org/) applied for the Black Sea, Black Sea circulation models (IO-BAS and Sofia University), ERSEM (http://www.meece.eu/library/ersem.html) applied for the Black Sea (in the frames of the daNUbs project[206], etc.

Table 80. Statistical data products of IBER-BAS, Bulgaria

Parameter/Indicator	Unit	Type of representation/product
Nutrients	ugAt/l	graph
Chl-A	Mg/l	graph
Primary productivity	mgC/m3/day	graph
Water temperature	°C	graph

Note: not clear whether they are automatically derived from a data base, as no data base is specified to be sustained in the Institute

Biodiversity and biotic Indices (e.g. Shannon, AMBI, M-AMBI etc.) are calculated based on available data by IFR-Varna and IO – BAS.
In the BulArgo project the spatial mode data dissemination is based on ESRI's ArcGIS Server by publishing the trajectory of the each Argo float (Fig.30).

[206] daNUbs – ECFP5, DG Research project (2001-2004) ''Nurient management in the Danube .Basin and its impact on the Black Sea', http://danubs.tuwien.ac.at

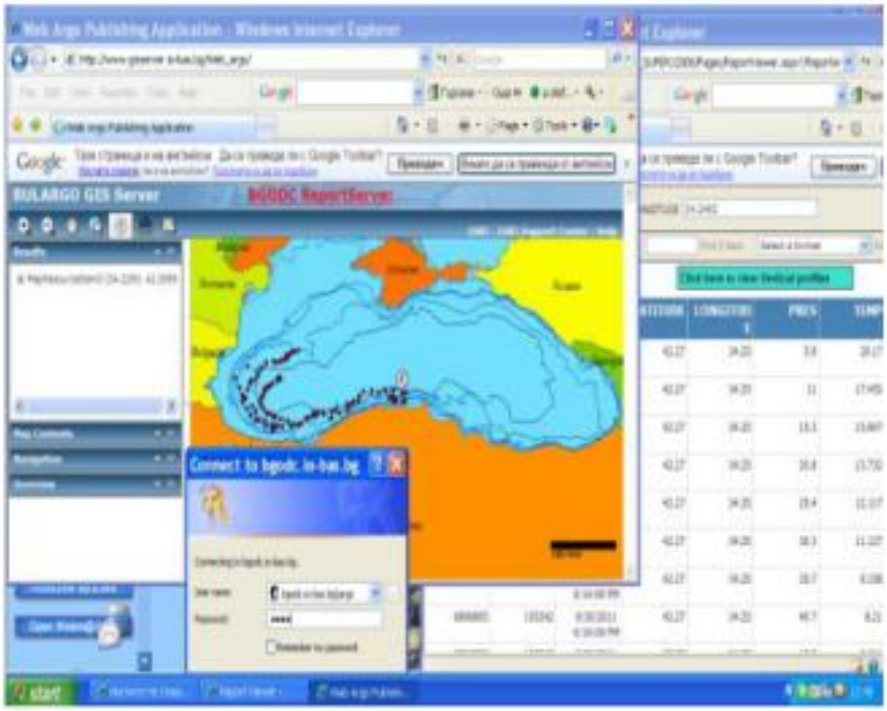


Figure 30. Visualization of BulArgo floats trajectories by ArcGis Server and Report Server

The recently deployed in the BS Argo floats (March 2011) give an opportunity to study the spatial and temporal characteristics of the Black Sea temperature and salinity 3D fields and in particular the CIL evolution. Vertical profiles of temperature, salinity and dissolved oxygen measured by the floats are among the products prepared (demonstrated in Fig. 31). The data are available at the Institute of Oceanology website (http://www.gisserver.io-bas.bg/Web_argo).

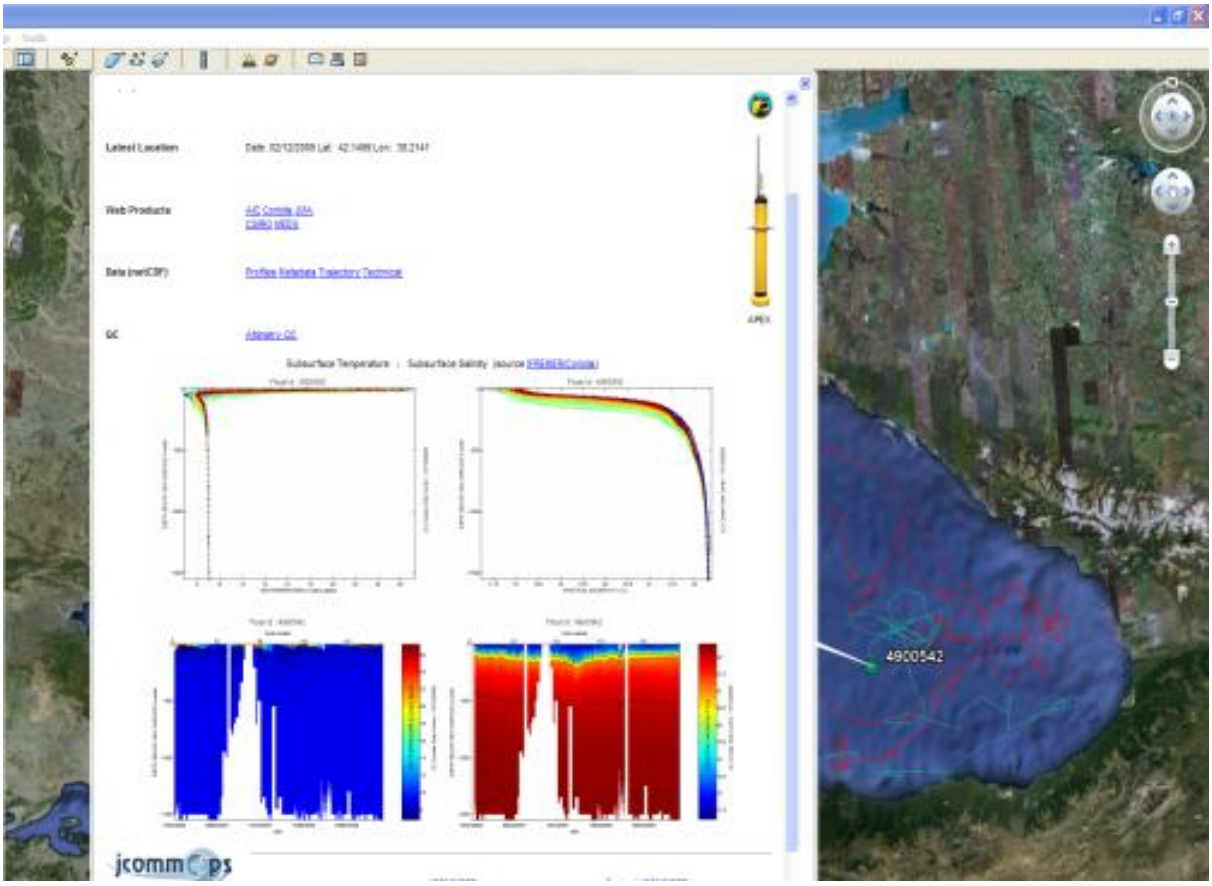


Figure 31. Argo products

Statistical softwares used: Brodgar (2009), Microsoft Excel, Statistica, OriginLab, MathLab

Softwares used for spatial and temporal visualization of data: Ocean Data View , Golden Software (Surfer, Grapher), Grads,Integrated Data Viewer (IDV)

Models: Regional model for Western Black Sea (based on Princeton Ocean Model) – outputs: sea level (at the 2,5 meters considered sea surface), currents, temperature and salinity (from 2,5 down to 2000 meters).

Table 81. Statistical data products (National Institute for Research and Development in Tourism, Romania)

Parameter/Indicator	**Unit**	**Type of representation/product**
The average duration of the stay of tourists	Days	Tables
Average expense per tourist	Euro and LEI	Tables
The market share (for arrivals and overnight stays)	%	Tables, graphics

Table 82. Data products automatically derived from data bases of NIMRD, Romania

Indicator	**Unit**	**Type of representation/product**
Backshore with (average, max. min)	m	Table and figures (Annual and seasonal rate of shoreline change)
Erosion/accretion rate	Meter	Tables, graphs, maps
Beach width	Meter	Tables, graphs, maps
Eroded/accumulated areas	Square meter/kilometres	Tables, graphs, maps

No data products and indicators have been specified for bathing waters and radionuclides. Constanta County Department for Statistics (www.constanta.insse.ro) specified also no data products.

Table 83. Data products automatically derived from the data base of Dobrogea Littoral Water Directorate, Romania

Indicator*	**Unit**	**Type of representation/product**
Air temperature	° C	Excel spreadsheet, for all the indicators analyzed in each section, for the water body/ Product: ecological state of a water body (*sensu* WFD)
Water Temperature	° C	
pH	-	
Dissolved oxygen (concentration)	mgO2/l	
CBO5	mgO2/l	
CCO-Mn	mgO2/l	
N-NH4	mg/l N	
NH4	mg/l	
N-NO2	mg/l N	

Indicator*	Unit	Type of representation/product
NO2	mg/l	
N-NO3	mg/l N	
NO3	mg/l	
Total N	mg/l N	
P-PO4	mg/l P	
PO4	mg/l	
Total P	mg/l P	
Salinity		
Fixed residue	mg/l	
Total suspended matter	mg/l	
Conductivity	(µS/cm)	
Total phenols (phenol index)	µg/l	
Chlorides	mg/l	
Sulphates	mg/l	
Calcium	mg/l	
Magnesium	mg/l	
Sulphides	mg/l	
Dissolved Fe (Fe2+ + Fe3+)	mg/l	
Dissolved Cadmium	µg/l	
Dissolved Mercury	µg/l	
Dissolved Nickel	µg/l	
Dissolved Lead	µg/l	
Dissolved Cu	µg/l	
Dissolved Zn	µg/l	
Dissolved Cr (Cr3+ + Cr6+)	µg/l	
Dissolved As	µg/l	
Total cyanide	µg/l	
Anion-active detergents	µg/l	
Extractable substances in organic solvents	mg/l	
Transparency	cm	
Quality class	-	
Quality class	-	
Quality class	-	
Quality class	-	
Quality class	-	
Final class	-	
Biomass		
Chlorophyll a	µg/l	
Density	mln cell/l	
Density		
Rce biomass	-	
Rce chlorophyll a	-	
Rce density	-	
Number of taxons index	-	
Rce density	-	

*__Note__: For all the analyzed indicators the minim, maxim, average is being calculated P10, P50, P15, P90, StDev.

Table 84. Data products automatically derived from the data base of SC AQUASERV SA, Romania

Indicator	Unit	Type of representation
BOD 5, SS, CC, NT, PT		REPORT
List and state of the PLC inputs and outputs		REPORT
Protection system		REPORT
Manage emergency alarm situations		REPORT
Real-time display of operating parameters		REPORT
Show trends trial		REPORT
Archiving data, commands, information		REPORT

The Romanian Space Agency provides the following data products derived from satellite observations and aerial monitoring: tables, charts, thematic maps, automatic categorization, thematic layers of land cover, vegetation indices, etc.

TURKEY

No data products have been mentioned by Ondokuz Mayis University (Samsun), Ataturk University (Erzerum), Canakkale Onsekiz Mart University, Institute of Marine Science and Technology (Izmir), Central Fisheries Research Institute (Trabzon), Sinop University, and Istanbul University (Institute of Marine Science and Management).

Statistical softwares used: MatLab, PRIMER, etc.
Softwares used for spatial and temporal visualization of data: No information provided.
Models developed: No information provided.

To conclude on data products.
The lack of well-developed data bases is closely related to the poor provision of data products in the beneficiary countries. Of course, the scientific community provides in different reports statistical analysis and indicators, but the statistical processing is not embedded in the available data bases and the indicators are mostly not automatically derived. Graphs and maps of distribution of various parameters are also produced by manual input of data into the used softwares, such as Ocean Data View, ArcGIS, etc. Consequently, most of the data remain poorly managed, statistically unprocessed, insufficiently visualised and not included in the calculation of. Much improvement is required in the field. Development of models (except hydrophysical) is poorly attended either.

3. QA/QC procedures in data management

QA/QC of data is poorly attended in the beneficiary countries. Almost no specific information has been provided by the stakeholders contacted. It is not clear whether any control is in place. At the regional level there are three manuals dealing with QA/QC of data, they were produced under the project Upgrade Black Sea SCENE with the support of the BSC. They are as follow:

- Goriup, P., Kideys, A., Abaza, V. 2010. Guidance on Data Quality Control for Marine Biodiversity in the Black Sea.
- Moncheva, S. 2010. Data Quality Control guidelines for Black Sea biological data – phytoplankton.
- Korshenko, A;. Denga, Y., Velikova, V. (draft, 2011, 2012). QA and QC of chemical oceanographic data collections.
- Iona, S., Zodiatis, G., Khaliulin, A., Zhuk, E. 2011. Data Quality Control Guidelines for physical and chemical parameters.

There is no reason to confirm that these manuals are used in practice, no matter they have been cited by the stakeholders or not. The issue of QA/QC of data is obviously pending in the beneficiary countries and requires measures to promote attention and consequent introduction into routine practices of data management.

BULGARIA

Ocean Data View 4.5.0 2012 (http:/odv.awi.de) with **DQC functions embedded in the software.**
For chemical data the Guideline of Korshenko *et al.* (draft, 2011, 2012) is specified, however, it contains little directions on data management so far, it is more about chemical monitoring QA/QC.
BulArgo data quality is ensured through the following procedures:

a) Comparison with reference climatology (e.g. regional climatology published by SeaDataNet (http://www.seadatanet.org/)
b) Comparison with CTD profiles
c) BulArgo floats inter-comparison

ROMANIA

No QA/QC procedures for data are specified by the stakeholders in Romania, except by SC AQUASERV SA, listing the same guidelines as specified in the field of monitoring QA/QC.

- ISO 9001:2008 - Quality Management System Certification
- ISO 14001:2005 - Environmental Management System Certification
- OHSAS 18001:2007 - Health Management System Certification its Safety Management
- ISO 28000:2005 - Food Safety Management System
- ISO 27001:2005 - Certified Information Security Management System
- according to ISI 17025 - Quality Assurance/Quality Control of Data System Certification

TURKEY

No QA/QC for data management have been mentioned by Ondokuz Mayis University, Ataturk University, Canakkale Onsekiz Mart University, Institute of Marine Science and Technology (Izmir), Central Fisheries Research Institute (Trabzon), Sinop University, Istanbul University (Institute of Marine Science and Management and of Fishery), and TUBITAK. IMS/METU (Erdemli) mentioned the QC/QA Guidelines produced by the Upgrade BSS Project, and specifically the one for physical parameters.

To conclude on QA/QC in data management.
Data management QA/QC is not paid due attention in the beneficiary countries. It is not clear how the reliability of data is checked and whether any of the available Guidelines is taken into consideration. This is especially valid for biological and fishery data.

4. Regular assessments

Many different reports are prepared in the beneficiary countries, though most of them remain for internal use and are not being communicated through on-line (electronic) publications. This is valid not only for the national level, but also for the various international projects funded by EC and other donors in the BS region. The projects release plenty of assessments which stay in their majority accessible only for the partner organizations. The annual reports of the BSC are also not public, only the 5-yearly SoE Report is published at the webpage of this Commission: www.blacksea-commission.org (for the period 2000-2006/7 is the last one: http://www.blacksea-commission.org/_publ-SOE2009.asp)[207]. The scientific data/information are dispersed in scientific papers, most of them hardly accessible due to payment requirements of the electronic journals available. A good exception is Romania, where annual reports, containing assessments based on a regularly collected data/information, appear as electronic publications revealing the state of the Black Sea. However, none of the beneficiary countries publishes information on pressures and impacts related to the state of the Black Sea. Bathing water quality is reflected in annual reports of BG and RO, published electronically on the EEA webpage (http://www.eea.europa.eu/, see for 2011: http://www.eea.europa.eu/themes/water/status-and-monitoring/state-of-bathing-water).

[207] For comparison you can find the available assessments of other Regional Seas Conventions at: http://www.unep-wcmc-apps.org/GRAMED/viewRecord.cfm?AssID=669

BULGARIA

The Black Sea-related reports in Bulgaria are almost all non-published and poorly communicated at any level.

Table 85. Information on regular assessment/reports prepared in Bulgaria

Type of assessment	Prepared by	Name of assessment/Report	Frequency	To whom the report is delivered	Where published (link, if any)
State of the environment and implementation of integrated monitoring	IFR-Varna	Project – related reports: Changes in Biodivresity, Abundance of Fish species; Marine cetaceans abundance, Climate changes etc. full list of projects in SeaDataNet web-site.	Annual	Agricultural Academy, Ministry of Agriculture	Not published full reports except in scientific papers, list of projects names is published in the SeaDataNet: Metadata for Institute of Fishing Resources: EDMERP data
Seasonal trends	IBER-BAS	Assessments prepared for scientific papers and projects	Regular	Not specified	Not published except in scientific papers
Biodiversity	IO-BAS	Black Sea Biodiversity (CBD National Report)	Annual	Ministry of Environment /Black Sea commission	Not published
Fishery		Turbot and sprat reports	Annual	National Agency of Fisheries and aquaculture	Not published
Bathing water	RIPCPH	Quality of Bathing Water	Annual	Ministry of Health and EEA	At the webpage of EEA: http://www.eea.europa.eu/themes/water/status-and-monitoring/state-of-bathing-water
State of the Black Sea, incl. pressures	Black Sea Basin Directorate	Major reports: related to the WFD implementation	Occasionally	Ministry of Environment, EC	http://www.bsbd.org/v2/uk/index.html
Fishery	NAFA	Fishing statistics reports, analysis of management decisions	Regular	EC	

In Romania, the Black Sea-related reports are regularly published and accessible to any end-user.

Table 86. Information on regular assessment/reports prepared in Romania

Type of assessment	Prepared by	Name of assessment/Report	Frequency	To whom the report is delivered	Where published (link, if any)
Bathing water quality	Constanta and Tulcea County Departments of Public Health	National report on the bathing water quality assessment	annual	Public Health Institute Bucharest and Ministry of Health	www.ms.ro; EEA: http://www.eea.europa.eu/themes/water/status-and-monitoring/state-of-bathing-water
Radionuclides [208]	Environment Protection Agency of Constanta	Monthly report	monthly	National Environmental Protection Agency	http://apmct.anpm.ro/articole/rapoarte_lunare_anul_2012-221
		Activity report	monthly	Regional Environmental Protection Agency Galati	http://apmct.anpm.ro/articole/rapoarte_lunare_anul_2012-221
		Annual reports environmental status	annual	Regional Environmental Protection Agency Galati	http://apmct.anpm.ro/Mediu/raport_privind_starea_mediului_in_romania-15
Environmental Impact Assessments	ExxonMobil	Company's projects environmental impact assessment (drilling operations for oil and gas)	For each project	Environmental Protection Agency Constanta	Not published
Statistical monitoring report of tourist flows in Romania	National Institute for Research and Development in Tourism	Statistical monitoring report of tourist flows in Romania[209]	In 2012	Ministry of Regional Development and Tourism	Study dlevered to the Ministry of Regional Development and Tourism
	National Company Maritime Ports Administration				
Litter and dolphins	Mare Nostrum NGO	Coastwatch Report	annual	Local authorities and funders / sponsors	www.marenostrum.ro
		Dolphins Report	annual	Funders / Donors, Accobams, INCDM	www.delfini.ro

208 Global beta specific activity and specific activity of gamma emitting radionuclides: Be-7, K-40, Pb-210, Bi-212, Pb-212, Ac-228, Bi-214, Pb-214, Th-234, U-235, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Ru-103, Ru-106, Sb-124, Sb-125, I-131, Cs-134, Cs-137, Ce-139, Ce-141, Ce-144, Eu-152, Gd-153, Eu-154,Eu-155

209 The report is divided in two parts - a general report which analyzes the situation in Romania and a series of ten specialized reports for each of the ten source countries of origin for foreign tourists, countries considered to be a priority for Romania. In the general report the flow of foreign tourists and that of Romanian tourists is analyzed separately.
Data storage is in a predefined Excel files format.

Type of assessment	Prepared by	Name of assessment/Report	Frequency	To whom the report is delivered	Where published (link, if any)
Geoecology	GeoEcoMar	Geoecological monitoring of the Romanian shelf	1-2/year	National Authority for Scientific Research	Not published
State of the environment and implementation of integrated monitoring	NIMRD	Annual report regarding the State of the Marine and Coastal environment	Annual	The Ministry of Environment and Forests	http://www.rmri.ro/RMRI/RaportStareaMediului/RaportStareaMediului_2011.pdf
		National contribution for the Black Sea regional SoE	5-yearly	BSC Permanent Secretariat	www.blacksea-commission.org
		National contribution for the reports of the BSC Advisory Groups[210]	Annual	BSC Permanent Secretariat	Not published
State of the environment and implementation of integrated monitoring	Dobrogea Littoral	Management Plan for the Danube River, Danube Delta, Dobrogea Area River and Coastal Waters	1 / 6 years	Romanian Waters National Administration, Bucharest	http://www.rowater.ro/dadobrogea/SCAR/Planul%20de%20management.aspx?RootFolder=%2fdadobrogea%2fPlanul%20de%20Management%20Bazinal%2fPlan%20de%20Management%20al%20Fluviului%20Dunarea%2c%20Deltei%20Dunarii%2c%20Spatiului%20Hidrografic%20Dobrogea%20si%20Apelor%20Costiere&FolderCTID=&View=%7b02A39433-949F-40C6-9DF4-54F3511B7DA7%7d
		Contribution to WISE report according to Directive 91/676/EEC on the protection of waters against pollution caused by nitrates of agricultural sources amended by Regulation 1882/2003/CE	1 / 4 years	Romanian Waters National Administration, Bucharest	
		Contribution to WISE report according to Directive 91/271/EEC on urban wastewater	1 / 2 years	Romanian Waters National Administration, Bucharest	

[210] NIMRD contributes to reports in the field of pollution monitoring, biodiversity, fishery, ICZM and land-based sources of pollution.

Type of assessment	Prepared by	Name of assessment/Report	Frequency	To whom the report is delivered	Where published (link, if any)
		treatment, Art. 15 and 17.			
		The operational manual for the Monitoring System for the Danube and Seaside hydrographic basin	annual	Romanian Waters National Administration, Bucharest	
		Synthesis of Water Quality Protection for hydrographic basin Seaside and Danube	annual	Romanian Waters National Administration, Bucharest	
Impact assessment (oil and gas exploration)	OMV Petrom SA	Monitoring the environmental quality of the production activity of X Petromar Constanta Area	Quarterly	Environmental Protection Agency Constanta.	
				National Guard environmental - Constanta County Commissioner	
Socio-economy	Constanta County Department for Statistics	No assessments specified			

TURKEY

No regular reports were mentioned in the completed Questionnaires by the contacted stakeholders. However, assessments of monitoring data are being prepared by the institutes participating in different Projects on annual basis. These are submitted to the Ministry of Environment. Annual assessment incorporating all data collected by an Institute is not asked and is not evaluated.

To conclude on the available assessments.

Various assessments are produced on a regular or irregular (for projects) basis, however, except in Romania the reports stay unpublished and undistributed for wider and public use. The reason for the latter is rooted in the historical legacy of secrecy in the field of environmental issues, and also in the habitual attitude of the scientific community to not disclose data which are not published in peer reviewed journals. The reports prepared by scientists are not qualified the same as the publications in journals with impact factor, which predetermines their keeping for internal use only or most often for no use.

5. Gaps in data management and assessments preparation, missing requirements

To create in minds the vision of tomorrow, scientists[211] have visualised the ideal multicomponent system of Black Sea state control, which requires sophisticated data management and relevant infrastructure, as shown below (Fig. 32, 33).

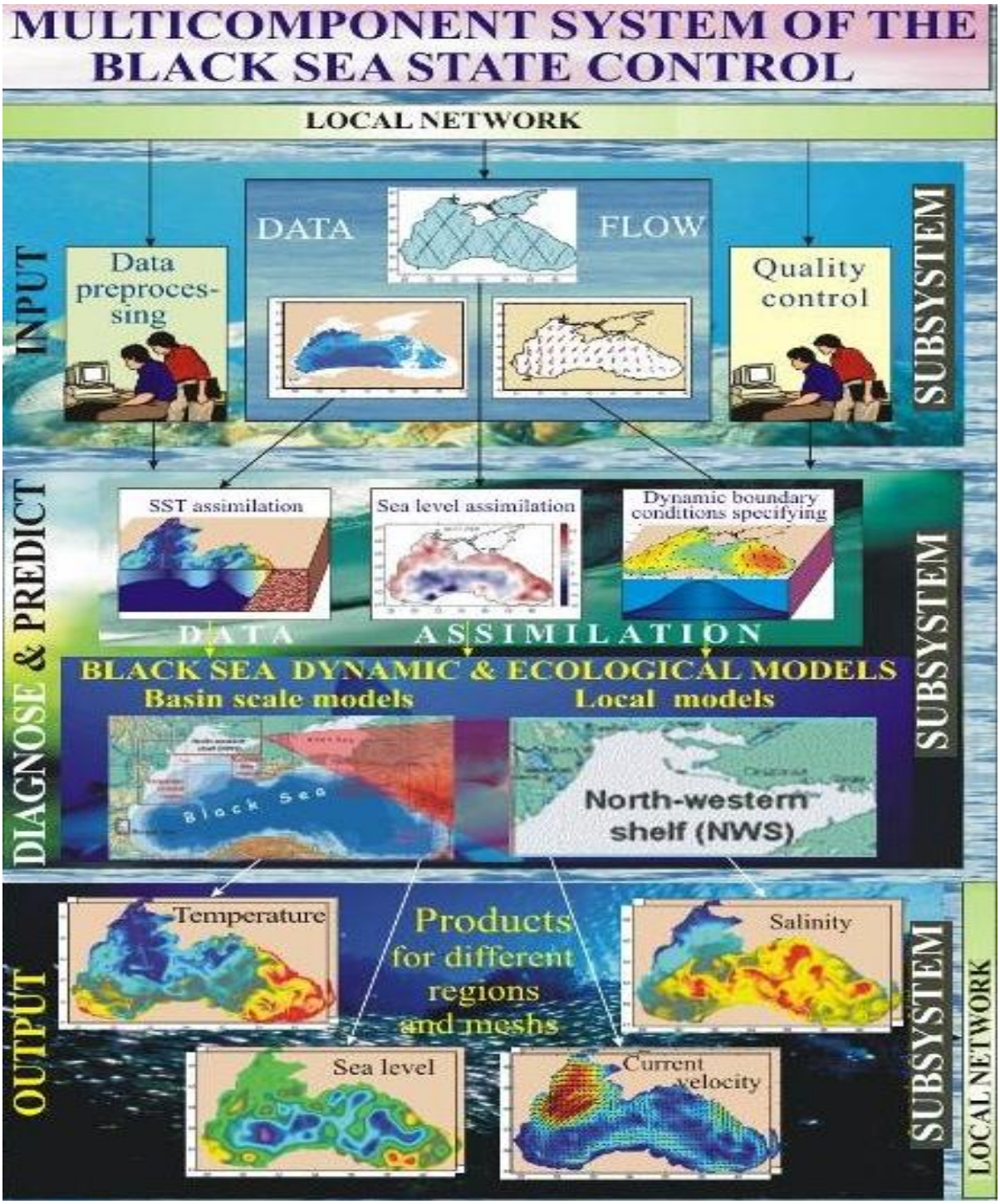


Figure 32. Multicomponent system of BS state control (a vision of data management and examples of products delivered), (re-drawn from MHI, Korotaev et al., 2010 presentation at the Black Sea Day, based on the Pilot version of the Black Sea Marine Forecasting Center (MFC) created by the FP7 Project "MyOcean").

[211] Marine Hydrophysical Institute, Sevastopol, Ukraine.

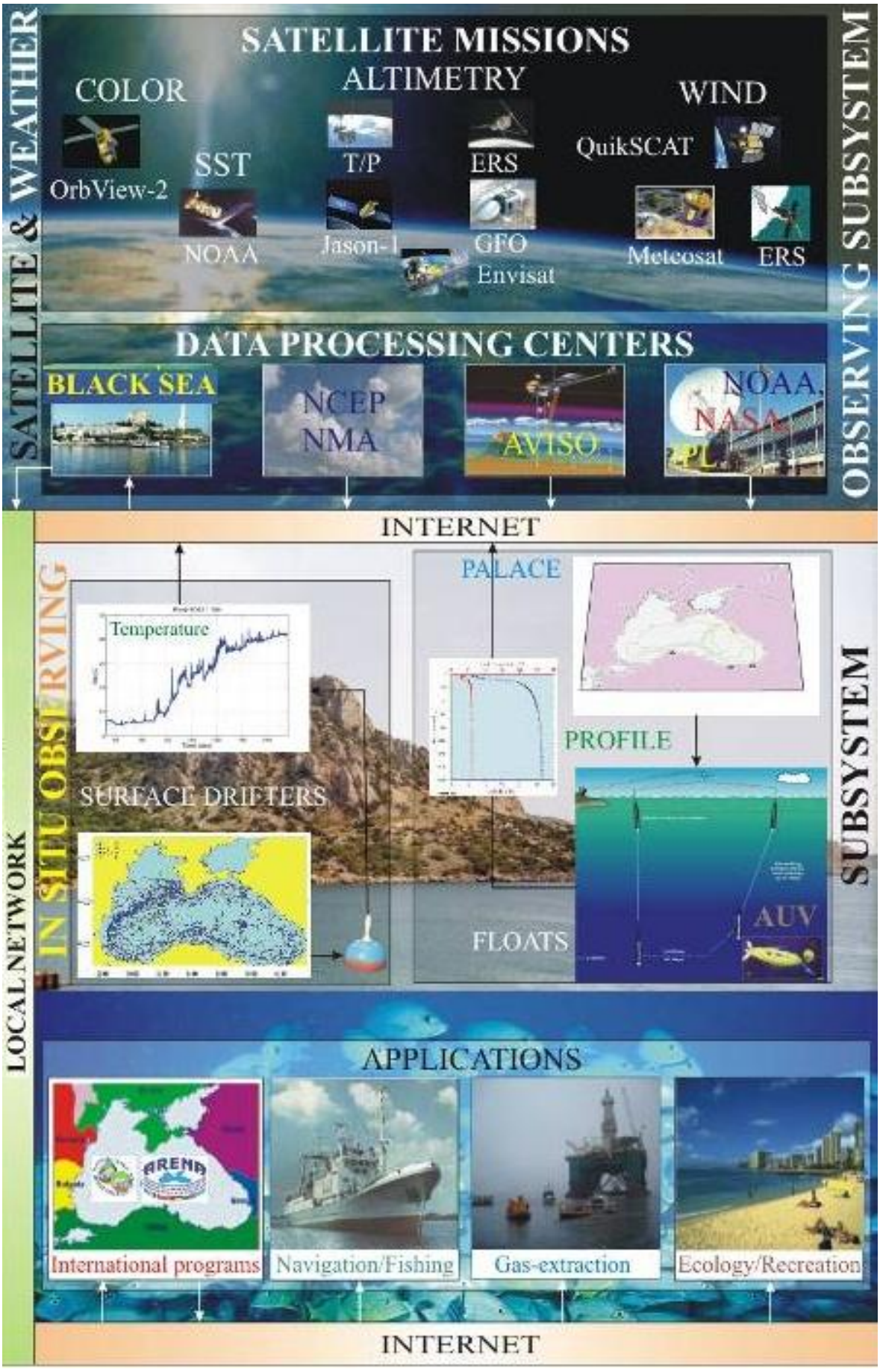


Figure 33. Operational monitoring data management and applications of data products (re-drawn from MHI, Korotaev et al., 2010 presentation at the Black Sea Day, based on the Pilot version of the Black Sea Marine Forecasting Center (MFC) created by the FP7 Project "MyOcean").

None of the organizations in the beneficiary countries works at such a level of data management as displayed in Fig 32 and 33.

Despite of obvious efforts, the monitoring itself in the beneficiary countries stays with certain gaps, however, those in the data management are even more serious. The bulk of data generated remains in Protocols, poorly processed further from initial records and is thus never properly used. Data products are often absent (especially those which are produced on a regular basis), even less are those which are publicly communicated. Stakeholders in the region and outside of the region poorly know what data bases are available.

Coordination arrangements between the various Ministries, their institutes, laboratories and agencies, including data/information/assessments exchange procedures, are not covered by the existing environmental regulations in the beneficiary countries. This prevents the creation of an effective Data Management System at the national level, which may provide to decision makers the reliable indicator-based reporting needed for management that might have an impact on the marine water quality or marine biodiversity.

Besides, national data bases are poorly developed, they are not unified even at the level of a single institution so that to incorporate all the data/information generated in the course of monitoring.

A number of international data bases, created in the frames of different projects, are available, however, they are poorly nourished with data (even at the level of meta data), and do not reflect the real data availability. Most of the project data bases are not accessible for use other than by partner-organizations, they have never been incorporated into national data bases which would disclose the data to management authorities.

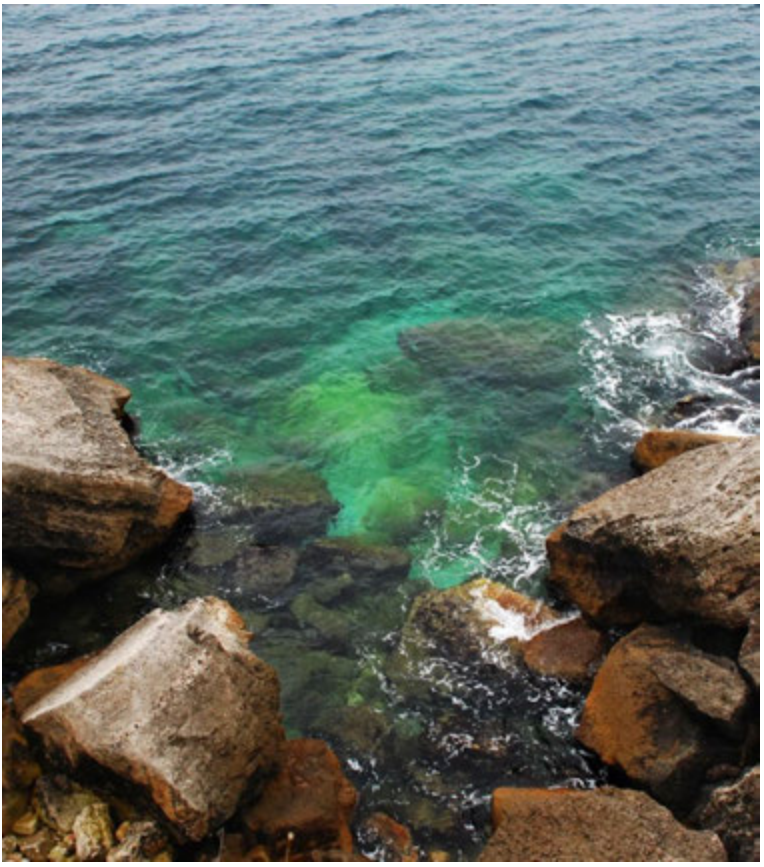
QA/QC of data are not attended, no specific procedures have been identified. A few Guidelines have been mentioned by the stakeholders contacted but the compliance with them is doubtful.

Reporting is generally poorly published, except in Romania.

Thus missing requirements are:

1. Mechanism for exchange of data/information between the various organizations managing environment data;
2. QA/QC in data management in all organizations dealing with generation of environment data;
3. Availability of a national data-base which would generate indicator-based reporting to management authorities;
4. Development of models;
5. Transparency of reporting;
6. Recognition of the reports prepared as peer-reviewed publications.

Further development of the report is scheduled. To be completed till the end of 2012.



III. Progress in water quality/GES classifications

This chapter briefly discusses the delays in GES identification and the lack of common understanding of 'water quality' in the Black Sea region.

BULGARIA

The Initial Assessment is under preparation in Bulgaria, until end of May 2013 IO-BAS in cooperation with experts from other organizations plans to deliver it together with the GES and environment targets identification.

ROMANIA

NIMRD has prepared the Intial Assessment in Romania, and has identified GES for some of the MSFD Descriptors. Work is ongoing to cover all MSFD Descriptors *sensu* GES and to identify environment targets.

TURKEY

In TR, MRC/TUBITAK in cooperation with IMS/METU and IMS/Istanbul University (or Faculty of Marine Sciences and Management, as named also) works on an assessment, which takes into consideration the MSFD IA requirements as well as GES and related targets identification. This is an activity under the already mentioned project DeKoS. As a first step capacity and gap analysis has being performed for each GES descriptor referring to the standards and criteria of EU (2010). The aim is to identify data and information available for proposed indicators, diagnose where the main gaps are and test some of the indicators with available data in different regions to identify GES and set targets, where possible. These efforts will be finally reported at the end of 2013 together with the proposal of a monitoring system and priority research topics. In the same study, reference sites and/or conditions especially for certain biological elements are proposed and being investigated with field studies and applying statistical tools on previous long-term data sets[212].

Regional dimension

At the regional level there were many attempts to develop common understanding of water/ecological quality, and in general of GES, as well as to elaborate indicators to also harmonise the assessments of the Black Sea state. There are lists of BlackSea-priority substances both for loads from point sources and for water quality identification, however, there is no regionally agreed methodology how to calculate indicators and to identify classes from poor to good water quality. The draft regional Methodology for water quality contains no biological elements and is still under discussion. There are case studies of application of such indicators as TRIX (trophic index, introduced by Vollenweider *et a*l., 1998) and HEAT[213] (HELCOM tool for evaluation of eutrophication status, created in support of the WFD implementation), however, this is not a regionally agreed practice to evaluate the trophic status of the Black Sea.

[212] This is basically done for the WFD classification system. However, these might be used for GES identification for certain descriptors.

[213] HEAT was adjusted to the data availability in the Black Sea region by J. Anderson in the frames of the BSC B2B Project, however, the testing of the tool, named BEAST, is in a very initial stage. First results show, that BEAST is no more indicative than TRIX, having in mind the data available to feed the assessments of eutrophication.

IV. Laboratory Infrastructure, Equipment, Vessels

Marine research infrastructure, in general terms, include research vessels, submersibles and unmanned vehicles, research aircraft, moored instruments, tide gauges, Lagrangian observations facilities, coastal and marine observatories, marine laboratories, satellite oceanography centers, modelling and data centers, and ships of opportunity. The existence of, and access to a complex and modern research infrastructure is a prerequisite to a successful research strategy for the Black Sea and its implementation.

This chapter further develops the findings of the EC SeasEra Project on laboratory infrastructure, equipment and vessels available in the Black Sea coastal states contributing to more efficient use of them in the region.

1. Infrastructure: general

BULGARIA

The Ministry of Environment and Water (MoEW) is responsible for the control of the environmental protection in Bulgaria including the Black Sea and implementation of Monitoring programs, EC policy initiatives and their transposition into the national legislation. **The Executive Environment Agency (ExEA)** is the administrative unit within the Ministry of Environment and Water which functions as a coordination body for the protection of the environment in Bulgaria. It is also the national coordination center to EEA and a member of the EPA Network. ExEA has a reference laboratory for setting environmental methodological standards. Related to Black Sea monitoring, the responsible units for chemical analysis including contaminants are the regional Environmental Agencies in the cities of Burgas and Varna, which are under the coordination of the Black Sea Basin Directorate.
(http://www.bsbd.org/v2/uk/index.html)

IO-BAS is a scientific institution, based in Varna, with several departments: Marine physics, Marine chemistry, Marine biology and ecology with molecular taxonomy/genetics lab, Coastal zone dynamics, Marine geology and archaeology, Ocean technologies and the NODC. Marine biology and ecology department integrates several subdivisions: phytoplankton, zooplankton, macrophytobenthos, macrozoobenthos, ichthyology and genetic and molecular laboratory. It has a marine station (Shkorpilovtzi), located on the coast near the village of Shkorpilovtzi, 50 km south of Varna. The building and the pier were built between 1980 and 1983. There are conditions for work and living of 35 persons. The pier is 230m long, 7m high and is used for mounting of research gauges. The base is suitable for training of students, scientific meetings and coastal studies.

IBER-BAS is a scientific institution, based in Sofia, with the following departments: Department of Plant and Fungal Diversity and Resources; Department of Animal Diversity and Resources; Department of Aquatic Ecosystems; Department of Ecosystem Research, Environmental Risk Assessment and Conservation Biology. It has a marine station in Sozopol (nearby the city of Bourgas.

Executive Agency "Maritime Administration" (EAMA)[214] is a legal entity on budget support to the **Ministry of transport**, information technology and communications, based in Sofia with regional offices in Bourgas, Varna, Lom and Rousse. It organizes and coordinates activities related to the safety of shipping in the sea spaces and inland waterways of the Republic of Bulgaria; Responsible for actual liaison between the government and ships flying the Bulgarian flag; exercise control on: the observation of shipping safety requirements by Bulgarian and foreign ships; provision of services for traffic management and information of shipping maritime spaces, inland waterways, canals, ports in Bulgaria and other duly defined regions; the supervision and organization of the protection of the marine environment and the Danube River from pollution from ships; Maintenance of registers of ships, seafarers, ports and port operators in the Republic of Bulgaria.

NAFA have not specified their infrastructure, the Agency is based in Sofia. Inspectorates are functioning in different coastal cities.

NIMH has the following departments: Dep. Meteorology, Dep. Hydrology, Dep.Prognoses, Dep. Atmospheric Physiscs and Ecology. Its headquaters are in Sofia, there is a branch in the city of Varna.

The **Regional Health Inspectorate** (**RHI**) has two Directorates with several laboratories. The Directorate dealing with bathing water comprises sanitary microbiology (*E.colli* and intestinal enterococci) and chemical laboratories. The Directorate of surveillance of infectious diseases has laboratories of clinical microbiology, virology and parasitology.

In **IRF** (scientific institution) there are three main departments – hydrobiology and hydrochemistry (limited parameters observed), ichthyology, and laboratory of population genetics. The Institute owns a public Aquarium (very old fashioned) and a Library being sustained since 1932.

[214] **Postal address**: 9, Diakon Ignatii str., 1000, Sofia; **Contact person**: Sergey Kirilov Tzarnakliyski; Phone: (+359 2) 930 09 10; e-mail: bma@marad.bg

ROMANIA

NIMRD is a scientific institution, based in Constanta, it has the following departments:

- Oceanography, Marine and coastal engineering
- Ecology and environmental protection
- Living marine resources
- National Center for oceanographic and environmental data
- Custody of marine protected areas
- Information dissemination department

GeoEcoMar is a scientific institution, based in Bucharest with a branch in Constnata, with the following departments:

- Marine Geology and Sedimentology
- Seismo-Acoustic, Digital Cartography, GIS, Data Base
- Geophysical Methods of Deep Investigation
- Geochemical, Geoecological and Sedimentological Analysis
- Coastal Zone Research and Management
- Environmental Quality Investigation

The **Constanta Maritime Hydrographic Directorate** has the following units: hydrographic and oceanography laboratories, classic marine cartography, and electronic maritime cartography.

Constanta County Department of Public Health has the following units:

- *Department for assessing the risk factors from living and work environmental;*
- *Laboratory for diagnosis and investigation in Public Health (microbiology laboratory and laboratory for sanitary chemistry and toxicology)*
- *Ionizing radiation hygiene laboratory*

Border Police General Inspectorate[215]**,** based in Bucharest, has territorial inspectorates of Border Police and Coast Guard (e.g. Constanta Coast Guard and others), which are internally organised into Departments speciliazing in different fields of activities (e.g. Department of Marine and Riverine Environmental Protection within the Coast Guard, and others).

Naval Academy has departments of Marine Engineering and Navigation.

Note: Constanta City Hall has responded to the Qusetionnaire Part II, however, no information has been provided to be presented in Chapters IV-VII of this report.

[215] Governmental organization. Postal address: Bucuresti, str. Razoare no. 5, Sector 6, code 050506 Telefon: 021.316.25.98 int. 19338, Fax: 021.312.11.89, E-mail: pfr@igpf.ro.; webpage: http://www.politiadefrontiera.ro/; Contact person: Police commissar eng. Adrian SBARCEA; Telefon: 021.316.25.98, int. 19535, Fax: 021.311.18.56; E-mail: adrian.sbarcea@igpf.ro

The Marmara Research Center (MRC) of TUBITAK is a public research organization which constitutes of 6 Institutes: Environment, Energy, Material, Food, Genetics and Chemistry. All institutes have their advanced equipment, infrastructure developed and human capacity.

The Karadeniz Technical University, Faculty of Marine Science (Trabzon) includes chemistry, biology, fish diseases, molecular biology, fish processing, seafood and analytical chemistry, aquatic toxicology, oceanography, genetic and computer laboratories, geographical information system, fishing net design, and aquaculture research units. Additionally: sport hall, Navigation, Safety at sea, medical care and first aid, seamanship, oil spill laboratories. Full mission bridge simulator (ship handling sim), liquid cargo handling, GMDSS, and engine simulator are available.

The Central Fisheries Institute (Trabzon) comprises the following units: Fisheries management, Environmental and Resource Management, Breeding and Genetics, Processing and Handling, Fisheries Health, and Aquaculture. The Institute owns a Hatchery (Sea water/Freshwater). The sea water hatchery was established as a flatfish seed production facility under cooperation with JICA. This facility consists of seawater intake system, system of filtering, sterilizing and heating, and rearing facility including three laboratories for broodstock, feed and larvae/juvenile. The freshwater fish hatchery is located in Maçka-Altındere. In the facility, production and rearing research studies of some species like trout and sturgeon are carried out.

IMS/METU (Institute of Marine Sciences - Middle East Technical University, Erdemli) consists of the following departments: Marine Biology and Fisheries, Chemical and Physical Oceanography and Marine Geology and Geophysics. IMS/METU has also an **Atmospheric Tower** for studying atmospheric aerosols (bulk and size segregated) properties in a continuous mode. The atmospheric tower, constructed close to the Aegean coast, is 20 m in height. Sampling devices are installed on its platforms.

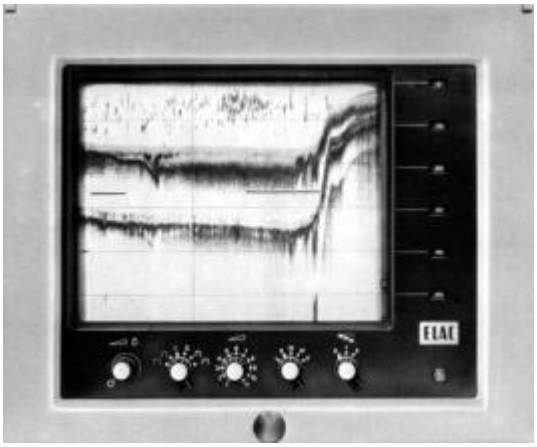
Figure 34. Atmospheric Tower in Erdemli

2. Equipment

BULGARIA

A few stakeholders have given information on their equipment available, as presented further.
IO-BAS

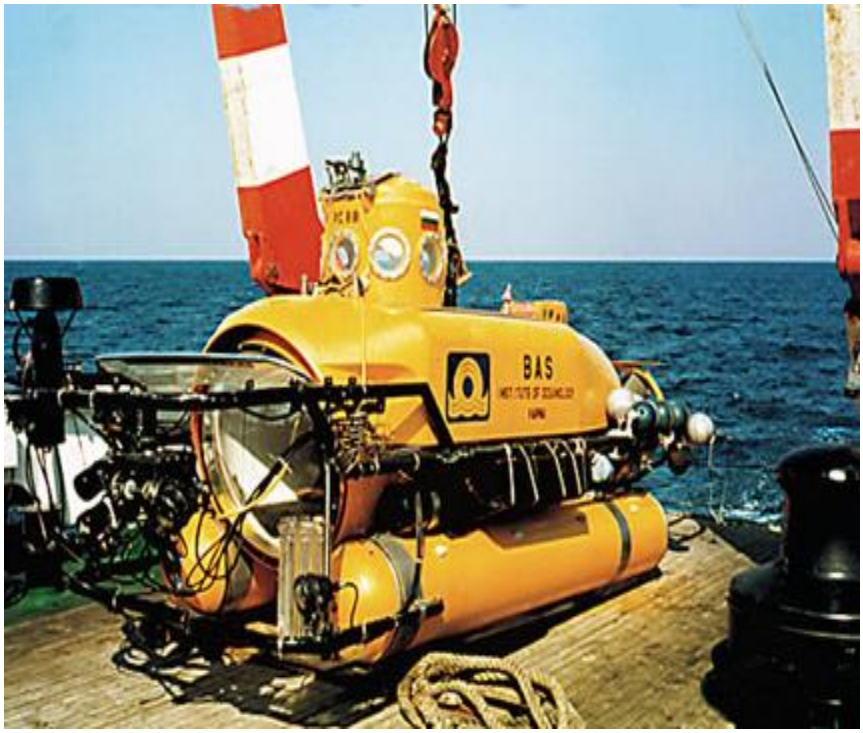
• Sea-Bird Electronics **CTD SBE** 911 plus - SBE 32 carosel - 12 barometers (Niskin) 5 litres each. Main housing: computer communications port location. The downcast data are binned to 1-m depth intervals using SBE Data Processing Software version 7.18 (Sea-Bird Electronics, Bellevue, Washington, USA). Attached – Fluorometer. Parameters recorded *in situ*: conductivity 0-7 Sm, temperature -5 +35°C, pressure 0-2000 dBar, and chlorophyll_a concentration (in situ fluorescence)



• **Echosounder** Simrad EK60 - hull mounted 38, 120 and 200 kHz split-beam transducers. The transducers are located at 4.5 m depth. The raw data are logged by Simrad ER60 software (20 log R TVG). Main characteristics: Low frequency: 12- 50 kHz; High frequency: 100,150,200 kHz; Resolution: – 0,1m at 200 kHz; Accuracy: ± 1 figure or 1% (which one appears the bigger); Range: 0,00 – 9990 m

• **Side scan sonar** system: Model Klein 530, Frequency: 100 kHz, Acoustic beam pattern:1° in horizontal plane, 40° in vertical plane, Pulse duration: 100 mS, Subbotom profiler: Model Klein 530, Frequency: 3.5 kHz, Acoustic beam pattern: 50° conical, Pulse duration: 0.4 mS, Graphic recorder: Model EPC 4800S, Channels: up to 3, Paper roll: Dry electro-sensitive, L/D 24m/50cm, Computer (PC) with 12 bit A/D converter

- **Current meter -** Model AANDERAA RCM 4



- **Research Submersible** PC-8 - The research submersible PC –8 has been operated since 1987. Main characteristics: Operating depth – 250m, Deadweight – 5t, Length – 6,5m, Crew – 2+1, Range of underwater cruise – 5 n miles, Endurance underwater – 5 hours, Scientific equipment – photo-camera, video-camera, manipulator, sampling devices

- **Phytoplankton net (**mesh size 20µm)
- **Juday plankton** nets (d=0.36 m, mesh size 150µm and 200 µm)
- **Hensen-egg net** (d=0.70 m, mesh size 300 µm)
- **Ring-Trawl plankton net** (d=1.1 m, mesh size 500 µm)
- **Nansen closing plankton net** (d=0.70m, mesh size200 µm)
- **Grab "Van-Veen**" (opening 0.1 m^2)
- **Microscopes:** Nicon TE2000-U connected to a video-interactive image analysis system OLYMPUS–BS41 with camera, Olympus SZ30 Stereoscopic Zoom Microscope
- **Spectrophotometers, UV-VIS**
- **Fluorometer** NOVA 400
- **Well equipped new laboratory for genetic and molecular taxonomy analysis**

Note: IO-BAS deploys Argo floats (*in situ* data acquisition equipment) in the frames of the BulArgo project, as mentioned in Chapter I.

IBER-BAS

- Gas chromatograph for the analysis of organic pollutants (PAHs, PCBs, etc.)
- Atomic absorption spectrophotometer for analyses of heavy metals
- LS-counter
- Molecular ecology PCR machines
- ELPHO (electrophoresis system?)
- Photodocumentation system
- Compound microscopes (Olympus and Leitz) for DIC, stereomicroscopes and a digital system for image processing and analysis
- 2M Multimedia Studio

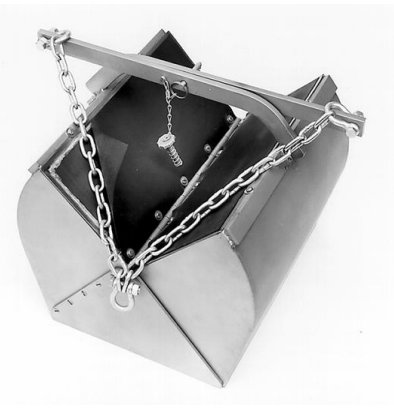
Regional Health Inspectorate (RHI)

- Gas chromatography
- Liquid chromatography
- Ion-exchange chromatography
- Spectrophotometer

IFR

- CTD "Sea&Sun technology" - CTD profiler is self-powered, capable of sampling in profiling mode. Main housing: 250 meters, I/O computer communications port location. Attached - Fluorometer Mini Back Scat I – model 1010 P, pH-meter – redox sensor, oxygen sensor. Parameters recorded *in situ*: conductivity, temperature, pressure, pH, and oxygen and chlorophyll *a* concentration. Derived parameters: salinity, depth, density, dissolved oxygen saturation. Data averaged in 0.5m depth bins.
- Bathometers (Niskin bottles of 1l or 5 l volume)
- Bongo net (d=2X 0.6 m, mesh size 300 µm & 500µm)
- Plankton net (d=0.36 m, mesh size 150µm)
- Jedy net (d=0.36 m, mesh size 150µm)
- Grab "Van-Veen" (opening 0.1 m^2)
- Echosounder Simrad EQ 33
- Underwater video-camera "Panasonic"
- Microscopes: stereomicroscopes and binoculars
- Spectrophotometer HITACHI Model U-2001 UV/Vis
- Electronic Balances Precisa XT 220A





Zooplankton net "Bongo", Niskin Bottles, "van Veen" Grab

The stakeholders in RO have declared the availability of the following equipment, however, some of them have specified no opportunities to be shared except with visiting scientists based on request.

NIMRD

- Perkin Elmer CLARUS 500 gas chromatograph with ECD and MS detectors (can not be shared), Spectrophotometer UV-VIS SHIMADZU (can't be shared),
- Automated TOC Analyzer SHIMADZU (can not be shared),
- ThermoElectron Atomic Absorbtion Spectrometer Solaar M6 (can not be shared)

GeoEcoMar

- X-STAR full Spectrum Digital Sub-Bottom Profiler (Edge Tech) with 216-D towfish working in 2-16 kHz domain (CHIRP System), multibeam systems for deep waters and for shallow ones;
- Dual Frequency Side-Scan Sonar (GeoAcoustics)
- Digital Side scan sonar GeoAcoustics
- Single beam digital scientific echosounder Ceeducer
- Onboard gravimeters GMN-K and GMN-KM
- G–856AX Memory -Mag TM - Portable Proton Procession Magnetometer
- G-877 Marine Magnetometer
- ROV Vector M5 (1000m depth)
- ADCP
- Multi-Gas Analyser "INNOVA - Bruel&Kjaer - 1302" (using infrared photo-acoustic method, low detection limits, at present configuration able to measure five different gases and water vapour on the same air sample)
- SeaBird CTD with rosette sampler system and 12 Niskin bottles for water sampling
- Multicorer Mark II-400
- Van Veen Grab
- Computer controlled, double beam atomic absorption spectrometer SOLAAR 939 Em
- VRA 30 X-ray fluorescence spectrometer
- UV/VIS Spectrophotometer Lambda 35, PerkinElmer
- Microscope Zeiss Axio LabA1 and Primo Star
- Stereomicroscop StereoDiscoveryV8 and Stereo 2000C
- Laboratory facilities for ecotoxicological bioassays

Dobrogea Litoral

- Field colorimetric kits for nutrients and toxicities
- UV-VIS spectrometers (laboratory)
- AAS and ICP-MS spectrometers for metals
- Analyzers for TOC/TN, and AOX
- Microscopes

Constanta County Department of Public Health

- list of microbiology laboratory equipments for water microbiological determinations

No crt.	**Equipment name**
1	VARIOCLAV AUTOCLAVE
2	ANTARES LAMINAR FLOW HOOD
3	MEMMERT BE THERMOSTAT
4	SANYO DISTILLER
5	SANYO BIDISTILLER
6	PG 802 TECHNICAL BALANCE
7	FILTER INSTALLATION TYPE SARTORIUS
8	VORTEX AGITATOR
9	BLF 132 ULTRAVILET LAMP
10	FRIOCELL 111COOLING INCUBATOR
11	INCUCELL 111 INCUBATOR– 2 pieces
12	INCUCELL 222INCUBATOR
13	RAYPA DOD DRYING STOVE
14	SELECTA WATERBATH
15	pH- METRU WTW
16	RAYPA AE AUTOCLAVE -110DRY - 2 pieces
17	FILTER INSTALLATION TYPE MILLIPORE
18	BACTERIOLOGICAL HOOD MICROFLOW 1500 EV/A
19	COLONY COUNTER WTW BZG 30
20	UV LAMP TYPE KRUSS
21	ROTABIT ORBITAL SHAKER - 2 pieces
22	BINOCULAR MICROSCOPE TYPE KRUSS
23	REA RLPR REFRIGERATOR

- equipments list for physical and chemical water determinations

No. crt.	Equipment name
1.	Atomic absorption spectrophotometer SHIMAZU type AA 6650
2.	Atomic absorption spectrophotometer type AA-6300
3.	UV spectrophotometer - VIS tip T80+
4.	spectrophotometer DAD MultiSpec -1501
5.	Electronic balance METTLER – TOLEDO type AG 204
6.	Electronic balance METTLER-TOLEDO type PG 2002 :
7.	PH-meter METTLER-TOLEDO type MP 220
8.	Memmert oven
9.	Turbidimeter type Turb 555 IR
10.	Multiparameter analyzer type C860
11.	Sand bath Caloris Type BNC 03
12.	Cyclon Distilled device
13.	Cooling incubator FRIOCELL 111
14.	Thermostated water bath CALORIS type BAC 45
15.	Measurement equipment of gamma activity with GeHp detector
16.	Equipment of measuring small beta activity with liquid scintillations
17.	Equipment of measuring alfa and beta activity with proportional detectors

Naval Academy has equipment to measure underwater noise and pollutant emmissions.

Most of the stakeholders contacted did not give detail list of equipment. For instance, the Central Fisheries Institute mentioned the availability of equipment, which could be shared with visting scientists, mentioning only the microscopes in the Labs, as an example.

MRC/TUBITAK: All major equipment (oceanographic *in situ* equipment, marine laboratory equipment, auto analyzer (4-channel), CHN analyzer, AA-Flame, AA-Graphite, ICP-MS, GC-MS, HPLC, and others) of the Environment Institute as well as the infrastructure/equipment of the other MRC/TUBITAK institutes are accessible by public organizations, universities and international bodies upon written request to the MRC/TUBITAK.

IMS/METU: AA, GC, HPLC, CHN Analyzer, Autoanalyzer, Fluorometer, Zooscan, Light, Inverted and Epifloresans Microscopes, flow cytometry, PCR, high capacity computers, etc. In detail the major field and laboratory equipment of the Institute is described below:

- Atomic Absorption Spectrophotometer (GBC-906, Varian Techtron AA-6)
- Spectrophotometer (LKB Biochrom Ultrospec II) and Thermo-spectronic Model Hedios δ)
- UV-VIS Spectrophotometer (Cecil Model 5000)
- Spectrofluorometer (Hitachi F-3000)
- Gas chromatography (Agilent Technologies 6890N, Network GC system) High performance liquid chromatography (HP 1090)
- CHN elemental analyzer (Carlo Erba, Model-1108)
- Total organic carbon analyzer (Shimadzu, Model TOC-5000)
- Radioactive C-14 measuring system
- SA quanta meter (PAR)
- Underwater spectroradiometer (LI-1800 UW model)
- Integrated Nephelometer (Radiance Resaearch Model M903)
- pH meter (Chemcadet, NEL)
- pH Meter (Chemitrix M-400)
- Dissolved oxygen (DO) meter (YSI M-58)
- Freeze dry system (Labconco)
- Conductivity meter (WTW LF 530 Model)
- Portable incubator for fecal coliforms analysis
- Microscopes (Nikon Stereo, Nikon polarizing, Olympus stereo with photographic tube)
- Various scales, dryers, rotary vapor and vacuum pumps, pressure and vacuum filtration systems
- Water distillation and purification instruments
- Two CTD profilers (Sea Bird Electronics, Model 9/11) equipped with two CHELSEA Aquatrac II in-situ fluorometers; two 25cm Sea-Tech Transmissiometers, GO-FLO Rosette Sampler, 12x5 lt (General Oceanics), and one SBE 9 CTD probe with memory unit
- Fisheries echo sounder (JVC 28-200 kHz, 360o, color monitor)
- Fisheries sonar (JVC 180 kHz, color monitor)
- Remotely operated underwater vehicle (Benthos MiniRover MK II)
- Five channels autoanalyzer (Technicon Model A-II)
- Current meters (Aanderaa RCM-4, EG&G)
- Precision depth recorder 50 200 kHz JMC)
- Side scan sonar (EG&G IB systems)
- Uniboom (shallow seismic system EG&G)
- Gravity corer (Phleger)
- Grab sampler (Van Veen)
- Bottom sampler (InterOcean)
- Automatic Winkler titration system (Hydro Bios)
- Microwave digestion system (EnviroPrep Questron Q45)
- Filtering system (Milipore)
- High volume air samplers (General Metal Works, model GMWL-2000

- and Model PM10 with size selective sampling inlet and Hi-Vol cascade impactor)
- Andersen dry-wet deposition sampler
- Automatic weather station (Aanderaa and Davis Instruments Weather Monitor II)
- Plankton nets (Nansen closing net, Egg net, Naked Hai)
- Various fishing nets (bottom

The Nature Conservation Center uses field equipment for observing and recording various species on coast, e.g. binoculars, telescopes, cameras, GPS devices, etc. For field trips they have 4X4 vehicles.

The Istanbul University, carrying out complex monitoring, obviously owns all necessary equipment, however, no list has been provided. The Fishery Faculty sustains a passive acoustic device fixed in the middle part of the Bosporus Strait. It detects acoustically active dolphins but also records ship noises.

3. Vessels

BULGARIA

Two organizations have specified the availability of a research vessel (R/V).

IO-BAS: Research Vessel "Akademik", Length – 55.5m; Breadth – 9.8m; Draught – 4.8.m; Speed – 9.5 knots; Crew – 22; Staff - 20 persons; R/V AKADEMIK has been operated since 1984 (constructed in 1979). In 1988 the ship was reconstructed and furnished with contemporary navigational and scientific equipment, for rent - 6000 EUR per day. Endurance at cruise 35 days, range at cruise speed 7500 n miles.

IFR: Research Vessel "**Prof. Valkanov**", Length - 34 m; Breadth - 7m; Speed - 9 knots; Crew and Staff - 10 persons; Build - Astrahan, Russia 1979, for rent - 1000 EUR per day. **Note**: the vessel is currently not available for renting.

Additional information is provided below as presented in the SeasEra Project Inventory.

Kaliakra sail training vessel
Owner: **Naval Academy Varna**
Address: N.Y.Vaptsarov Naval Academy, 73 V. Drumev St., Varna 9026 Bulgaria
Tel.: +359/52/552228; +359/52/552374
Public Relation Office; Fax: +359/052/ 303 163,
+359/052/552 225
E-mail: public-rel@naval.acad.bg
info@naval.acad.bg;
interpart@naval-acad.bg Contact person: Boyan Mednikarov
Website: http://www.naval-acad.bg

ROMANIA

NIMRD

• Vessel - ***R/V Steaua de mare – I;*** Length 25.8; Gross Tons -134; Fuel Capacity - 35 m^3; Area Drylab – 12 m^2; Speed – 7kt (max: 9 kt); Endurance (days) – 15; Accommodation: Officers 2, Crew 7, Scientists 10; Available AirCond. Navigational Equipment: ship's radar transponder; Communications: VHF radiotelephone station, MF radio DSC encoder, VHF EPIRB; Satellite Communications NAVTEX receiver; Global Positioning System Equipment GPS – KODEN. Scientific equipment: CTD Sea Bird 911plus; Core Grab 3; Acoustic Echosounder; Sea Surface Mapping System.

GeoEcoMar

• R/V **Mare Nigrum**, 25 places for scientists, 7 laboratories with a total area of about 200 m^2, different scientific and technical equipment, including a Multibeam system for water depth of 3,000 m (rent of the ship includes all facilities; price/12 working hours/day – 6800 Euro; price/24 working hours/day – 11500 Euro); Year of built 1971. Technical characteristics: Length: 82 m; Draught: 5 m; Displacement: 3200 t; Main propulsion: 2 SKL 8 NVD 48A- 2U from 1160 HP each; Main power: 2x320 kVA, 1x350 kVA, 1x50 kVA; Telecommunications: NERA Fleet 55 satellite communication; Inmarsat C - GMDSS by VHF radiotelephone FM 8500 and facsimile Furuno D Fax; Navigation systems - Kelvin Hughes 5000 t 6000 A and Nucleus 5000 radar-two units; Gyrocompass Vega 2 M; log Furuno DS70; echosounder LAZ50 ; Ninas integrated navigation system.

Laboratories: Tomography; Hydrology; Gase mesurements; Biology; Geochemistry; Geophysics; Computer room; Seismo – acoustics; Photo bab; Wet lab.

Marine equipment:

- ✓ Multibeam bathymetric system SEABEAM 1050 Elak Nautik
- ✓ Seism - acoustics CHIRP Star Full Spectrum
- ✓ Magnetometer Geometrics G-87
- ✓ On-board (GMNKM) and bottom (GDK) gravimeters
- ✓ ROV (1000 m water deep)
- ✓ Sub-bottom profiler
- ✓ Side Scan sonar

Geochemical, Geoecological and Sedimentological equipment:

- ✓ CTD SBE 25 Sealogger
- ✓ Gravity and piston corers
- ✓ Multi-corer Mark II-400
- ✓ Grab samplers
- ✓ Nets for biology

Deck equipment:

- ✓ Hydraulically Winch 10 tf
- ✓ Electrical Winch 8 tf
- ✓ CTD Winch
- ✓ ROV winch
- ✓ Grab sampler winch
- ✓ Crane 3 tf/15 m
- ✓ A – Frame on aft ship

• Fluvial research vessel "**Istros**" - 147.8 t displacement, 8-10 places for scientists, Crew – 7 persons; 2 laboratories, 800 km navigation autonomy, Multibeam system for shallow water (rent of the ship includes all facilities; price/day – 1500 Euro). Technical characteristics: Length: 32 m; Breadth: 6.90 m; Draught: 1.25 m; Main propulsion: 2 engine with 420 HP each; Main power: 2x35 kVA.

Laboratories:

- ✓ Geochemistry
- ✓ Geophysics
- ✓ Multifunction lab

Marine equipment:

- ✓ Multibeam bathymetric system SEABEAM 1050 Elak Nautik
- ✓ DGPS Sea Star 3200 LR 12
- ✓ Magnetometer Geometrics G-877
- ✓ On-board (GMNKM) and bottom (GDK) gravimeters

Geochemical, Geoecological and Sedimentological equipments:

- ✓ Gravity and piston corers
- ✓ Grabs samplers

Deck equipment:

- ✓ A-Frame on aft ship
- ✓ Side crane
- ✓ Hydrological winches
- ✓ 2 hand cranes

Floating laboratory/house boat "**Halmyris**" - 20 places for scientists, 3 laboratories, conference/dining, air-conditioned hall (price/day – 1000 Euro). Technical characteristics: Length: 32 m; Breadth: 6,60 m; Draught: 0,60 m; Displacement: 90 t.

Laboratories:
✓Geochemistry
✓Biology

Other Facilities:
✓Electrical power generator
✓Air condition intalations
✓14 cabins (single and doubles)
✓Conference room (30 – 40 persons)
✓Boats

- Research/inspection boat "**Carina**" – 6 m long, 6 places, 150 CP diesel engine, speed up to 35 Mph (price/day – 350 Euro).

Dobrogea Litoral
Ship Marina 1 berth RO RO 2, available 24 hours, with marching order signed by the General Director; engine characteristics VOLVO PENTA 701 KW motor.

Constanta Maritime Hydrographic Directorate
Hydrographic vessel (2 600 tonnes) for large and medium depths. It has hydrographic and oceanographic laboratories (in 2012-2014 being under modernization).

Border Police General Inspectorate owns vessels that can be used, based on collaboration protocols signed with interested institutions. Vessels characteristics can not be made public. Rental of ships or providing services can be arranged under orders of the Minister of Administration and Interior.

Naval Academy has vessels which are part of the Naval Squadron School of ANMB (Naval Academy "Mircea cel Batran").

TURKEY

TUBITAK: The Environment Institute of MRC/TUBITAK operates two vessels: one (6m Lx 2,4m W) is for lakes, transitional and coastal waters having the capacity of 1300kg and a crane of capacity 250kg, and the second one is a regional class R/V of 41.2 m length (**R/V Marmara**) which is legally and technically capable of conducting research and sampling/measuring surveys in coastal, territorial and international waters. Both are eligible for rent, however, terms of rules for both will be set in 2013 since both are new and R/V Marmara will be operational in early 2013.
R/V Marmara (TÜBİTAK / MRC) Launching day (17 February 2013, ÇEKSAN Shipyard, Tuzla-İstanbul)

Main features
Length: 41.20 m
Breadth: 9.55 m
Draught: 4.50 m
Load displacement: 497 t
Operating cruising speed: 14 knot
Crew: 12
Scientific staff: 11
Endurance: 15 days
Range: 5000 nmi
Propulsion:
Engines: 2 x 1040 kW, 1650 rpm marine diesel
DC Generators: 2 x 300 kWe diesel generators; 1 x 108 kWe emergency generator
Bow and stern thrusters: 95 kW
Class 1 dynamic positioning
Deck equipment and facilities:
Aft deck space: 65 m2
Laboratory space: 62 m2, 5 labs (wet, dry, biology, computer, and heat-controlled)
A-frame (aft): hydraulic, 3 ton capacity, 4 m clearance, 45° total range inward/outward
Knuckleboom crane (aft): 3 ton capacity, 9 m range
Winches: 2 multipurpose winches (one with 3000 m data cable, the other with 2000 m steel cable
Scientific Equipment:
Multibeam survey sounder system (SEA BEAM 1050D - 3000 m maximum depth)
Single beam hydrographic survey sounder (HydroStar 4900 – 3000 m maximum depth)
2 x hull-mounted deep water ADCPs (Teledyne RDI Ocean Surveyor; 75 and 150 kHZ)
CTD (SBE 25plus with a transmissometer, pH, fluorometer, turbidity, PAR, and DO sensors)
Carousel water sampler (SBE 32C, 12 x 8 liter bottles) 18
Thermosalinograph (SBE 21)

Istanbul University (Faculty of Fishery) has reported the availability of **R/V Yunus** – 32 m (no other detail has been provided). Other vessels are described as follow:

R/V Avar: Built in 1951; Length 31.27 m; Draft 3,20m; Tonnage 173,68 gross tons; Length 31.27; Draft (m) 2.76; Gross Tons 178.0; Capacity Dry Cargo Area (m^3) 3.0; Fuel Capacity (m^3) 30.0; Area Wetlab (m^2) 8.0; Area Drylab (m^2) 10.0; Free Deck Area (m^2) 55.0; Range (n mi) 5000.0; Speed Cruise (kt) 9.0; Speed Max (kt) 11.0; Endurance (days) 30.0; Accommodation - Officers 2, Crew 11, Scientists 15; Air Cond; Navigational Equipment Radar SatNav Gyro; Satellite Communications DGPS; Acoustics and Profiling: Acoustic Sonar Fisheries; Oceanographic: Winches Winches (number): 1; Cranes - Stern and Midships.

R/V Arar 2: Length 16.0; Speed Cruise (kt) 12.0; Accommodation - Crew 3 and Scientists 9.

R/V ALEMDAR II

Flag	Turkish
Owner	Istanbul University, Institute of Marine Science and Management
Reg. Port	Istanbul
Building place and date	Germany – 1966 / Adapted as R/V with renovation during 2011-
Lenght over hall	63.40m
Width	11.0 m
Max. draft	5.20 m
Max. Speed/Dead Slow	13 knt/6 knt
Gross tonnage	967
Net tonnage	291
Berths	20 Crew + 18 pers.
Main machine	2 MWM (2x2500 BHP) Diesel (2*1840kW)
Generator	3 MWM 210kWA (380V 3 phase 50Hz)
Fuel consumption	175lt/h (1 main machine) + 35lt/h (1 generator)
Navigation equipments	2 pieces radar, Gyro compass (main gyro and repetears), AIS Class
Equipment	

- A Frame swl 5tonnes
- Crain, swl 2t, 12m.
- 3 pieces mataforas (for oceanographic equipments)
- Winches for multi purpose

Laboratory (60m^2)
- Computer room
- Wet laboraory
- Instrumental analysis loboratory
- Multi purpose conference room

Oceanographic Equipment
- Currentmeter vessel mounted, 150kHz BBADCP (Broad Band Acoustic Doppler Current Profiler)
- CTD, Conductivity, temperature and depth system.
- Rosette sampler 12x5lt
- Gravity Core
- Van Veen Grab (Hydro-bios, 0.1m^2)
- Plankton Nets
- Trawl Net

The Karadeniz Technical University (Trabzon) has two vessels: **RV/DENAR 1**, length - 25 m and **YAKAMOZ** - 12 m.

R/V Denar I: Length 25; Draft (m) 2.7; Fuel Capacity (m^3) 10.0; Area Wetlab (m^2) 20.0; Range (n mi) 500.0; Speed Cruise (kt) 10.0; Speed Max (kt) 12.0; Endurance (days) 10; Accommodation - Crew 4 and Scientists 7; Data Processing Equipment: Computers IBM PC; CTD Make Aandrea, RCM 9, YSI 3800, Idronaut Ocean 7 316, Satlantic in water Hyperspectral Spectroradiometer (HP PRO II), LICOR; Spherical Quantum Sensor (For PAR); CTD Oxygen Sensor Idronaut- Oxygen Sensor (1500 m); CTD Fluorometer WETLabs ECO BB2F Combination Scattering Meter and Fluorometer; Navigation and Communication: Navigational Equipment Radar: Furuno and JRC, Communications VHF: Sailor and Furuno, Global Positioning System; Other equipment -LORENZ Chart Ploter, MACELLAN NAV 5000 D, MACELLAN 300; Acoustics: Acoustic Echosounder JVC V-10, JRC JFV-850, Acoustic Sonar SUZIKI S-1600 m -15, Acoustic Doppler Current; Profilers: AANDERA (RCM 9); Crane – Midship, Crane Max Load (tons): 1.0.

General Directorate of Mineral Research and Exploration – Istanbul[216]

R/V Sismik 1: Length 55.75; Draft (m) 3.96; Gross Tons 750.0; Fuel Capacity (m^3) 88.3; Area Wetlab (m^2) 40.0; Water Capacity (m^3) 106.0; Free Deck Area (m^2) 140.0; Range (n mi) 2400.0; Speed Cruise (kt) 11.0; Speed Max (kt) 12.0; Endurance (days) 25.0; Accommodation - Officers 7, Crew 18, Scientists 12; Air Cond; Data Processing Equipment: Computers and SeisNet software; Radars: Sperry, MK 10-3 and Furuno, 2010; Gyrocompass: Sperry MK 227; SeisNet Integrated navigation System; Communications SSB Radio: Sailor, HF SSB RE2100 Radiotelephony; Navtex: SHIPMATE RS6100; Telefax, Mobile Telephone; Equipment - Core Grab KAHLSICO Type 214WB250; Acoustics – Echosounder, 210kHz 33kHz. Other equipment - Core Grab KAHLSICO Type 214WB250.

Turkish Navy, Department of Hydrography, Oceanography and Navigation – Istanbul[217]

• **R/V Cesme** : Length 87.00m ; Freeboard to Work Deck (m) 3.0; Draft (m) 4.6; Gross Tons 2900.0; Fuel Capacity (m^3) 346.0; Area Wetlab (m^2) 30.0; Free Deck Area (m^2) 150.0; Space Cont Labs Supported (m^2) 100; Range (n mi) 8000.0; Speed Cruise (kt) 12.0; Speed Max (kt) 15.0; Endurance (days) 50.0;
Accommodation – Officers 11.0, Crew 72.0, Scientists 15.0; Data Processing Equipment: Computers; Data Processing Printers/Plotters; CTD -SBE-25, SBE-19 with Oxygen and Transmissivity Sensors, CTD Fluorometer and CTD Rosette; Equipment - Core Grab, Core Box, Core Gravity, Core Piston; Navigational Equipment - Radars: RAYTHEON Pathfinder St (ARPA-96nm.), KELVIN HUGES Nucleus2 6000A (ARPA-96nm.) Gyro: SPERRY Mk.23 Mod.4ECDIS: YNAVTEX; Communications -HF, MF, UHF, VHF; Satellite Communications - INMARSAT C, Global Positioning System EquipmentRaytheon NAV 398, Trimble Navigation NT-100; Acoustic Echosounder ELAC LAZ 4700; Sidescan; Multibeam; Winches (number): 4.0; Crane Max Load (tons): 2.5.

[216] Postal address: Üniversiteler Mahallesi Dumlupınar Bulvarı No:139 06800 Çankaya/ANKARA TURKEY; Tel: +90 312 201 11 51; Fax: +90 312 285 36 19; E-mail: mta@mta.gov.tr; Website: http://www.mta.gov.tr/v2.0/eng/index.php; Contact person: Dr. Yavuz Hakyemez E-mail: hakyemez@mta.gov.tr

[217] Address: Turkish Navy, Department of the Hydrography, Oceanography and Navigation, Cubuklu Istanbul, 81647 Turkey; Telephone +90 216 322 25 80; Fax +90 216 331 05 25; Website: http://www.shodb.gov.tr/Eng_index.html; E-mail: info@shodb.gov.tr; Contact person: Admiral Nazim Cubukcu E-mail: director@shodb.gov.tr

• **R/V Cubuklu**: Length 40.41; Freeboard to Work Deck (m) 1.2; Draft (m) 3.95; Gross Tons 660.0; Fuel Capacity (m^3) 75.0; Area Wetlab (m^2) 6.0; Area Drylab (m^2) 30.0; Free Deck Area (m^2) 40.0; Range (n mi) 5000.0; Speed Cruise (kt) 10.0; Speed Max (kt) 11.5; Endurance (days) 30.0; Accommodation - Officers 5, Crew 11, Scientists 8; Air Cond; Data Processing Equipment: Computers IBM PC; Data Processing Printers/Plotters; CTD -SBE-25, SBE-19 with Oxygen and Transmissivity Sensors, CTD Fluorometer and CTD Rosette; Equipment - Core Grab, Core Box, Core Gravity, Core Piston; Navigational Equipment Radars: Decca RM-1226C (48 nm), Raytheon R40 (24 nm), Gyro: SG Brown Mk-1 Mod.5; Communications HF, MF, UHF, VHF ; Global Positioning System Equipment SERCEL NR-103; Acoustic Echosounder ELAC LAZ 721, ELAC LAZ 4700; Acoustic Sonar Sector-scan; Sidescan; Multibeam; Winches (number): 4.0; Crane Max Load (tons): 1.

• **R/V Mesaha 1**: built in 1994 ; Length /Breadth : 21.28 mt/5.07 mt; Displacement: 47 ton; Draft: 1.33 mt; Maximum Speed: 10 KTS; Endurance: 400 mil; Accommodation - Crew 10 and Scientists 5.

• **R/V Mesaha 2**: built in 1994; Length/Breadth: 21.28 mt/5.07 mt; Displacement: 47 ton Draft: 1.33 mt; Maximum Speed: 10 KTS; Endurance:400 mil; Main Engine 2 x 1000 HP; Accommodation: Crew 10 and Scientists 5.

The Central Fisheries Institute (Trabzon) owns one vessel, which is 28 m long and 720 HP.

• **R/V Surat Arastirma 1**: Length 22.0m; Freeboard to Work Deck (m) 10; Draft (m) 1,75; Gross Tons 76,38; Capacity Dry Cargo Area (m^3) 89,16; Fuel Capacity (m^3) 10 000; Area Wetlab (m^2) 60; Area Drylab (m^2) 8; Water Capacity (m^3) 8 000; Free Deck Area (m^2) 60; Space Cont Labs Supported (m^2) 8; Speed Cruise (kt) 8; Speed Max (kt) 10; Accommodation - Officers 2, Crew 4; Scientists 10; Air Cond (yes/no); Data Processing Equipment: Computers; Data Processing Printers/Plotters; CTD Capabilities: temperature salinity conductivity, sigma-t, pH, DO (oxygen), chlorophyl-a, light transmission; Diving Capabilities: diving equipment for 4 persons, compressor; Navigational Equipment: JMC navigation plotter, JMC meteorologic monitoring system,GPS, ECHOSOUNDER,RADAR,VHF; Communications VHF RADIO TELEPHONE ; Global Positioning System Equipment JMC V-127 P GPS; Acoustic Echosounder JMC V 122(50-200KHz) color echosounder; Acoustic Sonar JMS CS-100 Sonar+Echosounder; Winches (number): 2

IMS/METU (Erdemli) operates the following vessels:

• **R/V Bilim-2**: built in 1985; Length: 40.36 m, Beam: 9.47 m; Tonnage: 433 Gross ton; Draft:3.80 m; Speed: 11.5 knot; Dry Cargo Area (m^3)26.0; Fuel Capacity (m^3)120.0; Area Wetlab (m^2)15.0; Area Drylab(m^2) 40.0; Free Deck Area (m^2)20.0; Range (n mi) 6500.0; Speed (kt)9.5; Speed Max (kt)11.5; Endurance (days) 45; Accommodation – Officers 5, Crew 8, Scientists 14; Air Cond; Data Processing Equipment: Computers IBM-COMPAQ PS/320; CTD Specifications: CTD RosetteGeneral Oceanics Engineering Design; Fixed Equipment Navigation and Communication: Navigational EquipmentRadar DECCA RM 1226; Auto-pilot (DECCA 757), SatNav Gyro; Echo-sounder (ATLAS EDIG 10/DESO 10); Fax; Telephones; Radio Console SAIT-6 Global Positioning System EquipmentGPS Magnovax MX 100; Acoustics and Profiling: Acoustic Echosounder38kHz 120kHz; Acoustic SonarFisheries; Oceanographic equipment: Winches (number): 2; Crane: Stern, Midships

• **R/V Lamas** (wooden hull): built in 1981; Length: 16 m; Tonage: 28 Gross; Draft: 1.60 m; Speed: 11.5 knot; Accommodation – crew 3 and scientists 4. The Trawler is used mostly in biological and fisheries surveys but is also capable of oceanographic investigations. Equipment: JRC Fisheries echosounder (Fish finder) (50 & 200 kHz); Garmen GPS; Oceanographic winch; Sentinel Workhorse ADCP (300kHz); Wireless communication device.

• **R/V Erdemli** (wooden hull sail boat): built in 1979; Length:16 m; Tonage: 30 Gross ton; Draft: 1.80 m; Speed: 10 knots; Accommodation: crew 4 and scientists: 5; Equipment: JRC Echosounder; winch. This R/V is sed extensively for coastal oceanographic research.

The Institute has also remotely operated underwater vehicle (Benthos MiniRover MK II).

Note: last 2 R/Vs are operating from IMS METU habour (Mediterranean Sea)

Dokuz Eylül University - Institute of Marine Sciences and Technology - Izmir

R/V Piri Reis: Length 36.0m; Draft (m) 2.3; Gross Tons 280.0; Fuel Capacity (m^3) 45.0; Water Capacity (m^3) 23.0; Speed Cruise (kt) 10.0; Endurance (days) 20; Accommodation - Crew 10, Scientists 11; Air Cond; CTD Rosette; Core Gravity; Navigational Equipment - Decca Radar (12 n.mile); Decca Radar Bridge Master (Arpa - 96 n.mile); Decca 550 Autopilot; Microtechnica Mk Sirius II; Gyro; Debeg Mod. ITT 2200 Automatic Range Finder; Debeg 7313, Transreceiver, 400 MW; Communications - Amplidan 9000, 10 channels in board communication system; Telefax Portable; Telephone; Portable walkie – talkies (Aselsan - 3 ps); VHF/FM Radiotelephone 9100 (Ray Jefferson); Navtex Receiver, JRC NCR - 300 A; GPS Loran 10x (Trimple); DGPS (Trimple); Acoustic Echosounder EK-400 simrad; Sidescan.

To conclude on the availability of vessels, underwater vehicles, laboratory and vessels equipment, especially those which can be shared.

The inventory of equipment available in the Laboratories of the beneficiary countries shows a very high level of capacity to manage the various samplings and analyses required by the MSFD. Laboratory equipment can be shared with visiting scientists upon written request to the administrations of the institutes (**Note**: contact details of all organizations are given in Annex II).

Inventory of the Vessels, which have capacity to carry out monitoring, is given in Table 87. They are 26 of different class. The vessels of the Romanian Border Police and Naval Academy are not included in the Inventory (Table 87), as no information was provided on their number and capacity to participate in monitoring. However, the RO Border Police mentioned that rental of ships or providing services could be arranged under orders of the Minister of Administration and Interior.

The classification of the research vessels was proposed by the SeasEra Project, and it is according to the US Research Vessel fleet classification, namely:

> 65 m: **Global vessels** are large and currently operate on an at least multi-Ocean scale
55 m < L < 65 m: **Ocean vessels** are large enough to currently operate on an Ocean scale
35 m < L < 55 m: **Regional vessels** currently operate generally on a European Regional scale
10 m < L < 35 m: **Local and/or coastal vessels** for research only
L < 10 m: **Coastal**

The underwater vehicles are classified as follows:
ROV: Remote operated underwater vehicles
AUV: Autonomous unmanned vehicles
MS: Manned submersibles
USV: Unmanned surface vehicle

Large exchangeable vessel equipment: multibeam and side scan sonars, echosounders, underwater video cameras, CTDs, etc.

Table 87. Research vessels number per country

Country	**Research vessels**					**Underwater vehicles**				**Large exchangeable vessel equipment**
	Global	**Ocean**	**Regional**	**Local**	**Coastal**	**ROV**	**AUV**	**MS**	**USV**	
Bulgaria		1		2				1		6
Romania	2			4	1					6
Turkey	1	1	4	9	1	1				10
Total	3	2	4	15	2	1		1		22

Table 88. Research vessels details

Country/ Vessel name	Owner/operator and website	Category	Length (m)	Year	Rent per Day(Euro)
Bulgaria					
RV Akademik	Institute of Oceanology – Varna, Bulgaria www.io-bas.bg	Ocean	55.5	1979	6000
RV Prof. A. Valkanov	Institute of fishing resources – Varna, Bulgaria www.ifrvarna.com	Local	34	1979	1000
Kaliakra Sail Training vessel	Naval Academy- Varna, Bulgaria www.naval-acad.bg	Local			
Romania					
R/V Mare Nigrum	GeoEcoMar, Constanza, Romania www.geoecomar.ro	Global	82	1971	6800
R/V Istros	GeoEcoMar, Constanza, Romania www.geoecomar.ro	Local	32	1986	
Halmyris – Floating Lab	GeoEcoMar, Constanza, Romania www.geoecomar.ro	Local	32		
Boat Carina	GeoEcoMar	Coastal	6		
R/V Steaua de mare – I	NIMRD “Grigore Antipa” Constanza, Romania www.rmri.ro/menu.en.html	Local	25.8		
Marina	Dobrogea Litoral	Local			
Hydrographic vessel (NH)	Constanta Maritime Hydrographic Directorate	Global			
Turkey					
Small boat	MRC/TUBITAK	Coastal	6	2012	
R/V Marmara	MRC/TUBITAK	Regional	42	2013	
R/V Arar	University of Istanbul, Istanbul, Turkey www.istanbul.edu.tr/enstituler/ denizbilimleri/turkce/turkish.htm	Local	31.27	1951	
R/V Arar 2	University of Istanbul, Istanbul, Turkey www.istanbul.edu.tr/enstituler/ denizbilimleri/turkce/turkish.htm	Local	16		
R/V Bilim	Middle East Technical University, Erdemli, Turkey www.ims.metu.edu.tr	Regional	40.36	1983	
R/V Lamas-1	Middle East Technical University, Erdemli, Turkey www.ims.metu.edu.tr	Local	16	1981	
R/V Erdemli	Middle East Technical University, Erdemli, Turkey www.ims.metu.edu.tr	Local	17	1979	
R/V Piri Reis	Institute of marine Sciences and Technology - Izmir, Turkey Web.deu.edu.tr/deuimst/	Regional	36	1978	

R/V Denar 1	Karadeniz Technical University, Faculty of Marine Sciences – Trabzon, Turkey www.ktu.edu.tr	Local	24.5	1992	
Yakamoz	Karadeniz Technical University, Faculty of Marine Sciences – Trabzon, Turkey www.ktu.edu.tr	Local	12		
R/V Sismik 1	General Directorate of Mineral Research and Exploration – Istanbul, Turkey www.mta.gov.tr/	Ocean	55.75	1976	
R/V Cesme	Turkish Navy, Istanbul, Turkey www.shodb.gov.tr/Eng_index.html	Global	87	1965	
R/V Cubuklu	Turkish Navy, Istanbul, Turkey www.shodb.gov.tr/Eng_index.html	Regional	40.41	1986	
R/V Mesaha 1	Turkish Navy, Istanbul, Turkey www.shodb.gov.tr/Eng_index.html	Local	21.28	1994	
R/V Mesaha 2	Turkish Navy, Istanbul, Turkey www.shodb.gov.tr/Eng_index.html	Local	21.28	1994	
R/V Surat Arastirma 1	Central Fisheries Research Institute – Trabzon, Turkey www.sumae.gov.tr/en	Local	22	1984	

Table 89. Underwater Vehicles details

Country/Vehicle name	**Owner/operator and website**	**Category**	**Depth**	**Year**
Bulgaria				
PC-8	Institute of oceanology – Varna, Bulgaria www.io-bas.bg	Manned Submersible	600	1986
Turkey				
Benthos MiniRover MK II	IMS/METU, Erdemli www.ims.metu.edu.tr	Remote operated underwater vehicle		

V. Training

This chapter deals with the level of capacity building and needs to provide for smooth implementation of the MSFD in a coordinated and harmonised manner.

(what kind of trainings are ensured on a regular basis, and what are the needs)

No regular trainings are conducted. Training programmes in **IO-BAS** are related to projects of external funding, such as those during the last 10-12 years conducted:

- 30 April -4 May 2012 – Workshop/training course on Direct and Hollistic methods for stock assessment under (SRCSSMBSF)25 – 30 June 2012 - Application of acoustic surveys in the assessment of pelagic fish stocks. Organized by Institute of Oceanology – BAS, Varna under the Project "Strengthening the regional capacity to support the sustainable management of the Black Sea Fisheries (SRCSSMBSF)"
- 21 July – 01 August 2008 - Statistic Analysis of Biological Data and Time-Series, Organized by IO-BAS, Varna, funded by SESAME Project.
- November 2008, Fisheries acoustics training course, Data collection, analyses and fish stock assessment by applying of hydroacoustic method, Organized by IO-BAS, Varna, Bulgaria, Lecturer from IMR/MAREC, Norway
- 11-15 June 2007 - GIS Training course "Geographic information systems – Introduction in GIS applications, based on ArcGis Desctop ", Organized by IO-BAS, Varna, funded by SIBEMA Project
- 28 September – 06 October 2002 - The socio-economic aspects of the regional sustainable development and the ecosystem of the Black sea region, Organized by IO-BAS, Varna, funded by the project "CESUM'BS
- 24 September – 07 October 2001 - Ecosystem health assessment and sustainable development of marine environment, Organized by IO-BAS, Varna, funded by the project "CESUM'BS.

In **IBER-BAS** the trainings are also project-funded, they were:

- Integrated management and dynamics of wetlands – 2012 (Project Wetlanet)
- Basics of molecular evolution and phylogenetics – 2012 (Project Wetlanet)
- GIS in wetland conservation and management – 2012 (Project Wetlanet)
- Molecular and biochemical markers for wetland ecotoxicology – 2010 (Project Wetlanet)
- Molecular taxonomy, phylogenetics and ecology – 2010 – Project CEBDER
- Analysing biological and environmental data – using univariate analysis – 2007 (UNESCO)

In **IFR** a few trainigs have been organised. For instance, in 2009 there was a training course for 2 weeks with selected lecturers from IFR and IO-BAS on Fisheries and Aquaculture.The course have been organized by the Training Center of BENA at IFR.The trainees: staff of NAFA-VARNA and VMS center of NAFA. In 2012 there was a training course on innovative methods for Cetaceans monitoring.

Since 2001, scientists of the institute have participated in the following trainings, which have been organised by other organizations under different projects:

- Training course: MIKADO, NEMO, Ocean View; Ostende, Belgium, 28.02 - 4.03.2011 (II part)
- Training course on software for meta-data maintenance: MIKADO, NEMO, Ocean View; Ostende, Belgium, 24 - 30.10.2009 (I part)
- Statistical analysis of biological data and time series: DIVA analysis tool; DINEOF - Multivariate analysis etc., Varna, organized by the IO-BAS, 21.07 - 1.08.2008 (SESAME Project, as mentioned above by IO-BAS)
- Statistics course Brodgar & R, Sofia, Bulgaria, CLOE, 06.2007 (**Note**: CLOE is the previous name of IBER-BAS, the course is also mentioned by IBER above)
- Regime shifts workshop, Varna, Bulgaria, CLOE, 06.2005 (training for use of a relevant software to detect regime shifts; **Note**: IO-BAS scientists also participated)
- Training course on Cetacean monitoring in the Black Sea, NIMRD, Constanta, Romania, 12. 2001

Recommended trainings are: Phytoplankton and zooplankton taxonomy, Training in Statistics and use of new softwares applied in biology and ecology: STATISTICA, PRIMER 6, XLSTAT2012, as well as ArcView, Grapher, Surfer; Molecular taxonomy of microplankton and application in biodiversity.

ROMANIA

NIMRD specified once training conducted during the last years by the institute: Training on quality assurance/quality control on chemistry parameters. However, specialists from the Institute have participated in the trainings specified above as organised during different projects (e.g. BlackSea SCENE, SESAME, UNESCO 'Regime shifts', statistical analysis trainings, etc.).

GeoEcoMar organizes regularly training activities on "*Sediment and water sampling and sample processing at sea and in the laboratory for biology and geology students and graduated students*" with the occasion of each expedition at sea. During the last 5 years GeoEcoMar organized six such trainings.

Constanta County Department for Statistics organizes annual training courses for their own staff, with topics in the statistical field.
Constanta County Department of Public Health participates in annual trainings organized by the Ministry of Health for the Romanian Radiation Hygiene laboratories. During the last 5 years this Department has organized one training on radiation protection specific to radionuclide activity.

Border Police General Inspectorate (specifically the Department of Marine and Riverine Environmental Protection, within the Coast Guard) carries out regular trainings in marine environmental protection. However, no trainings have been listed for the last 5 years, except those related to oil spill preparedness and response, as well as to search and rescue (e.g. RODELTA2009 and GEODELTA2012[218]). The organization recommended MISIS to organize workshops for exchange of experience/information and development of closer collaboration between Black Sea stakeholders, especially in the implementation of the MSFD. They mentioned the importance of the Common Information Sharing Environment (http://www.eskema.eu/defaultinfo.aspx?topicid=154&index=5) and the advantages to bring together the maritime surveillance (in its environmental component, especially) with the traditional monitoring activities tracing the state of the Black Sea.

Naval Academy organizes regular trainings in preventing environment pollution.

Recommended trainings are:

- training in ecotoxicological monitoring
- modern sampling and analytical techniques (chemical oceanography, pollutants, biological elements)
- oceanographic data statistical processing and analysis
- integrated chemistry and biology data assessment (according to WFD and MSFD requirements)
- measuring pollution effects upon marine ecosystems, biomarkers
- monitoring and assessment of quality of bathing water
- measuring cyanobacteria toxicity (and of other toxic species)
- measuring radioactivity and its quality control
- development of public awareness (e.g. for beach users preparation of communications on water quality, etc.)

[218] RODELTA and GEODELTA are regional DELTA exercises, which are organised by the Black Sea coastal states with the support of the BSC. The 2009 DELTA was organised by Romania (RODELTA, http://www.blacksea-commission.org/_rodelta.asp) and the 2012 DELTA – by Georgia (GEODELTA). These exercises are regularly conducted (each 2 years) in implementation of the Contingency Protocol and Regional Contingency Plan to the Bucharest Convention.

TUBITAK/MRC (Istanbul): There is one regular and relevant training in the Environment Institute: Water-Wastewater Laboratory ISO 17025 Accreditation Applications- Validation Methods and Uncertainty Calculations. In 2012 and with the experience gained in the DeKoS project, training was provided to the Ministry of Waters and Forestry experts to assist WFD technical settings on definition and typology identifications of coastal waters, quality classification for coastal waters and identification of EQSs for chemical status assessment. Another one will be soon provided on the sampling strategy in transitional waters.

The Central Fisheries Institute (Trabzon) organizes trainings in fisheries management and aquaculture.

The Karadeniz Technical University (Trabzon) provides trainings for students and PhD students during their education in the University.
IMS/METU (Erdemli) provides for summer schools to develop awareness for graduate, undergraduate and primary school students in the field of marine sciences. During the last 5 years the Institute has organised: "I Know My Sea and I Protect My Sea" (training on marine environmental protection for school kids and teachers and for the public); "IMBER ClimECO3 Summer School", for training on ecosystem modelling.

The Nature Conservation Center organizes trainings on monitoring of forest biodiversity. They have also carried out courses to introduce the concept of biodiversity conservation/protection, and the importance/role of biodiversity in forest ecosystems through communicating knowledge on different species groups available (i.e. birds, butterflies, small mammals, etc.), ecosystem functions and processes, and the value of a healthy forest ecosystem. More specific courses have been also provided, such as on the ecological consequences of hydro-electric power plants in Turkey.

The Ministry of Environment and Urbanization and MRC/TUBITAK recommended:
Workshops on regional/global marine and climate policies and identification of research needs/issues. Diagnose the main gaps and main already advanced topics for the region and investigate how to make vertically detailed research.

Maritime and coastal economy as well as policy should be supported by researchers undertaking investigations on policy/economy oriented needs/issues.

New generation scientists have to be open minded, capabale of thinking and doing in an intersectorial way, and they should not be conservative about top-down approach. They should know how to deal with social and economic dimensions.

Recommended trainings by TR are as follow:

- Optimization of field surveys, data analysis and assessment tools for benthic flora (macro algae, angiosperms)
- Training on techniques of habitat mapping
- International and national harmonisation of sampling, data collection and data analysis in fisheries investigations
- Socio economic analysis of environmental impacts and resource use to support maritime and coastal economies: Fisheries and aquaculture . Analysis of economic sector data with fisheries data.
- MSFD-related training (**On understanding of GES and possible tools to identify it: A descriptor based GES or combined**)
- Biodiversity monitoring and indicators for MSFD implementation
- Learning about Biofuels, other products from micro and macro algae

- Learning about deep sea resources and techniques for research including the required infrastructure and human capacity

Conclusions on the priority needs in training in the MISIS beneficiary countries

1. **Monitoring**
- Optimization of field surveys
- Modern methods in monitoring (chemical oceanography, pollutants (incl. radioactivity), biological elements (especially for macroalgae and angiosperms), measuring pollution effects via biomarkers, bathing water)
- Biodiversity monitoring, including phytoplankton and zooplankton taxonomy, and molecular taxonomy
- Ecotoxicological monitoring
- Measuring toxicity of phytoplankton species

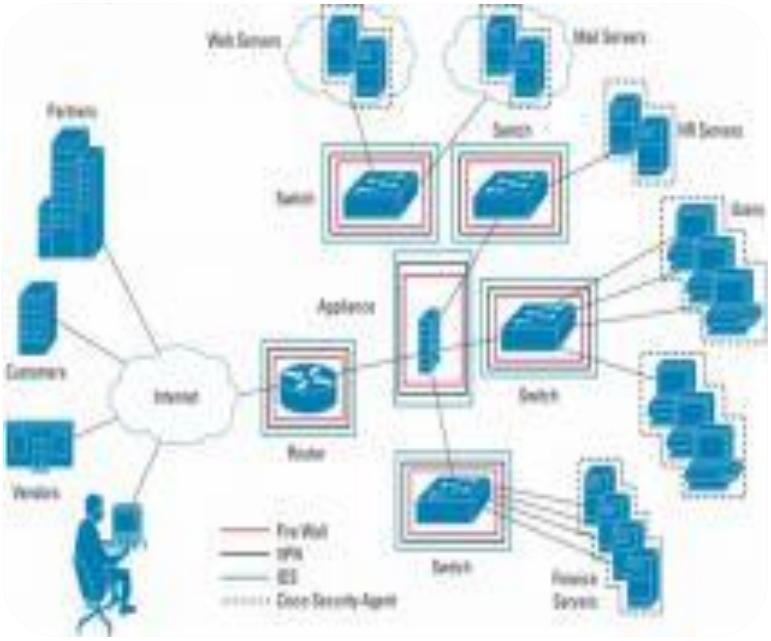
2. **Data processing and assessments**
- Oceanographic data statistical processing, visualization and analysis (especially applications in biology and ecology of STATISTICA, PRIMER 6, XLSTAT2012, as well as ArcView, Grapher, Surfer)
- MSFD-and WFD-related training: integrated chemistry and biology data assessment (according to WFD and MSFD requirements), identification of GES, development of indicators and methodologies for their calculation

Note: Such a training can be very beneficial, communicating the experience of BG and RO in identification of good ecological status sensu WFD.

- Modern analyitical/assessment tools (all spheres of investigations, priority mentioned - macro algae and angiosperms)

3. **Habitat mapping**

4. **Communication of research, development of public awareness** (e.g. for beach users preparation of communications on water quality, etc.)



VI. Data/information availability to comply with the MSFD

(versus Annex I and III of the MSFD)

This chapter deals with the requirements of the MSFD related to the Initial assessment (IA), (Art.8, Annex III), GES identification (Art. 9, Annex I), setting of targets (Art. 10) and the process of regular reviews to propose any necessary amendments in the measures (Art. 13) taken to achieve GES. The target period is 2006-2011. The frequency of observations is meant from monthly to annual, depending on the parameter discussed. The geographical coverage meant is the Exclusive Economic Zone of each country.

The Tables further presented reflect the availability of data to cover the indicators for each Descriptor of the MSFD (Annex I) and cross-check also the readiness of the beneficiary countries to provide for the IA and environmental targets identification. The fields marked in red in the Tables signify positive answers to the questions posted (which is good), the rest mean lack of data/information (green) or partial availability (yellow). Ironically, 'the greening' of the Black Sea in the field of environmental data/information availability to meet the requirements of the MSFD becomes visible immediately and conclusions on the gaps are made in the end of the Chapter.

BULGARIA

MoEW reported very limited data availability, collected by its own laboratories: nutrients in the water column; contaminants in water/sediment/biota; occurance and extent of acute pollution events; and loads from LBS (contaminants stemming to the Black Sea with municipal and industrial waste waters; agriculture&forestry run-offs). EAMA has no monitoring in the marine environment, but exercises inspections on ships related to environment and human safety aspects of shipping. NAFA collects fishery data/information in line with the CFP. The RHI provides for the compliance monitoring related to the Bathing Water Directive. The scientific institutions (IO-BAS, IBER-BAS, NIMH, and IFR) are the owners of the marine data/information (Tables 90-92) collected during different types of monitoring in the frames of national programmes, projects, problem-oriented EIA and others. These institutions trace the state of the Black Sea, identify trends in dynamics, however, their understanding of the causal chain pressures/impact is rather limited as demonstrated in Table 95.

Table 90. Check of availability of biological data in Bulgaria

Species	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)							
	MoEW	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
Bacteria	No	No	No	Yes	No	No	Yes	Yes
Phytoplankton	No	Yes	No	No	No	No	No	Yes
Protozoa	No	Yes[219]	No	No	No	No	No	Yes[163]
Macroalgae	No	Yes	No	Yes	No	No	No	Yes[220]

[219] For Noctiluca scintillans only
[220] Since 2009

Species	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)							
	MoEW	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
Mesozooplankton	No	Yes	No	No	No	No	No	Yes
Macrozooplankton	No	Yes	No	No	No	No	No	Yes
Meiobenthos	No	No	No	No	No	No	No	No
Macrozoobenthos	No	Yes	No	No	No	No	No	Yes
Fish	No	Yes	No	No	Yes	No	No	Yes
Mammals	No	Yes[165]	No	Yes	No	No	No	Yes[221]
Birds	No	No	No	Yes	No	No	No	No
Others	No	Genetics [222]	No	Fungi	No	No	No	Genetics[167]

A. Data availability versus Annex I of the MSFD

The Table below follows the EC COM Decision 2010/477/EU[223], which specifies criteria and indicators for Good Environmental Status definition (GES, *sensu* MSFD). Selected additional indicators are included, which could be used to identify GES.

Table 91.Check of data availability in Bulgaria versus Annex I of the MSFD

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)							
	MoEW	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
Descriptor 1: Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions								
1.1. Species distribution								
Distributional range	No	Yes[224]	No	Yes (GL/MPH[225])	Yes (F[226])	No	Yes (B[227])	Yes [228]
Distributional pattern within the latter, where appropriate	No	Yes	No	Yes (GL/MPH)	Yes (F)	No	No	Yes
Area covered by the species (for sessile/benthic species)	No	No	No	Yes (GL[229]/ MPH)	No	No	No	No
1.2. Population Size								
Population abundance and/or biomass, as appropriate	No	Yes	No	Yes (P[230])	Yes (F)	No	No	Yes
1.3. Population condition								
Population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity rates, survival/ mortality rates)	No	Yes	No	Yes (P)	Yes (F)	No	No	Yes
Population genetic structure, where appropriate	No	Yes[231]	No	Yes (P)	No	No	No	Yes [175]

[221] Mainly on strandings, very few data on population dynamics and by-catch.
[222] Limited to fish
[223] Commission Decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters (notified under document C(2010) 5956)/(2010/477/EU)
[224] For D1.1. IO-BAS data do not cover birds, bacteria, Protozoa (except *Noctiluca*) and meiobenthos, as specified above.
[225] GL/MPH – means geographically limited and for macrophytobenthos only
[226] F – for fish only
[227] For some pathogenic bacteria
[228] For the species specified above
[229] Only Bourgas Bay
[230] P – means Partly
[231] For fish

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)							
	MoEW	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
1.4. Habitat distribution								
Distributional range	No	Yes (P)	No	Yes (GL)	No	No	No	No
Distributional pattern	No	Yes (P)	No	Yes (GL)	No	No	No	No
1.5. Habitat extent								
Habitat area	No	No	No	Yes (GL)	No	No	No	No
Habitat volume, where relevant	No	No	No	Yes (GL)	No	No	No	No
1.6. Habitat condition								
Condition of the typical species and communities	No	No	No	Yes (GL/MPH)	No	No	No	No
Relative abundance and/or biomass, as appropriate	No	Yes	No	Yes (GL/MPH)	No	No	No	Yes
Physical, hydrological and chemical conditions	No	Yes	No	Yes (GL/MPH)	No	No	No	Yes
1.7. Ecosystem structure								
Composition and relative proportions of ecosystem components (habitats and species)	No	No	No	No	No	No	No	No
Ecosystem processes and functions: Interactions between the structural components of the ecosystem	No	No	No	No[232]	No	No	No	No
Descriptor 2: Non-indigenous species introduced by human activities are at levels that not adversely alter the ecosystem								
2.1. Abundance and spreading of non-indigenous species, in particular invasive species								
2.1.1.Trends in abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species, particularly invasive non-indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species	No	Yes	No	No	No	No	No	Yes
2.1.2. Vectors of introduction	No	No	No	No	No	No	No	No
2.2. Environmental impact of non-indigenous species								
2.2.1. Ratio between non-indigenous species and native species in some well-studied taxonomic groups, e.g. fish, macroalgae, molluscs	No	Yes (P)[233]	No	No	No	No	No	Yes (P)[234]
2.2.2. Magnitude of the impacts of non-indigenous species, in particular invasive species, on native communities, habitats and ecosystem functioning	No	Yes	No	No	No	No	No	Yes
2.2.3. The Biopollution Level (BPL) (index)	No	No	No	No	No	No	No	No

[232] The Quest says YES for 1.7 indicators, however, many ecosystem components are not studied, thus it seems the more appropriate answer is NO.
[233] For phyto-, zooplankton and macrozoobenthos only
[234] For zooplankton

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)							
	MoEW	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
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								
3.1. Level of pressure of the fishing activity								
3.1.1. Fishing mortality (F) related to a reference value	No	Yes	No	No	Yes (P)[180]	No	No	Yes
3.1.2. Catch/biomass ratio	No	Yes (P)[235]	No	No	Yes (P)[179]	No	No	Yes (P)
Maximum Sustainable Yield	No	Yes (P)[159]	No	No	Yes[236]	No	No	Yes (P)[179]
Trends in catches / biomass	No	Yes (P)[237]	No	No	Yes	No	No	Yes (P)[179]
3.2. Reproductive capacity of the stock								
3.2.1. Spawning Stock Biomass related to a reference value	No	Yes (P)[238]	No	No	Yes[239]	No	No	Yes (P)
3.2.2. Biomass indices	No	Yes (P)[180]	No	No	No	No	No	Yes (P)[180]
3.3. Population age and size distribution								
3.3.1. The proportion of fish larger than a given length, e.g. the length at which 100% of the females are mature	No	No	No	No	No	No	No	No
3.3.2. The mean maximum length across all species found in research vessel surveys	No	Yes	No	No	Yes	No	No	Yes (P)
3.3.3. The 95% percentile of the fish length distribution observed in research vessel surveys	No	No	No	No	Yes	No	No	No
Secondary indicator to D 3								
3.3.4. Size at full sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation	No	No	No	No	Yes[240]	No	No	No
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								
4.1. Productivity (production per unit biomass) of key species or trophic groups								
4.1.1. Performance of key predator species using their production per unit biomass (productivity)*	No	No	No	No	No	No	No	No
4.1.2. Production per unit biomass	No	No[241]	No	No	No	No	No	No
4.1.3. Marine Trophic Index	No	No	No	No	No	No	No	No
4.1.4. Trophic Levels (Functional feeding groups)	No	No[242]	No	No	No	No	No	No
4.1.5. Diet composition	No	Yes (P)[243]	No	No	No	No	No	Yes (P)[180]

[235] For turbot and sprat only
[236] For selected species only
[237] For selected fish species
[238] For sprat, turbot, anchovy, and whiting only
[239] For selected species only
[240] May be for fresh-water species only.
[241] Yes for Primary Production (PP) but very limited in frequency
[242] The Quest says No, however, for the BS Ecopath model (Daskalov, 2006) trophic levels were identified, and in the BSC Biodiversity Outlook Report (not published) there are calculations of the Trophic Index.
[243] For sprat, horse mackerel, and turbot only

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)							
	MoEW	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
4.2. Proportion of selected species at the top of food webs								
4.2.1. % Large fish (by weight)	No	Yes	No	No	No	No	No	No
4.2.2. Body size (length, weight) in selected functional groups/species	No	Yes	No	No	Yes	No	No	Yes
4.3. Abundance/distribution of key groups/species								
4.3.1. Abundance trends - Abundance and spatial distributions of species	No	Yes (P)[244]	No	No	Yes (P)[180]	No	No	Yes (P)
Additional to D4: Energy flows in food webs: Ratio of production or biomass between different trophic levels								
Ratio of pelagic to demersal fish biomass and/or production	No	No	No	No	No	No	No	No
Ratio of macrobenthos invertebrate to demersal fish production or biomass	No	No	No	No	No	No	No	No
Ratio zooplankton production required/ zooplankton production	No	No	No	No	No	No	No	No
Ratio benthic production required/benthic production	No	No	No	No	No	No	No	No
Descriptor 5: Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters								
Nutrient loads	No	Yes (P)[245]	No	No	No	No	No	Yes (P)[165]
5.1. Nutrient level								
5.1.1. Nutrients concentration in the water column	Yes	Yes	No	Yes	No	No	No	Yes
5.1.2. Nutrients ratio: Deviate from normal proportion of nutrient ratios (Si:N:P) (e.g. Si is reduced in relation to other nutrients)	No	Yes	No	Yes	No	No	No	No
5.2. Primary symptoms or directs effects of eutrophication								
5.2.1. Chlorophyll (concentration, spatial areas of high concentrations)	No	Yes	No	Yes	No	No	No	Yes [246]
5.2.2. Water transparency due to increase in suspended algae	No	Yes	No	Yes	No	No	No	Yes [247]
5.2.3. Algal community structure - Abundance/ Increase of opportunistic macroalgae (e.g. can form blankets over the natural flora and suffocate benthic animals	No	Yes	No	Yes	No	No	No	Yes
5.2.4. Species shift in floristic composition	No	Yes (P)	No	Yes (P)	No	No	No	Yes
5.2.5. Primary production	No	No (LD[248])	No	Yes	No	No	No	No

[244] For some groups or species of fast turnover rates
[245] The Data are not collected by the organization but received from other sources
[246] Derived by CTD, not very reliable
[247] Sechi Dics

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)							
	MoEW	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
5.2.6. Nuisance / toxic algal blooms	No	Yes	No	No	No	No	No	Yes
5.2.7. Submerged aquatic vegetation - spatial coverage and density of beds	No	No	No	Yes (GL)	No	No	No	No
5.3. Secondary symptoms or indirect effects of eutrophication								
5.3.1. Abundance/Decrease in perennial seaweeds and seagrasses	No	Yes	No	Yes	No	No	No	Yes (P)
5.3.2. Dissolved oxygen	Yes	Yes	No	Yes	No	No	No	Yes
5.3.3. Benthos - diversity and proportion of sensitive vs. non-sensitive species (e.g. P-R model)	No	Yes	No	Yes (GL/MPH)	No	No	No	Yes (P)[249]
5.3.4. Benthos / fish kills	No	No[250]	No	No	No	No	No	No
Descriptor 6: Sea-floor integrity is at a level that ensures that the structure and function of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected								
6.1. Physical damage, having regard to substrate characteristics	No	No (LD)	No	No	No	No	No	No
6.2. Type, abundance, biomass and areal extent of relevant biogenic substrate	No	Yes (P)	No	No	No	No	No	No
6.3. Extent of the seabed significantly affected by human activities for the different substrate types	No	No	No	No	No	No	No	No
6.4. Condition of benthic community	No	Yes	No	Yes (GL/MPH)	No	No	No	Yes
6.5. Structure of benthic habitats	No	Yes (P)	No	Yes	No	No	No	No
6.6. Abundance of bio-engineering species	No	Yes	No	Yes (GL/MPH)	No	No	No	Yes
6.7. Diversity and richness indices also taking into account species -area relationships	No	Yes	No	Yes (GL/MPH)	No	No	No	Yes
6.8. Proportion of biomass or number of individuals in the macrobenthos above some specified length/size	No	No	No	No	No	No	No	No
6.9. Biomass size spectrum	No	Yes (P)	No	No	No	No	No	Yes (P)
6.10. Shape of cumulative abundance curves of numbers of individuals by size group	No	Yes	No	No	No	No	No	Yes
6.11. Secondary production	No	No	No	No	No	No	No	No
6.12. Opportunistic-sensitive species proportion (e.g. AMBI, P-R-model)	No	Yes	No	No	No	No	No	Yes

[248] LD – very limited data
[249] For diversity only
[250] No regular monitoring

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)							
	MoEW	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
6.13. Parameters describing the characteristics (shape, slope and intercept) of the size spectrum of the benthic community	No	No	No	No	No	No	No	No
6.14. Presence of particularly sensitive and or tolerant species	No	Yes	No	Yes	No	No	No	Yes
Pressures - Descriptor 7: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems[251]								
Data/information on constructions at sea, landfills and land claim, barrages, windmill farms and other renewable energy constructions, oil and gas platforms and bridges, dredging and deposition in the sea, constructions on land with outlets into the sea e.g. power plants outfalls (Annex III, Table 2).	No	Yes (P)	No	No	No	No	No	No
Impacts - Descriptor 7: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems								
7.1. Spatial characterisation of permanent alterations	No	No	No	No	No	No	No	No
7.1.1. Extent of area affected by permanent alterations	No	No	No	No	No	No	No	No
7.1.2. Changes in sedimentation	No	No	No	No	No	No	No	No
7.2. Impact of permanent hydrographical changes	No	No	No	No	No	No	No	No
7.2.1. Spatial extent of benthic habitat affected by the permanent alteration	No	No	No	No	No	No	No	No
7.2.2. Changes in benthic communities and or biomass production	No	Yes	No	No	No	No	No	Yes
7.2.3. Extent of area with spatial or temporal hypoxia/anoxia	No	Yes[252]	No	No	No	No	No	No
7.2.4. Presence of benthic communities associated with low oxygen conditions	No	No	No	No	No	No	No	No
7.2.5.. Diversity and richness indices, based on species number and relative abundance in the benthic community	No	Yes	No	No	No	No	No	Yes
7.2.6.. Presence of particularly sensitive or tolerant species	No	Yes	No	No	No	No	No	Yes

[251] More detail specification of human activities was required in the Questionnaire, however, none of the stakeholders provided such information.
[252] Doubtful information.

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)							
	MoEW	**IO-BAS**	**EAMA**	**IBER**	**NAFA**	**NIMH**	**RHI**	**IFR**
7.2.7. Changes in habitat functions due to altered hydrographical conditions[253]	No	Yes (P)	No	No	No	No	No	No
Descriptor 8: Concentrations of contaminants are at levels not giving rise to pollution effects								
8.1 Concentrations in water, sediments and biota (measured, where relevant, in the same matrix[254])	Yes	Yes (P)[255]	No	Yes (P)	No	No	No	No
8.2. Biological effects on the elements of concerned ecosystems	No	No	No	No	No	No	No	No
8.3. Occurrence and extent of acute pollution events	Yes	No	No	No	No	No	No	No
Descriptor 9: Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards								
9.1. Frequency of levels exceeding regulatory levels	No	No	No	No	No	No	No	No
9.2. Actual levels detected	No	No	No	No	No	No	No	No
9.3 Numbers of contaminants for which exceeding levels have been detected	No	No	No	No	No	No	No	No
9.4. Origin of contaminants (geological versus anthropogenic; local versus long distance)	No	No	No	No	No	No	No	No
Descriptor 10: Properties and quantities of marine litter do not cause harm to the coastal and marine environment								
10.1. ML washed ashore and/or deposited on coastlines	No	No	No	No	No	No	No	No
10.2. ML in the water column, including floating and suspended litter on the sea floor	No	No	No	No	No	No	No	No
10.3. ML ingested by marine animals/birds	No	No	No	No	No	No	No	No
10.4. Microparticles (mainly mircroplastics) derived from degradation of litter	No	No	No	No	No	No	No	No
10.5. Impact rates of degraded litter on organisms	No	No	No	No	No	No	No	No
10.6. Potential chemical pollution resulting from degraded litter (plastic)	No	No	No	No	No	No	No	No
Descriptor 11: Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment								
11.1. Distribution in time and place of loud, low and mid frequency impulsive sounds	No	No	No	No	No	No	No	No
11.2 Continuous low frequency sound	No	No	No	No	No	No	No	No

[253] (e.g. changes in areas for fish/mammals reproduction (spawning areas, breeding), nursery and feeding areas and migration routes of fish, birds and mammals)

[254] List of priority Black Sea contaminants was required to be specified, however, none of the stakeholders gave this information.

[255] No for Biota

B. Data availability versus Annex III of the MSFD

Avoiding duplication with Annex I, here selected parts of Annex III are given for data availability check.

Table 92. Characteristics – state of the Sea in Bulgaria

Characteristic	Component	Criteria	Organizations involved in monitoring/data collection (Yes/No for each item and organization)							
			MoEW	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
Physical and chemical features	Bathymetry and topography		No	Yes	No	Yes (GL)	No	No	No	No
	Temperature and salinity regime, ice cover, current velocity, stratification (CIL[256]), upwelling, wave	Seasonal variability, spatial distribution, trends	No	Yes	No	No	No	Yes (P)[257]	No	Yes (P)
	pH, pCO, H_2S profiles		No	Yes	No	No	No	No	No	No
Biological features at the level of functional groups	Seabirds	Diversity, abundance, spatial distribution, migrations, trends	No	No	No	Yes	No	No	No	No
	Mammals		No	Yes (P)	No	Yes [258]	No	No	No	Yes (P)

In the Table below the availability of data/information to describe the human activities exercised in Black Sea national waters and on coast of the beneficiary country (BG) is presented. However, the shown availability reflects only the potential of the stakeholders contacted to describe human activities. This does not obligatory mean that data/information are absent in other stakeholders, which have not been included in the MISIS Quest. In this context, relevant explanations are given in footnote for each activity.

Table 93. Description of human activities in Bulgaria

Activity Theme	List of Human Activities	Description of marine use/activity/Organizations							
		MoEW[259]	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
Extraction of living resources	Fisheries incl. recreational fishing (fish & shellfish)	No	Yes[260]	No	No	Yes	No	No	No
	Seaweed and other sea-based food harvesting[261]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Extraction of genetic resources/ bioprospecting/ maerl[152]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[256] Cold Intermediate Layer
[257] Water temperature and salinity at 3 sations only
[258] Doubtful information.
[259] MoEW (the contacted person) reported no collection of data/information on human activity. Of course, this is not the case. Further, the cross-check shows that at least for **LBS** the Ministry traces the sources of pollutants and nutrients. And Agriculture&Forestry were mentioned to be known, together with point sources.
[260] Number of fishing vessels, fishing effort
[261] Not applicable for BG

Activity Theme	List of Human Activities	Description of marine use/activity/Organizations							
		MoEW[259]	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
Food production	Aquaculture (fin-fish & shellfish)	No	No	No	No	Yes	No	No	No
Man-made structures (incl. in construction)	Land claim, coastal defence[262]	No	No	No	No	No	No	No	No
	Port operations[153]	No	No	No	No	No	No	No	No
	Placement & operation of offshore structures (other than for energy production)[153]	No	No	No	No	No	No	No	No
	Submarine cable & pipeline operations[153]	No	No	No	No	No	No	No	No
Extraction of non-living resources	Marine mining (sand, gravel, rock)[153]	No	No	No	No	No	No	No	No
	Dredging[263]	No	No	No	No	No	No	No	No
	Desalination/water abstraction[152]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Energy production	Marine-based renewable energy generation (wind, wave & tidal power)[152]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Marine hydrocarbon extraction (oil & gas)[153]	No	No	No	No	No	No	No	No
Transport	Shipping	No	No	Yes	No	No	No	No	No
Waste disposal	Solid waste disposal incl. dredge material[264]	No	No	No	No	No	No	No	No
	Storage of gases[152]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tourism and recreation	Tourism & recreation incl. yachting	No	No	No	Yes (P)	No	No	Yes	No
Research and survey	Marine research, survey & educational activities	No	Yes	No	Yes	No	No	No	Yes
Military	Defence recurrent operations[265]	No	No	No	No	No	No	No	No
	Dumping of munitions[266]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Land-based activities (coastal, riverine and atmospheric)	Urban (municipal waste water discharge)	No????	No	No	Yes (P)	No	No	No	No
	Industry (discharges, emissions)	No????	No	No	Yes (P)	No	No	No	No
	Agriculture & forestry (run-off, emissions)	No????	No	No	Yes (P)	No	No	No	No
Other marine uses and activities		No	No	No	No	No	No	No	No

In the Table below, the cross-check provides for each human activity the availability of data/information to describe the pressures exercised on the Black Sea.

[262] They are quite well documented. For instance, human-induced coastline modifications and changes in beaches are well documented since 1908 for the Varna area, for other areas there are also long-term data/information.
[263] MoEW should have the data/information
[264] Disposal of wastes is forbidden, dumping should be known by the MoEW
[265] Ministry of Defence, confidential information
[266] It is forbidden. Illegal dumping hardly takes place.

Table 94. Human activities and pressures (cross-check) in Bulgaria (**Note**: N/A means not applicable; the Table synthesizes the input of all stakeholders contacted)

Activity Theme	Human Activities	***PRESSURES***											
		Physical loss (area, extent[267])	*Physical damage (area, extent)*	*Interference with hydrological processes*	*Other physical disturbance (areas, extent)*		*Contamination by hazardous substances (load)*	*Systematic and/or intentional release of substances (load)*	*Nutrient and organic matter enrichment (load)*	*Biological disturbances*			*Acidification*
		Smothering Sealing	Siltation Abrasion Extraction (e.g. sand)	Thermal and salinity regime change	Noise (trends in level)	Marine litter (trends in amount on coast and in sea)	Synthetic compounds Non-synthetic substances Radionuclides	e.g. produced water, carbon storage	Fertilizers and other nutrient-rich substances.	Extraction of species, including non-target [268]	Invasives, trans-locations [269]	Microbial pathogens	Decrease in pH
Extraction of living resources	Fisheries incl. recreational fishing (fish & shellfish)	No	No		No	No				Yes			
	Seaweed and other sea-based food harvesting	N/A	N/A							N/A			
	Extraction of genetic resources/ bioprospecting/ maerl	N/A	N/A							N/A			
Food production	Aquaculture (fin-fish & shellfish)						No		No		No	No	
Man-made structures (incl. in construction)	Land claim, coastal defence	No	No	No									
	Port operations	No	No	No							No		
	Placement & operation of offshore structures (other than for energy production)	No	Yes	No									
	Submarine cable & pipeline operations	No	No		No								
Extraction of non-living resources	Marine mining (sand, gravel, rock)	No	No		No					No			
	Dredging	No	No	No	No		No			No			
	Desalination/ water abstraction			N/A									
Energy production	Marine-based renewable energy generation (wind, wave & tidal power)	N/A	N/A	N/A	N/A	N/A							
	Marine hydrocarbon extraction (oil & gas)	No	No		No	No	No	No					
Transport	Shipping		No		No	No	Yes*				No		
Waste disposal	Solid waste disposal incl. dredge material	No	No										
	Storage of gases							N/A					
Tourism and recreation	Tourism & recreation incl. yachting				No	No			No			Yes	
Research and survey	Marine research, survey & educational activities				No					Yes			
Military	Defence recurrent operations				No	No							
	Dumping of munitions												
Land-based activities (coastal, riverine and atmospheric)	Urban (municipal waste water discharge)					No	Yes		Yes			No	Yes
	Industry (discharges, emissions)			No		No	Yes		Yes				
	Agriculture & forestry (run-off, emissions)						Yes		Yes				Yes[270]
Other marine uses and activities													

*Note: check whether the question was correctly understood. This pressure/impact has been reported by the Executive Agency Maritime Administration (EAMA).

[267] Area and extent, where mentioned, are meant for different types of affected substrates.
[268] The Pressure can be described by number of vessels, fishing effort, frequency trawled, etc.
[269] The pressure can be described by vectors of introduction, risk areas, number of new species identified per year, number of established species per decade, etc.
[270] Doubtful information

In the Table below cross-check of data/information for each pressure to describe the related impact is provided.

Table 95. Pressures and impacts (cross-check)[271] in Bulgaria

Pressure theme	Pressure	Impact on	Organizations involved in monitoring/data collection (Yes or No for each parameter)							
			MoEW	IO-BAS	EAMA	IBER	NAFA	NIMH	RHI	IFR
Physical loss	Smothering	Seabed Habitats	No	No	No	No	No	No	No	No
	Sealing		No	No	No	No	No	No	No	No
Physical damage	Siltation		No	No	No	No	No	No	No	No
	Abrasion		No	No	No	No	No	No	No	No
	Extraction		No	Yes	No	No	No	No	No	No
Other physical disturbance	Underwater noise	Functional groups and habitats (water column and seabed)	No	No	No	No	No	No	No	No
	Marine litter		No	No	No	No	No	No	No	No
Interference with hydrological processes	Thermal regime change	Functional groups and habitats (water column and seabed)	No	No	No	No	No	No	No	No
	Salinity regime change		No	No	No	No	No	No	No	No
Contamination by hazardous substances	Synthetic compounds	Seabed habitats, functional groups, seafood	No	No	No	Yes	No	No	No	No
	Non-synthetic substances		No	No	No	Yes	No	No	No	No
	Radionuclides		No	No	No	No	No	No	No	No
Systematic and/or intentional release of substances	Other substances	Seabed habitats, functional groups	No	No	No	Yes	No	No	No	No
Nutrient and organic matter enrichment	Nutrients	Water column and seabed habitats, species, functional groups, ecosystems	No	Yes	No	Yes	No	No	No	Yes
	Organic matter		No	Yes	No	Yes	No	No	No	No
Biological disturbance	Microbial pathogens	Safety of food (fish and other seafood), bathing water quality	No	No	No	No	No	No	Yes	No
	Non-native species and translocations	Water column and seabed habitats, species, functional groups, ecosystems	No	Yes	No	No	No	No	No	No
	Extraction of selected species incl. non-target catches	Water column and seabed habitats, species, functional groups, ecosystems	No	Yes	No	No	Yes [272]	No	No	No
Others			No	No	No	No	No	No	No	No

[271] The Table is similar to Table 2 from the EC document: **Guidance for 2012 reporting under the Marine Strategy Framework Directive**, however covers broader scale impacts under certain pressures as seen being possible in the Black Sea.

[272] NAFA says NO, however, according to the Tables above, idea about the impact on functional groups should be known by NAFA in order to manage fishery.

Conclusions on the gaps in data/information availability in BG to meet the requirements of the MSFD

1. Biological data gaps:
Protozoa and meiobenthos. Mammals are poorly studied as well.

2. MSFD Descriptors gaps

Descriptor 1: Biological diversity is maintained
- Areas covered by sessile/benthic species
- Distributional range and pattern of habitats
- Habitat area and volume
- Condition of the typical species and communities in habitats
- Ecosystem structures - composition and relative proportions of ecosystem components (habitats and species); ecosystem processes and functions: interactions between the structural components of the ecosystem

Descriptor 2: Environmental impact of non-indigenous species
- Vectors of introduction
- The Biopollution Level (BPL) (index)

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
- Biomass indices - very limited data
- The proportion of fish larger than a given length, e.g. the length at which 100% of the females are mature
- Size at full sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation[273]

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
For most of the indicators data are missing, very limited data are available for production per unit biomass and for diet composition. Energy flows through the food web are not estimated.

Descriptor 5: Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters
- Submerged aquatic vegetation - spatial coverage and density of beds – very limited data
- Benthos and fish kills are not regularly monitored

Descriptor 6: Sea-floor integrity is at a level that ensures that the structure and function of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected
- Physical damage, having regard to substrate characteristics - very limited data
- Type, abundance, biomass and areal extent of relevant biogenic substrate – very limited data
- Extent of the seabed significantly affected by human activities for the different substrate types – not known
- Proportion of biomass or number of individuals in the macrobenthos above some specified length/size – not known
- Secondary production – not known
- Parameters describing the characteristics (shape, slope and intercept) of the size spectrum of the benthic community – not known

[273] Note: NAFA reported data availability but it is doubtful the data are about Black Sea species.

Descriptor 7: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems

- Data/information on constructions at sea, landfills and land claim, barrages, oil and gas platforms and bridges, dredging and deposition in the sea, constructions on land with outlets into the sea e.g. power plants outfalls (Annex III, Table 2) – very limited data (or access to such data is limited)
- Changes in habitat functions due to altered hydrographical conditions (e.g. changes in areas for fish/mammals reproduction (spawning areas, breeding), nursery and feeding areas and migration routes of fish, birds and mammals) – very limited data

No data are available for:

- Spatial characterisation of permanent alterations
- Extent of area affected by permanent alterations
- Changes in sedimentation
- Impact of permanent hydrographical changes
- Spatial extent of benthic habitat affected by the permanent alteration
- Extent of area with spatial or temporal hypoxia/anoxia
- Presence of benthic communities associated with low oxygen conditions

Descriptor 8: Concentrations of contaminants are at levels not giving rise to pollution effects

- Biota contamination – very limited data
- Biological effects on the elements of concerned ecosystems - No data

Descriptor 9: Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards - No data

Descriptor 10: Properties and quantities of marine litter do not cause harm to the coastal and marine environment - No data

Descriptor 11: Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment - No data

3. Characteristics – state of the Sea

No substantial gaps identified.

4. Human Activities description gaps

The gaps identified according to the contacted stakeholders response are not the real gaps. Human activities are well documented in BG, except for illegal practices (extraction of living and non-living resources, dumping of forbidden wastes, illegal discharges from ships or LBS, dredging, etc.). However, the data/information available are dispersed in many different organizations, which do not normally exchange them and there is no mechanism to arrange for this on a regular basis. On an adhock basis, as for instance the case of the collection of data to prepare the Initial Assessment under the MSFD, the MoEW has contacted the relevant organizations and they have been helpful in providing metadata and some of them also data.

5. Pressures gaps

Knowing the human activities does not mean that the related pressures are well documented.
The main gaps are in the pressures related to:

- Aquaculture
- Land claim and coastal defence
- Port operations – construction in ports (e.g. new terminals, etc.) go through EIA, however, other pressures are poorly documented (bunkering, emissions, release of anti-fouling chemicals, noise, loading of hazardous substances, ship-generated waste, etc.). There is no ballast water monitoring as well as a regular practice.
- Submarine cables and pipeline operations

- Marine mining
- Dredging
- Marine hydrocarbon extraction
- Dumping of spoils
- Shipping
- Agriculture

Most poorly known pressures are: physical loss and damage, other physical disturbance (noise and marine litter), thermal and salinity regime change, and contamination by hazardous substances (especially for sediments and biota).

6. Impacts gaps

As the pressures are poorly known, consequently the state of the environment is feebly related to them so that to speak with certainty about impacts. The Table below shows the major gaps and uncertainties in knowledge related to causal chains of pressures/impacts. The greenish fields show those areas where impact is known to exist but not studied even qualitatively. By asterisk (*) the insufficiency of data is marked. Almost uknown are the impacts related to the following pressures: physical loss and damage, other physical disturbance (noise and marine litter), thermal and salinity regime change, and contamination by hazardous substances, as demonstrated also in Table 95 (above). Worse known and related to pressures are the impacts on macroalgae, seagrasses and mammals.

Table 96. Synthetic analysis of pressures and impacts (Bulgaria)

		1	2	3	4	5	6	7	8	9
	Pressures / **Impact on:**	Changes in fresh water and sediment riverine fluxes	Nutrients and organic matter enrichment	Contamination by hazardous substances	Physical damage of habitats	Loss of habitats	Introduction of non-indigenous species	Marine litter	Underwater noise	Other pressure (extraction of species)
A	Plankton	*								*
B	Macroalgae			*	*					*
C	Seagrass		*		*					*
D	Zoobenthos		*	*	*	*				
F	Fish	*	*	*	*	*	*			
G	Marine mammals									*
H	Birds	*	*		*		*			

* Low or very low data/information availability and lack of proper quantified assessments

Note: For A9, B9 and C9 the impact may be high through trophic cascades, however, proper distinguishing between top-down, bottom-up and wasp-waste control for the Black Sea ecosystem has never been achieved.

Note: For B3, D3 and F3 eco-physiological effects are almost not known, as well as changes in the structures of the communities.

Note: For F9 quantitative assessments are also limited to selected commercial species.

	Intensity of the impact (based on their associated risk for biodiversity conservation)
	High impact
	Significant impact
	Low impact
	No impact
	Existing interaction, but the impact has not been determined even qualitattively
	Misread interaction, impact not determined

ROMANIA

Among all stakeholders contacted in RO, those who mentioned availability of data (any kind, which would be useful in the MSFD process) were respectively included in the Tables further. The stakeholders who answered with 'No' to all questions posted in the MISIS Questionnaire Part II (see Annex I) were: **Constanta City Hall**, **Constanta County Department of Statitics** (their response to the Questionnaire Part I did not also provide information on what data this organization collects)[274], and **Constanta Maritime Hydrographic Directorate** (**Note**: in the Questionnaire Part I they have reported measurements of noise and salinity),

Environmental Protection Agency Constanta (EPA-Constanta) specified availability of data only for the pressures under the MSFD Descriptor 7 (*Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems).* In Romania all requests for realization of projects (e.g. constructions at sea, landfills and land claim, barrages, windmill farms and other renewable energy constructions, oil and gas platforms and bridges, dredging and deposition in the sea, constructions on land with outlets into the sea e.g. power plants outfalls, etc. (Annex III, Table 2)) are submitted at county level and EPA-Constanta releases regulatory documents for them (permissions).

Border Police General Inspectorate and Naval Academy are included in those Tables only, where they have provided information.

Among those organizations, which responded to the Questionnaire Part I, but are missing as response to its Part II are: private companies and NGOs (such as Mare Nostrum, EXXON Exploration, OMV Petrom SA, Thermoelectric Factory Midia, and Sc AQUASERV SA) and some governmental organizations (Ministry of Env., Romanian Space Agency, National Institute for Tourism Research, Tulcea County Department of Public Health, and National Port Administration).

In the Tables below, where applicable, **Dobrogea Litoral** (Romanian Water Administration) is abbreviated as **DobLit, Constanta County Department of Public Health – CCDPH** (**Note**: The Tulcea Department would provide similar information, see Chapter I.3 for their monitoring activities), **Border Police General Inspectorate – BPGI**, **Naval Academy – NA**. NIMRD and GeoEcoMar are abbreviations widely used in the whole report.

Table 97. Check of availability of biological data in Romania

Species	**Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)**			
	NIMRD	**GeoEcoMar**	**DobLit**	**CCDPH**
Bacteria	?	No	No	Yes
Phytoplankton	Yes[275]	Yes[276]	Yes	No
Protozoa	?	No	No	No
Macroalgae	Yes	No	Yes[277]	No
Mesozooplankton	Yes	Yes[189]	No	No
Macrozooplankton	Yes	Yes[278]	No	No
Meiobenthos	Yes	Yes[279]	No	No
Macrozoobenthos	Yes	Yes[280]	Yes	No

[274] Surely there is an annula book produced by them (in Romanian), and it should be public on the webpage: www.constanta.insse.ro.
[275] Available data for coastal and marine waters up to 30Nm distance
[276] Data for 2006 for the coastal zone and in 2008-2011 for the RO Black Sea shelf, emphasis on *Calanus euxinus, Pseudocalanus elongatus, Anomalocera patersoni, Labidocera brunescens* for species distribution
[277] Monitored once every 3 years
[278] For Ctenophores and Aurelia aurita
[279] For all species of the groups Foraminifera, Nematoda, Ostracoda and Kinorhyncha
[280] For all species registered in Romanian Black Sea shelf with some exception (certain species from Nemertea, Bryozoa and the entire group Oligocheta). For species distribution emphasis on: *Rapana venosa, Lentidium mediterraneum, Mytilus galloprovincialis, Modiolula phaseolina, Mya arenaria, Alitta succinea, Dipolydora quadrilobata, Melinna palmata*, *Caprella acanthifera, Orchomene humilis, Megamphopus cornutus, Cumella pygmaea euxinica, Paramysis kroyeri, etc.*

Species	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)			
	NIMRD	GeoEcoMar	DobLit	CCDPH
Fish	Yes	Yes	No	No
Mammals	Yes[281]	No	No	No
Birds	No	No	No	No
Others	No	No	No	No

A. Data availability versus Annex I of the MSFD

The Table below follows the EC COM Decision 2010/477/EU[282], which specifies criteria and indicators for Good Environmental Status definition (GES, *sensu* MSFD). Selected additional indicators are included, which could be used to identify GES.

Constanta County Department of Public Health is not included in the Table below as they provided information related to the MSFD Descriptors, but in the following format:

Mineral oils mg/l
Surfactants (which reacts with methylene blue) mg/l lauril sulfat
Phenols (phenol index) C_4H_5OH mg/l
Transparency m
pH
Dissolved Oxygen
O_2 saturation degree
CBO_5
Temperature °C
Activity for radionuclides emitting gamma radiation (Bq)
Global alpha and beta activity (Bq)
Tritium radionuclide activity in water (Bq)

Table 98. Check of data availability in Romania versus Annex I of the MSFD

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)		
	NIMRD	GeoEcoMar	DobLit
Descriptor 1: *Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions*			
1.1. Species distribution			
Distributional range	Yes	Yes	Yes
Distributional pattern within the latter, where appropriate	Yes	Yes	No
Area covered by the species (for sessile/benthic species)	Yes[283]	Yes	No
1.2. Population Size			
Population abundance and/or biomass, as appropriate	Yes	Yes	Yes
1.3. Population condition			
Population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity rates, survival/ mortality rates)	Yes[284]	Yes[285]	No

[281] On strandings and bycatch only
[282] Commission Decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters (notified under document C(2010) 5956)/(2010/477/EU)
[283] For macroalgae and macrozoobenthos
[284] Body size for mussels; Age class structure, fecundity rate, survival/mortality rates for fish
[285] Body size and age class structure (Copepoda, Nematoda, *Melinna palmata, Mytilus galloprovincialis, Mytilaster lineatus, Rapana venosa,* Mysida and Cumacea)
Sex ratio (Copepoda, Nematoda, Mysida and Cumacea)

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)		
	NIMRD	GeoEcoMar	DobLit
Population genetic structure, where appropriate	No	No	No
1.4. Habitat distribution			
Distributional range	Yes (P)[286]	Yes[287]	No
Distributional pattern	Yes (P)[226]	Yes[288]	No
1.5. Habitat extent			
Habitat area	Yes (P)[226]	Yes	No
Habitat volume, where relevant	No	Yes	No
1.6. Habitat condition			
Condition of the typical species and communities	Yes (P)[226]	Yes	Yes
Relative abundance and/or biomass, as appropriate	Yes (P)[226]	Yes	Yes
Physical, hydrological and chemical conditions	???	Yes	Yes[289]
1.7. Ecosystem structure			
Composition and relative proportions of ecosystem components (habitats and species)	Yes	Yes	Yes (P)[290]
Ecosystem processes and functions: Interactions between the structural components of the ecosystem	Yes	Yes (P)[291]	No[292]
Descriptor 2: *Non-indigenous species introduced by human activities are at levels that not adversely alter the ecosystem*			
2.1. Abundance and spreading of non-indigenous species, in particular invasive species			
2.1.1.Trends in abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species, particularly invasive non-indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species	Yes (P)[293]	Yes (P) [294]	No
2.1.2. Vectors of introduction	Yes[295]	Yes[296]	No
2.2. Environmental impact of non-indigenous species			
2.2.1. Ratio between non-indigenous species and native species in some well-studied taxonomic groups, e.g. fish, macroalgae, molluscs	Yes	Yes (P)[297]	No
2.2.2. Magnitude of the impacts of non-indigenous species, in particular invasive species, on native communities, habitats and ecosystem functioning	No	Yes	No
2.2.3. The Biopollution Level (BPL) (index)	No	No	No
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[298]			
3.1. Level of pressure of the fishing activity			
3.1.1. Fishing mortality (F) related to a reference value	Yes	No	No
3.1.2. Catch/biomass ratio	Yes	No	No
Maximum Sustainable Yield	Yes	No	No
Trends in catches / biomass	Yes	No	No
3.2. Reproductive capacity of the stock			
3.2.1. Spawning Stock Biomass related to a reference value	Yes	No	No

[286] For 1.4, 1.5.1 and 1.6. the available data/information are for the habitats designated under NATURE2000.
[287] Pelagic zone: coastal and offshore waters; Benthic zone: Littoral rock and other hard substrata, littoral sediment, infralittoral rock and other hard substrata, sublittoral sediment and deep-sea bed
[288] Pelagic zone: DCM, thermocline and CIL; Benthic zone: Bathymetric gradient, sediment grain size, oxygen regime and dominant species
[289] For 16.1-1.6.3 DobLit specified availability of data for habitats as per each water body identified (transitional, coastal and marine waters). **Note**: it is not clear they mean pelagic habitats only or all.
[290] The Quest says 'Yes", however, most of the components of the ecosystem are not studied.
[291] Productivity and eutrophication-related effects
[292] The Quest says 'Ecological status provided by ARQ Program, however, this is something different.
[293] For *Mnemiopsis leidyi, Beroe ovata, Rapana venosa, Anadara inaequivalvis, Mya arenaria*
[294] *Mnemiopsis leidyi, Beroe ovata, Oithona brevicornis (**Note**: the right name is O. davisae), Corambe obscura, Rapana venosa, Anadara inaequivalvis, Mya arenaria*
[295] Written ballast water, however, it is important to know from where the ballast water originates, this is the vector as well.
[296] The Ports of Midia, Constanta and Mangalia mentioned, this hardly means that ballast water are studied in all of them.
[297] For Mollusca and Crustacea
[298] NIMRD answered YES to all indicators, however, most probably they had in mind selected species (turbot, sprat, e.g.) for knowing the safe biological limits.

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)		
	NIMRD	GeoEcoMar	DobLit
3.2.2. Biomass indices	Yes	No	No
3.3. Population age and size distribution			
3.3.1. The proportion of fish larger than a given length, e.g. the length at which 100% of the females are mature	Yes	No	No
3.3.2. The mean maximum length across all species found in research vessel surveys	Yes	No	No
3.3.3. The 95% percentile of the fish length distribution observed in research vessel surveys	Yes	No	No
Secondary indicator to D3.3			
3.3.4. Size at full sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation	Yes	No	No
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*			
4.1. Productivity (production per unit biomass) of key species or trophic groups			
*4.1.1. Performance of key predator species using their production per unit biomass (productivity)**	Yes	No	No
4.1.2. Production per unit biomass	No	Yes (P)[299]	No
4.1.3. Marine Trophic Index	No	No	No
4.1.4. Trophic Levels (Functional feeding groups)	No	Yes (P)[300]	No
4.1.5. Diet composition	No	No	No
4.2. Proportion of selected species at the top of food webs			
4.2.1. % Large fish (by weight)	Yes	No	No
4.2.2. Body size (length, weight) in selected functional groups/species	Yes	No	No
4.3. Abundance/distribution of key groups/species			
4.3.1. Abundance trends - Abundance and spatial distributions of species	Yes[301]	Yes	No
Additional to D4: Energy flows in food webs: Ratio of production or biomass between different trophic levels			
Ratio of pelagic to demersal fish biomass and/or production	Yes	No	No
Ratio of macrobenthos invertebrate to demersal fish production or biomass	Yes	No	No
Ratio zooplankton production required/ zooplankton production	Yes	Yes	No
Ratio benthic production required/benthic production	Yes	Yes	No
Descriptor 5: *Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters*			
Nutrient loads	Yes	Yes	Yes
5.1. Nutrient level			
5.1.1. Nutrients concentration in the water column	Yes	Yes	Yes
5.1.2. Nutrients ratio: Deviate from normal proportion of nutrient ratios (Si:N:P) (e.g. Si is reduced in relation to other nutrients)	Yes	Yes	No
5.2. Primary symptoms or directs effects of eutrophication			
5.2.1. Chlorophyll (concentration, spatial areas of high concentrations)	Yes	Yes	Yes
5.2.2. Water transparency due to increase in suspended algae	Yes	Yes	Yes
5.2.3. Algal community structure - Abundance/Increase of opportunistic macroalgae (e.g. can form blankets over the natural flora and suffocate benthic animals	Yes	No	Yes

[299] Benthos
[300] Without Fish and mammals
[301] For phyto and zooplankton, jellies, macrozoobenthos and fish

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)		
	NIMRD	GeoEcoMar	DobLit
5.2.4. Species shift in floristic composition	Yes	Yes	No
5.2.5. Primary production	Yes	No	No
5.2.6. Nuisance / toxic algal blooms	No	No	Yes
5.2.7. Submerged aquatic vegetation - spatial coverage and density of beds	Yes	No	Yes[302]
5.3. Secondary symptoms or indirect effects of eutrophication			
5.3.1. Abundance/Decrease in perennial seaweeds and seagrasses	Yes	No	
5.3.2. Dissolved oxygen	Yes	Yes	
5.3.3. Benthos - diversity and proportion of sensitive vs. non-sensitive species (e.g. P-R model)	Yes	Yes	
5.3.4. Benthos / fish kills	Yes	Yes	
Descriptor 6: Sea-floor integrity is at a level that ensures that the structure and function of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected			
6.1. Physical damage, having regard to substrate characteristics	????	Yes	No
6.2. Type, abundance, biomass and areal extent of relevant biogenic substrate	Yes	Yes	No
6.3. Extent of the seabed significantly affected by human activities for the different substrate types	????	Yes	No
6.4. Condition of benthic community	Yes	Yes	No
6.5. Structure of benthic habitats	Yes	Yes	No
6.6. Abundance of bio-engineering species	No	No	No
6.7. Diversity and richness indices also taking into account species -area relationships	Yes	Yes	No
6.8. Proportion of biomass or number of individuals in the macrobenthos above some specified length/size	Yes[303]	Yes (P)[304]	No
6.9. Biomass size spectrum	Yes	Yes (P)	No
6.10. Shape of cumulative abundance curves of numbers of individuals by size group	Yes	Yes (P)	No
6.11. Secondary production	Yes	Yes	No
6.12. Opportunistic-sensitive species proportion (e.g. AMBI, P-R-model)	Yes[305]	Yes (AMBI)	Yes
6.13. Parameters describing the characteristics (shape, slope and intercept) of the size spectrum of the benthic community	Yes (P)[306]	Yes (P)[249]	No
6.14. Presence of particularly sensitive and or tolerant species	Yes	Yes	No
Pressures - *Descriptor 7*: *Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems*			
Data/information on constructions at sea, landfills and land claim, barrages, windmill farms and other renewable energy constructions, oil and gas platforms and bridges, dredging and deposition in the sea, constructions on land with outlets into the sea e.g. power plants outfalls (Annex III, Table 2).	Yes[307]	Yes[308]	No
Impacts - *Descriptor 7*: *Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems*			
7.1. Spatial characterisation of permanent alterations	No	Yes	No
7.1.1. Extent of area affected by permanent alterations	????	Yes	No
7.1.2. Changes in sedimentation	Yes	Yes	No
7.2. Impact of permanent hydrographical changes	No	Yes	No

[302] For macroalgae
[303] Especially for mussels
[304] For 6.8-6.10: *Mytilus galloprovincialis, Mytilaster lineatus, Rapana venosa, Melinna palmata*
[305] AMBI, M-AMBI
[306] For mussels
[307] Data for oil and gas platforms and bridges, dredging and deposition in the sea based on the information from EIA (Evaluation of Environmental Impact Studies)
[308] Oil and gas platforms, dredging and deposition in the sea, constructions on land with outlets into the sea

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)		
	NIMRD	GeoEcoMar	DobLit
7.2.1. Spatial extent of benthic habitat affected by the permanent alteration	Yes	Yes	No
7.2.2. Changes in benthic communities and or biomass production	Yes	Yes	No
7.2.3. Extent of area with spatial or temporal hypoxia/anoxia	Yes	Yes	No
7.2.4. Presence of benthic communities associated with low oxygen conditions	Yes	Yes	No
7.2.5.. Diversity and richness indices, based on species number and relative abundance in the benthic community	Yes	Yes	No
7.2.6.. Presence of particularly sensitive or tolerant species	Yes	Yes	No
7.2.7. Changes in habitat functions due to altered hydrographical conditions (e.g. changes in areas for fish/mammals reproduction (spawning areas, breeding), nursery and feeding areas and migration routes of fish, birds and mammals)	Yes	No	No
Descriptor 8: *Concentrations of contaminants are at levels not giving rise to pollution effects*			
8.1 Concentrations in water, sediments and biota (measured, where relevant, in the same matrix)	Yes[309]	Yes (P)[310]	Yes (P)[311]
8.2. Biological effects on the elements of concerned ecosystems	No	No	No
8.3. Occurrence and extent of acute pollution events	Yes (P)[312]	No	No
Descriptor 9: *Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards*			
9.1. Frequency of levels exceeding regulatory levels	No	No	No
9.2. Actual levels detected	Yes (LD)[313]	No	No
9.3 Numbers of contaminants for which exceeding levels have been detected	No	No	No
9.4. Origin of contaminants (geological versus anthropogenic; local versus long distance)	Yes[314]	No	No
Descriptor 10: *Properties and quantities of marine litter do not cause harm to the coastal and marine environment*			
10.1. ML washed ashore and/or deposited on coastlines[315]	No	No	No
10.2. ML in the water column, including floating and suspended litter on the sea floor	Yes (P)[316]	No	No
10.3. ML ingested by marine animals/birds	No	No	No
10.4. Microparticles (mainly mircroplastics) derived from degradation of litter	No	No	No
10.5. Impact rates of degraded litter on organisms	No	No	No
10.6. Potential chemical pollution resulting from degraded litter (plastic)	No	No	No
Descriptor 11: *Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment*			
11.1. Distribution in time and place of loud, low and mid frequency impulsive sounds	No	No	No
11.2 Continuous low frequency sound	No	No	No

Note: Naval Academy has reported data on noise, but it is not clear whether they could cover the specific indicators under the Descriptor 11.

[309] OCP's in water, sediments and biota; PAH'S in water, sediments; TPHs in water, sediments; Heavy metals in water, sediments and biota
[310] Trace metals in sediments
[311] Water and sediments
[312] Occurrence and extent of acute oil pollution events
[313] Some data on OCP's and heavy metals in molluscs, limited data for fish
[314] Antropogenic, local and long-distance
[315] All contacted stakeholders have said No, however, in RO Marine Litter data for the coast is available in the NGO Mare Nostrum, as demonstrated in Chapter I on the monitoring.
[316] For 2010 and 2011

B. Data availability versus Annex III of the MSFD

Avoiding duplication with Annex I, here selected parts of Annex III are given for data availability check.

Table 99. Characteristics – state of the Sea in Romania

Characteristic	Component	Criteria	Organizations involved in monitoring/data collection (Yes/No for each item and organization)				
			NIMRD	GeoEcoMar	DobLit	BPGI	*NA*
Physical and chemical features	Bathymetry and topography		Yes (P)[317]	Yes	Yes (P)[318]	No	*No*
	Temperature and salinity regime, ice cover, current velocity, stratification (CIL[319]), upwelling, wave	Seasonal variability, spatial distribution, trends	Yes (P)[320]	Yes (P)[321]	Yes	Yes	*No*
	pH, pCO, H_2S profiles		Yes (P)[322]	Yes (P)[323]	Yes	No	No
Biological features at the level of functional groups	Seabirds	Diversity, abundance, spatial distribution, migrations, trends	No	No	No	No	No
	Mammals		Yes (P)	No	No	Yes[324]	No

In the Table below the availability of data/information to describe the human activities exercised in Black Sea national waters and on coast of the beneficiary country (RO) is presented. According to the information provided, the **Naval Academy is the organization having the ability to describe any human activity in Romanian Black Sea waters[325] and on** coast.

Table 100. Description of human activities in Romania

Activity Theme	List of Human Activities	Description of marine use/activity/Organization able to provide it					
		NIMRD	GeoEcoMar	DobLit	CCDPH	BPGI	NA
Extraction of living resources	Fisheries incl. recreational fishing (fish & shellfish)	Yes[326]	No	No	No	Yes[327]	Yes
	Seaweed and other sea-based food harvesting	N/A??	No	No	No	No	Yes????
	Extraction of genetic resources/ bioprospecting/ maerl	N/A??	No	No	No	No	Yes????
Food production	Aquaculture (fin-fish & shellfish)	Yes[328]	No	No	No	No	Yes
Man-made structures	Land claim, coastal defence	Yes[329]	No	No	No	No	Yes

[317] Only bathymetry
[318] Bathymetry once per year
[319] Cold Intermediate Layer
[320] Temperature, salinity, ice cover
[321] Temperature, salinity, and CIL
[322] Only pH
[323] pH and H_2S
[324] May be by-catch.
[325] However, the validity of the information has to be checked, because they have also reported information available for activities which are not exercised in RO waters according to NIMRD.
[326] Number of fisheries permits, No of equipment, fishing fleet, TAC, no info for recreational.
[327] Illegal fishery: Under the law, the territorial structure of Coast Guard is charged with preventing and combating illegal fishing.
[328] Aquaculture production by species
[329] Surface of land claimed from the see

Activity Theme	List of Human Activities	Description of marine use/activity/Organization able to provide it					
		NIMRD	GeoEcoMar	DobLit	CCDPH	BPGI	NA
(incl. in construction)	Port operations	Yes[330]	No	No	No	No	Yes
	Placement & operation of offshore structures (other than for energy production)[153]	Yes[331]	No	No	No	No	Yes
	Submarine cable & pipeline operations	Yes[332]	No	No	No	No	Yes
Extraction of non-living resources	Marine mining (sand, gravel, rock)	N/A????	No	No	No	No	Yes????
	Dredging	Yes[333]	No	No	No	No	Yes
	Desalination/water abstraction[152]	N/A????	No	No	No	No	Yes????
Energy production	Marine-based renewable energy generation (wind, wave & tidal power)	N/A????	No	No	No	No	Yes????
	Marine hydrocarbon extraction (oil & gas)	Yes[334]	No	Yes[335]	No	Yes[336]	Yes
Transport	Shipping	Yes[337]	No	No	No	Yes	Yes
Waste disposal	Solid waste disposal incl. dredge material[338]	Yes[339]	No	No	No	No[340]	Yes
	Storage of gases	N/A???	N/A	N/A	N/A	N/A	Yes????
Tourism and recreation	Tourism & recreation incl. yachting	Yes[341]	No	Yes	No	Yes	Yes
Research and survey	Marine research, survey & educational activities	Yes[342]	No	No	No	Yes	Yes
Military	Defence recurrent operations	Yes[343]	No	No	No	Yes[344]	Yes
	Dumping of munitions	N/A????	No	No	No	No	Yes?[345]
Land-based activities (coastal, riverine and atmospheric)	Urban (municipal waste water discharge)	Yes[346]	No	Yes[347]	No	No	Yes
	Industry (discharges, emissions)	Yes[348]	Yes	No	No	No	Yes
	Agriculture & forestry (run-off, emissions)	No	No	No	No	No	Yes
Other marine uses and activities		No	No	No	No	No	No

[330] No of ships in/out of port, type of cargo, quantity of cargo by type, port development in future
[331] No of structure, location
[332] Position of cable, type of cable or pipe
[333] Location of activities and possible quantities of materials that were removed
[334] Production of oil and gas
[335] Tomis and Belona Ports
[336] BPGI monitors through surveillance systems and vessels patrol the hydrocarbon prospecting activities in the contiguous and exclusive economic zone
[337] No of ships in transit, type of cargo carried, quantities of cargo carried, types of ships
[338] Disposal of wastes is forbidden, dumping of spoils is legal
[339] Position of disposal, and quantities
[340] Here is NO, and in the next Table is YES, one of these should be true.
[341] Location of touristic activities, no of tourists, types of recreational activities and location
[342] Location of research activities and type of activities
[343] Location of exercise polygons, number of exercises
[344] BPGI preforms shooting trainings or law enforcement in the territorial sea, contiguous zone and exclusive economic zone in accordance with the laws
[345] Activity 'Dumping of munitions" is illegal in the BS region (see the Dumping Protocol to the Bucharest Convention, http://www.blacksea-commission.org/_convention-protocols.asp).
[346] Location of discharges, quantities, total amount of waste water sufficiently or insufficiently treated
[347] Wastewater treatment
[348] Location of discharges, quantities, total amount of waste water sufficiently or insufficiently treated

In the Table below, the cross-check provides for each human activity the availability of data/information to describe the pressures exercised on the Black Sea.

Table 101. Human activities and pressures (cross-check) in Romania (**Note**: N/A means not applicable; the Table synthesizes the input of all stakeholders contacted)

Activity Theme	**Human Activities**	***PRESSURES***											
		Physical loss (area, extent[349])	*Physical damage (area, extent)*	*Interference with hydrological processes*	*Other physical disturbance (areas, extent)*		*Contamination by hazardous substances (load)*	*Systematic and/or intentional release of substances (load)*	*Nutrient and organic matter enrichment (load)*	*Biological disturbances*			*Acidification*
		Smothering Sealing	Siltation Abrasion Extraction (e.g. sand)	Thermal and salinity regime change	Noise (trends in level)	Marine litter (trends in amount on coast and in sea)	Synthetic compounds Non-synthetic substances Radionuclides	e.g. produced water, carbon storage	Fertilizers and other nutrient-rich substances.	Extraction of species, including non-target[350]	Invasives, translocations [351]	Microbial pathogens	Decrease in pH
Extraction of living resources	Fisheries incl. recreational fishing (fish & shellfish)	Yes	Yes		No	Yes				Yes			
	Seaweed and other sea-based food harvesting	N/A	N/A							N/A			
	Extraction of genetic resources/ bioprospecting/ maerl	N/A	N/A							N/A			
Food production	Aquaculture (fin-fish & shellfish)						No		Yes		Yes	No	
Man-made structures (incl. in construction)	Land claim, coastal defence	Yes	Yes	Yes									
	Port operations	Yes	Yes	Yes							No		
	Placement & operation of offshore structures (other than for energy production)	Yes	No	Yes									
	Submarine cable & pipeline operations	No	No		No								
Extraction of non-living resources	Marine mining (sand, gravel, rock)	N/A	N/A		N/A					Yes			
	Dredging	Yes	Yes	No	No		No			No			
	Desalination/water abstraction			N/A									
Energy production	Marine-based renewable energy generation (wind, wave & tidal power)	N/A	N/A	N/A	N/A	N/A							
	Marine hydrocarbon extraction (oil & gas)	Yes	Yes		No	No	Yes	Yes					
Transport	Shipping		Yes		No	No	Yes				Yes		
Waste disposal	Solid waste disposal incl. dredge material	Yes	Yes										
	Storage of gases							N/A					
Tourism and recreation	Tourism & recreation incl. yachting				No	No			No	Yes		Yes	
Research and survey	Marine research, survey & educational activities				No					Yes			
Military	Defence recurrent operations				No	No							
	Dumping of munitions												
Land-based activities (coastal, riverine and atmospheric)	Urban (municipal waste water discharge)					No	Yes	Yes	Yes			Yes	Yes
	Industry (discharges, emissions)			No		No	Yes	Yes	Yes				
	Agriculture & forestry (run-off, emissions)						Yes		Yes				No
Other marine uses and activities													

[349] Area and extent, where mentioned, are meant for different types of affected substrates.
[350] The Pressure can be described by number of vessels, fishing effort, frequency trawled, etc.
[351] The pressure can be described by vectors of introduction, risk areas, number of new species identified per year, number of established species per decade, etc.

In the Table below cross-check of data/information for each pressure to describe the related impact is provided.

Table 102. Pressures and impacts (cross-check)[352] in Romania

Pressure theme	Pressure	Impact on	Organizations involved in monitoring/data collection (Yes or No for each parameter)					
			NIMRD	GeoEcoMar	DobLit	CCDPH	BPGI	NA
Physical loss	Smothering	Seabed Habitats	Yes	Yes	No	No	No	No
	Sealing		Yes	Yes	No	No	No	No
Physical damage	Siltation		Yes	Yes	No	No	No	No
	Abrasion		Yes	Yes	No	No	No	No
	Extraction		Yes	Yes	No	No	No	No
Other physical disturbance	Underwater noise	Functional groups and habitats (water column and seabed)	No	No	No	No	No	No
	Marine litter		Yes[353]	No	No	No	No	No
Interference with hydrological processes	Thermal regime change	Functional groups and habitats (water column and seabed)	No	Yes	No	No	No	No
	Salinity regime change		No	Yes	No	No	No	No
Contamination by hazardous substances	Synthetic compounds	Seabed habitats, functional groups, seafood	Yes	No	No	No	No	No
	Non-synthetic substances		Yes[354]	Yes (P)[355]	No	No	No	No
	Radionuclides		No	No	No	No	No	No
Systematic and/or intentional release of substances	Other substances	Seabed habitats, functional groups	Yes	No	No	No	No	No
Nutrient and organic matter enrichment	Nutrients	Water column and seabed habitats, species, functional groups, ecosystems	Yes	Yes	Yes	No	No	No
	Organic matter		Yes	Yes	Yes	No	No	No
Biological disturbance	Microbial pathogens	Safety of food (fish and other seafood), bathing water quality	Yes	No	No	Yes	No	No
	Non-native species and translocations	Water column and seabed habitats, species, functional groups, ecosystems	Yes	Yes	No	No	No	No
	Extraction of selected species incl. non-target catches	Water column and seabed habitats, species, functional groups, ecosystems	Yes	Yes	No	No	No	No
Others			No	No	No	No	No	No

[352] The Table is similar to Table 2 from the EC document: **Guidance for 2012 reporting under the Marine Strategy Framework Directive**, however covers broader scale impacts under certain pressures as seen being possible in the Black Sea.
[353] Impact in the sea is most probably not studied, this answer is rather doubtful.
[354] According to the info above, little is known about the impact, investigations on biological effects are scarce. May be partially YES is the more correct answer.
[355] For trace metals

Conclusions on the gaps in data/information availability in RO to meet the requirements of the MSFD

1. Biological data: Mammals are insufficiently studied (mainly strandings data). For birds the information should be verified with relevant organizations.

2. MSFD Descriptors

Descriptor 1: Biological diversity is maintained
- Population genetic structure

Descriptor 2: Environmental impact of non-indigenous species
- Vectors of introduction[356]
- The Biopollution Level (BPL) (index)

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
NIMRD answered YES to all indicators, however, most probably they had in mind selected species (turbot, sprat, e.g.) for knowing the safe biological limits, whereas the Descriptor requires investigations on ALL commercially exploited species. Therefore, the available safe biological limits should be further checked and list those which are missing, then expanding of investigations for them could be recommended.

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
For some of the indicators data are limited or missing: e.g. production per unit biomass, trophic levels, and diet composition. Marine Trophic Index is not calculated.

Descriptor 5: Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters
No substantial gaps have been reported, nuisance and toxic algal blooms need to be better traced.

Descriptor 6: Sea-floor integrity is at a level that ensures that the structure and function of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected
- Parameters describing the characteristics (shape, slope and intercept) of the size spectrum of the benthic community – known for mussels only.

Descriptor 7: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems
No substantial gaps reported, more problem-oriented studies are needed into the impact of permanent hydrographical changes.

Descriptor 8: Concentrations of contaminants are at levels not giving rise to pollution effects
- PAHs in sediments – further studies are required to distinguish between natural and anthropogenic sources. Recommended indices/ratios are: LMW/HMW; IP/(IP+BghiP); Fl/Fl+Py; BaA/228; total PAHs index.
- Biota contamination – PCBs and PAHs are almost not studied; biomagnification along the food web is not known for all pollutants.
- Biological effects on the elements of concerned ecosystems – there are few investigations on general biomarkers like lysososmal membrane stability and oxidative enzymes. There are no studies on specific biomarkers as metalothionein, vitelogenin content, etc.

[356] There were answeres YES, but they are doubtful, it should be further checked whether Vecrors of introduction are properly traced.

Descriptor 9: Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards
Limited data are available. No data are reported for:

- Frequency of levels exceeding regulatory levels
- Number of contaminants exceeding regulatory levels

Descriptor 10: Properties and quantities of marine litter do not cause harm to the coastal and marine environment
Limited data are available, mostly for the coast.

Descriptor 11: Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment
Data availability is reported, however, it is not clear whether the specific indicators could be covered.

3. Characteristics – state of the Sea
No substantial gaps.

4. Human Activities
Human activities are well documented in RO, including illegal practices. However, the different stakeholders provided a bit contradictory information. It should be verified which human activities are not applicable for the Romanian coast and BS waters.

5. Pressures
The main gaps are in the pressures related to:

- Aquaculture – synthetic and non-synthetic substances release, microbial pathogens
- Port operations – ballast water monitoring is absent, risk assessments have not been conducted
- Submarine cables and pipeline operations

The List should be further completed where needed after careful re-check of the Table on Human activities and related Pressures.

6. Impacts
According to the information provided, for the following pressures the impacts are not known:

- Underwater noise (for water column and seabed habitats)
- Radionuclides

Little is known about the impacts related to contamination by hazardous substances and marine litter. More studies are needed to better understand how the thermal and salinity regime changes impact the biota and which are the critical loads of nutrients and pollutants stemming from LBS.

Table 103. Synthetic analysis of pressures and impacts **in Romania** (**Note:** the template is adopted from the PERSEUS Project with modifications)

		1	2	3	4	5	6	7	8	9
	Pressures / **Impact on:**	Changes in fresh water and sediment riverine fluxes	Nutrients and organic matter enrichment	Contamination by hazardous substances	Physical damage of habitats	Loss of habitats	Introduction of non-indigenous species	Marine litter	Underwater noise	Other pressure (extraction of species)
A	Plankton	*								*
B	Macroalgae	*	*				*			
C	Seagrass	*	*							
D	Zoobenthos			*						
F	Fish	*	*				*			
G	Marine mammals									*
H	Birds									

* Low or very low data/information availability and lack of proper quantified assessments

Note: Extraction of species (fishery) is not extensive in RO waters, therefore, the impacts are not distinguished as high. However, the fishery problem is transboundary, many BS fish stocks are depleted due to overfishing exercised by other BS countries. So, the impact of extraction of species on the pelagic and benthic communities in RO waters should be nested into a broader picture than taking into consideration the fishery activities in RO waters only.

	Intensity of the impact (based on their associated risk for biodiversity conservation)
	High impact
	Significant impact
	Low impact
	No impact
	Existing interaction, but the impact has not been determined even qualitattively
	Misread interaction, impact not determined

The abbreviations used in the Tables below are as follows:

- Ministry of Environment and Urbanization – MoEU
- Istanbul University/Faculty of Marine Sciences and Management – IU/MSM
- TUBITAK Marmara Research Center (Istanbul) – TUBITAK
- Istanbul University (Faculty of Fishery) – IU/FF
- Karadeniz Technical University, Faculty of Marine Science, Trabzon – KTU/FMS
- Recep Tayyip Erdoğan University Faculty of Fisheries – RTEU/FF
- Çanakkale Onsekiz Mart Univ. Faculty of Marine Sciences and Technology – COMU/FMST
- Institute of Marine Sciences/METU (Erdemli) – IMS/METU
- Central Fisheries Research Institute (Trabzon) – CFRI
- Nature Conservation Center - NCC

TURMEPA[357] was contacted for the Part II of the Questionnaire, however, they reported no data/information availability and, therefore, they are not included in the Tables below.

According to the information provided in Tables 104-106, among the 8 major research institutions dealing with the Black Sea in Turkey (studies in the sea itself), at least 3 have the set of biological elements investigated from bacteria to fish.

Table 104. Check of availability of biological data in Turkey

Species	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)										
	MoEU	IU/FMSM	TUBITAK	TUDAV	IU/FF	KTU/FMS	RTEU/FF	COMU/FMST	IMS/METU	CFRI	NCC
Bacteria	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Phytoplankton	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No
Protozoa	No	Yes	No	No	No	Yes	Yes	Yes	No	No	No
Macroalgae	Yes	Yes	No	No	Yes	No	Yes	Yes	No	No	No
Mesozooplankton	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	No
Macrozooplankton	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Meiobenthos	No	Yes	No	No	No	No	Yes	Yes	No	No	No
Macrozoobenthos	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Fish	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes[358]
Mammals	No	No	No	Yes	Yes	No	Yes	No	Yes	No	Yes
Birds	No	No	No	No	No	No	No	No	No	No	Yes
Others	No	No	No	No	No	No	Yes	No	Turtles	No	Yes[359]

A. Data availability versus Annex I of the MSFD

The Table below follows the EC COM Decision 2010/477/EU[360], which specifies criteria and indicators for Good Environmental Status definition (GES, *sensu* MSFD). Selected additional indicators are included, which could be used to identify GES.

Note: The response of MoEU is based on the work carried out or planned in the TR National Project "Quality Assessment and Classification of Marine and Coastal Waters (DeKoS)". This Project (2011-2013) is funded by the MoEU and implemented by TUBITAK/MRC, as mentioned already. National monitoring data sets are considered both in the Project and for the replies below.

Note: The TR stakeholders have answered to many questions in the Table below 'YES', without specifying to what extend this 'YES' covers the possibilities to provide for data to calculate the indicators in each Descriptor (as it was the practice applied by the stakeholders in BG and RO).Therefore, the 'YES' answers should be regarded with caution, especially for those descriptors related to biological elements. This shall be kept in mind for each particular organization. For instance, the 'YES' answers of the Central Fisheries Institute refer to fish and macrozoobenthos only, etc. The Nature Conservation Center (NCC) is a stakeholder involved in research on coast only. So, when they talk about mammals, for instance, it does not mean sea mammals, but those who inhabit the coast, and mainly forests, not wetlands. The same is for birds, NCC does not study seabirds. That is why seabirds look like non-studied in TR, which is for sure not the case. BirdLife International (http://www.birdlife.org/seabirds/index.html) or other relevant organizations have to be contacted to clarify the situation. And this was the case in all MISIS beneficiary countries, not only in TR. Marine scientists, who also implement MISIS, do not sufficiently communicate with ornithologists, and understandably they know little about the Birds Directive or projects dealing with birds and their protection. It would be beneficial to summon together seabirds researchers with marine scientists and encourage them to learn from each other.

[357] DenizTemiz Derneği/TURMEPA- Turkish Marine Environment Protection Association. Postal address: Nakkaştepe Azizbey Sok. No:26 Kuzguncuk Üsküdar/İstanbul-Turkey; webpage: www.turmepa.org.tr; Contact person: Aslin Karanfil; Nakkaştepe Azizbey Sok. No:26 Kuzguncuk; Üsküdar/İstanbul-Turkey; Tel: 0090216 310 93 01; Fax:0090216 343 21 77; E-mail: asline@turmepa.org.tr

[358] All 'YES' marked in this colour mean on coast organisms.

[359] Plant species, plant communities, dragonflies, butterflies and herpetofauna

[360] Commission Decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters (notified under document C(2010) 5956)/(2010/477/EU)

Table 105. Check of data availability in Turkey versus Annex I of the MSFD

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)										
	MoEU	IU/FMSM	TUBITAK	TUDAV	IU/FF	KTU/FMS	RTEU/FF	COMU/FMST	IMS/METU	CFRI	NCC
Descriptor 1: *Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions*											
1.1. Species distribution											
Distributional range	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Distributional pattern within the latter, where appropriate	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Area covered by the species (for sessile/benthic species)	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
1.2. Population Size											
Population abundance and/or biomass, as appropriate	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes		Yes
1.3. Population condition											
Population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity rates, survival/ mortality rates)	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Population genetic structure, where appropriate	No	No	No	Yes	Yes	Yes	Yes	No	No	Yes	No
1.4. Habitat distribution											
Distributional range	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distributional pattern	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.5. Habitat extent											
Habitat area	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Habitat volume, where relevant	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No
1.6. Habitat condition											
Condition of the typical species and communities	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Relative abundance and/or biomass, as appropriate	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Physical, hydrological and chemical conditions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
1.7. Ecosystem structure											
Composition and relative proportions of ecosystem components (habitats and species)	No	Yes	No	No	No	Yes	Yes	Yes	No	Yes	Yes
Ecosystem processes and functions: Interactions between the structural components of the ecosystem	No	Yes[361]	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Descriptor 2: *Non-indigenous species introduced by human activities are at levels that not adversely alter the ecosystem*											
2.1. Abundance and spreading of non-indigenous species, in particular invasive species											
2.1.1.Trends in abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species, particularly invasive non-indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No
2.1.2. Vectors of introduction	Yes	No	Yes	Yes	No	No	No	No	No	Yes	No
2.2. Environmental impact of non-indigenous species											
2.2.1. Ratio between non-indigenous species and native species in some well-studied taxonomic groups, e.g. fish, macroalgae, molluscs	No	No	Yes	No	No	No	Yes	Yes	Yes	Yes	No

[361] The "YES"s for Ecosystem structure contradict the 'NO's above, which state that there is no data on Species, population and habitat level. Actually, all these 'NO's are also in contradiction with Table 104 above, where it is stated that the organization (IU/FMSM) studies almost all biological elements. Thus, the information provided needs further check.

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)										
	MoEU	IU/FMSM	TUBITAK	TUDAV	IU/FF	KTU/FMS	RTEU/FF	COMU/FMST	IMS/METU	CFRI	NCC
2.2.2. Magnitude of the impacts of non-indigenous species, in particular invasive species, on native communities, habitats and ecosystem functioning	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No
2.2.3. The Biopollution Level (BPL) (index)	Yes	No	Yes	No	No	No	No	Yes	Yes	No	No
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											
3.1. Level of pressure of the fishing activity											
3.1.1. Fishing mortality (F) related to a reference value	Yes	No	No	No	No	Yes	No	Yes	Yes	Yes	No
3.1.2. Catch/biomass ratio	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No
Maximum Sustainable Yield	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No
Trends in catches / biomass	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No
3.2. Reproductive capacity of the stock											
3.2.1. Spawning Stock Biomass related to a reference value	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
3.2.2. Biomass indices	No	No	No	No	Yes	No	Yes	Yes	Yes	Yes	No
3.3. Population age and size distribution											
3.3.1. The proportion of fish larger than a given length, e.g. the length at which 100% of the females are mature	No	No	No	No	No	Yes	No	Yes	Yes	Yes	No
3.3.2. The mean maximum length across all species found in research vessel surveys	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No
3.3.3. The 95% percentile of the fish length distribution observed in research vessel surveys	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No
Secondary indicator to D3.3											
3.3.4. Size at full sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No
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*											
4.1. Productivity (production per unit biomass) of key species or trophic groups											
*4.1.1. Performance of key predator species using their production per unit biomass (productivity)**	Yes	No	No	No	No	No	No	Yes	Yes	Yes	No
4.1.2. Production per unit biomass	No	No	No	No	No	No	No	Yes	Yes	No	No
4.1.3. Marine Trophic Index	No	No	No	No	No	No	No	Yes	Yes	No	No
4.1.4. Trophic Levels (Functional feeding groups)	No	No	No	No	No	Yes	No	Yes	Yes	No	
4.1.5. Diet composition	No	No	No	No	No	Yes	No	No	No	Yes	No
4.2. Proportion of selected species at the top of food webs											
4.2.1. % Large fish (by weight)	Yes	No	No	No	No	Yes	No	Yes	No	Yes	No
4.2.2. Body size (length, weight) in selected functional groups/species	No	No	No	No	No	Yes	No	Yes	Yes	Yes	No
4.3. Abundance/distribution of key groups/species											
4.3.1. Abundance trends - Abundance and spatial distributions of species	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Additional to D4: Energy flows in food webs: Ratio of production or biomass between different trophic levels											
Ratio of pelagic to demersal fish biomass and/or production	Yes[362]	No	No	No	No	Yes	No	Yes	Yes	Yes	No
Ratio of macrobenthos invertebrate to demersal fish production or biomass	No	No	No	No	No	No	No	Yes	No	Yes	No

[362] Based on landings data

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)										
	MoEU	IU/FMSM	TUBITAK	TUDAV	IU/FF	KTU/FMS	RTEU/FF	COMU/FMST	IMS/METU	CFRI	NCC
Ratio zooplankton production required/ zooplankton production	No	No	No	No	No	Yes	No	Yes	No	Yes	No
Ratio benthic production required/benthic production	No	No	No	No	No	No	No	No	No	Yes	No
Descriptor 5: *Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters*											
Nutrient loads	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes	
5.1. Nutrient level											
5.1.1. Nutrients concentration in the water column	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
5.1.2. Nutrients ratio: Deviate from normal proportion of nutrient ratios (Si:N:P) (e.g. Si is reduced in relation to other nutrients)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
5.2. Primary symptoms or directs effects of eutrophication											
5.2.1. Chlorophyll (concentration, spatial areas of high concentrations)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
5.2.2. Water transparency due to increase in suspended algae	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No
5.2.3. Algal community structure - Abundance/Increase of opportunistic macroalgae (e.g. can form blankets over the natural flora and suffocate benthic animals	Yes	Yes	Yes	No	No	No	No	Yes	No	No	No
5.2.4. Species shift in floristic composition	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No
5.2.5. Primary production	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	No	No
5.2.6. Nuisance / toxic algal blooms	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No
5.2.7. Submerged aquatic vegetation - spatial coverage and density of beds	No	Yes	No	No	No	Yes	No	Yes	No	No	No
5.3. Secondary symptoms or indirect effects of eutrophication											
5.3.1. Abundance/Decrease in perennial seaweeds and seagrasses	No	No	No	No	No	No	Yes	Yes	No	No	No
5.3.2. Dissolved oxygen	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No
5.3.3. Benthos - diversity and proportion of sensitive vs. non-sensitive species (e.g. P-R model)	No	No	No	No	No	No	No	Yes	No	Yes	No
5.3.4. Benthos / fish kills	No	No	No	No	No	No	No	Yes	No	Yes	No
Descriptor 6: Sea-floor integrity is at a level that ensures that the structure and function of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected											
6.1. Physical damage, having regard to substrate characteristics	No	No	No	No	No	Yes	No	Yes	No	Yes	No
6.2. Type, abundance, biomass and areal extent of relevant biogenic substrate	No	No	No	No	No	No	No	No	Yes	Yes	No
6.3. Extent of the seabed significantly affected by human activities for the different substrate types	No	No	No	No	No	No	No	Yes	No	Yes	No
6.4. Condition of benthic community	Yes	No	Yes	No	No	No	Yes	Yes	No	Yes	No
6.5. Structure of benthic habitats	No	No	No	No	No	No	Yes	Yes	No	Yes	No
6.6. Abundance of bio-engineering species	No	No	No	No	No	No	No	No	No	No	No
6.7. Diversity and richness indices also taking into account species -area relationships	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)										
	MoEU	IU/FMSM	TUBITAK	TUDAV	IU/FF	KTU/FMS	RTEU/FF	COMU/FMST	IMS/METU	CFRI	NCC
6.8. Proportion of biomass or number of individuals in the macrobenthos above some specified length/size	No	No	No	No	No	No	No	Yes	No	Yes	No
6.9. Biomass size spectrum	No	No	No	No	No	No	No	Yes	No	Yes	No
6.10. Shape of cumulative abundance curves of numbers of individuals by size group	No	No	No	No	No	No	No	Yes	No	Yes	No
6.11. Secondary production	No	No	No	No	No	No	No	Yes	No	Yes	No
6.12. Opportunistic-sensitive species proportion (e.g. AMBI, P-R-model)	Yes	No	Yes	No	No	No	No	Yes	No	Yes	No
6.13. Parameters describing the characteristics (shape, slope and intercept) of the size spectrum of the benthic community	No	No	No	No	No	No	Yes	Yes	No	Yes	No
6.14. Presence of particularly sensitive and or tolerant species	Yes	No	Yes	No	No	No	No	Yes	No	Yes	No
Pressures - *Descriptor 7*: *Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems*[363]											
Data/information on constructions at sea, landfills and land claim, barrages, windmill farms and other renewable energy constructions, oil and gas platforms and bridges, dredging and deposition in the sea, constructions on land with outlets into the sea e.g. power plants outfalls (Annex III, Table 2).	Yes[364]	No	Yes	No	No	No	No	No	No	No	Yes (P)
Impacts - *Descriptor 7*: *Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems*											
7.1. Spatial characterisation of permanent alterations	Yes	No	Yes	No	No	No	No	Yes	No	No	Yes
7.1.1. Extent of area affected by permanent alterations	No	No	No	No	No	No	No	Yes	No	Yes	Yes
7.1.2. Changes in sedimentation	No	No	No	No	No	No	No	Yes	No	Yes	No
7.2. Impact of permanent hydrographical changes	No	No	No	No	No	No		Yes	No	Yes	No
7.2.1. Spatial extent of benthic habitat affected by the permanent alteration	No	No	No	No	No	No	Yes	Yes	No	Yes	No
7.2.2. Changes in benthic communities and or biomass production	No	No	No	No	No	No	Yes	Yes	No	Yes	No
7.2.3. Extent of area with spatial or temporal hypoxia/anoxia	Yes	No	No	No	No	No	No	Yes	No	No	No
7.2.4. Presence of benthic communities associated with low oxygen conditions	No	No	No	No	No	No	No	Yes	No	Yes	No
7.2.5.. Diversity and richness indices, based on species number and relative abundance in the benthic community	No	No	No	No	No	No	Yes	Yes	No	Yes	No
7.2.6.. Presence of particularly sensitive or tolerant species	No	No	No	No	No	No	Yes	Yes	No	Yes	No
7.2.7. Changes in habitat functions due to altered hydrographical conditions (e.g. changes in areas for fish/mammals reproduction	No	No	No	No	No	Yes	No	Yes	Yes	Yes	No

[363] More detail specification of human activities was required in the Questionnaire, however, none of the stakeholders provided such information.
[364] Dredging and deposition, landfills and land claim, constructions on land with outlets at sea, oil and gas platforms and bridges

MSFD Descriptor and relevant indicators	Organizations involved in monitoring/data collection (Yes/No for each parameter and organization)										
	MoEU	IU/FMSM	TUBITAK	TUDAV	IU/FF	KTU/FMS	RTEU/FF	COMU/FMST	IMS/METU	CFRI	NCC
(spawning areas, breeding), nursery and feeding areas and migration routes of fish, birds and mammals)											
Descriptor 8: *Concentrations of contaminants are at levels not giving rise to pollution effects*											
8.1 Concentrations in water, sediments and biota (measured, where relevant, in the same matrix[365])	Yes	No	Yes	No	No	Yes	No	Yes	Yes	Yes	No
8.2. Biological effects on the elements of concerned ecosystems	No	No	Yes	No	No	No	No	Yes	Yes	Yes	No
8.3. Occurrence and extent of acute pollution events	No	No	No	No	No	No	No	Yes	Yes	No	No
Descriptor 9: *Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards*											
9.1. Frequency of levels exceeding regulatory levels	No[366]	No	No	No	Yes	No	No	No	Yes	No	No
9.2. Actual levels detected	No	No	No	No	Yes	No	No	No	Yes	No	No
9.3 Numbers of contaminants for which exceeding levels have been detected	No	No	No	No	Yes	Yes	No	No	Yes	No	No
9.4. Origin of contaminants (geological versus anthropogenic; local versus long distance)	No	No	No	No	No	Yes	No	No	No	No	No
Descriptor 10: *Properties and quantities of marine litter do not cause harm to the coastal and marine environment* [367]											
10.1. ML washed ashore and/or deposited on coastlines	No	No	No	Yes	Yes	No	No	No	No	No	No
10.2. ML in the water column, including floating and suspended litter on the sea floor	No	No	No	Yes	Yes	No	No	No	Yes (P)	No	No
10.3. ML ingested by marine animals/birds	No	No	No	No	No	No	No	No	No	No	No
10.4. Microparticles (mainly mircroplastics) derived from degradation of litter	No	No	No	No	No	No	No	No	Yes (P)[368]	No	No
10.5. Impact rates of degraded litter on organisms	No	No	No	No	No	No	No	No	No	No	No
10.6. Potential chemical pollution resulting from degraded litter (plastic)	No	No	No	No	No	No	No	No	No	No	No
Descriptor 11: *Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment* [369]											
11.1. Distribution in time and place of loud, low and mid frequency impulsive sounds	No	No	No	Yes	Yes	No	No	No	No	No	No
11.2 Continuous low frequency sound	No	No	No	Yes	Yes	No	No	No	No	No	No

[365] List of priority Black Sea contaminants is not yet elaborated in TR, but a national project is implemented (2012-2014), which should deliver such a List. It is coordinated by TUBITAK/MRC and supported by the Ministry of Water and Forest focusing on the development of Environmental Quality Standards basing on the chemicals in Annex VIII and X of WFD.

[366] However, the Ministry says that an assessment is being prepared by the project DeKoS (TUBITAK) through consultation with relevant organizations.

[367] The Ministry informs that the project DeKOS prepares an assessment in consultation with relevant organizations, and gaps and needs are also being identified.

[368] Just initiated

[369] The same as for Marine Litter

B. Data availability versus Annex III of the MSFD

Avoiding duplication with Annex I, here selected parts of Annex III are given for data availability check.

Table 106. Characteristics – state of the Sea in Turkey

Characteristic	Component	Criteria	Organizations involved in monitoring/data collection (Yes/No for each item and organization)									
			MoEU [370]	IU/ FMSM	TUBITAK [371]	TUDAV	IU/ FF	KTU/ FMS	RTEU/ FF	COMU/ FMST	IMS/ METU	CFRI	NCC
Physical and chemical features	Bathymetry and topography		Yes	No	Yes	No	No	No	No	Yes	Yes	No	No
	Temperature and salinity regime, ice cover, current velocity, stratification (CIL[372]), upwelling, wave	Seasonal variability, spatial distribution, trends	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No
	pH, pCO, H_2S profiles		No	No	No	No	No	Yes	Yes	Yes	No	Yes	No
Biological features at the level of functional groups	Seabirds	Diversity, abundance, spatial distribution, migrations, trends	No	No	No	No	No	No	No	No	No	No	No
	Mammals		No	No	No	Yes	Yes	No	No	No	Yes	No	Yes

In the Table below the availability of data/information to describe the human activities exercised in Black Sea national waters and on coast of the beneficiary country (TR) is presented. The shown availability reflects only the potential of the stakeholders contacted to describe human activities. The Karadeniz Technical University (Faculty of Marine Science) provided detail information which organizations are data/information holders regarding human activities (see in the Footnote 304).

Table 107. Description of human activities in Turkey

Note: according to the responses of the stakeholders, it is not clear which activities are applicable for the TR Black Sea. For instance, renewable energy, dumping of munitions, desalinization, storage of gasses, etc. should be checked for relevanance.

Activity Theme	List of Human Activities	Description of marine use/activity/Organizations										
		MoEU	IU/ FMSM	TUBITAK	TUDAV	IU/ FF	KTU/ FMS[373]	RTEU/ FF	COMU/ FMST	IMS/ METU	CFRI	NCC
Extraction of living resources	Fisheries incl. recreational fishing (fish & shellfish)	No	No	No	No	No	No	Yes	No	Yes	Yes	
	Seaweed and other sea-based food harvesting	No	No	No	No	No	No	No	No	No	Yes [374]	
	Extraction of genetic resources/ bioprospecting/ maerl	No	No	No	No	No	No	No	No	No	Yes [375]	
Food production	Aquaculture (fin-fish & shellfish)	Yes	No	Yes	No	No	No	Yes	No	No	Yes	

[370] The given "Yes"s below mean that data are collected from the NODC and partner institutions of the DeKoS Project, such as the Istanbul University (Faculty of Marine Sciences and Management) and IMS/METU (Erdemli)
[371] The same comment as for the MoEU (above 301)
[372] Cold Intermediate Layer
[373] The University gave information which organizations are holders of respective data/information. They listed the following:
Fisheries incl. recreational fishing (fish & shellfish); Aquaculture (fin-fish & shellfish); Placement & operation of offshore structures (other than for energy production) ; Dredging - Information is available in the national fisheries statistics (TUİK)
Port operations; Shipping - Information is available in the national fisheries statistics and Ministry of Transport Maritime Affairs and Communications
Submarine cable & pipeline operations; Marine-based renewable energy generation (wind, wave & tidal power) - Information is available in Ministry of Energy and Natural Resources
Solid waste disposal incl. dredge material; Urban (municipal waste water discharge); Industry (discharges, emissions); Agriculture & forestry (run-off, emissions); Coastal mining (sand) - Information is available in local Municipalities
Tourism & recreation incl. yachting - Information is available in the Ministry of Tourism
Marine research, survey & educational activities - Information is available from the Universities and Research Centers
[374] Doubtful information
[375] Doubtful information

Activity Theme	List of Human Activities	Description of marine use/activity/Organizations										
		MoEU	IU/ FMSM	TUBITAK	TUDAV	IU/ FF	KTU/ FMS[373]	RTEU/ FF	COMU/ FMST	IMS/ METU	CFRI	NCC
Man-made structures (incl. in construction)	Land claim, coastal defence	Yes	No	Yes	No	No	No	No	No	No	Yes	
	Port operations	Yes	No	Yes	No	No	No	No	No	No	No	
	Placement & operation of offshore structures (other than for energy production)	No	No	No	No	No	No	No	No	No	No	
	Submarine cable & pipeline operations	Yes	No	Yes	No	No	No	No	No	No	No	
Extraction of non-living resources	Marine mining (sand, gravel, rock)	No	No	No	No	No	No	No	No	No	No	
	Dredging	Yes	No	Yes	No	No	No	No	No	No	Yes	
	Desalination/water abstraction	No	No	No	No	No	No	No	No	No	No	
Energy production	Marine-based renewable energy generation (wind, wave & tidal power)	No	No	No	No	No	No	No	No	No	No	
	Marine hydrocarbon extraction (oil & gas)	No	No	No	No	No	No	No	No	No	No	
Transport	Shipping	Yes	No	Yes	No	No	No	No	No	No	No	
Waste disposal	Solid waste disposal incl. dredge material	Yes	No	No	No	No	No	No	No	No	No	
	Storage of gases	No	No	No	No	No	No	No	No	No	No	
Tourism and recreation	Tourism & recreation incl. yachting	Yes	No	Yes	No	No	No	No	No	No	No	Yes (P)
Research and survey	Marine research, survey & educational activities	Yes	No	Yes	No	No	No	No	No	Yes	Yes	
Military	Defence recurrent operations	No	No	No	No	No	No	No	No	No	No	
	Dumping of munitions	No	No	No	No	No	No	No	No	No	No	
Land-based activities (coastal, riverine and atmospheric)	Urban (municipal waste water discharge)	Yes	No	Yes	No	No	No	No	No	yes	No	
	Industry (discharges, emissions)	Yes	No	Yes	No	No	No	No	No	yes	No	
	Agriculture & forestry (run-off, emissions)	Yes	No	No	No	No	No	No	No	yes	No	Yes (P)
Other marine uses and activities		No	No	No	No	No	No	No	No	No	No	

In the Table below, the cross-check provides for each human activity the availability of data/information to describe the pressures exercised on the Black Sea.

Note: some of the information provided by the stakeholders looked doubtful, questions are posted in Footnotes. Further check and verification of this Table (below) is required.

Table 108. Human activities and pressures (cross-check) in Turkey (Note: N/A means not applicable; the Table synthesizes the input of all stakeholders contacted)

Activity Theme	List of Human Activities	***PRESSURES***											
		Physical loss (area, extent[376])	*Physical damage (area, extent)*	*Interference with hydrological processes*	*Other physical disturbance (areas, extent)*		*Contamination by hazardous substances (load)*	*Systematic and/or intentional release of substances (load)*	*Nutrient and organic matter enrichment (load)*	*Biological disturbances*			*Acidification*
		Smothering Sealing	Siltation Abrasion Extraction (e.g. sand)	Thermal and salinity regime change	Noise (trends in level)	Marine litter (trends in amount on coast and in sea)	Synthetic compounds Non-synthetic substances Radionuclides	e.g. produced water, carbon storage	Fertilizers and other nutrient-rich substances.	Extraction of species, including non-target[377]	Invasives, trans-locations[378]	Microbial pathogens	Decrease in pH
Extraction of living resources	Fisheries incl. recreational fishing (fish & shellfish)	No[379]	No		No	No[380]				Yes	Yes		
	Seaweed and other sea-based food harvesting[381]	No	No							No			
	Extraction of genetic resources/ bioprospecting/ maerl[382]	No	No							No			
Food production	Aquaculture (fin-fish & shellfish)[383]	????					???		???		???	???	
Man-made structures (incl. in construction)	Land claim, coastal defence	No	No	No									
	Port operations[384]	????	???	???							Yes		
	Placement & operation of offshore structures (other than for energy production)	No	No	No									
	Submarine cable & pipeline operations	No	No		No								
Extraction of non-living resources	Marine mining (sand, gravel, rock)	No	No		No					No			
	Dredging[385]	Yes	Yes	Yes	Yes[386]	???	Yes			????			
	Desalination/water abstraction[387]												
Energy production	Marine-based renewable energy generation (wind, wave & tidal power)[388]	No	No	No	No	No							
	Marine hydrocarbon extraction (oil & gas)	No	No		No	No	No	No					
Transport	Shipping		Yes		Yes	Yes	Yes				Yes		
Waste disposal	Solid waste disposal incl. dredge material[389]	Yes	Yes										
	Storage of gases[390]												
Tourism and recreation	Tourism & recreation incl. yachting		No		No	Yes					No	Yes	
Research and survey	Marine research, survey & educational activities				No					Yes			
Military	Defence recurrent operations				No								
	Dumping of munitions[391]		No		No		No	No					
Land-based activities (coastal, riverine and atmospheric)	Urban (municipal waste water discharge)					No[392]	Yes	Yes	Yes			No	????
	Industry (discharges, emissions)[393]			No		No	Yes	Yes	???				
	Agriculture & forestry (run-off, emissions)						Yes	Yes	Yes				Yes[394]
Other marine uses and activities													

Note: MoEU did not give 'Yes' to any of the pressures in the Table above, however they reported data availability for contaminants and nutrient loads, so at least these pressures should be positively marked. Table 3 of QII not replied. That is the reason. "yes" answers for LBS, waste diposal, dreding etc. is also valid for MoEU

376 Area and extent, where mentioned, are meant for different types of affected substrates.
377 The Pressure can be described by number of vessels, fishing effort, frequency trawled, etc.
378 The pressure can be described by vectors of introduction, risk areas, number of new species identified per year, number of established species per decade, etc.
379 Karadeniz University says YES to these pressures (physical loss and damage). Do they really know the Fisheries impact in terms of smothering, sealing, siltation, etc.?
380 For Marine Litter the Karadeniz University says YES. However, they have not pointed availability of ML data in the Tables above. Do they really know how much ML comes from Fishery?
381 Is it exercised in TR waters of the Black Sea?
382 For bioprospecting Karadeniz University says YES to all possible pressures. Do you have such kind of human activity in TR waters?
383 Karadeniz University says YES to all possible pressures of Aquaculture. Do they really study the release of contaminants, nutrients, invasive species and microbial pathogens from Aquaculture farms in the Black Sea? CFRI say that there is a physical loss due to Aquaculture and they identify it (smothering, sealing). Are they sure about this?
384 Karadeniz University says YES to all pressures related to Port Operations. Do they really study them and have the data to describe such pressures as physical damage/loss, changes in hydrology and invasive species?
385 For dredging the same – Karadeniz University says YES to all possible pressures. Do they study them?
386 CFRI says also YES to all pressures related to Dredging, but they also include a pressure like Marine Litter associated with dredging. Are they sure there is such a pressure existing?
387 Is it applicable for TR waters?
388 Is it applicable for TR waters?
389 Residential waste and rubble has been infilled along the shores of some TR cities for a distance of 30–50m from the sea side since the 1970s. This now supports a double lane road construction that follows the shore line. Both actions have caused damage to sea shore ecology.
390 Is it applicable for TR waters?
391 Is it applicable for TR waters?
392 Karadeniz University says YES for Marine Litter, microbial pathogens and acidification. Do they study them in relation to municipal waste water?
393 Karadeniz University says YES to all possible pressures. Do they study them?
394 Karadeniz University says YES to acidification related to agriculture/forests run-offs. Do they study this?

In the Table below cross-check of data/information for each pressure to describe the related impact is provided.

Table 109. Pressures and impacts (cross-check)[395] in Turkey

Pressure theme	Pressure	Impact on	Organizations involved in monitoring/data collection (Yes or No for each parameter)										
			MoEU	IU/ FMSM	TUBITAK	TUDAV	IU/FF	KTU/ FMS	RTEU/ FF	COMU/ FMST	IMS/ METU	CFRI	NCC
Physical loss	Smothering	Seabed Habitats	No	No	No	No	No	Yes	No	No	No	No	No
	Sealing		No	No	No	No	No	Yes	No	No	No	No	No
Physical damage	Siltation		No	No	No	No	No	Yes	No	No	No	No	No
	Abrasion		No	No	No	No	No	Yes	Yes	No	No	No	No
	Extraction		No	No	No	No	No	Yes	No	No	No	No	No
Other physical disturbance	Underwater noise	Functional groups and habitats (water column and seabed)	No	No	No	No	No	No	Yes	No	No	No	No
	Marine litter		No	No	No	No	No	No	Yes	No	No	No	No
Interference with hydrological processes	Thermal regime change	Functional groups and habitats (water column and seabed)	No	No	No	No	No	No	No	Yes	No	No	No
	Salinity regime change		No	No	No	No	No	Yes	Yes	Yes	No	No	No
Contamination by hazardous substances	Synthetic compounds	Seabed habitats, functional groups, seafood	No	No	No	No	No	No	No	No	No	No	No
	Non-synthetic substances		No	No	No	No	No	No	No	No	No	No	No
	Radionuclides		No	No	No	No	No	Yes	No	No	No	No	No
Systematic and/or intentional release of substances	Other substances	Seabed habitats, functional groups	No	No	No	No	No	Yes	No	Yes		No	No
Nutrient and organic matter enrichment	Nutrients	Water column and seabed habitats, species, functional groups, ecosystems	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	No	No
	Organic matter		Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	No	No
Biological disturbance	Microbial pathogens	Safety of food (fish and other seafood), bathing water quality	Yes	No	Yes	No	No	Yes	Yes	Yes	No	No	No
	Non-native species and translocations	Water column and seabed habitats, species, functional groups, ecosystems	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No
	Extraction of selected species incl. non-target catches	Water column and seabed habitats, species, functional groups, ecosystems	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Others			No	No	No	No	No	No	No		No	No	No

[395] The Table is similar to Table 2 from the EC document: **Guidance for 2012 reporting under the Marine Strategy Framework Directive**, however covers broader scale impacts under certain pressures as seen being possible in the Black Sea.

Conclusions on the gaps in data/information availability in Turkey to meet the requirements of the MSFD

Note: It will be beneficial to compare the conclusions below with the findings of the TR DeKoS Project, when this project is at the more advanced stage. MoEU and TUBITAK/MRC has already found a lot of gaps in biodiversity and other parameters monitoring, which are not sufficiently well reflected in the responses of the TR stakeholders to the MISIS Questionnaire (on data availability). Therefore, the findings further (reflected also in the Tables for TR above) are not completely reflecting the present situation in TR. The stakeholders contacted most probably meant that they had the capacity to work on the MSFD indicators but in reality they do not perform such monitoring all along the TR coastline.

1. **Biological data gaps**: Seabirds look like non-studied, however, this information should be verified with the relevant organizations, such as BirdLife International (http://www.birdlife.org/seabirds/index.html), etc. Benthic macroalgae and seagrasses are studied with limited geographical coverage.

2. **MSFD Descriptors gaps**

Descriptor 1: Biological diversity is maintained
No gaps have been found, some stakeholders reported 'Yes' even for habitat area and habitat volume. It would be needed to clarify with them how they study these and do they perform habitat mapping. The geographical coverage is also an issue, according to the monitoring activities reported in Chapter I, benthic habitats are poorly studied along the TR Black Sea coast with small exceptions.

Descriptor 2: Environmental impact of non-indigenous species
No substantial gaps have been identified, 'ballast water' is mentioned as the vector of introduction. A GloBALLAST Project (IMO) took place in TR in the period 2006-2008 (implemented by MRC/TUBITAK and Ministry of Transport), and the issue of 'vectors' was well studied (including origin of ballast water and respective risk assessments for large TR ports). However, it is not clear whether such investigations continue for new non-natives. For instance, in 2010 Ozturk&Shiganova (Diagnostic Report I) reported that some new species move from the Mediterranean Sea to the Black Sea (north-ward migration) on their own due to increase in water temperature. Therefore, ballast water might not be the only vector of introduction of non-natives.
Biopollution Level (BPL) is being tested for certain species. Work will continue.

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
No substantial gaps have been identified, however, the stakeholders have not specified whether they can provide the listed indicators for all commercial species or for a few of them. A confirmation is needed that stock assessments are carried out for all commercial species and that maximum sustainable yield and others are known for all of these species as well.

Within DeKoS only two indicators are considered (look at the MoEU QII) for a list of species. This data are accessible. Work is on-going.

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
A few stakeholders have reported availability of data to cover this Descriptor. Worse known are:

- Diet composition of species
- Ratio benthic production required/benthic production

Descriptor 5: Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters

- Algal community structure – limited data
- Benthos and fish kills – limited data

Descriptor 6: Sea-floor integrity is at a level that ensures that the structure and function of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected

This Descriptor is rather poorly ensured by data. Most limited in data availability are:
- Type, abundance, biomass and areal extent of relevant biogenic substrate
- Extent of the seabed significantly affected by human activities for the different substrate types
- Abundance of bio-engineering species – no data
- Proportion of biomass or number of individuals in the macrobenthos above some specified length/size
- Biomass size spectrum
- Shape of cumulative abundance curves of numbers of individuals by size group
- Secondary production
- Parameters describing the characteristics (shape, slope and intercept) of the size spectrum of the benthic community

Descriptor 7: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems
This descriptor is rather poorly covered by data availability.
For spatial characterisation of permanent alterations very limited data:
- Extent of area affected by permanent alterations
- Changes in sedimentation

For Impact of permanent hydrographical changes:

- Extent of area with spatial or temporal hypoxia/anoxia
- Presence of benthic communities associated with low oxygen conditions

Descriptor 8: Concentrations of contaminants are at levels not giving rise to pollution effects
- Occurrence and extent of acute pollution events – very limited data

Descriptor 9: Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards
Very limited data for all indicators of the Descriptor are available.

Descriptor 10: Properties and quantities of marine litter do not cause harm to the coastal and marine environment
Very limited data for:
- ML washed ashore and/or deposited on coastlines
- ML in the water column, including floating and suspended litter on the sea floor
-

No data for:
- ML ingested by marine animals/birds
- Microparticles (mainly mircroplastics) derived from degradation of litter
- Impact rates of degraded litter on organisms
- Potential chemical pollution resulting from degraded litter (plastic)

Descriptor 11: Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment
Very limited data, most probably mainly for the Bosporus area are available.

3. Characteristics – state of the Sea
No data for seabirds reported, as mentioned already above.

4. Human Activities description gaps

The outlined gaps are most probably due to problems related with data/information accessibility. They are:

- Placement & operation of offshore structures (other than for energy production)
- Marine hydrocarbon extraction (oil & gas)
- Defence recurrent operations

5. Pressures gaps

The main gaps are in all possible pressures related to:

- Land claim and coastal defence
- Port operations
- Placement & operation of offshore structures (other than for energy production)
- Submarine cables and pipeline operations
- Marine mining
- Marine hydrocarbon extraction

6. Impacts gaps

Especially poorly known are all impacts related to:

- Physical loss and damage
- Underwater noise
- Marine litter
- Thermal regime change
- Contamination by hazardous substances

Further verification of the gaps is needed as the information provided was contradictory when cross-checked.

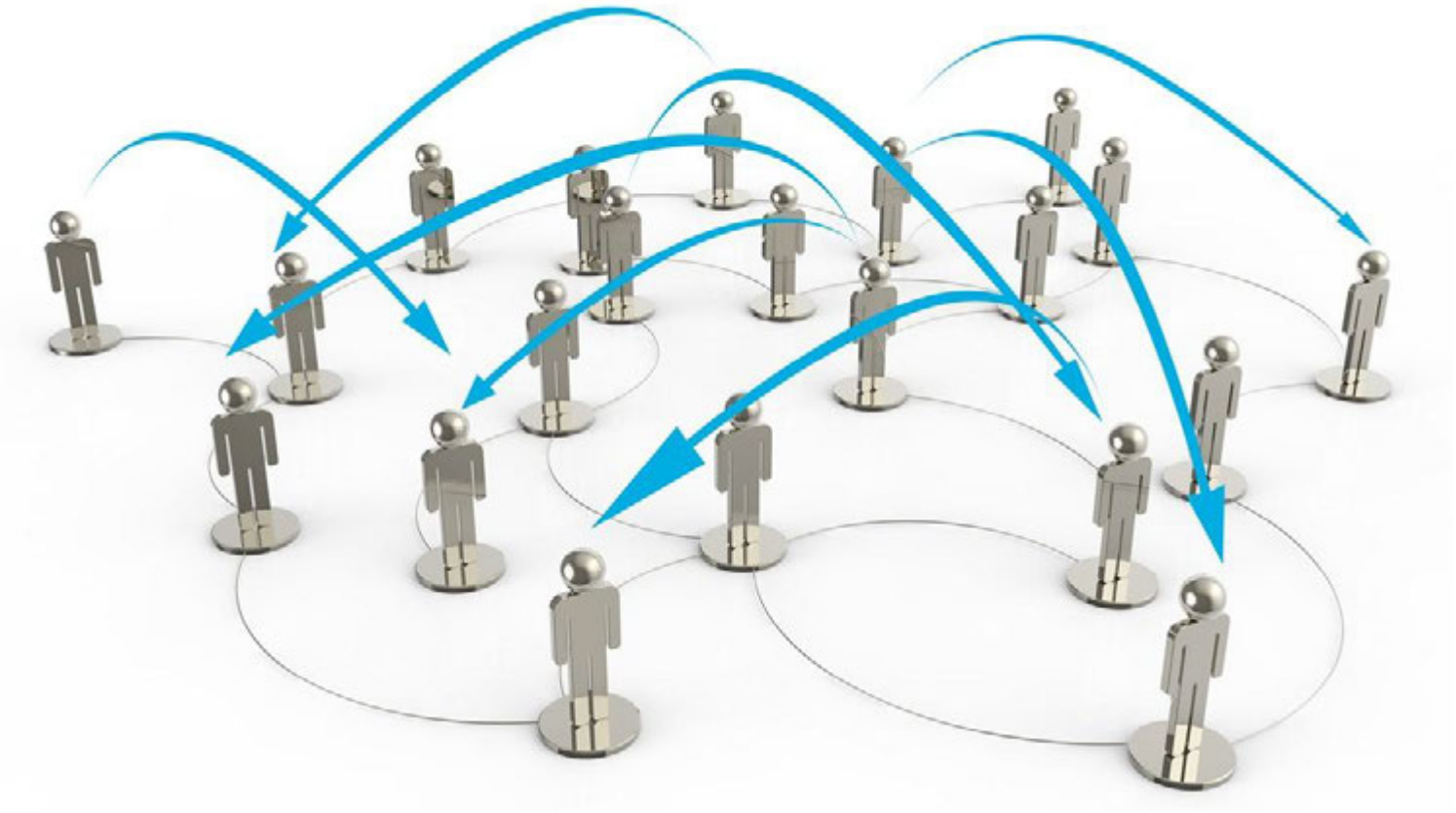
Table 110. Synthetic analysis of pressures and impacts (Turkey)

		1	2	3	4	5	6	7	8	9
	Pressures / **Impact on:**	Changes in fresh water and sediment riverine fluxes	Nutrients and organic matter enrichment	Contamination by hazardous substances	Physical damage of habitats	Loss of habitats	Introduction of non-indigenous species	Marine litter	Underwater noise	Other pressure (extraction of species)
A	Plankton									*
B	Macroalgae			*						*
C	Seagrass			*						*
D	Zoobenthos		*	*						
F	Fish		*	*						
G	Marine mammals									*
H	Birds									

* Low or very low data/information availability and lack of proper quantified assessments
Note: For D4 and D5 only the Karadeniz University/FMS reported availability of data, which means that the impact of physical loss and damage on seabed habitats is almost not studied in TR. This is why we mark these fields in green.

	Intensity of the impact (based on their associated risk for biodiversity conservation)
	High impact
	Significant impact
	Low impact
	No impact
	Existing interaction, but the impact has not been determined even qualitattively
	Misread interaction, impact not determined

VII. Harmonization process (needs)



This chapter deals with the requirements of the MSFD stipulated in Art 11.2:

2. Member States sharing a marine region or subregion shall draw up monitoring programmes in accordance with paragraph 1 and shall, in the interest of coherence and coordination, endeavour to ensure that:
(a) monitoring methods are consistent across the marine region or subregion so as to facilitate comparability of monitoring results.

And in Annex V of the MSFD:

(8) Need to ensure comparability of assessment approaches and methods within and between marine regions and/or subregions.
(9) Need to develop technical specifications and standardised methods for monitoring at Community level, so as to allow comparability of information.
(10) Need to ensure, as far as possible, compatibility with existing programmes developed at regional and international level with a view to fostering consistency between these programmes and avoiding duplication of effort, making use of those monitoring guidelines that are the most relevant for the marine region or subregion concerned.

All stakeholders contacted have confirmed the need for harmonization both at the national and regional level. Some of them spoke also about the need to upgrade equipment, increase number of stations, geographical coverage and frequency of observations, having in mind that the insufficient harmonization between experts, organizations and states is not the only problem in the Black Sea region. The main problems are to be again stressed – the lack of sufficient funding and coordination between the organizations involved to sustain a regular, problem-oriented and complex, cost-efficient and non-overlapping monitoring with consequent assessments to support knowledge-based decision-making in environment protection utilising the principles of the ecosystem approach.

The opinions expressed on the harmonization needs were as follow.

National level

a. Sampling strategy (equipment, frequency, sampling area coverage) – setting regularly implemented and adequate monitoring program, covering also the Exclusive Economic Zone of BG, with special attention on the missing domains - priority substances including contamination of biota at the national level, and for the regional level to provide for harmonised stock assessments of commercial living resources and bathing water quality assessments based on common standards.
b. Data analysis – harmonisation of analytical methods (e.g. statistical, models) at national and regional level
c. Indicators development – both at the national and regional level the indicators used should be agreed and calculated based on common methodologies
d. GES assessment – development at the national level and harmonization at the regional

ROMANIA

Romanian institutions have specified the lack of sufficient harmonization at the national level:

- Sampling strategies: equipment used, area coverage, frequency and methodologies
- Samples processing and data management
- Data analysis and assessment methodologies
- Indicators development to facilitate decision-making

TURKEY

TR stakeholders have mentioned that harmonization is needed both at the national and regional level.

Regional level

In **Bulgaria** the stakeholders have identified the following regional priorities in harmonization:

- Setting of reference/threshold values
- Monitoring and assessments, including loads and marine litter
- Joint implementation of the CFP principles at Black Sea basin scale (not only in BG and RO as EC countries), harmonization of monitoring, data collection, stock assessments and indicators for GES

In **Romania** all mentioned issues for the national level are eligible for the regional as well, additional issues have been specified with priorities listed as follow:

- Indicators development, taking into consideration the MSFD Descriptors
- GES identification and consequent assessments
- MPAs identification, designation and related monitoring

In **Turkey** the stakeholders mentioned the same priorities as already listed above by Bulgaria and Romania, except the EC Common Fishery Policy utilization.

VIII. Conclusions and Recommendations

Legal/policy.
BG, RO and TR have strong legal/policy and scientific foundations which could provide for the development of integrated monitoring/assessment programmes following the DPSIRR model. Much of the further work will involve building on, or adapting already existing monitoring arrangements. GES identification and environment targets for pressures, state and impact are under development (though with delays). They will allow designing a full-body monitoring program in line with the requirements of the MSFD. However, important regulations are missing, and it is recommended to address the gaps in policy, namely for:

3. Monitoring NIS and ship ballast water in risk areas
5. Control on the level of underwater noise
6. Development of operational monitoring
7. Coordinated and regular monitoring of pressures/impacts
8. Inter-sectoral cooperation in monitoring and data management
9. Regular exchange of data between sectors

Financing of monitoring.
In all beneficiary countries the financial mechanism, sustaining environmental monitoring programmes, is in need for improvement. In the case of Turkey and Bulgaria, financing for the implementation of monitoring programs is through competitive bidding, and usually for short periods of time which hampers the long-term development of the networks and investments in capacity building, as there are no long-term guarantees.
Delays in providing funding do often occur. They hamper the frequency of observations and the geographical coverage. The insufficiency of funding leads to improper geographical coverage and mandatory parameters are impossible to cover. The latter of course could be also related to lack of human capacity and expertise, which is mostly related to lack of sufficient funding to hire staff and train people in point of fact.

Therefore, it is recommended to find the ways to increasing funding for monitoring. This can be not only through governmental budgets dedicated to state monitoring, but also through the private sector, and through projects (different fundng agencies from abroad, for instance, and of course, national).

Monitoring.
Going back to the recommendations of the Diagnostic Report I in relation to monitoring, the following important issues were found to be still insufficiently addressed:

N	Issue		Bulgaria	Romania	Turkey
1	**Maintain frequency of observations** – in line with WFD and MSFD		**Since 2012**	**Mostly Yes**	**No**
2	**Ensure proper geographical coverage** – include open sea to cover the EEZ		**Since 2012, partially**	**No**	**Yes**
3	**Sustain stations and transects with long-term observations** (and create network of Reference stations)		**Mostly Yes, but with no network of Reference stations**	**Yes**	**No such stations and transects, no Reference stations**
4	**Cover mandatory parameters**		**No**	**Mostly Yes**	**Partially**
5	**Improve**	**Fisheries monitoring**	**Yes**	**Yes**	**Yes**
		Cetacean surveys	**No**	**Partially**	**Partially**
		Marine Litter monitoring (especially in the sea)	**No**	**Partially (not in the sea)**	**Partially**
		Contamination of sediments	**No**	**Yes**	**Yes**
		Contamination of biota	**No**	**Partially**	**Partially**
		Habitats monitoring	**Poor**	**Poor**	**Mostly No**
		Biodiversity change monitoring	**Partially**	**Partially**	**Partially**
6	Utilization of the **capacities of all Institutes** dealing with monitoring in the country (not only those, which are officially nominated by the Ministries of Environment or others to implement National Programmes)		**No**	**No**	**No**
7	**Avoid overlapping of activities and efforts**		**No**	**No**	**No**

Additionally, operational monitoring development is basically poorly attended. There is much to desire in the introduction of automated systems of observation in the sea, as well as in the development of remote sensing.
Hense, it is recommended to pay attention to all those domains of the monitoring which are missing or partially developed, such as cetacean surveys, marine litter, habitats and biodiversity change. It is crucial also to avoid overlapping of monitoring activities.

Institutional framework of monitoring

The analysis shows that the coordination between the organizations involved in monitoring/data collection in the beneficiary countries is in general poor, especially between those engaged in tracing pressures and those who study the state of the environment, not to mention the socio-economy and fishery statistics collections. Hence, to properly build (in a quantitative form) the causal chains of the DPSIRR model turns to be a nearly impossible task at present.

Thus, many institutions, weak integration and lack of systematic approach characterise the institutional framework of monitoring in BG, RO and TR. Often inadequate fragmentation of responsibilities is in place, which hampers mobilization of resources. There are also areas of overlap, duplication of efforts and even conflicts.

The need for a systematic approach:

A systematic approach is urgently needed to identify and effectively use the synergies that exist among the many institutions and actors involved in monitoring activities serving directly or indirectly environment protection. There should be a stable networking between institutions dealing with governance, funding, and implementation of monitoring programmes. This will reduce the burdens placed on national authorities, promote the efficient use of resources and ensure that environmental laws and policies implementation is supported by adequate integrated monitoring program.

Strengthening of institutional framework means also capacity development. Capacity building activities are poorly attended in the beneficiary countries, due to lack of funding almost no regulat trainings take place (further see conclusions on Training).

Thus, improvements of the institutional framework are needed in:
- competent authorities capacity (including monitoring capacity)
- mechanisms of interaction between state institutions responsible for monitoring
- arrangements for agencies to coordinate and cooperate effectively with an adequate degree of operational autonomy
- adequate fragmentation of responsibility, avoiding overlaps

A major problem in the beneficiary countries is the constant change in governmental structures and redistribution of activities. Ministries not only change their names, but also their responsibilities and affiliated/subordinated bodies. Besides, staff changes, experienced professionals leave because working in governmental organizations is not an attractive option in view of the numerous responsibilities, stress and low salaries associated. The instability of human factor is not a prerequisite for a good governance practices, but often for non-continuity in decision-making. The same stands for the political instability, which is also an issue in the beneficiary countries. Constant reforms are hardly 'bought in' by the society, because in the sort-term run of their existence the gains ('payoff) are not realized. However, all of these are socio-economic problems, and MISIS is not in the position to deal with them as well.

More information on the subject 'institutional framework of monitoring' will be provided in a special Position Paper of the MISIS Project on the Institutional framework of monitoring, together with more concrete recommendations on strengthening.

DPSIRR. Data availability to meet the requirements of the MSFD

As per country the gaps identified are given in the conclusions of Chapter VI. Here general remarks are given, as follow.

Drivers (human activities) are relatively well mapped in all beneficiary countries. Accessibility of data/information, which are dispersed in many different organizations, is an issue.

In all beneficiary countries land-based pressures are defined as part of pollution source monitoring programs. These programmes are rather well financed and implemented. However, the methods and results of the pressures monitoring programs are seldom coordinated with, or used in, the ambient monitoring programs in the same areas. Hence, impacts are poorly related to pressures, and especially scarce is the knowledge on cumulative effects. Networking of institutions controlling pressures with those which deal with state and impacts observed in the Black Sea is crucial, yet obviously absent in the beneficiary countries.

The main gaps are in the pressures related to the following human activities:
- Aquaculture
- Port operations
- Submarine cables and pipeline operations
- Agriculture

Insufficiently well known are the pressures related to:
- Land claim and coastal defence
- Marine mining
- Placement & operation of offshore structures (other than for energy production)[396]
- Dredging
- Dumping of spoils
- Shipping
- Marine hydrocarbon extraction

[396] To be verified whether such structures exist.

Most poorly known pressures are: physical loss and damage, other physical disturbance (noise and marine litter), thermal and salinity regime change, and contamination by hazardous substances (especially for sediments and biota). More studies are needed to better understand what are the critical loads of nutrients and pollutants stemming from LBS (point sources) and to evaluate the contribution of diffuse sources.

For the following pressures the impacts are not known:

- Underwater noise (for water column and seabed habitats)
- Radionuclides

Little is known about the impacts related to:

- Physical loss and damage
- Underwater noise
- Marine litter
- Thermal regime change
- Contamination by hazardous substances

In all beneficiary countries most limited are the data/information for Descriptors 6-11.

Recommendations.

The monitoring should be improved to cover the following insufficiently studied domains:

Descriptor	Additional monitoring requirements
Descriptor 1, 4 and 6 – functional groups	Protozoa, ichthyoplankton, meiobenthos
Descriptor 1, 4 and 6 – functional groups	Marine mammals: 5 yearly census of dolphins populations
	Birds: seabirds colonies and seabird by-catch
Descriptor 1, 4 and 6 - habitats	Deep sea biogenic structures
	Seabed, mapping of habitats, tracing of habitat change and loss, hot spots of habitat destruction/degradation
Descriptor 2 - NIS	Abundance and distribution of NIS, especially in high risk locations
Descriptor 3 - fish	More species
Descriptor 4 – food web	Energy flows through the food web/production
Descriptor 5 - eutrophication	Primary production (phytoplankton and macroalgae), areas of hypoxia, change in macroalgal communities
Descriptor 7 – hydrographical conditions	Changes in water temperature and salinity related to human activities
Descriptor 8 - contaminants	Screening for new pollutants
Descriptor 9 – contaminants in seafood	Commercial fish
Descriptor 10 – marine litter	Floating and seafloor litter
Descriptor 11 – underwater noise	Underwater noise level

Furthermore, biodiversity of the Black Sea is insufficiently attended in the routine monitoring programmes. Especially important is to better study: bacteria, phytoplankton, Protozoa and meiobenthos. Genetic investigations are scarce. Better knowledge of the Black Sea populations genetic structure and gene pool are required. Acidification and carbon storage studies need to be advanced.

All gaps mentioned above should be taken into consideration in revision of monitoring programmes and improvement of existing practices.

QA/QC in the field of monitoring and laboratory work.

QA/QC in monitoring is well advanced in BG and RO. However, a few common guidelines are used in BG and RO in conducting monitoring, so the comparability of data is an issue. In TR QA/QC is either not receiving due attention in all Institutions or the stakeholders insufficiently reflected their efforts.

Proficiency tests in the field of chemistry (limited list of parameters though) are carried out on a relatively regular basis in all beneficiary countries, but not the case for the biological monitoring. In the latter, insufficient number of inter-calibration exercises have been organised by different projects only (e.g. phytoplankton and zooplankton) at the national and regional level.

Therefore, QA/QC developments are especially needed in the field of biological/biodiversity studies. In all fields the compliance with existing guidelines/manuals need to be strengthened.

Data reporting.

The data of different organizations are reported to various end-users, however, the bulk of them remains for internal use only**.** At the national level in the beneficiary countries, there was no real effort to create a single Data/Information Center where all Black Sea-related data (DPSIRR) would be stored and used for ecosystem-based management. This gap in data accessibility became especially evident while preparing the Initial Assessments in BG and RO for the MSFD.
Harmonization of reporting is in its very early stage, requires more attention to reduce the coast and to make reporting less time-consuming. Data accessibility should be increased, centralised databases development should be encouraged.
Projects. The projects are a powerful tool, addressing specific questions, and advancing scientific knowledge, in general, however, most of them share none of their data compiled, and often the reports prepared under their activities are available for the partner-organizations only (password protected).

Integration of project results into national databases and assessments should be stimulated. Incentives should be provided.

Data bases with easy access.

Those which are available on-line such as SeaDataNet (incl. BS Scene Network) contain meta data, which are not regularly updated (depending on projects, not on regular financial assistance) and contain little information which would be useful for most of the MSFD descriptors and parameters in Annex III. In Bulgaria and Romania the Ministries of Environment have not specified availability of data bases, though the scientific Institutions reported on data delivered to the Ministries. Institutional and national data bases are poorly developed. The former do not incorporate all data/information generated in the course of monitoring.

Networks of databases should be created, their inter-operability should be enhanced as a first step in integration.

Data products.

The lack of well-developed data bases is closely related to the poor provision of data products in the beneficiary countries. Of course, the scientific community provides in different reports statistical analysis and indicators, but the statistical processing is not embedded in the available data bases and the indicators are mostly not automatically derived. Graphs and maps of distribution of various parameters are also produced by manual input of data into the used softwares, such as Ocean Data View, ArcGIS, etc. Consequently, most of the data remain poorly managed, statistically unprocessed, insufficiently visualised and not included in the calculation of indicators. Development of models is poorly attended either (except hydrophysical).

Much improvement is required in the field of data products generation. However, the few institutions involved in national monitoring programmes are heavily overloaded, and together with the insufficient funding, these are the main reasons for the scientists to be unable to properly manage the data produced. Besides, funding for relevant trainings is rarely foreseen in the budgets to ensure for capacity building in the field of data management.

Nevertheless, data products generation should be in the focus, and considered as the most important part of data management. Relevant trainings should be provided, as well as data bases conseptualisation should be rethought with a view of data management systems development to follow.

QA/QC in data management.

Data management QA/QC is not paid due attention in the beneficiary countries. It is not clear how the reliability of data is checked and whether any of the available Guidelines is taken into consideration in practice. This is especially valid for biological and fishery data.

Data Quality Control softwares should be incorporated in the data bases.

Assessments.

Various assessments are produced on a regular or irregular (for projects) basis, however, except in Romania the reports stay unpublished and undistributed for wider and public use. The reason for the latter is rooted in the historical legacy of secrecy in the field of environmental issues, and also in the habitual attitude of the scientific community to not disclose data which are not published in peer reviewed journals. The reports prepared by scientists are not qualified the same as the publications in journals with impact factor, which predetermines their keeping for internal use only or most often for no use.

Assessments will improve if the following recommendationsare observed:

1. Create mechanism for exchange of data/information between the various organizations managing environment data
2. Develop data management systems (to ensure indicator-based reporting and provision of diverse data products)
3. Provide for QA/QC in data management in all organizations dealing with generation of environment data
4. Develop models, especially those with bio-chemical components, application of Ecosim and Ecospace
5. Ensure transparency of reporting
6. Provide for official status of the reports (e.g. registration as official electronic publications or publications as peer reviewed in hard copies)

Equipment/vessels.

The inventory of equipment available in the Laboratories of the beneficiary countries shows a very high level of capacity to manage the various samplings and analyses required by the MSFD. Laboratory equipment can be shared with visiting scientists upon written request to the administrations of the institutes.

In the beneficiary countries there are in total 26 vessels of different classes (from coastal to global), which have the capacity to carry out monitoring. 9 of them are vessels over 35 m long and they can be used for regional investigations. These vessels are available for rent and the terms of rental are specified for some of them. The fees per day vary a lot depending on the class of the vessel and services provided. However, the stakeholders contacted have poorly communicated on the issue of rent, for only 3 vessels the prices per day were specified: Akademik, IO-BAS, BG (6000 Euro); Prof. Valkanov, IFR-Varna, BG (1000 Euro) and Mare Nigrum, GeoEcoMar, RO (6800 Euro). Large exchangeable vessel equipment includes multibeam and side scan sonars, echosounders,

underwater video cameras, and CTDs. In total 22 units of these have been identified in BG, RO and TR. There are also two underwater vehicles (one remote operated in Erdemly, TR and the second one is manned submersible, belonging to IO-BAS, BG.

Major problems: most of the vessels are old and most of the equipment was not specified as being available for sharing.

Capacity building.
Many stakeholders mentioned the lack of regular trainings, though there are some nice exceptions in RO and TR. Widely distributed practice is the organization of trainings in the frames of different projects. Fortunately, during the last decade many projects have taken place in the Black Sea region, and correspondingly almost annually trainings have been carried out. The shortcomings in such a practice is that the trainings are for the partner-organizations in the projects (who have the budget to attend the trainings) and in very rare cases specialists from other organizations are invited or have the opportunity to join. As per today, the priority needs in training identified by the MISIS stakeholders are as follow:

1. Monitoring

- Optimization of field surveys
- Modern methods in monitoring (chemical oceanography, pollutants (incl. radioactivity), biological elements (especially for macroalgae and angiosperms), measuring pollution effects via biomarkers, bathing water)
- Biodiversity monitoring, including phytoplankton and zooplankton taxonomy, and molecular taxonomy
- Ecotoxicological monitoring
- Measuring toxicity of phytoplankton species

2. Data processing and assessments

- Oceanographic data statistical processing, visualization and analysis (especially applications in biology and ecology of STATISTICA, PRIMER 6, XLSTAT2012, as well as ArcView, Grapher, Surfer)
- MSFD-and WFD-related training: integrated chemistry and biology data assessment (according to WFD and MSFD requirements), identification of GES, development of indicators and methodologies for their calculation

Note: Such training can be very beneficial, communicating the experience of BG and RO in identification of good ecological status sensu WFD.

- Modern analytical/assessment tools (all spheres of investigations, priority mentioned - macro algae and angiosperms)

3. Habitat mapping

4. Communication of research, development of public awareness (e.g. for beach users preparation of communications on water quality, etc.)

The identified needs in training have been incorporated in the MISIS document 'Training Program".

Harmonization. This report highlights also priority **needs in harmonization**, both at the national and regional level. They are as follow:

- Sampling strategies: equipment used, area coverage, frequency and methodologies
- Monitoring of loads, especially for rivers

- Samples processing and data management
- Data analysis and assessment methodologies
- Fisheries data collection, stock assessments
- Indicators development to facilitate decision-making
- GES identification
- MPAs identification, designation and related monitoring

The identified needs have been incorporated in the MISIS document “Harmonization Program”.

ANNEXES

ANNEX I.A. The Questionnaire/Part I

European Commission
environment

European Commission
DG Environment

Diagnostic Report
Questionnaire Part 1

MSFD Guiding Improvements in the Black Sea
Integrated Monitoring System

Questionnaire

The purpose of this questionnaire is to identify your organization's observational and informational capacity in the area of Black Sea monitoring, data management and assessments in relation with the MSFD implementation.

I. General

Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail, skype)

What type is your organization?

☐ Governmental ☐ NGO ☐ Private ☐ other (please specify here)

Is your organization part of a national monitoring system? ☐ Yes ☐ No

If Yes, please specify.

Is your organization part of SeaDataNet? ☐ Yes ☐ No

What other national and international networks related to monitoring /data analysis is your organization part of?

(*Note: Please press the enter key in the field above in order to add more lines*)

Specify relevance of your monitoring to other human activities beyond environmental sphere (please click on YES or NO in the appropriate cells of the table).
Note: this is to identify which are the main application areas of your organization data/assessments

Human activity	Yes/No	
Public health	☐ Yes	☐ No
Coastal and urban development	☐ Yes	☐ No
Marine and riverine traffic	☐ Yes	☐ No
Fishery and aquaculture	☒ Yes	☐ No
Tourism and recreation	☐ Yes	☐ No
Offshore gas and oil exploitation	☐ Yes	☐ No
Agriculture and farming	☐ Yes	☐ No
Various branches of industry	☐ Yes	☐ No
Military activities	☐ Yes	☐ No
Other activities (please specify) (*Note: Please press the enter key in the field above in order to add more lines*)		

II. Monitoring

1. Legal/policy instruments and institutional framework (**Note**: please add to the Tables as many lines as you need)

A. *International environmental legislation (conventions, multi- and bilateral agreements relevant to the monitoring performed by your organization; print dates when these instruments have been entered into force in your country)*

N	Title of Convention or Agreement	dd.mm.yy of ratification

B. *National environmental legislation (please specify laws, decrees, other legal acts related to the monitoring performed by your organization; print dates when these instruments have been entered into force)*

N	Title of National Legal Act	dd.mm.yy

C. Administrative instruments (*statements, resolutions, ministerial regulations, national standards, guidelines, etc. related to the monitoring performed by your organization, including sub-national level instruments)*

N	Title of Document	dd.mm.yy

D. Responsible organizations (*those which provide the budget for the monitoring carried out by your organization and approve the program*)

Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail, skype)

2. Type of monitoring, stations, parameters, frequency

Type of monitoring*	Geographical scope	Time period (from-to)	Frequency (from-to)	Number of stations	Number of parameters

*Environment routine complex monitoring; Ecotoxicological monitoring; Surveillance monitoring[1]; Compliance monitoring[2]; Operational monitoring (based on real-time observations[3].

Please provide:

A. Map of sampling stations and list with coordinates

N of station	Coordinates	Area/name of transect*	Type of station**

*e.g. Varna Bay, or Constanta / Mamaia transect, etc.
**transitional, coastal or marine waters; Please indicate which stations are Reference stations.

B. List of parameters (of biodiversity, eutrophication, contamination, commercial fish, litter, noise etc) with frequency of observations

Parameter	Analytical Method	Frequency			
		Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast

*on coast: monitoring at land-based point sources like at waste water discharges or at rivers

C. Does your monitoring provide for long-term trends? If yes, please specify for which parameters trends are regularly updated.

Parameter	Trend (Yes/No)			
	Water (specify Surface/Depth/Layer)	Sediment	Biota	On-Coast

*on coast: monitoring at land-based point sources like at waste water discharges or at rivers

[1] Surveillance monitoring is usually the environment monitoring for trends (complex and routine monitoring);
[2] Compliance monitoring is the one checking the relevance of water quality and level of discharges against certain norms (governmentally established);
[3] Operational monitoring - real time (satellites, radars, any automatic devices working for real-time collection of data).

3. Procedures of QA/QC in the field and in laboratory

A. Please provide References of major guiding documents and where possible links.

B. Please list proficiency tests/exercises which your organization takes part in and their frequency.

4. Reporting (to whom, kind of formats used)

A. If the data are reported (not the assessments), please specify to whom.

Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail, skype)

B. Please provide links to formats used (if any), (e.g. the EEA, SeaDataNet, etc. formats are available online) or the Formats themselves (as Annex to this Questionnaire).

5. On-going projects with monitoring component (**Note**: the projects which are currently implemented regardless the starting date)

Please provide the name of the project, duration, brief annotation (objectives of the project) and for each project specify:

A. Number of cruises planned, timing, stations, parameters

Number of cruises planned	Timing	Stations	Parameters

B. Reporting (what data and how the data are reported, where stored)

III. Data management, data products, QA/QC procedures applied, assessments

1. Please provide information on availability of data base(s) in your organization

Note: if you have more than one data base, please insert rows and describe each of them in separate.

Name of the data base (if any)	Link (if any)[1]	Year of launch[2]	Type of data base[3]	Is the data base linked to models?[4]	Terms of access

[1]Note – if the data base is not on-line, please specify it and provide information on how the data base is organised and replenished.

[2]Note – when the data base became operational? If the data are kept in Excel sheets or similar (not organised in a data base through specialised software), please specify the first year when an initial data have been stored electronically (e.g. not on hard copy in Protocols only).

[3]Note – specify how the data base is organised (Excel, DBF, ACCESS, Microsoft SQL Server (2008-R2 or other), ORACLE, etc.)

[4]Note – if yes, please specify in separate what kind of models and what these models are used to simulate.

2. Data products

A. Please list what indicators are automatically calculated or produced with query in the data base (Note: not the initial data but the derivatives of them).

Indicator	Unit	Type of representation[1]

[1]Note – the indicator can be derived from the data base in Table and Figures, or distribution / classification maps and reports can be produced.

B. Please list what kind of statistical methods are part of the data base (if any).

Indicator	Statistical method	Product

3. QA/QC procedures

A. Please provide References of major guiding documents and where possible links.

B. Please specify the needs of your organization to improve QA/QC.

4. Please list what kind of assessments are regularly prepared by your organization

Name of assessment/Report	Frequency	To whom the report is delivered	Where published (link, if any)

ANNEXES

ANNEX I.B. The Questionnaire/Part II

European Commission
DG Environment

Diagnostic Report
Questionnaire Part 2

MSFD Guiding Improvements in the Black Sea
Integrated Monitoring System

Questionnaire

The purpose of this questionnaire is to identify your organization's observational and informational capacity in the area of Black Sea monitoring, data management and assessments in relation with the MSFD implementation.

General

Name of organization	Postal address/webpage	Contact person (address, tel/fax, e-mail)

IV. Laboratory infrastructure, equipment, vessels

1. Please specify major units in your organization infrastructure;
2. Please specify major equipment (especially those which can be shared with other laboratories);
3. Please specify availability of vessels and characteristics of the vessel/s (including terms of rent).

V. Training

1. Please specify what kind of training are regularly conducted in your organization.
2. Please specify what kind of trainings have been organised by your organization during the last 5 years.
3. Please specify what kind of trainings you would recommend to be organised by MISIS.

VI. Data availability (versus Annex I and III of the MSFD)

This part of the Questionnaire aims at identifying the data availability for marine/uses activities, pressures/impacts and state of the Black Sea environment, so that to meet the requirements of the MSFD related to the Initial Assessment, GES and Targets identification.

The target period is 2006-2011. The frequency of observations is meant from monthly to annual, depending on the parameter discussed. The geographical coverage meant is the Exclusive Economic Zone of your country. In the column 'Your organization' of the Tables below, please write 'Yes' or 'No', where necessary you may wish to include Notes to specify better the data availability.

Please specify which of these are studied by your organization.

Species	Your organization (Yes or No)
Bacteria	
Phytoplankton	
Protozoa	
Macroalgae	
Mesozooplankton	
Macrozooplankton	
Meiobenthos	

Species	Your organization (Yes or No)
Macrozoobenthos	
Fish	
Mammals	
Birds	
Others	

A. Data availability versus Annex I of the MSFD

The Questionnaire follows the EC COM Decision 2010/477/EU[4], which specifies criteria and indicators for Good Environmental Status definition (GES, *sensu* MSFD). Selected additional indicators are included, which could be used to identify GES.

Descriptor 1: Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.

Progress towards GES for this descriptor must address several ecological levels: ecosystem, habitat/community and species. For assessment at the levels of habitat/community and species, it is not required to use all criteria for each species and habitat/community type to be assessed. To support a holistic and adaptive management of human activities based on the ecosystem approach, a risk-based selection is to be applied, to ensure that the assessment and monitoring required is effective and efficient.

At species level

A set of relevant species types are to be drawn up for each region/sub-region. Sub-species and populations are to be assessed separately where the initial assessment identifies them as being at risk of not meeting targets for GES.

1.1. Species distribution

MSFD	Your organization (Yes or No)
1.1.1. Distributional range	
1.1.2. Distributional pattern within the latter, where appropriate	
1.1.3. Area covered by the species (for sessile/benthic species)	

[4] Commission Decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters (notified under document C(2010) 5956)/(2010/477/EU)

1.2. Population Size

MSFD	Your organization (Yes or No)
1.2.1. Population abundance and/or biomass, as appropriate	

1.3. Population condition

MSFD	Your organization (Yes or No)
1.3.1. Population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity rates, survival/ mortality rates)	
1.3.2. Population genetic structure, where appropriate	

At habitats/communities level

This level ensures the organisation of complex associations of species (in benthic and plankton communities) into more manageable units. As a general rule, the habitat and its associated community are to be treated together. A set of relevant habitat types are to be drawn up for each region/sub-region.

1.4. Habitat distribution

MSFD	Your organization (Yes or No)
1.4.1. Distributional range	
1.4.2. Distributional pattern	

1.5. Habitat extent

MSFD	Your organization (Yes or No)
1.5.1. Habitat area	
1.5.2. Habitat volume, where relevant	

1.6. Habitat condition

MSFD	Your organization (Yes or No)
1.6.1. Condition of the typical species and communities	
1.6.2. Relative abundance and/or biomass, as appropriate	
1.6.3. Physical, hydrological and chemical conditions	

Ecosystem level

Assessment at the level of species and habitat/community state provides the basis for assessment at the level of the ecosystem, in particular the ecosystem structure and ecosystem processes and functions. The regions and sub-regions, or appropriate subdivisions, provide suitable scales for this assessment. Certain aspects of ecosystem functioning and processes are provided by other descriptors (such as 4 and 6, further presented).

1.7. Ecosystem structure

MSFD	Your organization (Yes or No)
1.7.1. Composition and relative proportions of ecosystem components (habitats and species)	
1.7.2. Ecosystem processes and functions: Interactions between the structural components of the ecosystem	

Descriptor 2: Non-indigenous species introduced by human activities are at levels that not adversely alter the ecosystem.

Apart from abundance, the identification and assessment of pathways and vectors of spreading of non-indigenous species as a result of human activities is a prerequisite to prevent that such species introduced as a result of human activities reach levels that adversely affect the ecosystems and to mitigate any impacts. For the latter, the environmental impact of non-natives should be also carefully regarded.

2.1. Abundance and spreading of non-indigenous species, in particular invasive species

MSFD	Your organization (Yes or No)
2.1.1.Trends in abundance, temporal occurrence and spatial distribution in the wild of non-indigenous species, particularly invasive non-indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species	
2.1.2. Vectors of introduction	

2.2. Environmental impact of non-indigenous species

MSFD	Your organization (Yes or No)
2.2.1. Ratio between non-indigenous species and native species in some well-studied taxonomic groups, e.g. fish, macroalgae, molluscs	
2.2.2. Magnitude of the impacts of non-indigenous species, in particular invasive species, on native communities, habitats and ecosystem functioning	
2.2.3. The Biopollution Level (BPL) (index)	

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.

This section applies for all the stocks covered by Regulation (EC) No 199/2008 (within the geographical scope of Directive 2008/56/EC) and similar obligations under the common fisheries policy.

3.1. Level of pressure of the fishing activity

The primary indicator for this criterion is *Fishing mortality (F).* Achieving good environmental status requires that F values are equal to or lower than the level capable of producing Maximum Sustainable Yield (MSY) over the long term (F_{MSY}).

MSFD	Your organization (Yes or No)
3.1.1. Fishing mortality (F) related to a reference value	

Secondary indicators: If analytical assessments yielding values for F are not available, then a possible secondary indicator is the *ratio between catch and a biomass index (hereinafter catch/biomass ratio) (3.1.2),* where the biomass index is ideally taken from sources independent from the commercial fishing activity (e.g. catch rates from bottom trawl surveys, biomass estimates from acoustic surveys, biomass estimates from egg-surveys).

MSFD	Your organization (Yes or No)
3.1.2. Catch/biomass ratio	

Alternatively to the catch/biomass ratio, secondary indicators may be developed on the basis of any other appropriate proxy for fishing mortality, adequately justified.

For example:

MSFD	Your organization (Yes or No)
Maximum Sustainable Yield	
Trends in catches / biomass	

3.2. Reproductive capacity of the stock

The primary indicator is the *Spawning Stock Biomass (SSB).* SSB is estimated from appropriate analytical assessments based on the analysis of catch at age or at length and ancillary information.

Secondary indicators: If analytical assessments yielding values for SSB are not available, then the *biomass indices taken from independent sources* can be used if these indices can be obtained for the fraction of the population that is sexually mature. Where, in absence of analytical assessments, abundance indices are chosen as indicator, then the abundance indices observed must be used when scientific judgement is able to determine, through detailed analysis of the historical trends of the indicator combined with other information on the historical performance of the fishery, that there is a high probability that the stock will be able to replenish itself under the prevailing exploitation conditions.

MSFD	Your organization (Yes or No)
3.2.1. Spawning Stock Biomass related to a reference value	
3.2.2. Biomass indices	

3.3. Population age and size distribution.

MSFD	Your organization (Yes or No)
3.3.1. The proportion of fish larger than a given length, e.g. the length at which 100% of the females are mature	
3.3.2. The mean maximum length across all species found in research vessel surveys	
3.3.3. The 95% percentile of the fish length distribution observed in research vessel surveys	

Secondary indicators: *Size at full sexual maturation (3.9),* which may reflect the extent of undesirable genetic effects of exploitation.

Given that the indicator "mean maximum length across all species" already incorporates information of a large set of fish and shellfish stocks, this criterion applies to the fish community rather than to individual stocks.

MSFD	Your organization (Yes or No)
3.3.4. Size at full sexual maturation, which may reflect the extent of undesirable genetic effects of exploitation	

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.

The species composition of food webs varies according to habitat and region, but the principles of energy transfer from sunlight and plants through successive trophic levels are the same. Criteria proposed are in relation to major attributes.

4.1. Productivity (production per unit biomass) of key species or trophic groups

If sufficient information is available, where appropriately developed, indicators such as the Marine Trophic Index can address the *trophic relationships within the food web*. The diet composition of a species or group of species describes the relative abundance of prey in a food web and can be diagnostic of food web changes.

MSFD	Your organization (Yes or No)
*4.1.1. Performance of key predator species using their production per unit biomass (productivity)**	
4.1.2. Production per unit biomass	
4.1.3. Marine Trophic Index	
4.1.4. Trophic Levels (Functional feeding groups)	
4.1.5. Diet composition	

If you have indicators developed to reflect the performance of key predator species, please specify them.

4.2. Proportion of selected species at the top of food webs

The rate of change in abundance of functionally important species highlights important changes in food web structure. For large fish, data can be used from fish monitoring surveys, on an annual basis, at the scale of a regional or subregional sea.

MSFD	Your organization (Yes or No)
4.2.1. % Large fish (by weight)	
4.2.2. Body size (length, weight) in selected functional groups/species	

4.3. Abundance/distribution of key groups/species

Indicators describe *abundance trends (4.3.1)* to identify changes in population status potentially affecting food web status. Assessments are required at regular intervals, taking account of seasonal changes.

Particularly suitable groups/species in a region or sub-region include:

(i) biological groups with fast turnover rates (e.g. phytoplankton, zooplankton, jellyfish, short-living pelagic fish, and bacteria) that will respond quickly to ecosystem change and are useful as early warning indicators;
(ii) groups/species that are targeted by human activities;
(iii) habitat-defining groups/species (e.g. benthic fauna);
(iv) groups/species at the top of the food web (which may accumulate harmful substances or respond to cascading effects from ecosystem changes);
(v) groups/species that are tightly linked to other groups/species at another trophic level.

MSFD	Your organization (Yes or No)
4.3.1. Abundance trends - Abundance and spatial distributions of species (of fast turnover rates, fish targeted by fishery, habitat-defining groups/species, species/groups tightly linked to other trophic levels, etc.)	

Additional: Energy flows in food webs: Ratio of production or biomass between different trophic levels
Indicators aim at measuring the degree of energy flow between different trophic levels. Ratios between primary production and top level predators are to be analyzed and controlled in order to test the efficiency of energy transfer through the food-web and whether the long term viability of all components is secured.

MSFD	Your organization (Yes or No)
Ratio of pelagic to demersal fish biomass and/or production	
Ratio of macrobenthos invertebrate to demersal fish production or biomass	
Ratio zooplankton production required/ zooplankton production	
Ratio benthic production required/benthic production	

Descriptor 5: Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters

The analysis to be made combines information on nutrient loads, analyses of a range of primary symptoms and, where ecologically relevant, of secondary symptoms.

MSFD	Your organization (Yes or No)
Nutrient loads	

5.1. Nutrient level

MSFD	Your organization (Yes or No)
5.1.1. Nutrients concentration in the water column	
5.1.2. Nutrients ratio: Deviate from normal proportion of nutrient ratios (Si:N:P) (e.g. Si is reduced in relation to other nutrients)	

5.2. Primary symptoms or directs effects of eutrophication

MSFD	Your organization (Yes or No)
5.2.1. Chlorophyll (concentration, spatial areas of high concentrations)	
5.2.2. Water transparency due to increase in suspended algae	
5.2.3. Algal community structure - Abundance/Increase of opportunistic macroalgae (e.g. can form blankets over the natural flora and suffocate benthic animals	
5.2.4. Species shift in floristic composition (e.g. diatom:flagellate ratio, benthic to pelagic shifts, indicator species, and harmful algae blooms). Annual bloom events of nuisance/toxic algal blooms. Annual to multi-year changes in frequency and/or duration of blooms. Changes in balance of diatoms/flagellates/cyanobacteria	
5.2.5. Primary production	
5.2.6. Nuisance / toxic algal blooms	
5.2.7. Submerged aquatic vegetation - spatial coverage and density of beds	

5.3. Secondary symptoms or indirect effects of eutrophication

MSFD	Your organization (Yes or No)
5.3.1. Abundance/Decrease in perennial seaweeds and seagrasses	
5.3.2. Dissolved oxygen	
5.3.3. Benthos - diversity and proportion of sensitive vs. non-sensitive species (e.g. P-R model)	
5.3.4. Benthos / fish kills	

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

The scale for assessing GES by this descriptor can be particular challenging because of the patchy features of some benthic ecosystems, both for natural and pressure aspects. Assessment of GES will have to integrate results from local scale, to much

larger regional and sub-regional scales, taking into consideration substrate characteristics[5], benthic communities composition and functional traits. Special attention is to be given to: i) distinct biogeographic regions, ii) different water depth habitat types, iii) different substrate type. In other words, physical damage regarding substrate characteristics and condition of benthic community for each particular type of substrate should be considered.

MSFD	Your organization (Yes or No)
6.1. Physical damage, having regard to substrate characteristics	
6.2. Type, abundance, biomass and areal extent of relevant biogenic substrate	
6.3. Extent of the seabed significantly affected by human activities for the different substrate types	
6.4. Condition of benthic community	
6.5. Structure of benthic habitats	
6.6. Abundance of bio-engineering species	
6.7. Diversity and richness indices also taking into account species -area relationships	
6.8. Proportion of biomass or number of individuals in the macrobenthos above some specified length/size	
6.9. Biomass size spectrum	
6.10. Shape of cumulative abundance curves of numbers of individuals by size group	
6.11. Secondary production	
6.12. Opportunistic-sensitive species proportion (e.g. AMBI, P-R-model)	
6.13. Parameters describing the characteristics (shape, slope and intercept) of the size spectrum of the benthic community	
6.14. Presence of particularly sensitive and or tolerant species	

Descriptor 7: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems

Permanent alteration of hydrographical conditions can derive from activities such as constructions at sea, landfills and land claim, barrages, windmill farms and other renewable energy constructions, oil and gas platforms and bridges, dredging and deposition in the sea, but also from constructions on land with outlets into the sea e.g. power plants outfalls (Annex III, Table 2). Permanent alterations of the hydrographical conditions can consist in changes in the tidal (emergence) regime, current or wave action, salinity and temperature characteristics, water clarity, which can affect marine ecosystems.

[5] Together with hydrodynamics, substrate is a main factor structuring benthic habitats, being a driver of patterns in diversity, function and integrity of benthic communities. Indirect indicators of functions (i.e. the benthic communities associated with the substrate) can be more practical to use in assessing GES than indicators of the substrate itself. The magnitude of impacts of human activities differs greatly between substrate types.

MSFD pressures	Your organization (Yes/No)*
Data/information on constructions at sea, landfills and land claim, barrages, windmill farms and other renewable energy constructions, oil and gas platforms and bridges, dredging and deposition in the sea, constructions on land with outlets into the sea e.g. power plants outfalls (Annex III, Table 2).	

- If 'Yes', please specify for which human activity/use are the data/information belonging to your organization.

The impacts are to be considered through the following indicators:

MSFD	Your organization (Yes or No)
7.1. Spatial characterisation of permanent alterations	
7.1.1. Extent of area affected by permanent alterations	
7.1.2. Changes in sedimentation	
7.2. Impact of permanent hydrographical changes	
7.2.1. Spatial extent of benthic habitat affected by the permanent alteration	
7.2.2. Changes in benthic communities and or biomass production	
7.2.3. Extent of area with spatial or temporal hypoxia/anoxia	
7.2.4. Presence of benthic communities associated with low oxygen conditions	
7.2.5.. Diversity and richness indices, based on species number and relative abundance in the benthic community	
7.2.6.. Presence of particularly sensitive or tolerant species	
7.2.7. Changes in habitat functions due to altered hydrographical conditions (e.g. changes in areas for fish/mammals reproduction (spawning areas, breeding), nursery and feeding areas and migration routes of fish, birds and mammals)	

Descriptor 8: Concentrations of contaminants are at levels not giving rise to pollution effects.

The Member States will consider the substances or group of substances that:
(i) have been identified as exceeding the relevant Ecological Quality Standards set for coastal or transitional water bodies adjacent to the marine region or subregion, be it in water, sediment or biota and/or
(ii) are included in the list of priority pollutants in Annex X of EC Directive 2000/60 and are discharged into the concerned marine region or subregion and/or
(iii) are pollutants under the terms of the Directive and their discharges, releases, losses or emissions are significant in the marine region or subregion, including acute pollution events following accidents.

Progress towards good environmental status will depend on whether their presence in the marine environment is consistently decreasing for synthetic or priority substances, or is progressively stabilised at background values for natural ones, as well as on whether their biological effect are kept within acceptable limits.

MSFD	Your organization (Yes or No)
8.1 Concentrations in water, sediments and biota (measured, where relevant, in the same matrix)*	
8.2. Biological effects on the elements of concerned ecosystems, after having established at national, regional or subregional level (i) the appropriate taxonomic groups where the effects must be identified, taking into account their sensitivity towards the pollutant concerned and within them (ii) the nature of the effect to be assessed	
8.3. Occurrence and extent of acute pollution events (e.g. slicks from oil and oil products) and impact on biota physically affected by this pollution	

*Is there an agreed list of contaminants which is developed based on existing national regulations? If yes, please specify which contaminants are agreed.

Descriptor 9: Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards

Member States are to monitor the presence in wild caught fish, crustaceans, molluscs, echinoderms, roe and seaweed harvested in the different (sub) regions destined for human consumption for substances:
- for which maximum levels contained within products destined to human consumption are established at EU, regional, or national level, and/or
- referred to in descriptor 8, for which the predicted or measured environmental concentration is above the level where no biological effects appear.

The presence of the contaminants above is to be assessed against regulatory levels set for human consumption. This includes the performance of a trend analysis when either environmental concentration levels or biological effect levels are still in the process of being set.

Progress towards good environmental status will depend on whether the contaminants subject to surveillance are at levels below the levels established for human consumptions or showing a downward trend (for the contaminants for which regulatory levels are in the process of being set).

Levels, number and frequency of substances:

MSFD	Your organization (Yes or No)
9.1. Frequency of levels exceeding regulatory levels (*)	
9.2. Actual levels detected	
9.3 Numbers of contaminants for which exceeding levels have been detected	
9.4. Origin of contaminants (geological versus anthropogenic; local versus long distance)	

*Is there list of contaminants to be considered which has been developed based on existing regulations? If yes, please specify which contaminants are agreed.

Descriptor 10: Properties and quantities of marine litter do not cause harm to the coastal and marine environment.

The distribution of litter is highly variable due to short time variations caused by meteorological and hydrodynamic events, including seasonal fluctuations. Such variability is to be taken into considerations when planning monitoring schemes. The descriptor deals with amount, composition and sources of litter, as well as with its impacts.

MSFD	Your organization (Yes or No)
10.1. ML washed ashore and/or deposited on coastlines	
10.2. ML in the water column, including floating and suspended litter on the sea floor	
10.3. ML ingested by marine animals/birds	
10.4. Microparticles (mainly mircroplastics) derived from degradation of litter	
10.5. Impact rates of degraded litter on organisms	
10.6. Potential chemical pollution resulting from degraded litter (plastic)	

Descriptor 11: Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

As well as underwater noise, other forms of energy inputs can be distinguished such as electromagnetic fields from electricity cables and light at the surface. At this stage, and subject to further development, only the aspect of underwater noise has been developed further as a fist priority.

Noise input can occur at many scales of both space and time. Anthropogenic sounds may be of short duration (e.g. impulsive) or be long lasting (e.g. continuous). Higher frequency sounds transmit less well in the marine environment whereas lower frequency sounds can travel far.

Organisms that are exposed to sounds can be adversely affected over a short time-scale (acute effect) or a long time-scale (permanent or chronic effects). Adverse effects can be subtle (e.g. temporary harm to hearing, behavioural effects) or obvious (e.g. death in the worst case). With sufficient resources and research, it might be possible to develop indicators for these many facets of harm from energy input; however the initial indicators described below (pressure indicators) focus on sounds that affect relatively broad areas rather than sounds that affect only local parts of the marine environment.

MSFD	Your organization (Yes or No)
11.1. Distribution in time and place of loud, low and mid frequency impulsive sounds (Proportion of days and their distribution within a calendar year over areas of a determined surface, as well as their spatial distribution, in which anthropogenic sound sources exceed levels that are likely to entail significant impact on marine animals measured as Sound Exposure Level (in dB re 1µPa 2 .s) or as peak sound pressure level (in dB re 1µPa peak) at one metre, measured over the frequency band 10 Hz to 10 kHz (11.1.1))	
11.2 Continuous low frequency sound (Trends in the ambient noise level within the 1/3 octave bands 63 and 125 Hz (centre frequency) (re 1µPa RMS; average noise level in these octave bands over a year) measured by observation stations and/or with the use of models if appropriate (11.2.1))	

B. Data availability versus Annex III of the MSFD

Avoiding duplication with Annex I, here selected parts of Annex III are given for data availability check.

Table 1. Characteristics –state of the Sea

Characteristic	Component	Criteria	Your Organization (Yes or No)
Physical and chemical features	Bathymetry and topography		
	Temperature and salinity regime, ice cover, current velocity, stratification (CIL[6]), upwelling, wave	Seasonal variability, spatial distribution, trends	
	pH, pCO, H_2S profiles		
Biological features at the level of functional groups	Seabirds	Diversity, abundance, spatial distribution, migrations, trends	
	Mammals		

In the Table below, please check whether you have data/information to describe the human activities exercised in your national waters and on coast. In the column 'Description of marine use/activity' please specify what kind of indicators you use in your country.

Table 2. Description of human activities

Activity Theme	List of Human Activities	Description of marine use/activity
Extraction of living resources	Fisheries incl. recreational fishing (fish & shellfish)	
	Seaweed and other sea-based food harvesting	
	Extraction of genetic resources/ bioprospecting/ maerl	
Food production	Aquaculture (fin-fish & shellfish)	
Man-made structures (incl. in construction)	Land claim, coastal defence	
	Port operations	
	Placement & operation of offshore structures (other than for energy production)	
	Submarine cable & pipeline operations	
Extraction of non-living resources	Marine mining (sand, gravel, rock)	
	Dredging	
	Desalination/water abstraction	
Energy production	Marine-based renewable energy generation (wind, wave & tidal power)	
	Marine hydrocarbon extraction (oil & gas)	
Transport	Shipping	

[6] Cold Intermediate Layer

Activity Theme	List of Human Activities	Description of marine use/activity
Waste disposal	Solid waste disposal incl. dredge material	
	Storage of gases	
Tourism and recreation	Tourism & recreation incl. yachting	
Research and survey	Marine research, survey & educational activities	
Military	Defence recurrent operations	
	Dumping of munitions	
Land-based activities (coastal, riverine and atmospheric)	Urban (municipal waste water discharge)	
	Industry (discharges, emissions)	
	Agriculture & forestry (run-off, emissions)	
Other marine uses and activities		

In the Table below, please cross-check whether for each human activity you have data/information to describe the pressures exercised on the Black Sea. In the shaded boxes please indicate 'Yes' or 'No' considering level of input/load (where appropriate) and/or level of pressure in the environment.

Table 3. Human activities and pressures (cross-check)

Activity Theme	List of Human Activities	*PRESSURES*											
		Physical loss (area, extent[7])	*Physical damage (area, extent)*	*Interference with hydrological processes*	*Other physical disturbance (areas, extent)*		*Contamination by hazardous substances (load)*	*Systematic and/or intentional release of substances (load)*	*Nutrient and organic matter enrichment (load)*	*Biological disturbances*			*Acidification*
		Smothering Sealing	Siltation Abrasion Extraction (e.g. sand)	Thermal and salinity regime change	Noise (trends in level)	Marine litter (trends in amount on coast and in sea)	Synthetic compounds Non-synthetic substances Radionuclides	e.g. produced water, carbon storage	Fertilizers and other nutrient-rich substances.	Extraction of species, including non-target[8]	Invasives, translocations[9]	Microbial pathogens	Decrease in pH
Extraction of living resources	Fisheries incl. recreational fishing (fish & shellfish)												
	Seaweed and other sea-based food harvesting												
	Extraction of genetic resources/ bioprospecting/ maerl												
Food production	Aquaculture (fin-fish & shellfish)												

[7] Area and extent, where mentioned, are meant for different types of affected substrates.
[8] The Pressure can be described by number of vessels, fishing effort, frequency trawled, etc.
[9] The pressure can be described by vectors of introduction, risk areas, number of new species identified per year, number of established species per decade, etc.

Activity Theme	List of Human Activities	PRESSURES											
		Physical loss (area, extent[7])	*Physical damage (area, extent)*	*Interference with hydrological processes*	*Other physical disturbance (areas, extent)*		*Contamination by hazardous substances (load)*	*Systematic and/or intentional release of substances (load)*	*Nutrient and organic matter enrichment (load)*	*Biological disturbances*			*Acidification*
		Smothering Sealing	Siltation Abrasion Extraction (e.g. sand)	Thermal and salinity regime change	Noise (trends in level)	Marine litter (trends in amount on coast and in sea)	Synthetic compounds Non-synthetic substances Radionuclides	e.g. produced water, carbon storage	Fertilizers and other nutrient-rich substances.	Extraction of species, including non-target[8]	Invasives, translocations[9]	Microbial pathogens	Decrease in pH
Man-made structures (incl. in construction)	Land claim, coastal defence												
	Port operations												
	Placement & operation of offshore structures (other than for energy production)												
	Submarine cable & pipeline operations												
Extraction of non-living resources	Marine mining (sand, gravel, rock)												
	Dredging												
	Desalination/water abstraction												
Energy production	Marine-based renewable energy generation (wind, wave & tidal power)												
	Marine hydrocarbon extraction (oil & gas)												
Transport	Shipping												
Waste disposal	Solid waste disposal incl. dredge material												
	Storage of gases												
Tourism and recreation	Tourism & recreation incl. yachting												
Research and survey	Marine research, survey & educational activities												
Military	Defence recurrent operations												
	Dumping of munitions												
Land-based activities (coastal, riverine and atmospheric)	Urban (municipal waste water discharge)												
	Industry (discharges, emissions)												
	Agriculture & forestry (run-off, emissions)												
Other marine uses and activities													

In the Table below, please cross-check for each pressure do you have the data/information to describe the impacts. Please indicate 'Yes' or 'No'.

Table 4. Pressures and impacts (cross-check)[10]

Pressure theme	Pressure	Impact on	Yes/No
Physical loss	Smothering	Seabed Habitats	
	Sealing		
Physical damage	Siltation		
	Abrasion		
	Extraction		
Other physical disturbance	Underwater noise	Functional groups and habitats (water column and seabed)	
	Marine litter		
Interference with hydrological processes	Thermal regime change	Functional groups and habitats (water column and seabed)	
	Salinity regime change		
Contamination by hazardous substances	Synthetic compounds	Seabed habitats, functional groups, seafood	
	Non-synthetic substances		
	Radionuclides		
Systematic and/or intentional release of substances	Other substances	Seabed habitats, functional groups	
Nutrient and organic matter enrichment	Nutrients	Water column and seabed habitats, species, functional groups, ecosystems	
	Organic matter		
Biological disturbance	Microbial pathogens	Safety of food (fish and other seafood), bathing water quality	
	Non-native species and translocations	Water column and seabed habitats, species, functional groups, ecosystems	
	Extraction of selected species incl. non-target catches	Water column and seabed habitats, species, functional groups, ecosystems	
Others			

VII. Needs in harmonization

Please specify your opinion on the needs in harmonization as per the MSFD:

1. National level
2. Regional level

Please specify the needs in harmonization in the following categories (examples):

a. Sampling strategy (equipment, frequency, sampling area coverage)
b. Data analysis
c. Indicators development
d. GES assessment

[10] The Table is similar to Table 2 from the EC document: Guidance for 2012 reporting under the Marine Strategy Framework Directive, however covers broader scale impacts under certain pressures as seen being possible in the Black Sea.

ANNEXES

ANNEX II. Inventories of Stakeholders

European Commission
environment

European Commission
DG Environment

Diagnostic Report
Inventories of Stakeholders

MISIS

MSFD Guiding Improvements in the Black Sea
Integrated Monitoring System

BULGARIA

No	Organization	Cat.	Sector	City	Web page	Title	Contact Name	Position	email	Phone
1.	Ministry of Environment and Water	public	Government	Sofia	http://www.moew.government.bg/	Mrs	Marinka Bogdanova	MFSD coordinator Expert Water management Directorate	bogdanovam@moew.government.bg	00359 2 940 6644
2.	Ministry of Regional development and Public Work	public	Government	Sofia	http://www.mrrb.government.bg/	Mrs.	Ekaterina Zaharieva	Deputy Minister	ezaharieva@mrrb.government.bg	00359 2 9405 9
3.	Ministry of economy, energy and tourism	public	Government	Sofia	http://www.mi.government.bg/bg	Mr.	Nikolai Nalbantov; Alexandrina Ivanova	Director "Energy and environment protection"	n.nalbantov@mee.government.bg	00359 2 9263 208
4.	Ministry of Health	public	Government	Sofia	http://www.mh.government.bg/	M.D.	Dimitar Dimitrov	Head "Public health directorate"	dimdimitrov@mh.government.bg	00359 2 930 11 59
5.	Ministry of Defence									
6.	Ministry of Foreign Affairs	public	Government	Sofia	http://www.mfa.bg/	Mr.	Ivan Petkov	Ambassador for special cases for the Black Sea region	iprd@mfa.bg	00359 2 971 14 08
7.	Ministry of Transport, Information Technology and communications	public	Government	Sofia	http://www.marad.bg/	Mr.	Petar Kirov	Deputy Director "Executive Agency Maritime Administration"	pkirov@marad.bg	00359 2 930 09 41
8.	Ministry of Agriculture and Food/National Agency for Fishery and Aquaculture	public	Government - Fishery & Aquaculture	Sofia	http://iara.government.bg/	Mr.	Ivailo Simeonov	Head Dep. "Fisheries and control"	office@iara.government.bg ; Ivaylo.simeoonov@iara.government.bg	00359 2 80 51 666; 00359 2 80 51 674
9.	Ministry of Culture	public	Government	Sofia	http://mc.government.bg/	Mr.	Georgy Stoev	Deputy Minister	g.stoev@mc.government.bg	00359 2 9400916
10.	Executive Environmental Agency	public	Government	Sofia	http://eea.government.bg/	Mr.	Velcho Kuyumdjiev	Head Dep. "Water monitoring"	blacksea@eea.government.bg.	00359 2 9559 818
11.	Basin directorate for water management in the Black Sea region/Ministry of Environment and water	public	Government	Varna	http://www.bsbd.org/	Eng.	Ventzislav Nikolov Desislava Konsulova	Director Head Dept."Management "	bsbd_mp@bsbd.org	00359 52 631447
12.	Institute of Oceanology-BAS	public	Research	Varna	www.io-bas.bg	Prof.	Snejana Moncheva	Head Dep. "Marine biology and Ecology"	snejanam@abv.bg	00359 52 370485
13.	National Institute of Hydrology and Meteorology-BAS	public	Research	Sofia	http://www.meteo.bg/	Assoc. prof.	Dobri Dimitrov	Deputy General Director	office@meteo.bg	00359 2 9753996
14.	Center of hydro-and aerodynamics-BAS	public	Research	Varna	http://www.bshc.bg/	Assoc. prof.	Konstantin Josifov	Director	office@bshc.bg	00359 52 370500
15.	LUKOIL Bulgaria Ltd	private	Gas and oil	Sofia	http://www.lukoil.bg/	Mr.	Valentin Zlatev	General Director	office@lukoil.bg	00359 2 91 74 100
16.	Petrol-AD Bulgaria	private	Gas and oil	Sofia	http://www.petrol.bg/	Mr.	Svetoslav Yordanov	Executive Director	office@petrol.bg	00359 2 4960 300
17.	Navy Academy "N. Vaptzarov"	public	Education	Varna	http://www.naval-acad.bg/	Prof.D. sci.,	Boyan Mednikarov	Dean	dean-eng@naval-acad.bg	00359 52 632 015
18.	Bulgarian Association of Tourist Agencies	other	NGO - tourism	Sofia	http://www.batabg.org/	Mrs.	Donka Sokolova	Chair of the Steering Committee	bata@mail.orbitel.bg	00359 2 980 6929
19.	Bulgarian Tourist Chamber	other	NGO - tourism	Sofia	http://www.btch.org/	Assoc. Prof.	Tzvetan Tonchev	Chair of the Steering Committee	btch@btch.org	00359 2 9874059
20.	Black Sea Institute	other	NGO - environment	Bourgas	http://bs-ml.eu/	Assoc. prof.	Maruysya Lyubcheva	President of the Administrative council	mar_lyb@yahoo.com	00359 56 843 667
21.	Consultancy Center for sustainable Development (CCSD) Geopont-Intercom Ltd.	private	Environment	Varna	http://geopont.enviro-link.org	Eng.	Lyudmil Ikonomov	General Manager	ikonomov@enviro-link.org	00359 52 612858
22.	Black Sea NGO Network (BSNN)	other	NGO - environment	Varna	http://www.bsnn.org/	Mrs.	Emma Gileva	Head Regional office	bsnn@bsnn.org	00359 52 615 856
23.	Association of Fish Products Producers BG Fish (AFPP BG Fish)	other	NGO - Fishery	Sofia	http://www.bgfish.com/	Dr.	Dr. Yordan Gospodinov -	Executive Director	bgfish@bgfish.com	00359 2 9817589

No	Organization	Cat.	Sector	City	Web page	Title	Contact Name	Position	email	Phone
24.	Fisheries Association "BLACK SEA SUNRISE"	other	NGO - Fishery	Varna	http://www.bssfishing.com/	Mr.	Emil Milev	President	bss.varna.bg@gmail.com	00359 898699060
25.	Union of the Bulgarian Black Sea local authorities (UBBSLA)	other	NGO	Varna	http://www.ubbsla.org/	Mrs.	Mariana Kancheva	Director	office@ubbsla.org	00359 52 600 266
26.	Bulgarian Association for Plastics	other	NGO - Industry	Sofia	http://www.bap-bg.org/	Mrs.	Antoaneta Pernikova	Executive Director	e-mail: bap@mail.bg	00359 2 9430500
27.	Ministry of Environment and Water (representation in Belgium, Brussels, EU)	public	Government	Brussels		Mrs	Violeta Popova	Environment attachee Permanent Representation of BG to EU	violeta.popova@bg-permrep.eu	0032 2 280 31 62
28.	Central Laboratory for High Geodezy (Stations in Varna,Irakli, Bourgas and Achtopol)	public	Research	Sofia	Sofia, 111, ul. Acad. G. Bonchev, bl. 1					02 720 841
29.	Institute for Fishing Resources (IFR-Varna)	public	Research	Varna	http://www.ifrvarna.com	Dr	Vesselina Mihneva	Scientist	vvmihneva@yahoo.com	052632066
30.	Regional Laboratory-Varna, Executive Agency for Environment	public	Government	Varna						
31.	Regional Laboratory-Bourgas, Executive Agency for Environment	public	Government	Bourgas						
32.	Maritime administration -Varna	public	Government	Varna						
33.	Maritime administration-Bourgas	public	Government	Bourgas						
34.	RHI (Bathing water)-Varna, Dobrich and Bourgas	public	Government	Varna, Dobrich and Bourgas						
35.	Geozashtita - Varna	public	Government	Varna						
36.	Municipalities Varna, Dobrich and Bourgas[1]	public	Government	Varna, Dobrich and Bourgas						
37.	Bulgarian Agency for Food Safety	public	Government	Sofia						
38.	National Statistical Institute	public	Government	Sofia						
39.	Institute of Biodiversity and Ecosystem Research, BAS (IBER-BAS)	public	Government	Sofia	www.iber.bas.bg					

[1] Note: largest municipalities have been mentioned, there are a number of smaller which are also potential holders or end-users of environmental data/information.

ROMANIA

No	Name	Postal address	Phone	Mail	Web	Contact person
	INSTITUTES					
1	Constanta County Department for Statistics	Bd. Tomis No. 51, Constanta	00 40 241 672032/ Fax: 0241/672032	tele@constanta.insse.ro / nicoleta.trandafir@constanta.insse.ro	www.constanta.insse.ro	Nicoleta Trandafir
2	National Research and Development Institute for Marine Geology and Geoecology - GeoEcoMar	Bd. Mamaia No. 304, RO-900581, Constanta	00 40 21 2522594 (Bucharest) / 00 40 241 548420 (Constanta)	headquarter@geoecomar.ro / branch.constanta@geoecomar.ro	www.geoecomar.ro	Tatiana Begun
3	National Institute for Research and Development in Tourism	St.Apolodor No. 17, Cod 050741, Bucharest	00 40 21 3162565 / 00 40 21 3162535	office@incdt.ro	www.incdt.ro	Dir. Ovidiu Teodorescu
4	National Institute for Marine Research and Development "Grigore Antipa" (NIMRD)	Bd. Mamaia No. 300, Ro-900581, Constanta	00 0 241 540870	office@alpha.rmri.ro	www.rmri.ro	Dir. Simion Nicolaev
5.	INCDD Tulcea					
6.	ARBDD Danube Delta					
	UNIVERSITIES					
7.	Ovidius University					
	MINISTRIES					
8.	Ministry of Environment and Forests Ministry of Health	Bd. Libertatii No. 12, Sector 5, Bucharest	00 40 21 4089641	otilia.mihail@mmediu.ro	www.mmediu.ro	Otilia Mihail
9.	Ministry of Agriculture					
10.	Ministry of Transport					
11.	Ministry of Defence					
12.	Ministry of Tourism and Development					
13.	Ministry of Industry					
14.	Ministry of Energy					
15.	Ministry of Economy					
	MUNICIPALITIES					
16.	Constanta City Hall (Environmental Department – Urban Ecology)	Bd. Tomis no. 51, Cod 900725, Constanta	00 40 241 488132	octavia.Bardasu@primaria-constanta.ro; mediu@primaria-constanta.ro	www.primaria-constanta.ro	Octavia Bardasu
17.	S.C. Aquaserv	St. Rezervorului no. 2, Tulcea	00 40 240 524042	aquaserv_tl@yahoo.com	http://www.aquaservtulcea.ro	Dir. Ionel Caraiman
	GOVERNMENTAL AGENCIES					
18.	Constanta County Department of Public Health	St. Lăcrămioarei No.1, Constanta	00 40 241 480939 / 00 40 241 480946	secretariat@dspct.ro / igiena_mediului_cta@yahoo.com	www.dspct.ro	Luiza Caruceru
19.	Tulcea County Department of Public Health	Str. Viitorului, nr. 50, Tulcea	00 40 240 534134 / 00 40 240 534404	dspj.tulcea@x3m.ro; giaa_2004@yahoo.com	http://www.dspjtulcea.ro	Giorgiana Maria Ghigu
20.	Romanian Waters National Administration					
21	Environmental Protection Agency Constanta (Monitoring Department)	St. Unirii, No. 23, RO-900532, Constanta	00 40 241 546596 / 00 40 241546696	office@apmct,anpm.ro	http://apmct.anpm.ro	Daniela Serban
22.	National Company Maritime Ports Administration (Environmental Department)	Constanta, Port, Maritime station	00 40 241 601 624	apmc@constantza-port.ro; pioncescu@constantza-port.ro	www.portofconstantza.com	Paul Ioncescu
23.	General Border Police Inspectorate (Coast Guard, Constanta)	St. Zmeurei No. 3, RO-900433, Constanta	00 40 241 641188 / 00 40 241 698668	contact@garda-de-coasta.ro	http://www.ijpfconstanta.ro/	Dumitru Radu
24.	National Environmental Guard - Constanta					
25.	National Environmental Guard - Tulcea					

No	Name	Postal address	Phone	Mail	Web	Contact person
26.	Environmental Protection Agency Tulcea (Monitoring Department)	St. 14 Noiembrie No. 5, RO-820009, Tulcea	00 40 240 510620 / 00 40 240 510622	office@apmtl.anpm.ro / monitoring_integrat@anpm.ro	http://apmtl.anpm.ro	Niculai Gheorghe
27.	Romanian Space Agency	St. Mendeleev, No. 21-25, RO-010362, Sector 1, Bucharest	00 40 21 3168722 / 00 40 21 3128804	marius-ioan.piso@rosa.ro	http://www.rosa.ro	Marius Piso
28.	Water Administration Dobrogea Littoral	St. Mircea cel Batran No.127, RO-900592, Constanta	00 40 241 673036 / 00 40 241 673025	camelia.pulbere@dadl.rowater.ro	www.rowaterct.ro	Camelia Pulbere
29.	RAJA Constanta (waste water treatment plant)					
30.	Romanian Naval Authority				www.rna.ro	
31.	Naval Academy	Str. Fulgerului, No.1	0040723498579	nicolae_florin_m@yahoo.com		Nicolae Florin
32..	Shipping Agencies					
33.	Municipal waste managers (POLARIS)					
34.	Constanta Maritime Hydrographic Directorate	St. Fulgerului , no. 1, Constanta,		hidro@dhmfn.ro		Adrian Filip
35.	Border Police General Inspectorate	Bucuresti, str. Razoare no. 5, Sector 6, code 050506	021.316.25.98 int. 19338, Fax: 021.312.11.89	pfr@igpf.ro	http://www.politiadefrontiera.ro/	Adrian Sbarcea
	NGOs					
36.	Mare Nostrum	Bd. 1 Decembrie 1918, no. 3, Bl. F17, Sc.A, Ap.3, Cod 900711, Constanta	00 40 241 612 422; 00 40 341 407 432	office@marenostrum.ro mihaela_candea@marenostrum.ro	www.marenostrum.ro	Mihaela Candea
37.	NGO SOR					
	PRIVATE COMPANIES					
38.	S.C. Thermo-electric factory Midia S.A. (Environment Department)	Bd. Navodari, No. 9A, RO-905700, Navodari, Constanta	00 40 241 486235	cetmidia@utmidia.ro / dana.rasica@utmidia.ro	www.utmidia.ro	Dana Rasica
39.	ExxonMobil Exploration and Production Romania Limited (Environment Department)	St. Floreasca 169 A, Building A, 4th floor, sector 1, Bucharest	00 40 745 327291	alin.stirbu@exxonmobil.com		Alin Stirbu
40.	OMV Petrom SA	Constant, the Port - Dana 34	00 40 372 824366 / 00 40 241 585420	wolfgang.leeb@omv.com		Wolfgang Leeb
41.	Diving Center Constanta					

TURKEY

No	Name	Postal address	Phone	Mail	Web	Contact person
	INSTITUTES					
1.	Trabzon Central Fisheries Research Institute	Su Ürünleri Merkez Araştırma Enstitüsü Vali Adil Yazar Cd. No:14 Kaşüstü, Yomra, 61250, TRABZON	(242)872 14 00	info@sumae.gov.tr	http://www.sumae.gov.tr	Prof. Kadir Seyhan
2.	Elazığ Fisheries Research Station	Sürsürü Neighborhood, Martyr Police M.Lami KARAAĞAÇ Street, No : 9, P.O.Box : 62, Post Code: 23040 ELAZIĞ	+90 (424) 241 10 85 241 10 86	bilgi@elazigsuurunleri.gov.tr	http://www.elazigsuurunleri.gov.tr/	
3.	Mediterranean Fisheries Research Production and Training Institute	Finike Karayolu 6 km Demre / ANTALYA	(242)872 14 00	info@akdenizsuurunleri.gov.tr	http://www.akdenizsuurunleri.gov.tr/index_tr.asp	
4.	TÜBİTAK Marmara Research Center, Institute of Environment	TÜBİTAK Marmara Araştırma Merkezi Çevre Enstitüsü 41470 Gebze / KOCAELİ	(262) - 677 20 00	ce.web@mam.gov.tr	http://www.mam.gov.tr/CE/index.html	Dr. Colpan Beken
	UNIVERSITIES					
5.	Akdeniz University (Faculty of Fisheries)	Akdeniz University Dumlupınar Boulevard Post Code: 07058 Campus ANTALYA, TURKEY	+ 90 242 310 1575	sufak@akdeniz.edu.tr	http://sufak.akdeniz.edu.tr/en	
6.	Ankara University (Faculty of Agriculture, Department of Fisheries)	Ankara Üniversitesi Ziraat Fakültesi 06110 Dışkapı - Ankara	903125961000/01-02	agricul@agri.ankara.edu.tr	http://www.agri.ankara.edu.tr/su/index.php?&fNo=21	
7.	Atatürk University (Faculty of Fisheries)	Atatürk Üniversitesi Su Ürünleri Fakültesi 25240 Erzurum	+90 442 2314726	suurunlerifak@atauni.edu.tr	http://www.atauni.edu.tr/#birim=su-urunleri-fakultesi	
8.	Çanakkale Onsekiz Mart University (Faculty of Fisheries)	Çanakkale Onsekiz Mart Üniversitesi Terzioğlu Kampüsü 17100 Çanakkale/TÜRKİYE	0 286 218 05 42	suurunleri@comu.edu.tr	http://suurunleri.comu.edu.tr	
9.	Çukurova University (Faculty of Fisheries)	Ç.Ü. Su Ürünleri Fakültesi 01330, Balcalı/Adana/Türkiye	+90 (322) 338 60 84	suf@cu.edu.tr	http://suurunleri.cu.edu.tr	
10.	Dokuz Eylul University (Institute of Marine Science and Management)	Bakü Bulvarı No:100 35340 İnciraltı / İZMİR	+90 (232) 278 51 12	deuimst@deu.edu.tr	http://web.deu.edu.tr/deuimst/	
11.	Ege University (Faculty of Fisheries)	E.Ü. Su Ürünleri Fakültesi 35100 Bornova / İZMİR TÜRKİYE	(232) 388 32 25 311 2988	sufak_dekanlik@mail.ege.edu.tr	http://egefish.ege.edu.tr/	
12.	Fırat University (Faculty of Fisheries)	Fırat Üniversitesi, Su Ürünleri Fakültesi PK: 23119 Elazığ-TÜRKİYE	+90 424 237 00 00	mncakmak@firat.edu.tr	http://portal.firat.edu.tr/WebPortal/?BirimID=84	
13.	Gaziosmanpaşa University (Faculty of Agriculture, Department of Fisheries and Aquaculture)	Gaziosmanpaşa Üniversitesi Ziraat Fakültesi Dekanlığı60240 Taşlıçiftlik Yerleşkesi – Tokat/Türkiye	+90 (356) 252 1616	ziraatdekanlik@gop.edu.tr	http://ziraat.gop.edu.tr/bolumDefault.aspx?dilId=1&birimlerId=13&bolumlerId=141&menuKod=unitetanitimi	
14.	İstanbul University (Faculty of Fishery)	Ordu Cad. No: 200 Laleli İstanbul 34130	(212) 455 57 00/ 16383	ozturkb@istanbul.edu.tr	http://www.istanbul.edu.tr/suurunleri/	
15.	İstanbul University (Institute of Maritime Sciences and Management	Müşküle Sok. No:1 Vefa- İstanbul	(212) 5282539	rapak@istanbul.edu.tr	http://www.istanbul.edu.tr/english/inst_maritime.php	Prof.Dr. Reşat Apak
16.	Karadeniz Technical University (Sürmene Faculty of Marine Sciences)	KTÜ. Sürmene Deniz Bilimleri Fakültesi, Çamburnu Kampüsü, 61530 Çamburnu/TRABZON	(462) 752 24 19	seyhan@ktu.edu.tr	http://www.deniz.ktu.edu.tr/index.htm	
17.	Mersin University (Faculty of Fisheries)	Mersin Üniversitesi Çiftlikköy Kampusu 33343 Yenisehir / Mersin	0 324 361 00 01	obasturk@mersin.edu.tr	http://www.mersin.edu.tr/akademikf/su-urunleri-fakultesi	
18.	Muğla University (Faculty of Fisheries)	Muğla Üniversitesi Su Ürünleri Fakültesi 48000 Kötekli / MUĞLA	0 252 211 18 86	sufak@mu.edu.tr	http://akademik.mu.edu.tr/default.aspx?bkod=04070000	
19.	Mustafa Kemal University (Faculty of Fisheries)	Meydan Mah. 512 Sk. İskenderun-HATAY-TÜRKİYE	(326) 614-1693	sufak@mku.edu.tr	http://suf.mku.edu.tr	
20.	Ondokuz Mayıs University (Faculty of Engineering, Department of Environmental Engineering)	Ondokuz Mayıs Üniversitesi Mühendislik Fakültesi Çevre Mühendisliği Bölümü Kurupelit Kampüsü 55139 Kurupelit/Samsun	(362)3121919	hbuyukg@omu.edu.tr	http://mf.omu.edu.tr/cevre/	Prof. Dr. Hanife BÜYÜKGÜNGÖR
21.	Middle East Technical University (nstitute of Marine Sciences)	Middle East Technical University, Institute of Marine Sciences, P.O.Box 28, 33731, Erdemli-Mersin, TURKEY	+90-324 521 3434	adminims.metu.edu.tr	http://www.ims.metu.edu.tr/	
22.	Ordu University (Fatsa Faculty of Marine Sciences)	T.C. ORDU ÜNİVERSİTESİ FATSA DENİZ BİLİMLERİ FAKÜLTESİ EVKAF MAH. 52400 FATSA / ORDU	(452) 4235053 4234722	fdbf@odu.edu.tr	http://fdbf.odu.edu.tr/Tr/	
23.	Recep Tayyip Erdoğan University (Faculty of Fisheries)	Rize Üniversitesi Rektörlüğü 53100 Merkez Rize-TÜRKİYE	0 464 223 61 26 1636	nurhayat61@yahoo.com	http://suf.rize.edu.tr/tr/	
24.	Sinop University (Faculty of Fisheries)	Akliman Mevkii Abalı Köyü 57000 – Sinop	0 368 287 62 54	oidb@sinop.edu.tr	http://www.sinop.edu.tr/akademikbirimler/fakulteler/su_urunleri/default.asp	

No	Name	Postal address	Phone	Mail	Web	Contact person
25.	Süleyman Demirel University (Eğirdir Faculty of Fisheries)	Süleyman Demirel Üniversitesi Eğirdir Su Ürünleri Fakültesi 32500 Eğirdir ISPARTA	246 313 34 47/47	esuf@sdu.edu.tr	http://esuf.sdu.edu.tr/	
26.	Tunceli University (Faculty of Fisheries)	Tunceli Üniversitesi Rektörlüğü, Atatürk Mahallesi Muhlis Akarsu Caddesi, Tunceli / Türkiye	+90 428 213 33 93	tusuf@tunceli.edu.tr	http://www.tunceli.edu.tr/akademik/fakulteler/suurunleri/surunanasayfa.htm	
	MINISTRIES					
27.	Republic of Turkey Ministry of Environment and Urban Planning (General Directorate of Environmental Management)	Vekaletler Caddesi No:1 Bakanlıklar 06573 Çankaya ANKARA TÜRKİYE	+90 312 586 30 00	cygm@csb.gov.tr	http://www.csb.gov.tr/gm/cygm/	
28.	Republic of Turkey Ministry of Environment and Urban Planning (Environmental Protection Agency for Special Areas)	Alparslan Türkeş Caddesi 17. sokak 10 Nolu Bina 06510 Beştepe Yenimahalle/ANKARA	+90 312 222 1234	tabiat@csb.gov.tr	http://www.csb.gov.tr/gm/tabiat/	
29.	Republic of Turkey Ministry of Transport, Maritime Affairs and Communications	Hakkı Turayliç Caddesi No:5 Emek 06510 ANKARA TÜRKİYE	+903122031000	bilgi@ubak.gov.tr	http://www.ubak.gov.tr/	
30.	Republic of Turkey Ministry of Food, Agriculture and Livestock (General Directorate of Fisheries and Fishery Products)	Eskişehir Yolu 9 km. Lodumlu ANKARA Çankaya ANKARA TÜRKİYE	+903122873360		http://www.tarim.gov.tr/; http://www.bsgm.gov.tr/	
31.	Republic of Turkey Ministry of Food, Agriculture and Livestock (General Directorate of Agricultural Research and Policy, GDAR)	Istanbul Yolu Uzeri Tarım Kampusu, P.K.51, 06171 Yenimahalle/ANKARA	+903123157623		http://www.tagem.gov.tr/	
32.	Republic of Turkey Ministry of Forestry and Water Affairs (General Directorate of Water Management)	Söğütözü Cad. No: 14/E Söğütözü Çankaya ANKARA TÜRKİYE	+903122075000; +903122076330	bilgiedinme@cevreorman.gov.tr	http://www.ormansu.gov.tr/; http://suyonetimi.ormansu.gov.tr	
33.	Republic of Turkey Ministry of Health (General Directorate of Health for Borders and Coastal Areas)	Kemankeş Cad. Karamustafapala Sk. No:21 Karaköy/Beyoğlu/ İSTANBUL	+902122933674	hssgm@hssgm.gov.tr	http://www.hssgm.gov.tr/	
34.	Republic of Turkey Ministry for EU Affairs (Agriculture and Fisheries Directorate)	Mustafa Kemal Mah. 2082. Cadde No: 4 06510 Bilkent, Ankara	+ 90 312 218 13 00	bilgiedinme@ab.gov.tr	http://www.abgs.gov.tr	
	COAST GUARD					
35.	TURKISH COAST GUARD COMMAND	Deniz Arama Kurtarma Koordinasyon Merkezi,ANKARA	0312 425 33 37		http://www.sgk.tsk.tr	
36.	Coast Guard Blacksea District Command	1 Nolu Yardımcı Arama Kurtarma Koordinasyon Merkezi, SAMSUN	0362 445 29 08		http://www.sgk.tsk.tr	
37.	Coast Guard Trabzon Group Command	1 Nolu Arama Kurtarma Alt Merkezi	0462 328 07 93		http://www.sgk.tsk.tr	
38.	Coast Guard Amasra Group Command	2 Nolu Arama Kurtarma Alt Merkezi	0378 315 10 04 2102		http://www.sgk.tsk.tr	
39.	Coast Guard Marmara and Straits District Command	2 Nolu Yardımcı Arama Kurtarma Koordinasyon Merkezi, İSTANBUL	0212 242 40 00		http://www.sgk.tsk.tr	
	MUNICIPALITIES					
40.	Artvin Municipality	Çarşı Mah. Cumhuriyet Cad. Belediye İşhanı No:3 Kat:4 ARTVİN	+90 (466) 212 37 11	artvin@artvin.bel.tr	http://www.artvin.bel.tr	
41.	Rize Municipality	Piriçelebi Mh. Menderes Bulvarı No:82	444 50 53	belediye@rize.bel.tr	http://www.rize.bel.tr	
42.	Trabzon Municipality	Gülbaharhatun Mahallesi Kahramanmaraş Caddesi No:201 (Varlıbaş AVM Yanı) TRABZON	0-462-224 6161	belediye@trabzon.bel.tr	http://www.trabzon.bel.tr	
43.	Ordu Municipality	Belediye Sarayı ORDU	0452-2250104	belediye@ordu.bel.tr	http://www.ordu.bel.tr	
44.	Giresun Municipality	Belediye Sarayı GİRESUN	444 4 028	halklailiskiler@giresun.bel.tr	http://www.giresun.bel.tr	
45.	Samsun Metropolitan Municipality	Pazar Mah.Necipbey Cad.No:35 İlkadım / SAMSUN	+90 (362) 431 60 90	info@samsun.bel.tr	http://www.samsun.bel.tr/	
46.	Sinop Municipality	Sinop Belediye Başkanlığı Merkez-SİNOP	0-368-261 1844	bilgi@sinop.bel.tr	http://www.sinop.bel.tr	
47.	Kastamonu Municipality	Kastamonu Belediyesi KASTAMONU	0 366 214 10 48	admin@kastamonu.bel.tr	http://www.kastamonu.bel.tr	
48.	Bartın Municipality	Bülentecevit Bulvarı Elmalık mevkii No:1 Merkez BARTIN	0 378 227 10 97	bartinbelediyesi@bartinbelediyesi.com	http://bartinbelediyesi.com/bel/	
49.	Zonguldak Municipality	Zonguldak Belediyesi, Belediye Bulvarı Acılık Cad. / ZONGULDAK	0372 259 67 67	info@zonguldak.bel.tr	http://www.zonguldak.bel.tr/	

No	Name	Postal address	Phone	Mail	Web	Contact person
50.	Düzce Municipality	Cedidiye Mah. Hükümet Sok. / Düzce	0 380 524 5821		http://www.duzce.bel.tr	
51.	Kocaeli Metropolitan Municipality	Karabaş Mah.Salim Dervişoğlu Cad. No:80 41040 İzmit / Kocaeli	0 262 318 10 01	RasitFidan@kocaeli.bel.tr	http://www.kocaeli.bel.tr/	
52.	İstanbul Metropolitan Municipality	Istanbul Büyükşehir Belediye Başkanlığı Kemalpaşa Mahallesi Şehzadebaşı Cad. No:25. 34134 Fatih / İST	+90 (212) 455 1300	webmaster@ibb.gov.tr	http://www.ibb.gov.tr	
53.	Tekirdağ Municipality	Mimar Sinan Cad. No:50 59030 TEKİRDAĞ	444 18 15	hesap@tekirdag.bel.tr	http://www.tekirdag.bel.tr/	
54.	Kırklareli Municipality	Kırklareli Belediye Başkanlıpı KIRKLARELİ	0288 214 12 67	kirklarelibelediyesi@hotmail.com	http://www.kirklareli.bel.tr	
	FISHERIES COOPERATIVES					
55.	Adana Regional Union of Fsheries Cooperatives	Karataş Balıkçı Barınağı	0.322.681 26 82			Mithat Altunay
56.	Balıkesir Regional Union of Fisheries Cooperatives	Çınarlı Mahallesi Servet Çırpan Cad.No:64 Bandırma / BALIKESİR	0.266.712 47 71			Kenan Çınar
57.	Çanakkale Regional Union of Fisheries Cooperatives	Namık Kemal Mahallesi Köpübaşı Cad. Yeni Balık Hali No:12 ÇANAKKALE	0.286.213 42 84			Hasan Uysal
58.	Doğu Karadeniz Regional Union of Fisheries Cooperatives	Foroz Balıkçı Barınağı İçi TRABZON	0.462.224 38 97			Ahmet Mutlu
59.	Hatay Regional Union of Fisheries Cooperatives	İskenderun Su Ürünleri Balıkçı Barınağı Tay Mahallesi İskenderun/HATAY	0.326.617 68 23			Nihat Beyazıt
60.	İstanbul Regional Union of Fisheries Cooperatives	Kennedy Cad.Sahil Yolu Mendirek İçi No:38 Bakırköy/İSTANBUL	0.212.572 63 80	info@istbirlik.com	www.istbirlik.com	Erdoğan Kartal
61.	İzmir Regional Union of Fisheries Cooperatives	Yalı Mahallesi Mithat Paşa Cad.No:228 İZMİR	0.232.234 24 30			Ahmet Yapıcı
62.	Kocaeli Regional Union of Fisheries Cooperatives					Şükrü İlikhan
63.	Marmara Regional Union of Fisheries Cooperatives	Balık Hali İçi No:93 Kumkapı / İSTANBUL	0.212.518 12 24			Aytunç Toker
64.	Mersin Regional Union of Fisheries Cooperatives	Kiremithane Mah.4420 Sok. 2/20 MERSİN	0.324.231 33 90			Hüseyin Beşkardaş
65.	Muğla Regional Union of Fisheries Cooperatives	Tarım İl Müdürlüğü MUĞLA	0.252.214 12 42			Osman Demirkol
66.	Sinop Regional Union of Fisheries Cooperatives	Camikebir Mahallesi Derinboğaz Ağzı No:32 SİNOP	0.368.261 87 83			Ali Bayrak
67.	Tekirdağ Regional Union of Fisheries Cooperatives	Hoşköy Kas.Liman İçi Şarköy / TEKİRDAĞ	0.282.538 61 00			Mümin Yazır
	PRIVATE, NGOs					
68.	Derinsu Underwater Engineering	Nilgün Sokak 5/1, 06650 Kavaklıdere ANKARA TÜRKİYE	(90) 312 467 3670	derinsu@derinsu.com	http://www.derinsu.com/	
69.	Envy Energy and Environmental Investments Inc.	Çetin Emeç Bulvarı 1314. Cadde (Eski 8. Cadde) No:7 Aşağı Öveçler 06450 Ankara / TÜRKİYE	0 312 583 88 00	envy@envy.com.tr	http://www.envy.com.tr	
70.	DenAr Ocean Engineering Ltd. Co.	Gazeteciler Sitesi, Hikaye Sokak No:1/4 34394 Şişli İSTANBUL	0 212 216 64 82	info@den-ar.com	http://www.den-ar.com	
71.	GeoMarine Land and Marine Engineering	Palmiye Mah. 1208 Sok. Necip Bey Apt. No:9/1 Yenişehir - Mersin	0324 325 26 86	bilgi@geomarine.com.tr	http://www.geomarine.com.tr/	
72.	Detek Offshore Technology Ltd. Co.	Güzelyalı Mahallesi Aydınlı Koyu Batı Sahili Yosun Sokak No: 3 34480 Pendik, İSTANBUL	0216 494 0 828		http://www.detek-tr.com	
73.	ABALIOĞLU YEM SOYA VE TEKS.SAN.A.Ş.	KEMALPAŞA MAH. 7412 SK. NO:4 PINARBAŞI/İZMİR	0232 479 21 68	kursad.unal@abalioglu.com	http://www.abalioglu.com	
74.	AGROMEY GIDA VE YEM SAN.TİC.A.Ş.	AGROMEY GIDA VE YEM SANAYI TICARET A.S. Ismet Kaptan Mah. Sair Esref Blv. No:48 Kat:5 Tuzcuoglu Is Merkezi 35220 Alsancak, Konak - IZMIR / TURKEY	+90 232 4468811	info@agromey.com	http://www.agromey.com	
75.	Akuvatur Su Ürünleri Tic. San. A.Ş.	Mansuroğlu Mah. 295/2 Sok. No:1 Ege Sun Plaza A Blok Kat:2 Daire: 220 35010 Bayraklı İzmir/TÜRKİYE	+90 232 462 10 58-68-78	info@akuvatur.com	http://www.akuvatur.com	
76.	GÜMÜŞDOĞA SU ÜRÜN.ÜRETİM İHR VE İTH.AŞ	AKYOL KÖYÜ DİBECİK MEVKİİ MİLAS – MUĞLA	0 252 536 62 28 -29	info@gumusdoga.com.tr	http://www.gumusdoga.com.tr	
77.	KILIÇ DENİZ ÜRÜNLERİ ÜRETİMİ İHR.İTH.VE TİC.A.Ş.	Kemikler Köyü Mavkii, Milas Bodrum Karayolu 18. km 48200 Milas - Muğla / Türkiye	+90 252 559 0283	info@kilicdeniz.com.tr	http://www.kilicdeniz.com.tr	
78.	MARENOSTRO DIŞ TİC.VE PAZ.A.Ş.	Güllük Karayolu 2.km, Milas 48670 Muğla, TÜRKİYE	+90 (252) 522 24 07	info@marenostro.net	http://www.marenostro.net	
79.	ÖZPEKLER İTH.-İHR. SU ÜRÜN.SAN VE TİC.LTD.ŞTİ.	Bozburun Mh. A.Nazif Zorlu Sanayi Sitesi 7152 Sk.No.2 DENİZLİ	+90 258 3718338	info@ozpekler.com.tr	http://www.ozpekler.com	

No	Name	Postal address	Phone	Mail	Web	Contact person
80.	UĞURLU BALIK ÜR.SAN.VE TİC.A.Ş	Korutürk Mah. Poyraz Sokak No:3/A Balçova-İzmir - TÜRKİYE	+90.232.277 33 36		http://www.ugurlubalik.com	
81.	Kızılırmak Su Ürünleri San. ve Tic. LTD. ŞTİ	Samsun Ankara Yolu 15. km Sastaş Soğutma Tesisleri Çivril Köyü Altı / SAMSUN	+90 362 611 28 26	info@kizilirmaksuurunleri.com.tr	http://www.kizilirmaksuurunleri.com.tr	
	FOUNDATIONS, SOCIETIES					
82.	Turkish Marine Research Foundation	P.O.Box: 10 , Beykoz, 81650, İSTANBUL	+ 90 216 424 07 72	info@tudav.org	http://www.tudav.org	
83.	Turkish Marine Environment Protection Association	Nakkaştepe, Aziz Bey Sokak No:1 34674 Kuzguncuk - İstanbul - Türkiye	(0216) 310 9301	info@turmepa.org.tr	http://www.turmepa.org.tr	
84.	United Nations Development Programme Turkey	Birlik Mahallesi, 415. Cadde (Eski 2. Cadde), No: 11, 06610 Çankaya, Ankara Türkiye	+90 312 454 1100	registry.tr@undp.org	http://www.undp.org.tr	Harun GÜÇLÜSOY
85.	Underwater Research Society Mediterranean Seal Research Group	Akincilar sok. 10/1 Maltepe, Ankara, TURKIYE	+90 312 230 3520	afag@sad.org.tr	http://sadafag.org	
86.	Turkish Sturgeon Conservation Society	Gelincik Mah. Gelincik Yolu Dostlar Sitesi No: 49/4 MERKEZ / SİNOP	0 368 260 54 64	info@merkoder.org	http://www.merkoder.org/	
87.	Word Wildlife Fund Turkey	Büyük Postane Caddesi No: 43-45 Kat:5 34420 Bahçekapı İstanbul	(0212) 528 20 30	info@wwf.org.tr	http://www.wwf.org.tr	
88.	Society of Fisheries Engineers	Su Ürünleri Mühendisleri Derneği PK: 76 Fatih/İstanbul	0 535 307 86 73	sumder@gmail.com	http://www.suurunleri.org.tr	
89.	Nature Conservation Center	Doğa Koruma Merkezi 1293 Sokak, No: 9/32, Beyazıt Apartmanı, Aşağı Öveçler 06830 Ankara	+90 (312) 287 40 67	dkm@dkm.org.tr	http://www.dkm.org.tr	

ANNEXES

ANNEX III. TR Legislation/Policy in the field of environmental protection

European Commission
DG Environment

Diagnostic Report
TR Legislation/Policy in the field of environmental protection

MSFD Guiding Improvements in the Black Sea
Integrated Monitoring System

A. Laws

1. By-law on Industrial Air Pollution Control (03.07.2009 27277 numbered Official Gazette)
2. By-law on Egzost Gases Emission Control (04.04.2009 27190 numbered Official Gazette)
3. Amendment of By-law on Control of Air Pollution due to the Domestic Heating (07.02.2009 27134 numbered Official Gazette)
4. Sensitive and Less Sensitive Water Areas Commnique Concerning urban Wastewater Treatment Regulation (27.06.2009 27271 numbered Official Gazette)
5. Regulation on Control of Water Pollution Communique on Administrative Procedure (10.10.2009 27372 numbered Official Gazette)
6. Regulation on Control of Water Pollution Communique on Sampling and Analysis Methods (10.10.2009 27372 numbered Official Gazette)
7. By Law on Environmental Inspection (21.11.2008 27061 numbered Official Gazette)
8. Regulation on General Principles of Waste Management (05.07.2008 26927 numbered Official Gazette)
9. Regulation on the Environmental Impact Assessment (Revised) (17.07.2008 26939 numbered Official Gazette)
10. Regulation on Qualifying the Environmental Measurement and Analysis Labratories (05.09.2008 26988 numbered Official Gazette)
11. Environmental Law (26.04.2006),
12. Regulation of the Urban Waste Water Treatment (08.01.2006 26047 numbered Official Gazette),
13. Regulation of Bathing Water directive (09.01.2006 26048 numbered Official Gazette),
14. The by-law on control of air pollution from industrial plants (22.07.2006 26236 numbered Official Gazette),
15. The by-law on Priciples of Organic Agriculture and Implemantation (17.10.2006, 263220 numbered Official Gazette)
16. Communiqué on imports of ozone depleting substances (published on 31.12.2011 dated and 28159 numbered Official Gazette)
17. Communiqué on integrated pollution control and prevention on textile industry published on 14.12.2011dated and 28142 numbered Official Gazette)

B. Regulations

1. Regulation on The Control of Major Industrial Accidents (published on 18.08.2010 dated and 27676 numbered Official Gazette)

2. Regulation on the determination of the procedures and principles on the tariffs of waste water infrastructures and domestic solid waste disposal facilities (published on 27.10.2010 dated and 27742numbered Official Gazette)

3. Regulation On The Procedures And Principles To Be Used For The Incentive Measures Of The Waste Water Treatment Facilities In Accordance With The Article 29 Of The Environmental Law (published on : 01.10.2010 dated and 27716 numbered Official Gazette)

4. Regulation on using the urban and domestic sludge on the soil (published on 03.08.2010 dated and 27661 numbered Official Gazette)

5. Regulation on the control of soil pollution and areas polluted by point sources(published on 08.06.2010 dated and 27605 numbered Official Gazette)

6. Regulation on Reception of Waste from the Ships and Waste Control (updated and published on 18/3/2010dated and 27525 numbered Official Gazette)

7. Regulation on management and assessment of environmental noise (published on 04.06.2010 dated and 27601 numbered Official Gazette)

8. Regulation on the measures to be taken for the protection of environment and public health from negative consequences of nonionized radiation (published on 24.07.2010 dated and 27651 numbered Official Gazette)

9. Regulation on the control of the emissions generated odor (published on 04.09.2010 dated and 27692 numbered Official Gazette)

10. Regulation on the quality of surface waters for obtaining drinking water or for planning to obtain (published on 29.06.2012 dated and 28338 numbered Official Gazette)

11. Regulation on control of groundwater against pollution and degradation (published on 07.04.2012 dated and 28257 numbered Official Gazette)

12. Regulation on Monitoring of Greenhouse Gas Emissions (published on 25.04.2012 dated and 28274 numbered Official Gazette)

Diagnostic report II

Guiding improvements in the Black Sea integrated monitoring system, data management, and assessments

MSFD Guiding Improvements in the Black Sea Integrated Monitoring System

Coordinator of the MISIS project
National Institute for Marine Research and Development "Grigore Antipa"a
Constantza - Romania
office@alpha.rmri.ro ; boicenco@alpha.rmri.r