

TECHNICAL REPORT



April 2021

Mapping Report of Mediterranean observatories and monitoring programmes for the environment and for marine and coastal activities

Table of Contents

Table of contents	2
List of acronyms	7
Introduction	12
 Albania	 14
I. General overview	14
Legal, administrative or other obligations involving monitoring	14
Governmental environmental institutions/organiSations	15
Monitoring institutions	16
Monitoring activities within MPAs	19
Environmental monitoring programmes	20
Environmental information systems	20
Bibliography	21
 Algeria	 22
I. General overview	22
Legal, administrative or other obligations involving monitoring	22
National environmental institutions/organisations	23
Monitoring institutions	24
Monitoring activities within MPAs	30
Environmental monitoring programmes	32
Environmental information systems	33
Bibliography	33
 Bosnia and Herzegovina	 35
I. General overview	35
Legal, administrative or other obligations involving monitoring	35
National environmental institutions	37
Monitoring activities	38
Environmental monitoring programmes	41
Environmental information systems	42
Bibliography	43
 Cyprus	 44
I. General overview	44
Legal, administrative or other obligations involving monitoring	44
Governmental environmental institutions	45

Monitoring institutions/observatories.....	46
Environmental monitoring programmes.....	47
Environmental information systems.....	48
Bibliography.....	48
Croatia.....	49
I. General overview	49
Legal, administrative or other obligations involving monitoring	49
National environmental institutions/organisations	50
Monitoring institutions/observatories.....	51
Environmental monitoring programmes.....	55
Environmental information systems.....	56
Bibliography.....	57
Egypt	58
I. General overview	58
Legal, administrative or other obligations involving monitoring	58
Governmental environmental institutions	59
Monitoring institutions/observatories.....	59
Environmental monitoring networks.....	63
Environmental information systems.....	63
Bibliography.....	64
France	65
I. General overview	65
Legal, administrative or other obligations involving monitoring	65
National environmental institutions/organisations	66
Monitoring institutions/observatories.....	67
Monitoring activities within MPAs	78
Environmental monitoring networks.....	80
Environmental information systems.....	82
Bibliography.....	83
Greece	85
I. General overview	85
Legal, administrative or other obligations involving monitoring	85
National environmental institutions/organisations	86
Monitoring institutions/observatories.....	86
Monitoring activities within MPAs	91
Environmental monitoring programmes.....	93
Environmental information systems.....	94
Bibliography.....	95

Israel	96
I. General overview	96
Legal, administrative or other obligations involving monitoring	96
Governmental environmental institutions	98
Monitoring institutions/observatories	99
Environmental monitoring programmes	101
Environmental Information Systems	102
Bibliography	103
Italy	104
I. General overview	104
Legal, administrative or other obligations involving monitoring	104
Governmental environmental institutions	106
Monitoring institutions/observatories	106
Environmental monitoring programmes	109
Environmental information systems	110
Bibliography	111
Lebanon	112
I. General overview	112
Legal, administrative and other requirements about monitoring	112
Governmental environmental institutions	113
Monitoring institutions/observatories	113
Environmental monitoring programmes	116
Environmental information systems and data centres	117
Bibliography	117
Libya	118
I. General overview	118
Legal, administrative, or other obligations involving monitoring	118
Governmental environmental institutions	119
Monitoring institutions/observatories	120
Monitoring activities within MPAs	122
Environmental Monitoring programmes	122
Bibliography	123
Malta	124
I. General overview	124
Legal, administrative or other obligations involving monitoring	124
Governmental environmental institutions	125
Monitoring institutions/observatories	125
Environmental monitoring programmes	128
Environmental monitoring networks	129
Environmental information systems	130
Bibliography	130

Monaco	131
I. General overview	131
Legal, administrative or other obligations involving monitoring	131
Governmental environmental institutions	132
Monitoring institutions/observatories.....	132
Monitoring activities within MPAs	133
Environmental monitoring networks.....	134
Environmental information systems.....	134
Bibliography.....	134
Montenegro	135
I. General overview	135
Legal, administrative or other obligations involving monitoring	135
National environmental institutions/organisations	137
Monitoring institutions/observatories.....	137
Environmental monitoring programmes.....	140
Environmental information systems.....	142
Bibliography.....	142
Morocco.....	143
I. General overview	143
Legal, administrative or other obligations involving monitoring	143
National environmental institutions/organisations	144
Monitoring institutions/observatories.....	144
Environmental monitoring programmes.....	149
Environmental information system	149
Bibliography.....	150
Palestine.....	151
I. General environmental context	151
Legal, administrative or other obligations involving monitoring	151
National environmental institutions	152
Monitoring institutions/observatories.....	153
Environmental information systems.....	153
Bibliography.....	154
Slovenia	155
I. General overview	155
Legal, administrative or other obligations involving monitoring	155
National environmental institutions/organisations	156
Monitoring institutions and observatories	156
Environmental monitoring programmes.....	159
Environmental information system	160
Bibliography.....	160

Spain	161
I. General environmental context	161
Legal, administrative or other obligations involving monitoring	161
National environmental institutions/organisations	162
Monitoring institutions/observatories.....	162
Environmental monitoring programmes.....	167
Environmental information systems.....	168
Bibliography.....	168
Syria	169
I. General overview	169
Bibliography.....	169
Tunisia	170
I. General overview	170
Legal, administrative or other obligations involving monitoring	170
National environmental institutions/organisations	171
Monitoring institutions/observatories.....	171
Environmental monitoring programmes.....	176
Monitoring activities within MPAs	177
Environmental information systems.....	178
Bibliography.....	180
Turkey	181
I. General overview	181
Legal, administrative or other obligations involving monitoring	181
Governmental environmental institutions	183
Monitoring institutions/observatories.....	184
Environmental monitoring programmes and networks	188
Environmental Information systems and databases.....	189
Bibliography.....	189
European Union	190
I. Legal, administrative or other obligations involving monitoring	190
European environmental institutions/organisations.....	192
Environmental monitoring programmes.....	194
Environmental information systems.....	195
Networks	197
Citizen science.....	198
Intergovernmental Mediterranean networks	199
I. Monitoring systems and networks.....	199
Online databases/information systems.....	202
Networks	203
Monitoring programme	204

List of Acronyms

AEGIS:	Coastal Environmental Observatory
AGIRE:	National Agency for Integrated Water Resources Management
AND:	National Waste Agency
ANPE:	National Environmental Protection Agency
APAL:	Agence de Protection et d'Aménagement du Littoral
APAWA:	Association for Protection of Aquatic Wildlife of Albania
AKB:	National Coastal Agency
AKM:	National Environment Agency
AKZM:	National Agency for Protected Areas
APAL:	Coastal Protection and Development Agency
ARPA:	Regional Agency for Environment Protection
ARSO:	Slovenian Environment Agency
ATOMM:	Association for the Protection of Marine Turtles in Morocco
AUGT:	Urban Planning Agency of Greater Tunis
BD:	BrčkoDistric
BRGM:	Geological and Mining Research Office
RAC/SPA:	Regional Activity Centre for Special Protected Areas
CEPIC:	Centre for Port and Coastal Studies
CEPRES:	Centre for Ecology and Natural Resources
CEREMA:	Centre for Studies and Expertise on Risks, Environment, Mobility and Planning
CGPM:	Commission Générale des Pêches pour la Méditerranée
CAPMAS:	Central Agency for Public Mobilisation and Statistics
CEREGE:	Environmental Geosciences Research and Education Centre
CIESM:	International Commission for the Scientific Exploration of the Mediterranean Sea
CIMAR:	Marine Research Centre of Santa Pola
CITET:	International Centre for Environmental Technologies of Tunis
CNL:	National Coastal Commission
CNDRB:	National Centre for Biological Resources Development
CNRDPA:	National Centre for Research and Development of Fisheries and Aquaculture

CNRS: Scientific Research National Centre

CNSM: National Centre for Marine Sciences

COO: Coastal Ocean Observatory

COMMON: Coastal Management and Monitoring Network for tackling litter in Mediterranean sea

CPiE: Permanent Centre for Environmental Initiatives

CSM: Monaco Scientific Centre

DGPA: General Directorate for Fisheries and Aquaculture

DHMPE: Directorate of Environmental Hygiene and Environmental Protection

DREAL: Regional Directorate of Environment, Planning and Housing

EC: European Commission

EGA: Laboratory of Environment General Authority

EEAA: Egyptian Environmental Affairs Agency

EMODnet: European Marine Observation and Data Network

EMWIS: Euro-Mediterranean Water Information System

ENSSMAL: National School of Marine Sciences and Coastal Planning

EPA: Environmental Protection Agency

ERA: Environment and Resources Authority

EUMETNET: European Meteorological Services Network

EurOBIS: European Node of the international Ocean Biodiversity Information System

FBiH: Federation of Bosnia and Herzegovine

GEF: Global Environment Fund

FSHN: Faculty of Natural Sciences of the University of Tirana

GDM: General Directorate of Mapping

GES: Good Environmental Status

GWA: General Water Authority

HAOP: Croatia Environment Agency

HAS: Herpetofauna Albanian Society

HCMR: Hellenic Centre for Marine Research

ICM: Institute of Marine Sciences

ICZM: Integrated coastal zone management

IFREMER: French Research Institute for the Exploitation of the Sea

IODE: International Oceanographic Data and Information Exchange

IGSR: Institute of Graduate Studies and Research

ILICO: Coastal research infrastructure

IMBK: Koto Institute of Marine Biology

INAT: Institut National Agronomique de Tunisie.

INCA: Institute for Nature Conservation in Albania

INCT: National Institute of Cartography and Remote Sensing

INSTM: Institut National des Sciences et Technologies de la Mer

IOC: Intergovernmental Oceanographic Commission

ISPRA: Italian National Institute for Environmental Protection and Research

IPA: Instrument for Pre-accession Assistance

IEO: Spanish Institute of Oceanography

IERSD: Institute for Environmental Research and Sustainable Development

IMAP: Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast

INRH: National Institute for Fisheries Research

INSTM: National Institute of Science and Technology of the Sea

IUCN: International Union for Conservation of Nature

IUEM: European University Institute of the Sea

LCRSSS: Libyan Centre for Remote Sensing and Space Sciences

LEDO: Lebanese Environment and Development Observatory

LEM: Maritime Studies Laboratory

LNESP: National Laboratory for Pollution Monitoring Studies

LOBEM: Laboratory of Biological Oceanography and Marine Environment

LPI: Laboratory Libyan Petroleum Institute

LRSE: Environmental Monitoring Network Laboratory

LTER: European Long Term Ecosystem Research Network

MBRC: Marine Biology Research Centre

MEDOBS: Observatory of Uses at Sea

MNHN: National Museum of Natural History

MONGOOS: Mediterranean Oceanography Network for the Global Ocean Observation System

MOOSE: Mediterranean Ocean Observing System for the Environment

MPA: Marine Protected Area

MRA: Man-Made River Authority

MRA: Malta Resources Authority

MSFD: Marine Strategy Framework Directive

NARSS: National Institute of Oceanography and Fisheries

NCE: Nature Conservation Egypt

NCRS: National Center for remote sensing

NGO: Non-Governmental Organisation

NIOF: National Institute of Oceanography and Fisheries

NMPANS: National Marine Park of Alonissos and Northern Sporades

NSO: National Statistics Office

NTM: Nature Trust Malta

ObsCat: Observatory of the Catalan sandy coast

ODCEEL: Departmental Observatory of Climatology Water Environment Coastline

OESA: Spanish Aquaculture Observatory

OFB: French Biodiversity Office

OFYPEKA: Organization for the Natural Environment and Climate Change

OHM: Human-environments observatories

IMO: International Maritime Organisation

ONAS: National Sanitation Office

ONB: National Biodiversity Observatory

ONEDD: National Observatory for the Environment and Sustainable Development

ONEM: National Environmental Observatory

ONML: National Observatory of the Sea and Coast

OOB: Observatory Oceanology of Bonyuls

ORB: Occitanie regional biodiversity observatory

ORED: Regional Observatories for the Environment and Sustainable Development

OREMA: Regional water and aquatic environment Observatory

OREME: Mediterranean Research Observatory for the Environment

ORRM: Regional Observatory of Major Risks

OSEMED: Socioeconomic observatory of the uses of the coasts and the sea

OTEDD: Tunisian Observatory for the Environment and Sustainable Development

PAM : Plan d'Action pour la Méditerranée

PCBS: Palestinian Central Bureau of Statistics

PIM Initiative: Mediterranean Small Islands Initiative

REMPEC: Centre régional Méditerranéen pour l'intervention d'urgence contre la pollution marine accidentelle

REPOM: National Network for Monitoring the Quality of Marine Ports Sediments

ROL: Coastal Observation Network of Corsica

RS: Republika Srpska

SEIS: Shared Environment Information System

SHFN: Hydrographic Service of the Naval Forces

SHOM: Hydrographic and Oceanographic Service of the Navy

SMW: Secretariat of Marine Wealth

SNO: Samothraki Nature Observatory

SOMLIT: Coastal Observation Service

SPNL: Society for the Protection of Nature in Lebanon

UNECE: United Nations Economic Commission for Europe

UNEP: United Nations Development Programme

UoM: Physical Oceanography Research Group

WAQI: Department of Labour Inspection

WWF: World Wildlife Fund

ZRSVN: Institute of the Republic of Slovenia for Nature Conservation

ZZRS: Slovenian Fisheries Institute

Introduction

The Mediterranean, one of the UNEP's regional seas, is a hotspot for marine and coastal biodiversity currently subject to increasing anthropogenic pressures. It hosts many emblematic species such as the monk seal and loggerhead sea turtles, as well as irreplaceable habitats such as the endemic seagrass (*Posidonia oceanica*) meadows. The Mediterranean coastal strip concentrates 40% of the human population of the basin. The intensification of agricultural, industrial and urbanisation activities lead to the degradation of coastal and marine ecosystems, and also adversely affect human health and well-being. The effects of climate change, such as coastal erosion and the onset of biological invasions, are also accelerating. Faced with the scale of these transformations, strengthening the observation of the marine and coastal environment is an essential mandate of the Plan Bleu, one of the Regional Activity Centres of the UNEP Mediterranean Action Plan (MAP). Within this framework, this technical report maps out Mediterranean observatories and observation programmes for the environment and marine and coastal activities within all the contracting parties to the Barcelona Convention (21 Mediterranean States and the European Union).

An environmental observatory is a structure or group of actors that regularly collects and/or pools data related to more or less specific aspects of the environment, within given geographic limits, to analyze their evolution and inform the target audiences. They are built around a specific monitoring objective, following a number of indicators. Most of them build information systems through computer devices (Geoportal) allowing the harmonized banking of data, and then share their analysis in the form of tables, maps, or indicators. Some of the observation programmes carry out monitoring activities for a limited period of time, mostly extended to a few years, although they are sometimes repeated several times. They make it possible to improve knowledge of precise phenomena, without however guaranteeing continuity over time of observation and monitoring activities.

To carry out the assessment of existing monitoring activities in the Mediterranean area, the following structure was chosen: a short assessment of the general state of observation of the environment and coastal activities has been drawn up for each country; a table of the main laws governing the monitoring activity in this area; as well as a quick overview of the ministerial bodies responsible for coordinating environmental monitoring. Observatories were then identified, starting with national agencies responsible for the monitoring of the coastal environment and marine and coastal activities; regional and local institutions; the main research entities participating in the monitoring activities; NGOs; citizen observatories; as well as the observation activities developed within MPAs. Some current observation programs are then presented, as well as the main existing information systems operational in the country. Information systems are tools for organizing information.

To produce the present report, research was oriented, when information was available, towards marine biodiversity observation activities; the quality of coastal waters; coastline monitoring; fisheries; maritime transport; pollution (in a watershed logic); sea beds and currents; risks; human/territory relations; and the occupation of the coastal strip. All of these fields of observation are not systematically documented, but they represent the framework of the research.

Lastly, for each observatory, the following elements were researched, when the information was available: its

year of creation, its missions, its areas and its main observation activities, the infrastructure and equipment, and the accessibility of data collected. This report also indicates, when the information is available, whether the observatory is part of national or international observation networks as well as observation programmes of limited duration, and lastly the type of documentation available on its website.

Given the impossible exhaustivity of a mapping report involving the 21 Mediterranean countries and the European Union, some trade-offs have been made. River-based monitoring programmes were included only regarding Mediterranean watersheds. At least one structure at the regional level was researched per country for the Mediterranean regional entity, when possible. As for monitoring activities within MPAs, an attempt to describe one observatory per type of conservation unit (e.g. Biosphere Reserve, National Park, Regional Park) was made. Given the terms of the expertise, only monitoring structures and programmes with updated information available on the internet were included. Also, given the methodology based solely on a literature review and internet research, data gathered in this report depends on the reliability of the information posted on the various institutions' websites. Bibliographies at the end of each country chapter present the main reports available on the state of the environment and the state of coastal and marine monitoring. 'General overviews' at the beginning of each country chapter focus on the latest information available on the state of coastal and marine monitoring activities rather than on the state of each country's environment.

The first draft of this report was sent to all the national focal points of the Plan Bleu to be revised and fact-checked. This version of the technical report thus includes the remarks and suggestions of the national focal points of Tunisia (Mosbah Abaza), Bosnia and Herzegovina (Tarik Kupusović), France (Benoît Rodrigues), Libya (Dr. Samia Grimida), Montenegro (Ivana Stojanovic), Spain (Jorge Ureta Maeso), Israel (Ayalet Rosen, with the assistance of Mr. Tafrir Gidron and Ms. Rotem Shamay) and Turkey (Dr. Menekşe Keski). Plan Bleu and its consultants wish to thank them most sincerely for their time and valuable inputs.

Lastly, this mapping report constitutes the first part of a two-phase scheduled expertise, as established between the Plan Bleu for the Mediterranean and LITTOCEAN. This report is the preliminary step of the Plan Bleu's strategy to revive its observation activities. It aims above all to help identify the main stakeholders of the observation of the environment and of marine and coastal activities, and synthesise assessments of the state of environmental monitoring activity in this field. A second report will complement the present technical report, in synthesising various aspects of the assessment of monitoring activities in coastal and marine environments.

Albania

I. General overview

Observation of coastal areas has been strengthened in Albania, due in particular to the application of European directives and the implementation of European projects. The number of monitoring stations (rivers, lakes, bathing water) has increased. However, in its latest report, the European Commission recommends that the National Environmental Agency's monitoring activities 'should be urgently strengthened' (European Commission, 2020). The number of urban liquid discharge monitoring sites decreased between 2008 and 2015 (SEIS, 2015). Moreover, there is very little monitoring of marine life (UNECE, 2018). An environmental fund still needs to be created to support environmental protection. The strategic environmental assessment methodology has not yet been adopted. Monitoring of marine and coastal activities are led mainly by a few recently established national agencies. At least two environmental information systems are currently operational (one on biodiversity monitoring, the other one specifically on wildlife monitoring).

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Law 10431/June 09, 2011	Law on Environmental Protection: this law sets the framework to ensure a high level of environmental protection, prevent and reduce risks to human health and improve the quality of life, while ensuring sustainable development. Provisions are made for the prevention and control of pollution (environmental standards and permits).
Law 10440/July 07, 2011	Law on Environmental Impact Assessment: this law defines the framework of requirements, responsibilities, rules and procedures for the assessment of environmental impacts (environmental impact assessment procedures, consultation, access to information and data confidentiality, decision-making by planning, sanctions)
Law 1006, of October 23, 2008, amended in 2019	Law on the protection and the protection of wild fauna: this law aims to preserve and restore the habitats of wild species and ensure the assessment of the state of biodiversity in Albania. It defines the monitoring activity of wild species.
Law 81/2017 of May 2017	Law on Protected Areas: it defines the status of MPAs and defines facilitating scientific research and environmental monitoring as primary activities of nature reserves.
[Draft Bill] no..... /2020	This Draft Bill relates to the integrated management of coastal areas: it must ensure the sustainable development of the coastal zone and determine the institutions responsible for the administration and management of the coastal zone. The National Coastal Agency is responsible for the inventory of the coastal zone.

Decision no. 177 of March 31, 2005	This Decision relates to the authorised standards of liquid discharges and the zoning criteria of receiving aquatic environments. Chapter V defines the monitoring procedures for the implementation of the norms.
Law 8905/June 06, 2002	This law relates to the protection of the marine environment against pollution and damage. Offshore platforms, vessels and all activities that take place in the marine environment must monitor the activity they exercise and publish the data on this monitoring.
Law no. 10 476, November 3, 2011	This law relates to the accession of the Republic of Albania to the Protocol to reduce acidification, eutrophication and the concentration of ozone level in the lower atmosphere. Article 8 on 'research, development and monitoring' states the goal of improving monitoring and modelling techniques and systems.
Law no. 64/2012	This law regulates the fishing activity, its management and provides for the protection of marine life and inland waters by promoting sustainable development in the activity in the maritime areas and the inland waters of the Republic of Albania. It sets out a control system for fisheries and establishes inspection procedures standardised and coordinated at sea, on land and throughout the market chain.
Law no. 9504/April 3, 2006	This law relates to the accession of the Republic of Albania to the Convention of the United Nations for the Transport of Goods by sea.
Law 1189/November 18, 2009	This law relates to the rules and procedures for the design and implementation of the national environmental monitoring program.
Decision no. 352 of April 29, 2015	This Decision relates to the evaluation of the ambient air quality and the requirements of certain pollutants about them.

Governmental environmental institutions/organisations

Ministry of Tourism and the Environment/Ministëri Turizmit dhe Mjedisit (MTM) (<http://turizmi.gov.al/>): is the main institution in the field of environmental protection and environmental monitoring. Among its essential agencies for environmental monitoring are the National Environmental Agency, responsible for drawing up the annual National Environmental Monitoring Programme, the National Agency for Protected Areas and the Coastal Zone Management Agency, as well as the Government Inspectorate of the Environment and Forestry, which missions are described below. It has the authority to manage water resources and control and prevent water pollution.

Ministry of Agriculture and Rural Development/Ministria e Bujqësisë dhe Zhvillimit Rural (MBZR) (<https://bujqesia.gov.al/>): is responsible for agriculture, rural development, food security and consumer protection, fisheries and aquaculture and water administration. It manages the 'National Fisheries Strategy 2016 - 2021'. Its Department of Fisheries and Aquaculture is responsible for collecting fishing and aquaculture data.

Monitoring institutions

National agencies

National Coastal Agency (AKB)

Established in 2014 by Decision of the Council of Ministers no. 31 of January 22, 2014, the National Coastal Agency (Agjencia Kombëtare e Bregdetit, AKB) (<http://www.bregdeti.gov.al/index.php/en/>) reports to the Ministry of Tourism and the Environment. The Agency's mission is to organise the integrated management of the country's coastal zone through the surveillance and control of the coastal zone, as well as the control of tourist activities throughout the territory. It must organise integrated coastal zone management work; investment promotion work in the coastal zone; program coordination work, development projects for the integrated management of the coastal zone, and ensure the sustainable development of tourism, through the inspection and control of tourism activities. The AKB has developed multiple international partnerships with the Small Mediterranean Islands Initiative (Initiative PIM), the french *Conservatoire du Littoral*, UNEP, the University of Michigan, and the ITA. Based in Tirana, it has four regional branches. The AKB makes available reports in English on the state of knowledge on certain coastal species (2013); on pollution (2013); MPA management plans (2015 for Sazani Island). It also publishes a weekly newsletter in Albanian.

Department of Fisheries and Aquaculture

The Department of Fisheries and Aquaculture (Drejtoria e Shërbimevetë Peshkimit dhe Akuakulturës) (<https://bujqesia.gov.al/drejtoria-e-sherbimit-te-peshkimit-dhe-akuakultures/>) was established in 2011 by Decree of the Council of Ministers, under the supervision of the Ministry of Agriculture and Rural Development. The scope of its action was modified in 2014, in order to provide it with a 'Monitoring and Control Sector', which deploys inspectors in 12 regions of the country. Thus, the structure of the Directorate of Fisheries and Aquaculture Services includes: the aquaculture sector, the finance and services sector, the port management sector and the surveillance and control sector. The mission of this Directorate is to provide all the necessary public services related to the management of fisheries and aquaculture infrastructure and data, as well as to ensure compliance with legal requirements for the protection of fisheries and aquaculture in the Republic of Albania. Its specific tasks are to manage the fishing infrastructure, including ports and fishing centres; collect fishing data; design programs to restock water categories and ensure compliance with legal requirements in the field of fisheries and aquaculture protection through monitoring and inspection of fishing activities. The monitoring and inspection of fishing activities is carried out by the Fisheries Monitoring and Control Sector. It has no website and no data are published.

General Maritime Directorate

The General Maritime Directorate (Drejtoria e Përgjithshme e Detare) (<http://dpdetare.gov.al/>) is the authority responsible for the operation of the maritime administration and for the development of maritime transport policies. It is placed under the Ministry of Defence (Ministria e Mbrojtjes). It has several responsibilities for the generation of environmental information: 'information on the quantities of waste generated by ships and ferries; information on the quantities of waste water generated by ships and ferries and the management infrastructure of those wastes; information related to the marine environment protection from pollution according to the national legislation and international agreements and protocols; information related to the implementation of Barcelona Convention Protocol related to marine transportation and ports' (UNDP & REC, 2018, p. 27). Data are not available online.

National Agency for Protected Areas (AKZM)

Established in 2015 (by Decree no. 102 of February 4, 2015), the National Agency for Protected Areas of Albania (Agjencia Kombëtare e Zonave Të Mbrojtura, AKZM) (<http://akzm.gov.al/>) comes under the supervision of the

Ministry of Tourism and the Environment. As a consequence, the management of protected areas is no longer subject to forest management authorities. It is responsible for managing, protecting, developing and expanding the country's protected areas. Among its specific missions are the management of the network of protected areas and other natural networks such as Natura 2000; the development and implementation of management plans for protected areas; as well as the monitoring and inventory of flora and fauna in these areas. It generates its own income by providing these services to other institutions. The agency employs nearly 300 people, including 20 at the headquarters and more than 250 at the regional level. However, its rangers have limited capacities in terms of prevention, as they do not have the power of inspectors (UNECE 2018). It collects large databases on the different species inventoried (number, geolocation). They are available through an online information system called BIONNA, created through the help of a partnership between the IUCN and the Italian Cooperation (<http://bionna.al/Index.aspx>). However, it did not produce any monitoring reports on biodiversity (UNECE, 2018). It also provides managers of protected areas with a Wildlife Information Monitoring System (WIMS), an online data entry and management service (<https://www.simf.online/>). Its regular international partners are MedPAN, the Italian and German Cooperations and the IUCN. The AKZM publishes environmental monitoring manuals; maps and brochures, fact sheets.

National Environment Agency (AKM)

Created in 2011, the National Environment Agency (Agjencia Kombëtare e Mjedisit, AKM) (<http://www.akm.gov.al/kreu.html#misioni>) is a central public institution under the supervision of the Ministry of Tourism and the Environment, modified by Decision 568 of 07/17/2019. It is responsible for developing the national environmental monitoring programme and monitoring the state of the environment, and for preparing and publishing the annual report on the state of the environment. The National Environmental Monitoring Programme organises the collection and sharing of data collected by the Ministries of Health and Social Protection; the Ministry of Agriculture and Rural Development; the Department of Defense; Ministry of Infrastructure and Energy (notably through the Albanian Geological Survey, member of EuroGeoSurveys) and the Ministry of Tourism and the Environment. With 4 regional agencies, the agency carries out environmental inspections through inspection units and around forty environmental specialists (UN Environment et al, 2018). It provides data for mapping pollutant emissions; surface water monitoring; industrial pollution reports; noise monitoring maps; monitoring of underground water, the quality of rivers, beaches, distribution of wildlife. It also concludes contracts with monitoring institutions: IFB; GSA; FSHN, UBT, QTTB. It operates on a Government budget and its own funds. Pollution data is made accessible through the Pollutant Release and Transfer Register of Albania. It publishes an annual state of the environment reports (last one published in 2019), as well as the annual national environmental monitoring programme (last one published in 2020, in Albanian).

The State Inspectorate of the Environment, Forestry, Water and Tourism

The State Inspectorate of the Environment, Forestry, Water and Tourism (Inspektorati Shtetërori Mjedisit, Pyjeve, Ujëavedhe Turizmit) (<http://insq.gov.al/inspektorati-shteteror-i-mjedisit-pyjeve-ujerave-dh-turimit/>) results from the integration of the State Inspectorate of the Environment and Forestry (established in 2014) with the State Water Inspectorate in 2017, then with the Inspectorate for Tourism. This Inspectorate is placed under the supervision of the Ministry of the Environment and Tourism. It is responsible for controlling the enforcement of forest and nature protection legislation. Coastal and marine activities are not among its priorities, as it mainly focuses on the ban on hunting and on the harvesting of timber. Its website is not yet functional. The Directorate publishes an annual report on its inspections. The 2018 report of the UNECE points out the lack of coordination between the inspectors of the State Inspectorate and the environmental inspectors of municipalities.

National Agency of Water Supply and Sanitation (AKUK)

The National Agency of Water Supply and Sanitation (Agjencia Kombëtare e Ujësjetës-Kanalizimeve, AKUK) (<http://www.akuk.gov.al/>) is the government body specialising in the field of drinking water supply, wastewater and their treatment. It technically supports the policies of the Ministry of Infrastructure and Energy, in accordance with the legislation and government policies. Its mission is to coordinate and monitor the activity of water supply and wastewater treatment for the entire population of the country. Among its missions relating to environmental monitoring is the organisation and management of data collection from all water supply and sanitation companies operating in the country; periodic review and evaluation of data, development of standards for benchmarking in the sector; as well as monitoring the progress of the companies inspected in order to improve their performance. It publishes annual reports of data on water supply and sanitation systems per administrative units (last one published: 2017).

Laboratories and research structures

Faculty of Natural Sciences of the University of Tirana (FSHN)

The Faculty of Natural Sciences of the University of Tirana (Fakulteti i Shkencave të Natyrës, Universiteti i Tiranës, FSHN) (<http://www.fshn.edu.al/>) of the University of Tirana carries out research and teaching activities in biology, in the fields of cell biology and conservation biology. Its educational programme in conservation biology aims in particular to prepare specialists capable of conducting qualitative research on natural, urban, agricultural and industrial ecosystems in Albania, for the preservation and sustainable use of biological and natural values of ecosystems. The Faculty conducts monitoring and draws up reports for the NEA once per year, but the reporting is not satisfactory due to a lack of funds (UNECE, 2018). FSHN publishes natural science bulletins (last one published in 2018); scientific articles and theses in conservation biology:

- 'In-depth study (microbiological, molecular, cytological, ecological) of the quality of the water and the ecosystem of Lake Ohrid at the service of the community and with the cooperation of local authorities' (2019)
- 'Interventions for adaptation to climate change in the Kune-Vaini lagoon system (Lezha, Albania) – ecological approach' (2018).

Non-governmental organisations

Association for Protection of Aquatic Wildlife of Albania (APAWA)

The Association for the Protection of Aquatic Wildlife of Albania (APAWA) (www.apawa-albania.com.al, not accessible at the moment) was created in 1999 and is located in Tirana. Its activities are led by its sixty members, including researchers from the University of Tirana. APAWA aims to raise public awareness on the protection and preservation of aquatic fauna; sustainable development in coastal and wetlands; the implementation of conservation strategies for aquatic communities; and monitoring the possible improvement of aquatic and coastal ecosystems. It is financed by donation and expertise. The Association conducts surveillance surveys of marine fauna such as aerial surveys and photographs by boat to identify populations of cetaceans in particular. As a MedPAN contact, APAWA collaborates with a set of national and international organizations relating to the protection of marine environments, at the national and regional level. APAWA is part of several networks:

- member of Reso-Med, the Mediterranean nature conservation network created in 2000 by the Centre for the Discovery of the Marine World;

- member of NETCET (Network for the Conservation of Cetaceans and Sea Turtles in the Adriatic), co-founded by the EU. As such, APAWA feeds the cetacean and sea turtle database (http://www.marinemammals.eu/database_spiaggiamenti.php?lang=en)

APAWA publishes monitoring reports on Albanian marine flora and fauna and, integrated management plans for marine and coastal protected areas.

Institute for Nature Conservation in Albania (INCA)

The Institute for Nature Conservation in Albania (INCA) is an NGO established in 2000 based in Tirana. (<https://www.inca-al.org/en/>) Its task is to relate issues of nature conservation and biodiversity to all other elements or scientific fields that have an impact on natural resources in Albania. Among its missions is the development of GIS databases. It has developed partnerships with MedPAN, WWF, IUCN, ECNC, AKZM, UNICEF, GEF. INCA is a member of IUCN, is the WWF representative in Albania, member of the Global Water Forum (GWF). INCA has been leading a consortium of national NGOs for the protection of nature since 2008. INCA publishes assessment reports on the state of the marine environment in Albania (2018) and its conservation (2014); assessment of the state of environmental problems (2017); a wildlife identification and registration information system (2018).

Herpetofauna Albanian Society (HAS)

The Herpetofauna Albanian Society (HAS) (<https://has-org.al/>) is an NGO founded in 2001 working on scientific research and environmental conservation in Albania. The major scientific research interest of HAS for the last decade has been the study of the populations of loggerhead turtles (*Caretta caretta*) along the Albanian coastline, which extended to the monitoring of the green turtle (*Chelonia mydas*) and the leatherback (*Dermochelys coriacea*). It is using mark-capture-recapture, genetics, photo-identifications and satellite tracking. HAS participates in the Network for the Conservation of Cetaceans and Sea Turtles in the Adriatic, the Mare Nostrum Network of civil society organisations involved in coastal and marine conservation in the Mediterranean. It receives fundings from the Regional Activity Centre for Special Protected Areas (RAC/SPA), the European Union, and the Global Environment Facility.

Monitoring activities within MPAs

MPA of KaraburunSazan

Albania's only marine park, the KaraburunSazan MPA (<https://www.karaburunsazanmpa.com/>), was established in 2010 by proclamation of the Council of Ministers. It was included in the ASPIM list in 2016. Covering an area of 12 450 hectares, it is managed by AKZM and the NGO Flag Pine. While the Karaburun Peninsula is a natural reserve, Sazan Island is a military zone. The MedFund has participated since 2019 in financing the MPA (through the NGO Flag Pine) in order to improve the activity of monitoring illegal fishing, the identification of species and habitats, and improving governance and equipment. The data collected by the MPA feeds into the national BIONNA database of habitat maps. The MPA has a functional website in Italian, Albanian and English. It regularly publishes newsletters in English (last one published in december 2019). Its partners include *Agenzia Italiana per la cooperazione allo Sviluppo*, AKZM, UNDP. A 'BIO master plan GIS' virtual data library is being created.

Environmental monitoring programmes

The IPA II Albania 2014–2020 Programme

The 'Instrument for Pre-accession Assistance'¹ (IPA) is the means by which the EU supports reforms in the 'enlargement countries' with financial and technical help. The IPA funds build up the capacities of the countries. The allocation for the IPA II Albania 2014–2020 Programme is 649.4 million EUR. The Programme includes a Priority Strategy for 'Environment and climate action' with a budget of 68 million EUR. It focuses on the alignment with EU law and standards; better treatment of waste and water; and monitoring air and pollution. Funding is allocated through sector budget support, service contracts, twinnings to deliver the assistance, as well as with IFI loans and IPA grants through the Western Balkan Investment Framework.

The EUAIR 2014–2020 Territorial Cooperation Programme

This cross-border Cooperation Programme 'Interreg IPA CBC – Greece – Albania'² reconducts the previous programme of 2007–2013 for the 2014–2020 period. It is co-funded by the European Union and the National Funds of Greece and Albania. It supports environmental monitoring in various domains: drinking water quality monitoring systems; monitoring of the emissions from transport activities such as shipping and the impact on the port cities and other shore areas; joint initiatives for monitoring and preventing air pollution; ground pollution, water pollution and usage (as per Directive 2000/60/EC) and marine pollution with a special focus on coordinated maritime plans for prevention of marine pollution and protection of bathing waters.

Environmental information systems

Biodiversity National Network of Albania (BioNNA)

The Biodiversity National Network of Albania (BioNNA) (<http://bionna.al/>) is the national biodiversity information system. Its aim is to provide a data-sharing system in order to support the National Biodiversity Strategy and Action Plan. BioNNA offers the information on the species occurrences through an open source Web-GIS system developed according to the standards defined by the EU INSPIRE Directive. It was developed in the framework of the project 'Institutional Support to the Albanian Ministry of Environment, Forest and Water Administration for Sustainable Biodiversity Conservation and Use in Protected Areas' (2012–2014) funded by the Italian Development Cooperation and implemented by the International Union for Conservation of Nature (IUCN), and the support of another project funded by the EU, 'Strengthening capacity in National Nature Protection – preparation for Natura 2000 network' (2015–2020). Data has been obtained by Albanian and international researchers from field data collected in the years 2015–2016, through data published 'in the scientific literature and through field data collected in the last 10 years by international experts or local researchers involved in the Institutional Support and the NaturAL projects. Field data have been collected in 7 protected areas' (Pacifici et al, 2018).

BioNNA is built using the BioCAsE Provider Software (<http://www.biocase.org/>)

Wildlife Information Monitoring System (WIMS)

The Wildlife Information Monitoring System (WIMS) was launched by AKZM to count the number of wild

¹ https://ec.europa.eu/neighbourhood-enlargement/instruments/funding-by-country/albania_en

² <https://interreg.eu/programme/interreg-greece-albania/>

animals in Albania. The method was developed by an expert of the INCA NGO. Rangers within protected areas are equipped with a monitoring guideline and several forms to register general wildlife observation, finding of carcasses for genetic and nutriment information, human-wildlife conflict, illegal activities to identify threats and pressures on protected species, patrol efforts (e.g. planning of patrols, annual plan), and the counting of birds (Rupert, 2018). It has been recently developed, and is not yet accessible to the public.

Bibliography

European Commission, 2020. 'Albania 2020 Report'. 135 pages.

URL: https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/albania_report_2020.pdf

GEF, Ministry of Environment, Forestry and Water Administration and UNDP, 2010. 'Protected area gap assessment, marine biodiversity and legislation on marine protected areas'. Tirana, 142 pages

Nature Protection Directory, 1999. 'Report on national situation of biodiversity in Albania'. 34 pages

National Marine Park Karaburun-Sazan, 2019. 'Newsletter December 2019, issue 8'. 9 pages

Pacifici M, Attorre F, Martellos S, Bego F, De Sanctis M, Hoda P, Meço M, Rondinini C, Sağdanaku E, Salihaj E, Scepti E, Shuka L, Ghiurghi A, 2018. BioNNA: the Biodiversity National Network of Albania. *Nature Conservation* 25: 77–88.

Ruppert, Daniel, 2018. "Assessing the effectiveness of the hunting ban in Albania". 36 pages.

UN Environment; Mediterranean Action Plan; Plan Bleu, 2018. 'Observation of coastal areas in the Mediterranean. Case of Tunisia, Morocco and Albania'. 12 pages.

UNDP, 2017. 'Assessment of Albania's national Capacities on environmental monitoring'. 146 pages

URL: https://www.al.undp.org/content/albania/en/home/library/environment_energy/assessment-of-albanias-national-capacities-on-environmental-moni.html (accessed on 02/12/2020)

UNDP, REC, 2018. 'Environmental monitoring and data information management in Albania'. Tirana, 92 pages.

UNECE, 2018. "Albania 3rd environmental performance review". 292 pages.

URL: <https://www.unece.org/environmental-policy/environmental-performance-reviews/enveprpublications/environmental-performance-reviews/2018/3rd-environmental-performance-review-of-albania/docs.html> (accessed on 02/12/2020)

Algeria

I. General overview

The legal framework of coastal and marine monitoring in the country has been strengthened, but still needs to be applied. There is little inter-institutional cooperation in terms of data exchange within the field. As for the issue of data management and the implementation of coastal monitoring systems, the need to strengthen the coordination and participation of parties, especially local communities and NGOs, is often underlined (Kheli et al, 2019). The exchange of data takes place within the framework of agreements, but there is no common platform for data management (MEER, PAP/RAC/PAM, 2018). Regarding the monitoring of the state of coastal waters, the assessment suffers from a lack of a standardised methodology used at the national level by ONEDD (National Observatory for the Environment and Sustainable Development) and its partners. While ONEDD is the main institution responsible for the control of the quality of bathing water, other structures which remain ad hoc and limited in space carry out studies on this subject (Belhaouari, 2018).

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Law no. 83-10 of 19 Jumada El Oula 1424/ corresponding to July 19, 2003	This law relates to the protection of the environment: it is the pillar of the legislative framework for environmental protection, including the preservation of biological diversity and the non-degradation of natural resources. Article 2 of its second chapter lays out that the Government monitors the various components of the environment.
Law no. 11-02 of February 17, 2011	This law relates to protected areas: it regulates environmental protection of specific habitats, both for marine and lands parts. The law specifies that the management plan of the protected area must include a research programme.
Law no. 14-07 of August 9, 2014	This law relating to biological resources sets out the terms and conditions for the use of these resources and the knowledge associated with them with a view to sustainable development. Article 17 states that a database on biological resources and the knowledge associated with them is established at the level of the body, the modalities of operation, exploitation and management of which are set by regulation.
Executive Decree no. 10-31 of January 21, 2010	This Decree established the modalities for extending the protection of the coastal seabed and determining industrial offshore activities.
Law no. 02-02 of February 5, 2002	This law relates to the protection and enhancement of the coastline: it provides a framework for protection which refers to sustainable development and the implementation of the precautionary principle. The law delimits the coastline. The National Coastal Commission must provide a global information system allowing permanent monitoring of coastal developments and the preparation of a report on the state of the coast published every two years.

Law no. 03-02 of 16 Dhou El Hidja 1423 corresponding to February 17, 2003	This law sets out the general rules for the use and tourist exploitation of beaches.
Law no. 01-19 of December 12, 2001	This law relates to the management, control and disposal of waste. Its chapter II organizes control and monitoring of waste treatment facilities.
Executive Decree no. 06-141 of 20 Rabie El Aouel 1427 corresponding to April 19, 2006	This Decree defines the limit values for discharges of liquid industrial effluents. Section 3 organises control and monitoring. Operators of installations generating discharges of industrial liquid effluents must keep a register in which the date and results of the analyzes they carry out, which they make available to the authorized control services, are recorded. Authorised services carry out periodic and or unannounced checks of the physical, chemical and biological characteristics of industrial liquid effluent discharges.
Executive Decree no. 14-264 of September 22, 2014	This Decree relates to the organisation of the combat against marine pollution and the establishment of emergency plans. This decree provides for the establishment of an information system allowing the collection and processing of environmental data in this area.
Law no. 01-11 of July 3, 2001; with its executive decree no. 04-18 of January 25, 2004.	This law relates to fishing and aquaculture. Article 12 specifies that the authority in charge of fisheries ensures the monitoring and assessment of biological resources within national waters.
Ordinance no. 76-80 of October 23, 1976	This Ordinance sets the Maritime Code
Executive Decree of July 07, 2016	This Decree regulates urban maritime transport and marine recreational activities

National environmental institutions/organisations

The Ministry of the Environment and Renewable Energies/Ministère de l'Environnement et des Energies Renouvelables (MEER) (http://www.meer.gov.dz/a/?page_id=173). Formerly the Ministry of Regional Planning and the Environment, the MEER is responsible for the development and implementation of the national policy on biodiversity and climate change and for the coordination of activities in this area. Among the programmes and agencies responsible for implementing this policy are the National Coastal Commission (CNL) and the National Centre for the Development of Biological Resources (CNDRB)

The Ministry of Agriculture, Rural Development and Fisheries/Le Ministère de l'Agriculture, du Développement Rural et de la Pêche (MADRP) (<http://madrp.gov.dz/>). The MADRP is the result of the merger of Agriculture and Rural Development with Fisheries and Fisheries Resources. It participates in the development of the Master Plan for the Development of Fisheries and Aquaculture Activities (SDDAPA) by 2025 with the Ministry of Water Resources.

- The General Directorate of Fisheries and Aquaculture (DGPA) defines policies for the management and responsible exploitation of fishery resources and the development of aquaculture, in particular the protection of endangered marine species.
- The General Directorate of Forests (DGF) leads the conservation of water and soil and the combat against desertification. It covers the coastal marine environment up to 6 meters deep at wetland level and the marine parts of coastal national parks under its authority, although the marine part is not mentioned in its activities.
- The National Agency for the Conservation of Nature (ANN)

The Ministry of Higher Education and Scientific Research/Le ministère de l'Enseignement supérieur et de la Recherche Scientifique (MESRS) (<https://www.mesrs.dz/>). The MESRS operates in the field of the environment through the scientific councils of research organisations of other ministries; through the university laboratories attached to it as well as training and research centres (such as the National School of Marine Sciences and Coastal Planning – ENSSMA). It participates with various laboratories in the development of the National PNR Research Programme, a significant part of which deals with environmental issues. Various university research structures operate in the Algerois region (Laboratory of Biodiversity and Environment: interactions, genomes; Conservation and development of marine resources; Marine and coastal ecosystems; Biological oceanography and marine environment), Annaba (Laboratory of Biogeochemical and Ecological Analysis of Aquatic Environments; Laboratory of Marine Bioresources; Laboratory of Applied Animal Biology; Laboratory of Ecobiology of Marine and Coastal Environments); in Mostaganem (the Laboratory for the Protection, enhancement of coastal marine resources and molecular systematics), as well as in Oran (the Aquaculture and Bioremediation Laboratory; the Environmental Monitoring Network).

Monitoring institutions

National agencies

National Observatory for the Environment and Sustainable Development (ONEDD)

Created in 2002 under the supervision of the Ministry of the Environment and Renewable Energies, the National Observatory for the Environment and Sustainable Development (Observatoire National de l'Environnement et du Développement durable, ONEDD) (<https://onedd.org/fr>, it mainly refers to 'error' pages) is a public industrial and commercial establishment with legal personality and financial autonomy. ONEDD collects, consolidates, analyses and transmits data relating to the state of the environment. It publishes reports on the state of the environment, thematic and regional monographs, periodic thematic bulletins, thematic maps, etc. Its head office is in Algiers, and its 4 regional laboratories are in Constantine, Oran, Algiers and Ourgla. It manages 18 monitoring stations and an atomic absorption spectrophotometer. The data collected relate to monitoring the state of natural environments (physicochemical, organic and inorganic parameters): water, air, soil; analysis of industrial discharges. ONEDD intervenes in the event of accidental pollution and carries out environmental studies (impact studies, hazard studies, environmental audits). The data feed into the National Sustainable Development Environmental Information System (SNIE-DD). However, no accessible newsletter nor no up-to-date report (last one dated 2003) are available on its website.

ONEDD has developed partnerships with JICA (Japan International Cooperation Agency); ENABEL (Belgian Cooperation); it was twinned by the EU with OIEAU (International Water Office, France) and Austria for 18 months (2014–2015). ONEDD is networking 4 laboratories and 18 monitoring stations for its monitoring network. It has benefited from long-term funding, coupled with project funding for the consolidation of its SIE. In 2019 ONEDD launched SASE – an 'Alert and Monitoring System for Environmental Violations', intended to report noise, water, soil, atmospheric and visual pollution observed on national territory (via an application mobile, a web form, mail, a toll-free number). Most ministries and the National Statistics Office are represented on the ONEDD Board of Directors.

National Coastal Commission (CNL)

Created in 2002, the National Coastal Commission (Commissariat National du Littoral, CNL) (<http://commissariatlittoral.dz/>) is a public administrative establishment under the supervision of the Ministry of the Environment and Renewable Energies. The CNL is also developing collaborative technical activities such as scientific monitoring and follow-up of the management of sites, particularly those with high heritage value; it also has a database relating to ENIs (MEER et al, 2018). The CNL is the leading monitoring institution for

the evolution of coastal ecosystems. Its missions are to preserve and enhance the coastline, coastal areas and their ecosystems; implement coastal and coastal zone protection measures; as well as promote public awareness and information programmes on the conservation and sustainable use of coastal areas and their biological diversity. It has set up a network of 14 branches located in 14 coastal wilayas. One of its departments is responsible for coastal development plans and databases. It publishes information bulletins ('Info littoral') updated every 4 months.

The National Agency for the Conservation of Nature (ANN)

Created by Executive Decree no. 98-352 of November 10/1998, the National Agency for the Conservation of Nature (Agence Nationale pour la Conservation de la Nature, ANN) (<http://www.ann.dz/index.html>) is a public establishment of an administrative nature and with a technical and scientific vocation under the supervision of the Ministry of Agriculture, Rural Development and Fishing. Located in Algiers, its purpose is to maintain the general inventory of fauna and flora throughout national territory and to propose all the measures necessary for its preservation and development. It is in charge of carrying out studies, observation and assessment of national natural ecosystems; inventorying and proposing the classification of sites likely to be the subject of protected areas; and ensuring the conservation and development of the national flora and fauna and more particularly endangered species as well as those of economic, utilitarian or scientific interest. Although it has an ex situ conservation area of national importance, it has little presence in the field of marine biodiversity. It operates within the framework of campaigns and/or projects (MEER et al, 2018).

General Directorate for Fisheries and Aquaculture (DGPA)

The General Directorate of Fisheries and Aquaculture (Direction générale de la pêche et de l'aquaculture, DGPA) (<http://madrp.gov.dz/dgpa/>) is a public establishment of an administrative nature placed under the supervision of the Ministry of Agriculture, Rural Development and Fisheries, by virtue of Executive Decree No. 16/243 of September 22, 2017. The DGPA coordinates the national policy on fisheries and aquaculture. It is in charge of developing policies for the management and responsible exploitation of fishery resources and the development of aquaculture, in particular the protection of endangered marine species. It is also responsible for the development and implementation of a statistical system for fishing and fishery resources and ensuring monitoring and control. Its facilities include 21 Fisheries and Halieutic Resources Directorates of the Wilayas and Interwilayas; the National Laboratory for the Control of Fisheries & Aquaculture Products and Environmental Sanitation; the Higher National Institute of Fisheries and Aquaculture; two Institutes of Fisheries and Aquaculture Technology; five Fishing and Aquaculture Technology Training Establishments; as well as the National Higher Institute of Fisheries and Aquaculture. The data collected are made accessible by the Statistical System for Fishing and Aquaculture in Algeria (SSPAAL), which also includes socioeconomic data related to seafarers³. The DG counts among its partners the EU, DIVECO2; UNOD; FAO; and UNIDO.

The Hydrographic Service of the Naval Forces (SHFN)

The Hydrographic Service of the Naval Forces (Service Hydrographique des Forces Navales, SHFN) is the main national actor in the field of hydrography. It is an establishment under the supervision of the Ministry of Defence. The SHFN provides hydrographic surveys, cartography, nautical instructions, light books, etc. It is responsible for collecting – by systematic surveys carried out at sea and along the coasts – data georeferenced concerning the configuration of the coast, including the artificial infrastructures intended for maritime navigation (navigation aids and port configuration); the depths of the seas in the area of national interest (including all the risks potential for navigation, as well as other maritime activities); the composition of the

³ <http://madrp.gov.dz/dgpa/sspaal-systeme-statistique-de-la-peche-et-de-laquaculture-en-algerie>.

background; tides and currents; the physical properties of the water column; weather parameters. It also processes the information to create an organised database that can contribute to the production of thematic maps, nautical charts and other types of documents intended for traffic control, coastal management and defense; preservation of the marine environment, exploitation of marine resources and installation of submarine cables/pipelines, scientific research associated with the sea and the coastal zone. All hydrographic and oceanographic work to be undertaken in these waters is subject to the approval and control of the Hydrographic Service of the Naval Forces (MEER et al, 2018).

National Institute of Cartography and Remote Sensing (INCT)

Created in 1967, the National Institute of Cartography and Remote Sensing (Institut National de Cartographie et de Télédétection, INCT) (<http://www.inct.mdn.dz/>) is an industrial and commercial establishment under the supervision of the Ministry of Defence. It is responsible for the production, collection, research and development, conservation and dissemination of geographic information. It provides support to various administrations, communities and public and private organisations. Its missions are the creation and maintenance on national territory of a basic framework in geodesy, levelling and gravimetry, the collection and conservation of satellite data, the creation of geographic databases and the preservation of archives. Its facilities include equipment for classical geodesy, gravimetry, levelling and spatial geodesy as well as aerial photography, photogrammetry, cartography, digital data. Based in Algiers, it has branches in Oran, Ouargla and Constantine. It publishes geographic science bulletins (the last one is dated 2014), and sells geographic and spatial data.

National Waste Agency (AND)

The National Waste Agency (Agence nationale des Déchets, AND) (<https://and.dz/>) is a public industrial and commercial institution created in 2002 (Decree. 02-175 of May 20, 2002), under the supervision of the Ministry of the Environment and Renewable Energies. It is responsible, as part of a public service mission, to inform and popularise the techniques of sorting, collection, transport, treatment, recovery and disposal of waste. It must capitalise and constitute a documentary base on waste management and ensure its dissemination to local communities and the business sector. It implements and operates EcoJem, the public system for the recovery of packaging waste. The National Waste Agency collects data on the production of waste and its management, which is made accessible within the National Waste Information System (SNID) (<https://snid.and.dz/>), accessible with an account). The AND also launched on July 14, 2019 the NDIF application (Arabic/French) to allow citizens to report illegal dumps, collection faults, black spots and lack of dumpsters on national territory. The information (geolocated photographs) is transmitted to local authorities. The Agency operates with the support of international cooperation (Belgium, Germany, South Korea, Tunisia, United Nations). It regularly publishes bulletins.

National Agency for Integrated Water Resources Management (AGIRE)

Created by decree in 2011 (Executive Decree No. 11-262 of July 30, 2011) and operational since 2014, the National Agency for Integrated Water Resources Management (Agence nationale de gestion intégrée des ressources en eau, AGIRE) (<https://www.agire.dz/>) is placed under the supervision of the Ministry of National Water Resources. It is in charge of developing the approach of integrated management of water by providing orientation, animation, coordination and evaluation missions of the hydrographic basin agencies. Its main missions are to carry out all research studies related to the development of integrated water resources management and to develop and coordinate integrated water information management systems. AGIRE must ensure the collection and processing of data and indicators relating to quantitative and qualitative parameters characterising water resources and natural environments and to carry out all information and awareness actions for the different categories of users on water conservation and the preservation of its

quality. It connects 5 hydrographic basin agencies (created in 1996) located in Algiers, Oran, Chlef, Constantine and Ouargla. Its mission of developing and managing the water information system is carried out through the Integrated Water Information Management System (SGIIE). The publication of the Decree of February 2, 2011 sets the terms of access to the data of the SGIIE, initiated by Article 66 of law no. 05-12 of August 4, 2005 relating to water. A Decree issued in January 21, 2015 provides the AGIRE with an assistant under the authority of the director general responsible for information and information systems, through which AGIRE produces indicators, thematic summaries and maps that it disseminates to the various users (EMWIS, 2017). AGIRE also publishes bulletins ('MAGs') of around thirty pages; national, regional and sectoral planning studies.

National Centre for Research and Development of Fisheries and Aquaculture (CNRDPA)

Although it was originally founded in 1921, the National Centre for Research and Development of Fisheries and Aquaculture (*Centre National de Recherche et Développement de la Pêche et de l'Aquaculture, CNRDPA*) (<http://www.cnrdfa.dz/index.html>) was launched in its current form in 2008. Located in Bou-Ismaïl, Wilaya of Tipaza, this public scientific and technical establishment is placed under the supervision of the Ministry of Agriculture, Rural Development and Fisheries. It must contribute to the preparation and implementation of national scientific research and technological development programmes in the field of fisheries and aquaculture. Its missions in terms of monitoring are to evaluate fishery resources and monitor their exploitation, to study aquatic ecosystems and to carry out economic and social studies in relation to fishing. Its facilities include 11 stations, 1 barge of 43 m (Lekacem GRINE) with an autonomy of 30 days and prospecting equipment for the evaluation of pelagic and benthic stocks, a multibeam sonar for the cartography of the seabed the sea and habitats; 1 boat of 12 meters; and 4 boats. The data collected relate to the fishery resources exploited by acoustics and trawling; spatio-temporal distribution of species; the ecology of populations; the characterisation and mapping of the seabed; hydrology and physicochemical parameters of the marine environment.

It is linked to 10 universities; 5 companies; the National Office for the Development of Aquaculture Production (ONDPA); the CNMA; the Fishing and Aquaculture Chamber of the Wilaya of Tipaza; and CAP of Algiers. Cooperation agreements link the CNRDPA with NAIK (2017–2022); a framework agreement with CoNISMa (2015–2020); a framework agreement with INSTM (2016–2021).

The CNRDPA participates in the AlphyNet Network⁴ (composed of 13 partners: Mostaganam University; Oran University; LNCAPPSM; Bilda University; MADRP; CRDER; CRAPC; COMENA; CRNRDPA; Tipaaya Park; University of Skikda; University of Annana; University of Taref) which develops and implements a strategy for monitoring sources of marine and continental pollution, the main causes of the appearance of harmful algal blooms. It has established a species database.

The CNRDPA has long-term state funding. It also operates through research projects, 5 of which are currently funded by international partnerships. It publishes bulletins (latest to date: October 2019) of around twenty pages presenting the results of studies carried out and upcoming events. It also has significant documentary holdings.

National Centre for Biological Resources Development (CNDRB)

The National Centre for Biological Resources Development (*Centre National de développement des ressources biologiques, CNDRB*) (<http://www.mre.gov.dz/presentation-du-cndrb/?lang=fr>, Website not accessible) is a public administrative establishment established in 2002, under the supervision of the Ministry of the Environment and Renewable Energies. It is in charge of centralising all inventories of flora and fauna, habitats and ecosystems,

⁴ <http://www.cnrdfa.dz/AlphyNet/index.html>

contributing to plans for the development of biological resources and proposing the conservation of national biological resources according to the regulations in force. It is responsible for updating the results of inventories of biological resources, habitats and ecosystems, and proposing development initiatives through the multiplication of priority species for flora and repatriation for fauna. It has 2 annexes (one in Laguermi since 2006; another in Moudjeraba since 2009 (responsible for the management of future protected areas). The establishment of other branches are planned: two branches in Adrar and Ghardia; one in Biskra. The centre is hiring 25 technical executives, 34 administrative staff, 42 support staff. The data collected are used to build inventories of flora and fauna:

- Centralisation of Habitats and Ecosystems (CHES) Programme (since 2016)
- Alien Invasive Species Signaling Programme (ESAS) (since 2014)
- Project to set up a device for mapping, monitoring and monitoring *Posidonia oceanica* meadows in Algeria

The Centre publishes an inventory of fauna, flora, habitats and ecosystems. It participates in all meetings and workshops in collaboration with the relevant departments of the Ministry and its partners, for the improvement of knowledge and the preparation of plans for enhancing biological resources and preserving ecosystems. It also participates in awareness programs for different segments of society.

Laboratories and research centres

National School of Marine Sciences and Coastal Planning (ENSSMAL)

Located in Algiers, the National School of Marine Sciences and Coastal Planning (*École Nationale Supérieure des Sciences de la Mer et de l'Aménagement du Littoral, ENSSMAL*) (<http://www.enssmal.dz/fr/>) is a school and research centre in the fields of oceanography, coastal planning and management. Its origins date back to 1882, although its current structure was set up in 2008. It comes under the Ministry of Higher Education and Scientific Research. It is responsible for the education of executives and researchers for the management of marine resources and the development of coastal areas and for the production of marine scientific data allowing the assessment and adequate exploitation of marine resources and rational management of the coast.

The School uses a Sidi Fredj Station. Its fleet is made up of 1 oceanographic research vessel (BENYAHIA, 25 meters, equipped with DGPS, Sonar, STD, Rosette, Clamshells, corers); 4 coastal work boats (HABIBAS II of 5 meters, acquired in 2014; BABA ARROUDJ; IBTACIM of 12 meters). The data collected concerns coastal ecology, fishery resources and environmental impact studies.

The School has signed framework agreements with 18 key national players and 6 international institutions (such as the National Institute of Applied Sciences (INSA) of Lyon, France; the University of Western Brittany – UBO – of Brest; Università DEGLI STUDI DI PALERMO ITALIA). It also signed an agreement with PAP/RAC for the organisation of an online MedOpen course.

It publishes PhD theses, maps and plans; scientific articles and articles are published on Researchnet⁵.

⁵ https://www.researchgate.net/institution/Ecole_Nationale_Superieure_des_Sciences_de_la_Mer_et_de_lAmenagement_du_Littoral-ENSSMAL

Maritime Studies Laboratory (LEM)

The Maritime Studies Laboratory (*Laboratoire d'études maritimes, LEM*) was created in 1979. It is attached to the Ministry of Public Works. LEM is an expertise office on maritime, port, coastal, hydraulic and environmental matters. LEM is the main actor at the national level in coastal engineering, and it participates in all maritime and port projects developed and carried out along coastal wilayas at the national level. It is organised around three departments (MEER, PAP/RAC/PAM, 2018):

- the Port Development Department, which leads general studies related to maritime transport;
- the Environment and Coastal Department, which leads studies of hydro-sedimentary phenomena, impact studies on the infrastructure construction project environment, studies of the delimitation of the maritime public domain, and studies on the preparation of coastal development plans.
- the Monitoring and Control Department, which provides technical assistance through intervention in inspections, surveys, topography, bathymetry, etc.

Laboratory of Biological Oceanography and Marine Environment (LOBEM)

Founded in 2010, the Laboratory of Biological Oceanography and the Marine Environment (*Laboratoire d'Océanographie Biologique et Environnement Marin, LOBEM*) (<https://lobem.usthb.dz/>) is a research laboratory of the Faculty of Biological Sciences of Houari Boumédiène University of Science and Technology. It comes under the supervision of the Ministry of Higher Education and is in charge of research on pelagic, coastal and benthic ecosystems and fisheries. Its research teams cover the following areas of research:

- Pelagic ecosystems: impact of climate variability on pelagic populations (phytoplankton, zooplankton, necton); consequences on pelagic stocks
- Coastal and benthic ecosystems: structure and functioning of benthic ecosystems; knowledge and evolution of coastal marine ecosystems
- Fisheries: biology, ecology and exploitation of some species of decapod crustaceans, cephalopod molluscs and fish; stock assessment and management
- Space oceanology and remote sensing: use of satellite data to monitor environmental parameters; comparison with in situ measurements; development of the GIS.

Its international (<https://lobem.usthb.dz/node/31>) and national publications (<https://lobem.usthb.dz/node/32>) are available online.

Environmental Monitoring Network Laboratory (LRSE)

Created by Ministerial Decree on July 25, 2000, the Environmental Monitoring Network Laboratory (*Laboratoire réseau de surveillance environnementale, LRSE*) (https://lrse.org/?page_id=7867) is attached to the Institute of Natural Sciences of the University of Oran. This research laboratory specialises in marine sciences, bio-monitoring of coastal marine pollution, management of fishery resources and aquaculture. It also intends to bring together the information collected since 1973 by a network of observers present on the Algerian coast. It has a team of 50 people, working in a 300 m² laboratory. The data collected concern marine ecotoxicology, marine and coastal ecology, marine parasitology, marine microbiology and fishery resources. The LRSE developed partnerships with the University of Oran; Mostaganem University; the University of Chlef; and USTOM. It depends financially

on the Faculty of Sciences of Nature and Life of the University of Oran 1; and on funding per research project. Publications of books and articles are available online (https://lrse.org/?page_id=7863).

National Laboratory for the Control and Analysis of Fishing and Aquaculture Products and Environmental Health

Established in 2012, the National Laboratory for the Control and Analysis of Fishing and Aquaculture Products and Environmental Health (*Laboratoire national de contrôle et d'analyse des produits de la pêche et de l'aquaculture et de la salubrité des milieux*) (*Non-functional website*) is an administrative establishment, endowed with legal personality and financial autonomy. Under the supervision of the Ministry responsible for fisheries, its Policy Board is made up of all the ministries concerned. It is responsible for carrying out different types of biochemical, bacteriological, physicochemical, parasitological and toxicological analyses of fishery and aquaculture products, environmental health analysis and quality control of marine and aquaculture waters; the constitution of all documentation or information relating to the quality of fishing and aquaculture products and of a database; and the contribution to awareness in the field of control of fishing and aquaculture products as well as their environments.

Laboratory for the Protection and Enhancement of Coastal Marine Resources and Molecular Systematics (LPVRMLSM)

Approved in 2015, the Laboratory for the Protection and Enhancement of Coastal Marine Resources and Molecular Systematics (<http://lpvrmlsm.univ-mosta.dz/>), unavailable at the moment) (*Laboratoire de Protection, Valorisation des ressources marines littorales et systématique moléculaire, LPVRMLSM*) is a research laboratory of the University of Mostaganem. It is responsible for the identification, protection and enhancement of coastal marine resources. The laboratory aims to foster a better exploitation of the marine and coastal resources of the coast of Mostaganem, using the techniques of molecular phylogenetic systematics; to identify and exploit marine macroalgues; and to propose an integrated management system for enhancing and protecting natural coastal and coastal areas. The Laboratory is led by 4 research teams: Diversity of Marine Resources, Livestock, Nutrition and Environment (DRMENE); Valorization of Marine Algae and Biochemistry of Natural Substances (VAMBSN); Molecular and Phylogenetic Systematics of Marine Organisms (SMPOM); Valuation & Exploitation of Coastal and Coastal Natural Resources (GEOMARLIT). It has an equipped research laboratory. The data collected concerns ecology and marine biology and are available through scientific publications (international and national articles).

Monitoring activities within MPAs

Habibas Islands MPA/Marine Nature Reserve

Established in 2003, the Habibas Islands Nature Reserve is Algeria's first MPA, as well as the country's first SPAMI. Under the tutelage of the CNL, it is co-managed by the Barbarous Association. It has a team made up of executives and a few guards (CAR ASP et al, 2015). Its management plan was finalised in 2013 and its implementation requires strengthening. The MPA's funding is both ad hoc and insufficient: it receives funding from the state and numerous international programs and collaborations.

- 2018 (8 months): A monograph of the MPA to publicise its natural heritage and sustainable funding was provided by MedPAN in the amount of 15,000 EUR.
- 2019: As part of the MedKey Habitats II Project⁶ (funded by the MAVA Foundation and executed by the SPA/RAC), carried out in Algeria with the MEER and the ABYSS Environmental Services design

⁶ <https://www.rac-spa.org/medkeyhabitats2>

office, a study was launched in July 2019 in order to inventory key marine habitats, assess the impact of fishing on them, and institutionalise monitoring of marine biodiversity.

- 2019: As part of the ASPIM project, a twinning project between the Italian SPAMIs/MPAs and the Habibas Islands Marine Nature Reserve⁷ was launched in 2019 in order to develop and strengthen its management capacities.

Kabyles Bank Marine Reserve (SPAMI) – future Taza National Park MPA

Registered on the SPAMI list, the Kabyles Bank Marine Reserve in Taza National Park was created in 2001. Its management is integrated with that of the National Park. A team is dedicated to the marine part of the park, and prioritises setting up a framework for discussion with the site's fishing communities (UNEP/MAP, CAR/ASP, 2013). The process of classifying the site as a Marine Protected Area has been underway since 2009. The Med PAN SUD-PN pilot project⁸ (2011) identified studies and research work on the Taza marine area between 2009 and 2011 (MADR, 2011) and made a summary of their results. WWF and MedPAN have been working since 2012 to classify the site as an MPA and to develop a fisheries management plan.

Réghaïa Marine Protected Area - Nature Reserve, RAMSAR site

Listed as a RAMSAR site in 2003, the site was classified as a Réghaïa Nature Reserve by a protection order from the Wali of Algiers on August 15, 2016. It is now seriously threatened by industrial pollution. The Réghaïa Coastal Plan was carried out within the framework of the National Strategy for the Integrated Management of Coastal Zones, enacted on March 23, 2014. This regional MedPMANet Project⁹ is led by the Ministry of Water Resources and the Environment and RAC/SPA. The management plan for the Réghaïa MPA was undertaken by the MedMPANet project carried by the SPA/RAC for the marine part, and by PAP/RAC for the coastal part in 2015. It recommends the designation of 1712 marine hectares and 772 terrestrial hectares, as well as the formation of a permanent scientific monitoring team. A cartographic atlas was produced on the basis of a geographic information system under ArcGIS version 10, by coupling the information and data provided by the thematic consultants with that collected through the processing of the 2012 satellite imagery (Larid, 2015).

Gouraya National Park/Biosphere Reserve

Created in 1984, the Gouraya National Park (PNG) was recognised as a Biosphere Reserve in 2004. With an area of 2080 hectares, it covers 11.5 km of coastline. The area is the subject of numerous scientific publications by students and researchers of the University of Bejaia. In 2016, the project 'Conservation of flora and natural habitats with local populations in the South and East of the Mediterranean basin (IPA-Med)'¹⁰ was led by PADRP, DGF and IUCN. In 2018, an increase in the protected marine area of the PNG was planned. The MedOpen 2018 training – UNEP/MAP, led by ENSSMAL is dedicated to the preparation of a Marine Protected Area within the PNG (MEER et al, 2019).

El Kala National Park

El Kala National Park was created in 1983. Recognised as a Biosphere Reserve in 1990, it covers an area of 80,000 hectares bordering the Mediterranean Sea and the Tunisian coast. In 2005, the management plan for the marine area of the park was the subject of specific funding by the MedMPA project. This made it possible

⁷ <http://www.meer.gov.dz/a/?p=3989>

⁸ https://www.panda.org/fr/aires_marines_protegees/projet_medpan_sud/

⁹ http://www.racspa.org/sites/default/files/doc_medmpanet/final_docs_algeria/53_plan_de_gestion_reghaia_algerie.pdf

¹⁰ <https://www.iucn.org/fr/news/m%C3%A9diterran%C3%A9e/201710/lancement-du-1er-r%C3%A9seau-national-de-botanique-dalg%C3%A9rie>

to synthesise all the work on marine biodiversity in the region (MED PMA et al, 2005). Between 2017 and 2018, a study was led by the Ministry of the Environment and Renewable Energies in partnership with German cooperation, 'Assessment of the economic value of ecosystem services in the lake area of El-Kala National Park (PNEK)' and the 'Guide to support the economic valuation of ecosystem services and the benefits of managing a natural space' was developed.

Environmental monitoring programmes

National monitoring programme for biodiversity and non-native marine species in Algeria (EcAp-Med II Project)

The Mediterranean Implementation of the Ecosystem Approach, in accordance with the European Union (EU) Marine Strategy Framework Directive (MSFD) benefited Algeria, through assistance to establish new monitoring programmes in line with EcAp¹¹. It led a national training session on monitoring techniques for marine habitats (2015–2019), seabirds and NIS (9–13 September 2018, Rachgoun Island). It also evaluated new monitoring requirements for the country.

Algerian BASin Circulation Unmanned Survey (ABACUS I to 5)

The ABACUS Research Project (2014–2019) focuses on the characteristics of the currents of the Algerian basin, where isolated cyclonic and anticyclonic eddies develop. Between Palma de Mallorca and the Algerian coasts, the ABACUS 5¹² Project set up 2 glider missions in the study area in November–December 2018 and April–May 2019. The ABACUS 5 glider mission enriched and extended the observations previously collected in the study area (fall 2014, 2015, 2016, 2017 and spring 2018). This project aimed to understand the dynamics of sub-basins, and contribute to the creation of a composite dataset to be used for the design and calibration of the SWOT satellite mission. The hosting infrastructure is the SOCIB glider facility, Spain, and the investigating leader of the project is from the Università degli Studi di Napoli. The activity received funding from European Commission's H2020 Framework Programme under the JERICO-NEXT Project.

National Monitoring Programme and Integrated Assessment for indicators relating to hydrography and to the coast – IMAP Algeria

This programme (2016–2021)¹³ aims to calculate the different applicable indicators and the assessment of the different ecological objectives covering the range of ecosystem components, to meet the requirements related to the monitoring of different legislative texts in the region and to collect data in a comparable manner between contracting parties in order to enable data integration. ONEDD is in charge of the implementation of observation and measurement of pollution and environmental monitoring. The programme specifically aims to set up a data management programme, as well as implementing the training, technology transfer and capacity-building for the benefit of participating national institutions, with priority given to ONEDD staff.

¹¹ http://www.rac-spa.org/sites/default/files/ecap/formation_algeria/imap_algerie%20.pdf

¹² https://www.jerico-ri.eu/download/ABACUS4_report_final.pdf

¹³ <http://iczmplatform.org/storage/documents/m4cVPq8BChOVmFVwD4BzJHk7OKgBt813xapEVeAJ.pdf>

Environmental information systems

Algerian Environmental Information System (ONEDD)

This environmental information system consists of a geocatalogue and a geoportal (inaccessible online), launched in 2016. It is part of the national environment strategy and the national action plan for the environment and sustainable development. It was financed by the twinning between Algeria and the European Union 'in support of the National Environment and Sustainable Development Observatory (ONEDD) for the improvement of its operational capacities and the implementation of the National Environmental Information System (SIE)' (2014–2016)¹⁴. Launched as part of the implementation of the association agreement between Algeria and the European Union, the project was set up for a period of 18 months, with the support of France and from Austria. This project was financed with an amount of 850,000 EUR for the European contribution and DN 12 million, the cost of the Algerian participation. Its Geocatalogue enlists data and information services on the environment. It uses indicators for water management and quality, biodiversity and agriculture, coasts, and industrial pollution.

Statistical System for Fishing and Aquaculture in Algeria

The Statistical System for Fishing and Aquaculture in Algeria is a device that relies on statistical data collecting agents at the fishing port level, who return the completed templates to the fishing branches to which they report. These branches relay data daily to the Departments of the Wilayas which, in turn, transmit them monthly to the Central Department of the DGPA. This information system was established to facilitate sharing statistics on fishing and aquaculture, through a new statistical system with the support of an online statistical application (SSPAALweb¹⁵). It was established within the framework of the DIVECO2 Programme in collaboration with the European Union. This project was able to set up an online monitoring system for the records of the fishing fleet as well as the monitoring of catches and fishing effort by sampling. The system has been operational since January 2019. It also includes socio-economic data related to seafarers.

Bibliography

Belhaouari, Benkhedda, 2018, 'Assessment of the state of littoral waters in Algeria: Guidelines and recommendations', in EWASH & TI Journal, vol 2, issue 1, pp 41–44. URL: <https://revues.imist.ma/index.php/ewash-ti/article/view/11299/6783>

CAR/ASP – PNUE/PAM, 2015. 'Financement durable de la future réserve naturelle marine de Réghaia, Algérie'. Par Diazabakana, A., Binet, T., Vertigo Lab. Ed. CAR/ASP - ProjetMedMPAnet, Tunis: 49 pages

European Environment Agency et Observatoire National de l'Environnement et du Développement Durable, 2012, "Instrument européenne de voisinage et de partenariat. Vers un système de partage d'informations sur l'environnement « SEIS ». Rapport pays Algérie", 44 pages

EMWIS, 2017. "Study of legislative frameworks promoting the development of National Water Information Systems in the Mediterranean countries of the European neighborhood", 83 pages

Khelil, Nawel; Larid Mohamed; Samir Grimes; Le Berre, Iwan, 2019, "Challenges and opportunities in promoting integrated coastal zone management in Algeria: Demonstration from the Algiers coast", in Coastal Management, 168

Larid, Mohamed, 2015. "L'apport du retour d'expérience au processus de gestion intégrée des zones côtières", Revue géographique des pays méditerranéens, 125, pp 141-152.

¹⁴ https://fr.welcomeurope.com/appele-projet-europe/ievp-jumelage-appui-observatoire-national-environnement-d-developpement-durable-onedd-am-lioration-capacite-s-op-rationnelles-mise-uvre-syst-me-national-da-information-environnementale-sie-alg-rie-2013-5664+5564.html#tab=onglet_details

¹⁵ <http://madrp.gov.dz/dgpa/sspaal-systeme-statistique-de-la-peche-et-de-laquaculture-en-algerie>

Ministre de l'Agriculture et du Développement Rural, 2011. "Synthèse des études et travaux de recherche sur la zone marine de Taza-MedPAN SUD-PN Taza 2009-2012". 34 pages.

Ministre de l'Agriculture et du Développement Rural; MedMPA/PNUE/PAM ; CAR/ASP, 2005." Plan de gestion de l'aire marine du parc national d'El Kala". 148 pages.

Ministère de l'Environnement et des Energies Renouvelables - PAP/RAC/PAM, 2018. "Rapport de mise en œuvre du Programme National de Surveillance et d'Evaluation Intégrées -IMAP-Algérie. (Appui EcAp MEDII)". 99p.

Ministère de l'aménagement du territoire et de l'environnement, PNUD-FEM, 2015. "Etude diagnostique sur la Biodiversité et les changements climatiques en Algérie, Rapport final". 135 pages

MEER, et SPA/RAC-ONU Environnement/PAM, 2018. "Programme national de surveillance de la biodiversité et les espèces non-indigènes marines en Algérie", Abdelhafid Chalabi. Ed SPA/RAC-Projet EcAp-Med II, Tunis, 167 p.

MEER; GEF; PNUD, 2019. "Sixième Rapport National sur la Diversité Biologique". 206 pages.

Office National des Statistiques, 2015. "Statistiques sur l'environnement". 110 pages

PAM, 2015. "Stratégie nationale de gestion intégrée des zones côtières en Algérie" (Appui PAM-MedPartnership, UNESCO). 94 p.

PNUE/PAM, CAR/ASP, 2013. 'Rapport sur la Révision périodique ordinaire des aires inscrites sur la Liste des ASPIM'. 75 pages.

Semide, 2017, "Etude des cadres législatifs favorisant le développement de Systèmes Nationaux d'Information sur l'Eau dans les pays méditerranéens du voisinage européen". 83 pages

Bosnia and Herzegovina

I. General overview

Bosnia and Herzegovina's coastline is 24.5 kilometres long and national sea area has 17.7 km². Therefore, monitoring activities regarding coastal and marine environments and activities are limited. In terms of general environmental policy, the elaboration of the BiH Environmental Strategy and Action Plan 2030+¹⁶ is under way. In the general field of environmental monitoring, there is no operational database with state-level environmental information in Bosnia and Herzegovina. The UNECE report on the environmental observation activity highlights that little progress had been made between 2011 and 2017 in the development of a coherent monitoring system as well as in the development of an environmental information system at the state level. Data exchange between different public institutions is limited. There are individual systems for collecting and reporting environmental data. However, this report underlines that air quality monitoring has been strengthened, water monitoring has been improved, and a register of pollutant emissions and the development of pollution discharge and transfer registers have been established. Regarding biodiversity, at the State level, the Second Natural Biodiversity Strategy and Action Plan for the period 2015 – 2020 was launched - it followed the first one ever implemented, for the period 2008-2015. However, systematic collection and analysis of data on biodiversity and monitoring of the state of biodiversity are almost non-existent. Existing protected areas do not fully implement a system of protection, monitoring and sustainable use, due to insufficient budget allocations, inadequate staff structure and the lack of management plans (MOFTER BiH et al, 2015). There is no sharing of statistical data relating to biodiversity. The main sources of data on biodiversity come from studies and publications prepared by various institutions or are the result of evaluations carried out within the framework of various projects financed by external donors. Information is generally not accessible to the general public: primary data is dispersed in various private and public databases and stored on local computers, in different formats (USAID, 2016). The absence of systematic soil monitoring, and information systems on soils and land and information on soil contamination, in particular due to the absence of specific laws at the state level on soils and land should also be noted. However, the CAMP project for Bosnia and Herzegovina was launched in 2020 between BiH and PAP/RAC institutions. Its goal is to ensure the sustainable management of the country's coastline, through the "establishment of an institutional mechanism for ICZM, monitoring of marine and coastal environment, inventory of marine habitats and protected areas, national contingency plan, sustainable tourism, data management and adaptation to climate change¹⁷". This Project is to be completed by 2022.

Legal, administrative or other obligations involving monitoring

The country is divided into three administrative entities:

- the Federation of Bosnia and Herzegovine, FBiH – further divided into 10 cantons, with very significant authorities and obligations;

¹⁶ <https://www.sei.org/projects-and-tools/projects/bosnia-herzegovina-environmental-policy/>

¹⁷ <http://papr.org/news/item/agreement-camp-bh-signed>

- the Republika Srpska, RS;
- and a separate administrative unit under the exclusive sovereignty of the State – Brčko District, BD.

At the State Level

The Law on Accreditation and the Institute for Accreditation of Bosnia and Herzegovina (BATA), is the only national accreditation body. It manages the accreditation of laboratories in Bosnia and Herzegovina. BATA maintains an active database with all accredited laboratories in Bosnia and Herzegovina.

For each entity

	<i>Federation of Bosnia and Herzegovina</i>	<i>Republika Srpska</i>	<i>Brčko District</i>
Law on nature protection	<p>Law on Environmental Protection ("OG FBiH", no. 33/03, 38/09)</p> <p>The law on Nature Protection of FBiH (OG of the FBiH, no. 66/13). Article 197 organises environmental monitoring.</p>	<p>The law on Nature Protection of RS (OG of RS, no. 20/14)</p> <p>Rulebook on establishing and managing an information system for protecting nature and monitoring ("OG RS", no. 85/05)</p>	<p>The law on Nature Protection of BD (OG of BD of BiH, no. 24/04, 1/05, 19/07, and 9/09)</p> <p>Law on Environmental Protection ("OG Brčko District BiH", no. 24/04, 1/05, 19/07 and 9/09)</p>
Navigation	Law on Inland and Marine Navigation ("OG FBiH", no. 73/05)		
Air and water pollution	<p>The law on Air Protection (OG FBiH No. 33/03, 4/10)</p> <p>The Regulation on monitoring of air emissions (OG FBiH No. 9/2014)</p> <p>The Regulation on monitoring of air quality OG FBiH 12/05, 9/16)</p> <p>The Regulation on Limit Values of Air Emissions from Combustion Plants (OG FBiH No. 03/13)</p> <p>The Regulation on the method of monitoring air quality and defining type of pollutants, limit values and other air quality standards. (OG FBiH No. 1/2012)</p> <p>Rulebook on water information system establishment and management ("OG FBiH", no. 77/09)</p>	<p>The law on Air Protection (OG RS No. 124/11, 46/17)</p> <p>The Decree on Air Quality Limit Values (OG RS 124/12)</p> <p>RS Strategy on Air Protection (2011)</p> <p>Rulebook on air quality monitoring ("OG RS", no. 30/05)</p>	<p>The law on Air Protection (OG BD No. 25/04, 1/05, 19/07, 9/09)</p> <p>The Regulation on Limit Values of Air Emissions (OG BD No.30/06)</p> <p>The Regulation on Limit Values of Air Emissions from Combustion Plants OG BD No.30/06)</p>

National environmental institutions

State level

Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina/ *Ministarstvovanjsketr-govineiekonomskihodnosabosneihercegovine* (<http://www.mvteo.gov.ba/home/language>): is responsible for defining policy general principles and coordinating activities and harmonising plans of the Entity authorities and institutions at the international level. It has no competence with regard to monitoring the environment (UNECE, 2018).

Agency for Statistics of BiH/ *Agencija za statistikuBiH* (<http://www.bhas.ba/>): is responsible for providing relevant statistical data: "gathers data from stakeholders that are authorised to report certain environmental indicators (National Resource Centres), using a provisional set of indicators. A core set of indicators to be used for official reporting in Bosnia and Herzegovina has not been adopted to date." (UNECE, 2018). The Agency manages a "a memorandum of understanding on mutual cooperation and support as regards the establishment of a national environmental monitoring system in Bosnia and Herzegovina, and the process of collection and preparation of statistics about the environment for reporting to the European Environment Agency (EEA) and European Environment Information and Observation Network (Eionet)" (UNECE, 2018)

The State Regulatory Agency for Radiation and Nuclear Safety / *Drzavnaregulatornaagencija zaradijacijsku/radijacionusigurnost/bezbjednost* (<http://www.darns.gov.ba/>): "oversees the regulatory control and safety of radiation sources, radioactive waste, storage and transportation. It is an independent administrative organisation that executes its activities under direct supervision of the Council of Ministers of Bosnia and Herzegovina. It is located in Sarajevo, with regional offices in Republika Srpska (in Banja Luka) and the Federation of Bosnia and Herzegovina (in Mostar)." (UNECE, 2018)

Republika Srpska

The Ministry of Agriculture, Forestry and Water Management of Republika Srpska/ *Министарствопољопривреде, шумарства и водопривреде* (<http://www.minpolj.gov.rs/>): is responsible for environmental monitoring.

Institute for Protection of Cultural, Historical and Natural Heritage of RS / *Заводзааштитикултурно-историјског и природногнаслеђа* (<https://nasljedje.org/>): is responsible for updating the register of protected areas, and conducting nature conservation. "Maintains a Register of Protected Natural Resources and other data of importance for nature conservation, including operating its own database." (UNECE, 2018)

Republika Srpska's Municipalities: they must ensure the preservation of natural resources in the area, the improvement of air quality and publish information about the state of air quality and determine the water management requirements and the implementation of specific activities for protection and preservation of the environment.

Federation of Bosnia and Herzegovina

Ministry of the Environment and Tourism of the Federation of Bosnia and Herzegovina/ *MinistarstvookolišaiturizmaFederacijeBosneiHercegovine* (<https://www.fmoit.gov.ba/bs/o-nama>): is responsible for environmental protection of air, water and soil, strategies and policies for environmental protection; quality standards for air, water and land; environmental monitoring and control of air, water and land.

Brčko Distric

Department of Agriculture, Forestry and Water Management of Brčko District (<https://fmpvs.gov.ba/en/links/>): manages environmental monitoring.

Department for Spatial Planning and Property Affairs of Brčko District (Sub-department for Spatial Planning, Urban Development and Environmental Protection) (<https://www.bdcentral.net>)

Monitoring activities

Water monitoring

Sava River Watershed Agency in Sarajevo (FBiH)

The Sava River Watershed Agency (*Agencija za vodnopruducjerijeke Save*) (<http://www.voda.ba/>) is in charge of the Water Information System (WIS) and monitoring, through data collected by automatic hydrological stations across the FBiH. Data is available online on its website. Its facilities include a water laboratory and three regional offices. It publishes studies on the improvement of the flow regime and the establishment of an ecologically acceptable flow on rivers over 10 km² of the watershed in the Sava River basin in FBiH; studies of long-term water supply for the population, the economy and industry in the watershed area of the Sava River in FBiH. The Agency is currently preparing the Water Management Plan for the Sava River Basin in the Federation of BiH (2022-2027).

Adriatic Sea Watershed Agency in Mostar (FBiH)

The Adriatic Sea Watershed Agency in Mostar (*Agencija za vodnopruducjeJadranskog mora*) (<https://avpjm.jadran.ba/>) is in charge of surface and groundwater monitoring. Since 2003 it has operated ecosystem monitoring through samples for phytobenthos analysis on rivers and on the Adriatic Sea (on four different sampling points). The last collected data for the Adriatic Sea available online was sampled in 2017. It also published "Report on the state of surface and groundwater quality of the Adriatic Sea water zone in FB-H" (last one published for the year 2018) in Bosnian. The Agency is currently preparing the Water Management Plan for the Sava River Basin in the Federation of BiH (2022-2027).

Vode Srpske (RS)

Vode Srpske (<http://www.voders.org/>) is a public institution that manages public water resources, as well as hydraulic and hydro-technical installations and systems, rivers, streams and lakes in the territory of the Republic of Srpska. Its headquarters are located in Bijeljina. Previously led by two Water Agencies (the Sava River District Water Agency in Bijeljina and the Trebišnjica River District Water Agency in Trebinje), the law on Water of 2006, modified in 2012, created Vode Srpske, and placed it under the supervision of the Ministry of Agriculture, Forestry and Water Management of the Republika Srpska. It also established regional offices for sub-basins. It is financed by the budget of the Republika Srpska, by selling services, and through donors and other sources in accordance with the law. Its Water Information System was financed by the CARDS Programme of the European Union in 2003, and strengthened through the UNDP project of 2017 on the modernisation of existing information systems in Bosnia and Herzegovina. So far, three web-based data entry applications have been developed. The Water Cadastre and Waterbook applications organise water cadastres data, while the "Water Characterisation" web application is intended for the entry and updating, as well as the review of spatial data for the development of the river basin management plan. VS also publishes yearbooks on surface water monitoring (last one published in 2019).

Air quality

“There is no aggregated air quality data available for the entire country. This might be aggravated by the low number of monitored locations (10) and the lack of cooperation and communication between the respective entities in charge of collecting air quality data. In addition, full implementation of quality control (QC) and quality assurance (QA) in Bosnia and Herzegovina is still lacking. The country also lacks estimates of the optimal number of monitored locations and air monitoring stations” (UNECE, 2018)

Hydrometeorological Institute of the Federation of Bosnia and Herzegovina

The Federal Hydrometeorological Institute (*Federalni Hidrometeorološki Zavod*) operates the federal air quality monitoring network. Real-time data can be found online (<http://fhmzbih.gov.ba/>). It uses CORINAIR methodology. It reports on ionising radiation in ambient air on an annual basis (UNECE, 2018).

Hydrometeorological Institute of Republika Srpska

According to the UNECE's report of 2018, most of its stations are not functioning due to funding difficulties. At the time of drafting this Report, the station in Prijedor was the only one to send real-time data from Republika Srpska to the website (www.hidrometeo.ba). It uses the Intergovernmental Panel on Climate Change (IPCC) methodology. This website displays all stations in BiH managed by the hydrometeorological institutes. This same report underlines that there is “no officially computed and verified Air Quality Index published for cities in Bosnia and Herzegovina” (UN, 2017)

Kemal Kapetanović Institute Environmental Monitoring Centre– University of Zenica

The “Centre for Environmental Monitoring of the Canton of Zenica-Doboj” was launched in 2019 at the “Kemal Kapetanovic” Institute. The Government of the Canton of Zenica-Doboj has approved 1.45 million EUR at the University of Zenica for the finalisation of the project. The Environmental Monitoring Centre will collect, systematise and analyse data from measuring stations in the region of the Canton of Zenica-Doboj, their connection and the networking of monitoring systems with similar systems at the Federation level¹⁸. The future monitoring centre should provide a complete and accurate picture of all parameters of air pollution in all parts of the Canton of Zenica-Doboj, as well as data from the cantonal register of plants and pollutants. Each station of the air pollution monitoring system of municipalities and towns in the Canton of Zenica-Doboj will be equipped. Benzene measuring devices at Zenica's measuring stations are currently not working, as additional devices need to be purchased for daily monitoring. The purchase contract for these devices has been signed. An external calibration will follow, in order to operate in accordance with European standards¹⁹.

Nuclear Safety

State Regulatory Agency for Radiation and Nuclear Safety

The State Regulatory Agency for Radiation and Nuclear Safety (*Državna regulatorna agencija za radijacijsku/ radijacionu sigurnost/bezbjednost, DARNS*) (<http://www.darns.gov.ba/en/EnglishDARNS/ Index>) is an independent administrative organisation in Sarajevo under direct supervision of the Council of Ministers of Bosnia and Herzegovina. It is performing administrative and professional operations in the field of ionising radiation. Its regional offices are established in the Republika Srpska Entity in Banja Luka, in the Federation of Bosnia and Herzegovina Entity in Mostar. Eleven automatic stations across the country perform continuous measurement

¹⁸ <https://bhrt.ba/1010701/monitoring-okolisa-zenicko-dobojskog-kantona/>

¹⁹ <https://zenicainfo.ba/2019/07/31/kada-ce-poceti-sa-radom-centar-za-monitoring-okolisa/>

of ionising radiation in ambient air. It provides a State registry for radioactive sources. DARNs represents Bosnia and Herzegovina at the international level with respect to the issues in the field of radiation safety and nuclear safety. It is funded by the budget of Bosnia and Herzegovina institutions, and from independent sources. It publishes annual monitoring reports on radioactivity (last one published: 2018).

Public health monitoring

Institute of Public Health of FBiH

Created in 1997, the Institute of Public Health of FBiH (*Zavodu za javnozdravstvo Federacije BiH*) (<https://www.zzjzfbih.ba/>) acts as an institution that implements public health functions in the Federation of Bosnia and Herzegovina. Its Health Ecology Service (*Službe za zdravstvenuekologiju*) is responsible for the monitoring of the quality of drinking water, surface water and the condition of the water supply; as well as the monitoring of the impact of water for bathing, leisure and sports on the state of health of the population. It performs chemical and microbiological analysis on water quality. The Statistics Services of the Institutes of Public Health provide annual health statistics reports available online in Bosnian (last one published: 2018).

Institute of Public Health of the RS

Located in Banja Luka, the Institute (*Zavod za javnozdravstvo Republike Srpske*) (<https://www.phi.rs.ba/>) performs its activities through its six units stationed in Banjaluka, Doboj, Trebinje, Istočno Sarajevo, Foča and Zvornik. It performs surveillance and analysis of the entire health sector of Republika Srpska and also processes clinical and non-clinical specimens and performs microbiological, epidemiological, radiological and physical and chemical testing.

Cantonal Public Health Institute

The Department of Public Health of Sarajevo Canton: The data on air quality in the Canton of Sarajevo are available in real time from 6 AQ monitoring stations managed by the Cantonal Public Health Institute, and are online (<http://kvalitetzraka.ba/>).

The Department of Public Health of Tuzla Canton: The official data on AQ in the Tuzla Canton are also online (<http://monitoringzrakatk.info/>).

Institute of Metrology of Bosnia and Herzegovina

The Institute of Metrology of Bosnia and Herzegovina (<http://www.met.gov.ba/institut/default.aspx?id=44&langTag=en-US>) determines the "accredited calibration laboratories, nominated metrology laboratories (in the field of verification) and bodies for compliance assessment of measuring instruments, which provide services for testing petroleum and natural gas and the physico-chemical parameters of petroleum and organic pollutants." (UNECE, 2018). Its facilities include various laboratories: Laboratory for mass and related quantities (LM IMBIH) (mass, pressure and density); Laboratory for chemistry; Laboratory for ionising radiation; Laboratory for temperature and humidity; Laboratory for electrical quantities; Laboratory for time and frequency; Laboratory for volume and flow; Laboratory for verification of measuring instruments (LVM); Laboratory for gas flow and volume meters.

Biodiversity

Centre for Ecology and Natural Resources (CEPRES)

Initiated by several experts at the Faculty of Natural Sciences and Mathematics - University of Sarajevo (<http://www.pmf.unsa.ba/cep-sr/>), it has participated in the implementation of several important projects in the field of biodiversity inventory, evaluation and conservation. Biodiversity data gathered during the execution of these projects (Protected areas of BiH, Emerald network of BiH and Integrated Management of the Sava River Basin) are integrated into a GIS database. Access to the database is limited to institutional use (GIZ, 2017).

Environmental Protection Fund of FBiH

The Environmental Protection Fund of FBiH (<https://fzofbih.org.ba/>) is a non-profit financial institution established by the Government of the Federation of Bosnia and Herzegovina on July 8, 2003. It became operational in 2010. Over the past 10 years, the Fund has been recognised as an entity which, with financial and technical support, contributes to the achievement of the objectives defined in the relevant national and international documents in the field of environmental protection. It has been developing the Federation of Bosnia and Herzegovina Nature Protection Information System (ISZP-FBiH) and various regional cooperation projects related to biodiversity conservation. These projects were supported by the Open Regional Fund for South-eastern Europe - Biodiversity (GIZ/ORF-BD)²⁰ within the framework of the "Regional Network" for Biodiversity Information Management and Reporting (BIMR), funded by the German Federal Ministry of Economic and Development Cooperation (BMZ) and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (2016-2018).

NGO Arbor Magna (RS)

Arbor Magna (<http://arbormagna.rs.ba/>), the Society for the Protection of Natural Heritage, is an NGO founded in 2000 that brings together more than a 100 professionals active in the field of biological research and nature protection in Bosnia and Herzegovina. It was initially specialised in forestry conservation, and then developed its activities on biodiversity. It publishes a variety of studies on biodiversity on its website. It also managed GISPASS, a multimedia spatial database of protected and potentially protected areas in RS. However, it has been unavailable since 2017. It is currently working on the development of a spatial database on Lepidoptera fauna in Bosnia and Herzegovina (since 2017); a flora database of Bosnia and Herzegovina (since 2010).

Environmental monitoring programmes

UNEP/Global Environment Fund - 'Capacity development for the integration of global environment commitments into national policies and development decision-making in Bosnia and Herzegovina'

This programme (2014-2019)²¹ is led by several executive agencies: the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina (MoFTER); the Ministry for Spatial Planning, Construction and Ecology of Republika Srpska and the Ministry of the Environment and Tourism of the Federation of Bosnia and Herzegovina. In 2016, UNEP opened two new air monitoring stations in Bosnia and Herzegovina (Prijedor and Gorazde) and brought two existing ones back to full function (in Ivan Sedlo and Banja Luka). It "included a system for enhancement of collection of environmental data and environmental information management. The Indicator Reporting Information System (IRIS), an online tool for data collection and indicator creation for

²⁰ <https://www.giz.de/en/worldwide/40686.html>

²¹ <https://www.unenvironment.org/news-and-stories/press-release/unep-delivers-new-climate-and-air-quality-monitoring-stations-bosnia>

national focal points reporting under Rio conventions, was presented in 2016. The system was developed by UNEP and can be connected to UNEP Live so that the economy can share relevant data and indicators with UNEP audiences. Currently, the documents presenting an overview of the current state of the environment in BiH, the availability of data and the competencies of the institutions, as well as gap analysis in the legislative, technical and institutional aspects in the field of environment are being developed. A List of Selected Environmental Indicators in BiH was also prepared and is awaiting adoption by the competent authorities, so that an Environmental Management Information System (EMIS) can be established to support environmental reporting and be linked to UNEP Live at the address: uneplive.unep.org." (GIZ, 2017)

Stockholm Environment Institute - Development of the Environmental Strategy and Action Plan of Bosnia and Herzegovina (2030+):

The Stockholm Environment Institute is accompanying²² the country's institutions in the preparation of an environmental strategy and action plan. The BiH Environmental Strategy and Action Plan 2030+ (2019-2022) will:

- build on existing and past strategic environmental documents to strengthen current environmental governance in BiH, the Federation of Bosnia and Herzegovina, the Republic of Srpska (RS), and the Brčko District (BD)
- support BiH in its European Union approximation through the alignment of the environmental strategy with EU environmental achievements
- provide a roadmap for future environmental sector measures and investments, and mechanisms for their implementation beyond 2030.

"Support to Implementation of the Birds and Habitats Directives in Bosnia and Herzegovina"

"As part of the project "Support to Implementation of the Birds and Habitats Directives in Bosnia and Herzegovina", implemented from 2012 to 2015, a digital database was developed that was used for a list of pSCIs and nomination of sites in BiH for the Natura 2000 network, based on the ArcGIS platform. In accordance with project recommendations, beneficiary institutions were supposed to create, collect and update important datasets according to agreed specifications and standards. Specifications could not be modified without prior consultation with other entities, BD and Government-level beneficiary institutions. Beneficiary institutions were supposed to submit harmonised Natura 2000 data, which would be virtually centralised in the Natura 2000 geoportal and stored in the unified database managed by the MoFTERBiH. The unified database would be used for information exchange between entities, state-level analysis and reporting to the European Commission. Due to the absence of agreement between governmental bodies at the state and entity level, at the time of preparation of this assessment this data is stored on a digital medium but not integrated into a single, publicly available and functional system. Natura 2000 data for the territory of RS is included in the Amendments to the RS Spatial Plan to 2025 and forms an integral part of this overarching document." (GIZ, 2017)

Environmental information systems

Clearing House Mechanism (BiH)

In 2013, the Clearing House Mechanism was launched to provide access to information on biological diversity in Bosnia and Herzegovina (www.bih-chm-cbd.ba). This is an effective biodiversity information service in BiH

²²<https://www.sei.org/projects-and-tools/projects/bosnia-herzegovina-environmental-policy/>

intended for relevant stakeholders and the general public. The data provided is in the form of metadata for the resources managed by different stakeholders and not the actual biodiversity data.

Flora of Republika Srpska

Flora of RS is a comprehensive web application (www.florasrpske.webfactional.com) for browsing and visualisation of spatial occurrence data of vascular plants in RS, published as a monograph by Günther Beck-Mannagetta, Karlo Maly and Željka Bjelčić in 1983, Flora Bosnae et Hercegovina. It is managed by the associates of the Faculty of Forestry in Banja Luka (GIZ, 2017).

Information System on the Protection of Nature of the FBiH

This information system includes information on the natural heritage (biological and geological) of the Federation of Bosnia and Herzegovina in the form of databases, applications and web service solutions. ISZP-FBiH is intended for the collection, storage, maintenance and sharing of data. Currently, only the list of selected endemic plant and terrestrial animal taxa in South-Eastern Europe (SEE) module has been developed, and in the following period, other parts will be established.

Information system for the protection of nature of the Republic of Srpska (RS)

This information system (<http://e-priroda.rs.ba/>) operates under the auspices of the Institute of the Republic for the protection of cultural, historical and natural heritage. Its website gathers databases on areas of high geological, biological, ecosystem or landscape diversity that are important as habitats for bird species; for endemic species whose classic localities are in the region of South-eastern Europe; for endangered or likely endangered wild species which are of particular importance from a genetic, ecological, ecosystem, scientific, health, economic and other point of view; for the RS register of animal species; for the list of species distributed in the RS, which are categorised as endangered according to the IUCN criteria; and for the register of plant species in the RS. The creation of this information system was financed by the German Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Bibliography

GIZ, 2017 "National assessment of biodiversity information management and reporting baseline for Bosnia and Herzegovina". 61p.
https://balkangreenenergynews.com/wp-content/uploads/2017/08/BiH-Assessment_ENG.pdf

MOFTER BiH, UNDP, 2012. "State of Environment Report BiH". 260 pages.

MOFTER BiH, UNEP, GEF, 2015. "Učesnici u praćenju izradi Strategije i akcionog plana za zaštitu biološke raznovidnosti Bosne i Hercegovine (2015-2020)". 176 pages. http://www.vijeceministara.gov.ba/akti/prijedlozi_zakona/default.aspx?id=25304&langTag=hr-HR (accessed on 2/12/2020)

UNECE, 2017, "Third Environmental Performance Review Report for BiH". 261 pages
URL: https://www.unece.org/fileadmin/DAM/env/epr/epr_studies/ECE.CEP.184.Eng.pdf

United Nations, 2017. "Factsheet on air quality in Bosnia and Herzegovina." 8 pages
<https://www.unicef.org/bih/sites/unicef.org/bih/files/2020-02/AQ%20in%20BiH%20Factsheet%201.pdf>

USAID, 2016. "Country biodiversity analysis: Bosnia and Herzegovina". 75 pages
URL: <http://www.measurebih.com/uiimages/Biodiversity%20Assessment.pdf>

Cyprus

I. General overview

Cyprus is situated in the Levantine Basin, characterised by a high degree of endemism because of its relative isolation, a relatively high biodiversity and very low biomass. The marine environment is particularly important, both for environmental and economic reasons, given the island's dependence on tourism. In Cyprus, the main activities and marine monitoring research projects are undertaken in relation to the MEDPOL/UNEP programmes and the Water Framework Directive. Owing to that, the observation of coastal areas has been strengthened. Cyprus has a high level of protected areas (Natura 2000 network which now covers 28.8 % of the land area) but there are significant shortcomings at sea, especially in the offshore marine areas. "The effective protection of Natura 2000 areas, especially the coastal zone, from incompatible activities that fragment or degrade them, remains a concern. Management plans for these areas must be properly implemented and all necessary environmental assessments carried out correctly before potentially damaging plans or projects can be approved" (EIR, 2019). Moreover, according to the EU Environmental Implementation Review, 'The implementation of the INSPIRE Directive by Cyprus leaves room for improvement (EIR, 2019) and currently, the accessibility of spatial data through viewing and downloading services is poor and up-to-date information about chemicals is still not available on any of the government's portals. Cyprus has a large number of nature-protected areas. In terms of coastal and marine monitoring capacity, the Fisheries and Marine Research Department of the Ministry of Agriculture, Rural Development and the Environment is the main institution that coordinates the efforts, owing mainly to the competencies of the Marine and Environment Research Lab and the Cyprus Institute.

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Law 127(I)/2018	Environmental Assessment of Certain Works: to acquire an environmental permit, a study and other relevant information must be submitted by the developer of the project.
Law N. 153(I) 2003 amended by law No. 113(I)/2012	Nature and wildlife protection and Management law: it contains provisions on ecosystem preservation, wild fauna, legal proceedings/administrative proceedings and management plans for coastal and marine areas of the 'Natura 2000' network.
Law 106(I)/2002	Water Pollution Control law
Law 77(I)/2010, law 3(I)/2017 and law 20(I)/2020	The Ambient Air Quality laws: together with the Regulations P.I. 111/2007, P.I. 327/2010, P.I. 37/2017 and P.I. 38/2017, these laws harmonise the Directives 2004/107/EC, 2008/50/EC and 2015/1480/EU regarding the ambient air quality matters.

Law 77/1971	Law on Fishing Vessels (Registration, Sales, Transfer and Mortgage) and implementing Regulations from 1972: there are some provisions about protected aquatic species.
Law 171/1990	This law contains provisions on the regulation, management and operation of fishing shelters.
Law 33(III)/2003)	Public Access to Information Related to the Environment law: this Cyprus law has incorporated the Aarhus Convention on Public Access to information, Public Participation in Decision-Making and Access to Justice in Environmental Matters.
Law 119(I)/2004	This law requires the public authorities to make available any environmental information held by the authorities

Governmental environmental institutions

Historically, competency for the environmental achievements in Cyprus has been shared by many Ministries. The Ministry of Agriculture, Rural Development and the Environment (MARDE) now has the majority of competencies relating to the environment. However, other ministries could also be engaged on a few major exceptions: the Ministry of Interior for Birds & Habitats Directives; the Ministry of Labour, Welfare and Social Insurance for Ambient air quality, air pollution control (including air aspects of IED).

Ministry of Agriculture, Rural Development and the Environment/Υπουργείο Γεωργίας, Αγροτικής Ανάπτυξης και Περιβάλλοντος (MARDE): This Ministry takes responsibility for promoting an integrated and coordinated approach to the protection and sustainable management of the environment and natural resources and the sustainable management of livestock and fisheries production. It contains a number of departments covering different themes. Two of them are responsible for coastal and marine monitoring: the Environment Department and the Fisheries and Marine Research Department.

Environment Department/Τμήμα Περιβάλλοντος (DoE): Set up in 1986, its mission is to conduct the effective management of resources and waste and environmental impact assessment by monitoring pollution and the state of species and habitats. Most of the environmental information is available on the website of the Environment Department. The Department operates as a contact point and implements the provisions of the Mediterranean Action Plan (MAP) of the United Nations.

Fisheries and Marine Research Department/Τμήματος Αλιείας και Θαλασσίων Ερευνών (DFMR): Marine areas are under the responsibility of the Fisheries and Marine Research Department and not of the Environment Department of the Ministry of Agriculture, Rural Development and the Environment. It has a Marine Environment Division (MED) that has developed significant activity in the field of monitoring and research of the marine environment in the framework of the implementation of several European and national laws, as well as international and regional conventions²³. It published annual reports in English and in PDF format, available online²⁴. The last one was published in 2019.

²³ <http://www.moa.gov.cy/moa/dfmr/dfmr.nsf/All/ABF40A7AB7C59E3842257F3700418786?OpenDocument>

²⁴ http://www.moa.gov.cy/moa/dfmr/dfmr.nsf/page07_en/pag07_en?OpenDocument&Start=1&Count=1000&Collapse=125 <https://www.giz.de/en/worldwide/40686.html>

Monitoring institutions/observatories

National Agencies

Department of Labour Inspection (WAQI)

The Department of Labour Inspection (Υπουργείο Εργασίας, Πρόνοιας και Κοινωνικών Ασφαλίσεων) (: http://www.mlsi.gov.cy/mlsi/dli/dliup.nsf/index_en/index_en?OpenDocument) is one of the departments of the Ministry of Labour, Welfare and Social Insurance (DLI). It is the competent authority for the implementation of the Ambient Air Quality Laws of 2010 to 2020 via its Air Quality and Strategic Planning Section, and it is responsible for the monitoring and management of Ambient Air Quality in Cyprus. It publishes technical reports about air quality on regular basis available online²⁵.

Laboratories and research structures

Marine and Environment Research Lab (MER)

The Marine and Environment Research Lab (<http://www.merresearch.com/about-mer/>) is located in the tourist centre of Limassol, on the southern coast of Cyprus and operates in the eastern Mediterranean. It is equipped with a complete set of field equipment to carry out underwater surveys, sampling and monitoring of physico-chemical and biological variables in the water column and benthos. It is especially equipped to collect, analyse and process biotic and abiotic data, for marine environmental monitoring and research. For example, they participate in mapping key marine habitats and assessing their vulnerability to fishing activities (MedKeyHabitats II Project).

Cyprus Institute (MSG)

The Cyprus Institute (Ινστιτούτο Κύπρου) (<https://www.cyi.ac.cy/>) was established in 2005 and launched in 2007 by the Energy, Environment and Water Research Centre (EEWRC). The Centre established several environmental monitoring facilities that include aerial vehicles (UAVs) for atmospheric and earth surface observations, an analytical laboratory for trace gases and aerosol analyses and an evolving ground-based observatory in the Peristerona watershed. The Centre has access to surface-based atmospheric long-term monitoring data (Agia Marina Xyliatou Atmospheric supersite) in collaboration with the CNRS (France) and the Air Quality Department of the Ministry of Labour. The Marine Science Group (Cyl) is also a member of the European PERSEUS project 'Policy-oriented Marine Environmental Research for the Southern European Seas'²⁶ that was designed to contribute to a network of monitoring systems for European seas. MSG has joined a global network of plankton surveys (MedCPR) launched in the Mediterranean. Plankton monitoring provides information on the productivity and health of the ocean and can be used as an indicator of climate change and pollution.

Oceanography Centre, University of Cyprus

The Oceanography Centre (Ωκεανογραφικό Κέντρο Πανεπιστημίου Κύπρου) (<http://www.oceanography.ucy.ac.cy/>) was established in 2003 and is the Cyprus institution for ocean research and one of the operational marine core and downstream forecasting and monitoring centers in the Mediterranean. The Oceanography Centre is equipped with oceanographic equipment such as a mooring profiler, coastal sea level stations, gliders, offshore buoys, multi-parametric probes, HRPT ground satellite receiving station, etc. It also periodically charters multipurpose vessels to conduct open sea research in the EEZ of Cyprus in the Levantine Basin, while

²⁵ <http://www.airquality.dli.mlsi.gov.cy/reports>

²⁶ www.perseus-net.eu

for coastal surveys it hires suitable small vessels. The Centre participates in many European and regional monitoring projects on the Mediterranean Sea. Among those that are ongoing are the Cyprus Coastal Ocean Forecasting & Observing System (CYCOFOS), the Cyprus Basin Oceanography (CYBO) Project that aims to study the seasonal and inter-annual variability of the general circulation of the Cyprus-SE Levantine basins and the eastern Mediterranean Sea, the Cyprus Coastal Oceanography (CYCO) Project that aims to collect physical and chemical oceanographic data in the coastal sea area of Cyprus, particular at Akrotiri Bay, in order to study the coastal hydrodynamic regime of the Bay and to carry out the summer practice/training of students.

Environmental monitoring programmes

Monitoring activities within MPAs

Within the framework of the 'Natura 2000' network, 5 marine areas which include important habitat types and marine areas, which include important habitat types and fauna and flora species that meet the criteria of the Habitats Directive, 92/43/EEC, for fauna and flora, are proposed to be protected (Moulia, Cape Greco, Nisia, Polis Yialia, Cape Aspro - Petra tou Romiou). Cyprus is part of the MedMPA Programme (regional project for the development of marine protected areas in the Mediterranean region).

Mapping key marine habitats and assessing their vulnerability to fishing activities MedKeyHabitats II Project

The MedkeyHabitats II Project (<http://www.merresearch.com/portfolio/mapping-marine-key-habitats-and-assessing-their-vulnerability-to-fishing-activities-medkeyhabitats-ii-project/>) was launched in 2020 from a collaboration between SPA/RAC with the Cyprus governmental authority (Department of Fisheries and Marine Research) to help with the development of adequate technical support and capacity building for the planning and proper management of the marine protected areas in Cyprus. The Project aims to assist the competent authority of Cyprus to undertake a socio-economic study and an evaluation of the vulnerability of *Posidonia* meadows to fishing activities in Cape Greco MPA. In this Project, the Marine and Environmental Research (MER) Lab of Cyprus is in charge of studying and evaluating the risks imposed on key species and habitats, mainly *Posidonia oceanica* (Linnaeus) Delile, 1 813 meadows, by the fishing activities in the Cape Greco MPA. Several maps will be produced to visualise the presence, vulnerability and sensitivity of habitats in the area and the interactions with each fishing technique (including illegal activities) in the different zones of the MPA. Other pressures such as marine litter and invasive species will be monitored, while permanent monitoring stations for *Posidonia oceanica* will be established and baseline data will be collected.

Scientific monitoring programme of artificial reefs in the MPAs of Paralimni, Ayia Napa, Amathounta, Dasoudi and Geroskipou

This three-year project (May 2019 - May 2022) (<http://www.merresearch.com/portfolio/scientific-monitoring-on-artificial-reefs-in-marine-protected-areas-of-paralimni-ayia-napa-amathounta-dasoudi-and-geroskipou-tender-36-2018-dfmr/>) is the first scientific monitoring programme implemented on artificial reefs and aims to evaluate their efficiency in terms of biological productivity and marine biodiversity enhancements in the oligotrophic waters of Cyprus. The Department of Fisheries and Marine Research supported the deployment of several artificial structures of different forms (e.g. wrecks, natural boulders, constructions with nets, amphorae, etc.) around the island. The areas with the artificial reefs are Marine Protected Areas (MPAs) since they have been declared as 'no-take zones'. Seasonal surveys are being conducted on all structures, at reference stations and shallow rocky reefs mainly to assess fish abundance, biomass and coverage by sessile macro-invertebrates and seaweeds. The programme is funded by the Department of Fisheries and Marine Research and by the European Maritime and Fisheries Fund (EMFF).

Environmental information systems

Cyprus Coastal Ocean Forecasting and Observation System (CYCOFOS)

CYCOFOS (<http://eurogoos.eu/member-product/cycofos-cyprus-coastal-ocean-forecasting-and-observing-system/>) is a sub-regional forecasting and observation system in the eastern Mediterranean Levantine Basin, which covers the coastal and open sea areas of Cyprus, Cilician and Lattakian Basins and the Eastern Levantine Basin. CYCOFOS is linked to the European Global Ocean Observation System (EuroGOOS) and the Cyprus Oceanography Centre. CYCOFOS publishes electronic reports on the state of progress in oceanographic predictions and observations. These include the sea currents, sea temperature and salinity, sea level, offshore significant wave height, swell, tides and direction. The CYCOFOS forecasting products are updated daily. These reports are available online²⁷.

Air Quality in Cyprus and the World Air Quality Index (WAQI)

On the World Air Quality Index (WAQI) database, there is a page for Cyprus (<https://aqicn.org/map/cyprus/>). This is an effective website with air quality information available to the public, which enables real-time assessment of pollution and health risks. A geographic information system with a map is available. The Cyprus database is available online.

The data are from the Air Quality and Strategic Planning Section in Cyprus – collected by the Department of Labour Inspection (DLI) of the Ministry of Labour, Welfare and Social Insurance, and they originate from 7 different stations in Cyprus.

Bibliography

European Commission. 2019. The Environmental Implementation Review 2019 - Country Report Cyprus, 34 pages (https://ec.europa.eu/environment/eir/pdf/report_cy_en.pdf).

UNEP(DEPI)/MED WG. 2013. Draft proposals of areas for inclusion in the list of specially protected areas of Mediterranean importance (Spami List). Rabat, 42 pages.

UNEP(DEPI)/MED WG. 2005. Report of the third review meeting on Med Pol - Phase III - Monitoring activities. Palermo, 48 pages.

²⁷ <http://www.oceanography.ucy.ac.cy/cycofos/bulletin.html>

Croatia

I. General overview

A monitoring and observation system is currently being prepared in line with an initial marine environment assessment in Croatia. It includes monitoring of all descriptors of good environmental conditions based on an indicative list of characteristics, pressures and impacts defined in the Regulation (OG 136/11) (UNECE, 2014). The Regulation on the strategic environmental assessment of strategy, plan and programme was voted in 2017 (Official Gazette 3/17). The legal apparatus regarding monitoring is detailed, however, some ordinances have not been implemented (UNECE, 2014). Due to the importance of tourism for the country's economy, the country's bathing water monitoring programme is highly developed and well established. Its data have been reported to the European Commission since 2009. However, the national "Adriatic" marine monitoring programme, operational since 1998, was reduced in 2012 due to a drop in funding. As part of the forthcoming marine and coastal management strategy, work is underway to link all updated marine monitoring activities and develop new ones to verify the consistency and coordination of marine environmental monitoring. The Ministry of the Environment and Nature Protection coordinates the preparation of the monitoring and observation system. So far there is no national monitoring system of offshore activities in place (MEE, 2019). Overall, there is therefore an improvement in the operational monitoring of the state of surface water bodies. For example, there was operational monitoring in coastal and transitional waters in the second river basin management plan, which was not the case in the first one. However, Croatia's performance in implementing the INSPIRE Directive could be improved (EU, 2019).

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Environmental Protection Act - 2019 (following 80/12, 153/13, 12/18 et 118/18). Consolidates the law of June 24, 2013.	Environmental Protection Act: this law defines the scope of environmental monitoring. It includes the monitoring of air, water, sea, soil, flora and fauna, exploitation of raw minerals, emissions into the environment, the impact of environmental pollution on human health, the impact of significant economic sectors on environmental components, natural phenomena, meteorological, hydrological, erosion, seismological, radiological and other geophysical phenomena, and the conservation status of nature. The ministries in charge are subject to ordinances regarding monitoring details. Centres must be established or appointed by the Government to implement monitoring: one such centre, for marine water, has been established.
Nature Protection Act - OG 80/13, 15/18	Nature Protection Act: this law regulates the system of protection and complete preservation of nature and its components and other related matters. This law also determines competence in terms of environmental monitoring.
OG 112/14, 39/17: transposition of MSFD	Regulation on the development and implementation of the documents of the Marine and Coastal Management Strategy
Decree, JO 136/2011-2724	Regulation Establishing a Framework for Action for Croatia in the Field of Marine Environment Protection: one of its aims is to implement systematic monitoring and observation of the marine environment.

OG 73/08	The Regulation on coastal bathing water quality: regulates the monitoring of coastal bathing water quality, while inland bathing water quality is covered by the Regulation on bathing water quality (OG 51/10).
OG 153/09, 130/11, 53/13, 14/14	Water Act: Article 44 organises systematic monitoring, which shall be carried out by Croatian Waters, competent to interpret the monitoring results, to enact an annual monitoring plan and to prepare an annual report, with the prior consent of the Ministry.
Official Gazette 87/15	Ordinance on the environmental pollution register: this Ordinance prescribes the mandatory content and manner of keeping the register of data on environmental pollution, the manner, methodology and deadlines for collecting and submitting data on emissions or discharges, transfer and elimination of pollutants in the environment and waste, data on the polluter, plant operator, organisational unit within the polluter, time and method of informing the public, manner of checking and ensuring the quality of the data submitted and kept in the register, deadline for keeping records from which the data was submitted.
NN 62/17, 130/17, 14/19 in force from February 15, 2019.	Marine Fisheries Act: this law determines at the national level the objectives of the fishing policy, the mode of management and protection of the renewable biological resources of the sea, the mode and the conditions of fishing, the collective and the management of the data, the management of the fishing fleet and other matters relating to sea fishing.
OG 181/04, 76/07, 146/08, 61/18, 56/13, 26/15;	Maritime Code: legal framework for registration and putting into service offshore installations, prescribing statutory requirements with regard to new and existing offshore installations
Law OG 68/08	Regulation on the Environmental Information System: this regulation prescribes the structure, content, form and mode of operation, the methods of management and maintenance of the environmental information system, the obligations, methods and deadlines for submitting data, environmental information and relevant reports to the Environmental Protection Agency, as well as how to manage environmental data and information.

National environmental institutions/organisations

Ministry of Environmental and Nature Protection/Ministarstvo zaštite okoliša i energetike (MZOE) (<https://mzoe.gov.hr/>): Formed in 1990, the scope of work of the Ministry includes tasks related to the protection and conservation of the environment and nature in line with the sustainable development policy of the Republic of Croatia, as well as tasks related to water management and administrative and other tasks from the field of energy. Its main goals are to protect the environment, to develop a monitoring system for weather, climate and the environment, to develop sustainable water management, and to develop the economy through strengthening the energy system and hydrocarbon management. It operates through various Directorates, such as the Directorate for Environmental Impact Assessment and Sustainable Waste Management; the Directorate for Climate Activities, Sustainable Development and the Protection of Soil, Air and Sea; Directorate for Nature Protection. The Ministry supervises air quality monitoring; coordinates the marine environment monitoring; biodiversity monitoring; monitoring of emissions released into water, wastewater and waste.

Ministry of Agriculture/Ministarstvo poljoprivrede (<http://www.minpolj.gov.rs/>): it is in charge of the monitoring of drinking water; monitoring of forest ecosystems through the Croatian Forest Research Institute and soil monitoring of agricultural and forestry land.

Monitoring institutions / observatories

National agencies

Croatian Waters

Croatian Waters (*HrvatskeVode*) (<https://www.voda.hr/en>) is a legal entity for water management established by the Water Act (Official Gazette no. 107/95 & 150/2005) related to the Ministry of Environment and Energy. It is responsible for the preparation of planning documents for water management, water regulation and protection from adverse effects of water and the management of the public water estate. Therefore, it is in charge of monitoring the surface waters, including coastal water and groundwater. On top of its six regional offices across the country, its facilities include a main laboratory in charge of surface water monitoring, which includes water sampling and the implementation of physico-chemical, biological and microbiological analyses accompanied by quality control implementation for the monitoring of border rivers. Its data on water quality, floods, irrigation, and water use is partly available on a Geoportal. It developed cooperation with the Slovenian and Hungarian laboratories and participates in the work of the bilateral sub-commissions for the protection of water quality within the bilateral water management commissions. It publishes brochures, journals and guides in Croatian.

Project WATERCAR - Water management solutions for reducing microbial environment impact in coastal areas (Interreg Italy-Croatia - 2019-2021)²⁸

Croatian Environment Agency (HAOP)

The Croatia Environment Agency (*Hrvatska agencija za okolišiprirodu, HAOP*) (<http://www.haop.hr/>) was born in 2015 from the fusion of the Agency for the Protection of the Environment (*Agencije za zaštituokoliša*) and the State Institute for the Protection of Nature (*Državnogzavoda za zaštituprirode*). Its activities are defined by the Regulation on the establishment of the Croatian Environment Agency, by the 2007 Environmental Protection Act and the 2013 Environmental Protection Act amended in 2019. In 2019 it was finally merged with the Ministry of the Protection of the Environment and Energy. In accordance with Article 73, paragraph 3 of the law on Amendments to the law on Environmental Protection (2019), the Ministry of the Environment and Energy takes over all the tasks and workers supported by the company, property, equipment, registers and other documents, working instruments, real estate, rights and obligations and financial resources. The main activity of the Agency was the collection and consolidation of data and information on the environment and nature, in addition to assisting and maintaining the mission of the policy of protection of the environment and nature. It led biodiversity monitoring as well as marine environmental monitoring. It created the Croatian Environmental Information System (CEIS) following the Regulation on the Environmental Information System (OG 68/08), as well as ENVI - Environmental information portal on nature protection.

National Institute of Public Health

Based in Zagreb, the National Institute of Public Health (*Hrvatskizavod za javnozdravstvo*) (<https://www.hzjz.hr/>) is a public entity in charge of identifying the current public health needs of the population, anticipating future trends, and providing the preconditions for their effective management, with the fundamental aim of preserving and improving the health of the population. It was founded in 1994. It monitors coastal bathing quality in seven coastal counties. The Department's laboratories are accredited for water analysis (drinking water, natural mineral, natural spring and table water), and provide physico-chemical, chemical data, and microbiological data. It publishes papers, reports and statistics.

²⁸ <https://www.italy-croatia.eu/web/watercare>

Laboratories and research centres

Institute of Oceanography and Fisheries

Formed in 1930, the Institute of Oceanography and Fisheries (*Institut za oceanografiju i ribarstvo*) (<http://www.izor.hr/web/guest/znanstvena-djelatnos>) has been part of the University of Dubrovnik since 2006. The first institution for marine research in Croatia, its missions are to provide scientific research, the application of scientific results to the development of fisheries, the education of young scientists and the population of Croatia in general. It is carried out mainly within the framework of scientific projects of permanent research activities. Through scientific projects funded by the Croatian Science Foundation, the Institute focuses on understanding the functioning of marine ecosystems to create measures to protect the Adriatic and its biological resources, with the aim of sustainable exploitation. Through numerous projects funded by the European Commission or various economic entities, it monitors the biodiversity of populations and the state of marine organisms, undertakes mapping of biotopes, determines the initial state of the environment and conducts various environmental impact studies. Its facilities include a variety of laboratories and two vessels: BIOS DVA (36 m long, with a capacity for 18 scientists); NAVICULA (10 m long, for coastal research). It collects data on biological oceanography, chemistry and physics, sedimentology, fish biology and mariculture. The Institute has several real-time measurement systems available online: web-camera; meteo-oceanographic stations, oceanographic buoys systems, HF radar systems for surface current measurements (<http://www.izor.hr/web/guest/mjerni-sustavi-u-realnom-vremenu>)

The data collected by the Institute helps in the implementation of the European directives aimed at the management and protection of surface water and the marine environment. Its website makes available multiple data and indicators on the state of the marine environment (<http://baltazar.izor.hr/azopub/bindex>).

The Institute has developed several bilateral cooperation projects with France, the United States, Germany, and the United Kingdom. Its staff is actively engaged in the work of many international organisations, committees and programmes for sea exploration, especially in the Mediterranean (CIESMM - International Commission for Scientific Research of the Mediterranean, GFCM - General Fisheries Council for the Mediterranean, OECD - Organisation for Economic Cooperation and Development, UNEP - the United Nations Environment Programme). Within the FAO-AdriaMed, the Institute was named the “focal point” institution at the level of countries of the eastern Adriatic and was named responsible for co-operation with the IOC by Republic of Croatia.

The Institute participates in SeaDataNet²⁹, the IODE system, as well as a lot of projects within the Adriatic region:

- ITACA³⁰ : Innovative Tools to increase the competitiveness and sustainability of small pelagic fisheries (2010-2021);
- AdriaAquaNet³¹ (Strengthening innovation and sustainability in Adriatic aquaculture, 2019-2021);
- SUSHIDROP³² (Sustainable Fisheries with Drones data Processing, 2019-2021);

²⁸ <https://www.italy-croatia.eu/web/watercare>

²⁹ <https://acta.izor.hr/wp/en/activities/international-cooperation-and-projects/seadatanet-project/>

³⁰ <https://keep.eu/project-ext/23105/>

³¹ <https://www.italy-croatia.eu/web/adriaquanet>

³² <https://acta.izor.hr/wp/en/sushi-drop-sustainable-fisheries-with-drones-data-processing/>

- FAIRSEA³³ (Fisheries in the Adriatic Region – a Shared Ecosystem Approach, 2019-2021);
- LEKFishResCRO³⁴ (Local Ecological Knowledge and Fisheries Research in Croatia)
- BivACME³⁵: Archives of environmental change in the coastal marine ecosystems (2020-2024), founded by the Croatian science foundation (HRZZ)

It publishes a scientific journal: "ACTA ADRIATICA", monographies and online library.

Institute for Marine and Coastal Research of the University of Dubrovnik

Formed in 1949, the Institute for Marine and Coastal Research of the University of Dubrovnik (*Institut za istraživanja mora i priobalja*) (<https://www.imp-du.com/>) carries out fundamental and applied research on the natural features of the Adriatic Sea and the coast, and in particular research on the structure and processes of ecosystems. The Institute also develops other activities such as: monitoring of living resources at sea and on land, monitoring of sea quality, experimental cultivation of plant and animal species, and the formation of scientific and professional collections. It has a permit from the Ministry of Environmental Protection, Spatial Planning and Construction of the Republic of Croatia to carry out environmental protection activities, such as the preparation of environmental impact studies. The Institute manages an aquarium and a botanical garden and collects data with its research vessel «Baldo Kosić II», 15.75 meters long. It was funded by the Ministry of Science, Education and Sports, with support from the Ministry of the Sea, Transport and Infrastructure. Its monitoring of species and sea quality is available on the Flora Croatica database, and published articles are available online.

Project: New aspects of zooplankton vertical migration in the complex open South Adriatic ecosystem (2020-2024).

Institute "RuđerBošković"

Created in 1950, the Institute RuđerBošković (<https://www.irb.hr/eng>) leads scientific research in the natural, biomedical and engineering sciences. Based in Zagreb, its Division for Marine and Environmental Research (DMER) must contribute to the environmental management of Croatia. It provides services for radioactivity determination. The Institute owns 50 percent of all scientific equipment in Croatia. The DMER uses 12 laboratories, one marine station (Martinska, near the city of Šibenik) and employs 104 scientists and technicians. The DMER carries out research in oceanography, aquatic chemistry, radioecology, geochemistry, biogeochemistry, bioelectrochemistry, environmental electrochemistry, ecotoxicology, aquaculture and fish pathology, ecological modeling and environmental informatics. The scale of research problems spans from nanoscience to satellite oceanography. The Institute is currently engaged in over 200 projects, for which over half of the total funding is from European Union projects and other international sources. About 75% of the Institute's funding is provided by the Government of Croatia, through the Ministry of Science, Education and Sports. It publishes annual reports of its activities in English, as well as a variety of scientific papers.

Institute for Marine and Coastal Research - Hydrographic Institute (HHI)

Originally founded in 1860, the Institute for Marine and Coastal Research (*Hrvatski hidrografski institut, HHI*) (<http://www.hhi.hr/staticpages/index/povijest>) has been a national public institution since 2000. The law (OG 68/98) states that the Croatian Hydrographic Institute conducts scientific research, development and

³³ <https://www.ogs.trieste.it/en/content/fairsea-fisheries-adriatic-region-%E2%80%93-shared-ecosystem-approach>

³⁴ <http://jadran.izor.hr/~brankod/LEK/>

³⁵ <http://jadran.izor.hr/~ezgeta/bivacme/>

professional work related to security navigation on the Adriatic, hydrographic and geodetic surveys of the Adriatic, marine geodesy, design and production of nautical charts and publications, oceanographic research, research and publication in underwater geology. The Croatian Hydrographic Institute has two research vessels: HIDRA (used for coastal and coastal works in the inter-island and territorial part of the Croatian part of the Adriatic Sea); and the research vessel PALAGRUŽA (used for offshore work in the Croatian part of the Adriatic Sea). Its hydrographic surveys, data on magnetometric detection, seabed geological research, oceanographic research and re-ambulation maps of the coast and islands, are available on the portal of the marine database ("GeoAdriatic"). All data collected and processed are stored in the archives of the HHI database. Originals of all printed maps are also kept in the archives. The Croatian Hydrographic Institute has a library of about 8 000 professional books and journals, collected over many years of work and exchanges with hydrographic institutes and associated institutions. It publishes a monthly report ("OZP"), scientific articles, research reports and annual activity reports.

Non-governmental organisations

Blue World Institute

The NGO "Blue World Institute" (<http://www.blue-world.org/what-we-do/our-projects/adp/>) was created in 1999 in order to take over the Adriatic Dolphin Project. This Project was led between 1987 and 1998 by the Italian Tethys Research Institute. Through funds from private and public donors, the Blue World Institute leads research activities throughout the entire Adriatic Sea, equipped with boats and a small laboratory in Lošinj. It has participated in more than 10 EU-funded projects on mapping and recycling of marine litter; monitoring of sea turtles; and participatory monitoring. It developed a Marine Partnership Mobile Application, a tool for citizen science and participatory monitoring. It also leads the Adriatic Dolphin Project. Data collected within the framework of this Project include recording environmental conditions, navigation, locations of sighting, numbers of dolphins encountered, group composition, photographs of dorsal fins for photo-ID analysis and data about dolphin behaviour and human activities. Digital underwater cameras are being used to film different situations at sea, either for scientific or scenic/visual purposes. Standardised protocols guarantee exchange of data among researchers. Some additional data and samples are collected occasionally, such as interviews with fishermen on dolphin-fisheries interaction. All data collected in the field are stored in a digital database. The Blue World Institute currently holds a catalogue of bottlenose dolphins with over 2 250 individuals covering over 30 years of surveys within the Adriatic Sea. The Project has resulted in declaration of six Natura 2000 sites for bottlenose dolphins.

Citizen science

Coastal Observatory

"Coastal Observatory" (*Obalniopervatoriji*) is an initiative of the Association "Centre for Healthy Growth" (*Centar za zdravoodrastanje*) launched in 2019 in the region of the Island of Lošinj. This Project aims to bring together local actors in systematic monitoring of the state of the coast and the seabed. The Coastal Observatory Project aims to improve the capacities of the local community for a sustainable and socially just management of the coastal zone, the sea and the maritime heritage. The Project will be implemented through four types of activities, the most important of which is the monitoring of the coast and underwater through direct field inspections, quarterly visits to protected natural areas and parts of maritime assets sub-contracted as concessions and inviting citizens to inquire about the situation in the target area.

Monitoring activities within MPAs

Lošinj Dolphin Reserve

This marine Natura 2000 site was created in 2014. It was initiated by the Blue World Institute of Marine Research and Conservation (BWI), an NGO created in 2000 which leads conservation programmes in the Adriatic Sea, and more specifically in the Lošinj-Cres archipelago. The dolphins in the region have been studied and monitored consistently since 1987, as part of the Adriatic Dolphin Project. The database is managed by BWI.

Telašćica Nature Park

Telašćica Bay, located in the central part of the eastern coast of the Adriatic Sea, is surrounded by 13 islands and islets, together with 6 islets inside the Bay itself. It was proclaimed a Nature Park in 1988. It covers a total of 70.50 km² (44.55 km² of sea, 25.95 km² of land). The entire Nature Park area is part of Natura 2000. The public institution "Telašćica Nature Park" prepared the "Management Plan" and the "Sustainable Tourism Plan"). Monitoring activities are part of the Management Plan and the Nature Park hosted more than fifty research projects in the last twenty years.

Environmental monitoring programmes

The PORTODIMARE Project

The PORTODIMARE (2018-2020)³⁶ (Geoportal tools and data for sustainable coastal and marine environment management) Project aims to create a common platform (Geoportal) for data, information and tools focusing on the coast and sailing in the Adriatic-Ionian Seas, integrating existing databases, portals and tools developed in previous EU-funded projects (SHAPE, ADRIPLAN, etc.). The activities of the Project are to implement a unique virtual space for the knowledge and resources available on the coastal and marine space in the Adriatic-Ionian Seas. Its target users are decision-makers, scientific and professional institutions, and the general public. The main outcome of the Project is the design and implementation of the Geoportal. Eleven partners from 6 countries (Italy, Greece, Slovenia, Montenegro, Croatia and Bosnia-Herzegovina) are participating in the Project. The Centre for Regional Activities Priority Action Programme and the Istria County Institute of Physical Planning are the partners of this Project in Croatia.

"Adriatic"

"The national marine monitoring programme "Adriatic" has been in operation since 1998 and includes 2 500 time series, but because of a lack of funding, the programme was significantly reduced in 2012. Marine physics, chemistry and biology are measured." (UNECE, 2014)

"Explore transboundary aquatic biodiversity" Project (2020-2023) - Interreg IPA Cross-Border Cooperation Programme for Croatia - Bosnia and Herzegovina -Montenegro

The main objective of the Project is to strengthen and diversify the tourist offer through the search for cross-border aquatic biodiversity and to enable better management and sustainable use of cultural and natural heritage. With this Project, it is planned to develop a new tourist offer in Kotor - the Kotor Tourist Route and the Boka Aquarium. The Project lead is the University of Dubrovnik. Partners from Bosnia and Herzegovina

³⁶ <https://www.portodimare.eu/>

are the Tourism Organisation of Herzegovina-Neretva County and the “HutovoBlato” Nature Park. Besides the Institute, the partner from Montenegro is the Kotor Tourism Organisation. This project is part of the Interreg IPA Cross-border Cooperation Programme for Croatia - Bosnia and Herzegovina - Montenegro 2014-2020.

Environmental information systems

Croatian Environmental Information System (CEIS) of the Croatian Agency for the Environment and Nature (HAOP)

CEIS³⁷ shares information on various elements of the environment, such as inland waters and the sea. It gathers data on the quality of bathing water in rivers and lakes in the Republic of Croatia, data and indicators on the state of the marine environment, mariculture and fishing, the quality of coastal and marine waters, fishing and mariculture; annual assessments of bathing water quality in the Republic of Croatia; and the quality of the sea for bathing in the Republic of Croatia.

Marine Database Portal - Hydrographic institute of the Republic of Croatia

Croatian Marine Spatial Data Portal - GeoAdriatic³⁸ - provides search and view services for marine spatial data, and e-services from the scope of the Hydrographic Institute of the Republic of Croatia (HHI). It was launched in 2019, and is being progressively enriched with data of hydrographic surveys, data on navigations, and operational oceanography.

Environmental Information portal (ENVI)

The ENVI metadata catalog of the HAOP³⁹ contains “meta” information about the systems available and presented in the ENVI environmental atlas, structures and presents them to interested stakeholders in a standardized way, conditioned by the INSPIRE directive. It was established in 2015. Target users are Ministries, public administration bodies, faculties, environmental non-governmental organizations, professionals and the general public.

Nature Protection Information System

The nature protection information system⁴⁰ consists of a set of databases, application solutions and web services for the storage, maintenance and sharing of data on biodiversity, geodiversity and the diversity of landscapes and the protection of nature in the Republic of Croatia. Established in 2015, Biportal is a nature protection information system web portal that also contains a GIS browser and provides public access to information and transparent data-sharing, encourages scientific and professional research and helps educate the public on Croatia’s natural wealth and the importance of biodiversity conservation. The data gathers the spatial dataset (Biportal), the Republic of Croatia habitat map, protected areas of the Republic of Croatia, Natura 2000 ecological network, speleological objects from the Republic of Croatia, distribution of species in the Republic of Croatia, visitor infrastructure in protected areas.

³⁷ <http://www.haop.hr/hr/informacijski-sustavi/informacijski-sustav-zastite-okolisa/kopnene-vode-i-more>

³⁸ <https://hhi.maps.arcgis.com/apps/webappviewer/index.html?id=4f4f42fb922b4cd5b8729f26e4117b2d>

³⁹ <http://www.haop.hr/hr/baze-i-portali/envi-katalog-metapodataka>

⁴⁰ <http://www.haop.hr/hr/baze-i-portali/biportal-web-portal-informacijskog-sustava-zastite-prirode>

Bibliography

European Commission, European Commission Study. 2016. Country report Croatia. 12 pages.

URL: https://ec.europa.eu/info/sites/info/files/cr_croatia_2016_en.pdf

European Commission, 2019. "The Environmental Implementation Review 2019 : Croatia ". 36 pages.

URL: https://ec.europa.eu/environment/eir/pdf/factsheet_hr_en.pdf

European Environment Agency, 2018, "Country report. Croatian bathing water quality in 2017", 9 pages.

https://ec.europa.eu/environment/eir/pdf/report_hr_en.pdf

Ministry of Environment and Energy, 2019. Framework for marine environment protection in Croatia. 26 pages. URL: https://harmonia.adrioninterreg.eu/wp-content/uploads/2019/02/MarineEnvironmentProtection_Croatia-MZOE.pdf

PAP/RAC, 2007, "National Report on Current Policy, Procedures, Legal Basis and Practice of Marine Spatial Planning in Croatia", 48 pages

UNECE, 2014. Environmental performance reviews - Croatia. 234 pages

https://www.unece.org/fileadmin/DAM/env/epr/epr_studies/ECE_CEP_172_En.pdf

Egypt

I. General overview

In Egypt, the main national institution responsible for the monitoring of the marine environment is the Egyptian Environmental Affairs Agency (EEAA). To monitor the country's Mediterranean coasts, EEAA is collaborating with the Institute of Graduate Studies and Research (IGSR) located in Alexandria. Other universities and research institutes are undertaking monitoring activities of the marine environment. These are not regular monitoring, but they are undertaken within the framework of projects or academic works limited in time. Moreover, very little environmental information is available on the government's portals and there is no integrated information system for coastal and marine data. Egypt's 'Vision 2030' sets out four strategic objectives for implementing environmental policies with a view to achieving sustainable development. The most important of these steps include the development of environmental monitoring systems and networks, the calculation of environmental indicators for the air or waterways, the development of systems to assess the environmental impact of development projects and the development of law enforcement systems to deal with all types of chemicals and hazardous substances and wastes according to international standards (SoE – Country Report, 2017). Egypt is also part of many international conventions and agreements such as the Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention), the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, the Agreement on the Conservation of Cetaceans of the Black Sea and the Mediterranean Sea and contiguous Atlantic Area (ACCOBAMS).

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Law no. 4 of 1994 amended by law No. 9 for 2009	The Environment law: this is the main legal text governing the environmental policy in Egypt. It established the Environmental Affairs Agency within the cabinet premiership and affiliated to the competent Minister for Environmental Affairs with a public legal personality. The same law established the Environmental Protection Fund.
Law no. 102 of 1983	Nature Protectorates: this law set out the provisions for the protection of natural sites declared as protected areas in Egypt. It also defined the missions of the administrative body responsible for the enforcement of the provisions. In this context, it included specific provisions for monitoring. Indeed, Article 4 stipulated that monitoring natural features and wildlife within the protectorates is among the functions of the Administrative Body. Executive regulations introduced further details for the enforcement of law no. 4 of 1994. Regarding monitoring, it stipulates in Article 8 that the resources of the Environmental Protection Fund established within the framework of EEAA may be used for the creation and functioning of the Environmental Monitoring Networks.

Law no. 4 of 1994, amended by law 9/2009 and law 105/2015

This law defined the Environmental Monitoring Networks as 'Agencies which undertake, within their spheres of competence and through their stations and work units, to monitor the components and pollutants of the environment and relay their results and data to the competent authorities periodically.'

It states in Article 24 that environmental monitoring networks with their stations and working units shall be formed and 'shall undertake, in their respective fields of specialisation, to monitor the components and pollutants of the environment on a regular basis and make the results available to the authorities concerned'. The networks may call on the assistance of research centres and competent authorities which shall furnish the networks with the studies and information they request. The Agency shall supervise the establishment and operation of the environmental monitoring networks'.

Governmental environmental institutions

Ministry of the Environment (MOE) (<http://www.eeaa.gov.eg/en-us/home.aspx>): it was created in 1997 by Presidential Decree no. 275/1997. From thereon, the new ministry has focused, in close collaboration with the national and international development partners, on defining environmental policies, setting priorities, and implementing initiatives within a context of sustainable development. It is in charge of preparing the necessary plans for environmental protection and environmental development projects, following up their implementation, and undertaking pilot projects. It is also in charge of supporting the Egyptian Integrated Environmental Management Systems. On its internet website, there are some annual reports available for the public to consult, mostly in Arabic and in the pdf format⁴¹. Among them, there is the 2017 State of the Environment Report (Egypt SEO, 2017).

Monitoring institutions/observatories

National agencies

Egyptian Environmental Affairs Agency (EEAA)

The EEAA (<http://www.eeaa.gov.eg/en-us/home.aspx>) was established in 1994 and it represents at the central level the executive arm of the Ministry of the Environment. It is responsible for the development of environmental management plans, the collection of environmental data, the prevention and control of pollution and the adaptation of International Environmental Agreements. It operates as the central environmental enforcement agency and coordinates government entities. 'Regarding Environmental monitoring, EEAA is tasked by this law with the collection, on a periodical basis, of national and international information on the environmental situation and the changes affecting it. In this context, the Agency should cooperate with the information centres of other relevant agencies. It also has a mandate to participate in the preparation and implementation of the national programme for environmental monitoring and to compile and publish periodic reports on the main environmental indicators' (IMAP, Egypt – Draft Assessment Report)

Central Agency for Public Mobilisation and Statistics (CAPMAS)

The Central Agency for Public Mobilisation and Statistics (CAPMAS) (<http://www.capmas.gov.eg/>) was established by Presidential Decree 2,915 in 1964 and it is the official provider of data, statistics, and reports. It is composed

⁴¹ <http://www.eeaa.gov.eg/en-us/mediacenter/reports.aspx>

of 5 main sections which are: air quality statistics, water quality statistics, biodiversity statistics and land use, weather and climate change. CAPMAS provides environmental data and statistics to planners, researchers and decision makers and those interested in the environmental field and spreading environmental awareness to all social and cultural levels. Tasks and activities include providing various statistical data within the environmental context such as: environmental indicators and sustainable development package, publishing an annual report on environmental statistics, preparation of studies and surveys in the environmental field (under-construction), providing data on environmental pollutants according to types and sources (such as CO₂, SO₂, NO₂, lead...etc.), for international and national organisations, participating in environmental workshops and global conferences, preparing environmental indicators for publication on the website, archiving reports and databases on its website. For instance, it makes an annual report tackling various environmental statistics of the Arab Republic of Egypt.

National Authority for Remote Sensing and Space Sciences (NARSS)

The National Authority for Remote Sensing and Space Sciences (NARSS) was established in 1991 with the aim of promoting the use of space technology and Earth observation for sustainable development of Egypt and introducing high technological capabilities into the local and regional market. It has the potential to contribute to the implementation of IMAP in Egypt since it works on the use of data provided by earth observation satellites and various airborne sensors to produce maps and spatial data for various applications such as the evaluation and monitoring of natural resources, natural hazards, and environmental management. This is mainly through the Department of Environmental Studies and the Department of Land Use, which form part of its Division of Environmental Studies and Land Us. (IMAP, Egypt – Draft Assessment Report).

Laboratories and research structures

Institute of Graduate Studies and Research (IGSR)

The Institute of Graduate Studies and Research (IGSR) (<https://igsr.alexu.edu.eg/index.php/en/>) was established by Presidential Decree no. 239 in 1983 as a University institution under the umbrella of Alexandria University. It has four thematic departments; one of them is the Department for Environmental Studies. This Department has among its missions the monitoring of environmental pollutants in the air, water and soil. Its laboratories are equipped for a wide range of analyses, including radiation and environmental toxicity monitoring as well as remote sensing and computer modelling. IGSR is collaborating with EEAA for the implementation of the national monitoring programme for Mediterranean water from Salloum to Rafah. It is therefore one of the main players in the field of marine environment monitoring in Egypt (IMAP, Egypt – Draft Assessment Report).

National Institute of Oceanography and Fisheries (NIOF)

The National Institute of Oceanography and Fisheries (NIOF) (<http://www.niof.sci.eg/>) is affiliated with the Ministry of State for Scientific Research of Egypt and has as its main mandate to implement research programmes in oceanography, fisheries and aquaculture. The Mediterranean section of NIOF is located in Alexandria. It covers a wide range of scientific topics related to marine science, fisheries, aquaculture, and oceanography. NIOF has two research vessels, one of them, "Salsabil" works in the Mediterranean Sea. It is a vessel 31 m. long equipped for water and sediment sampling and has the capacity for 17 scientists and crew members. This research vessel needs substantive maintenance work to be properly operational' (IMAP, Egypt – Draft Assessment Report).

Oceanography Department of Alexandria University

The Department of Oceanography of Alexandria University was established in 1948, as part of the Faculty of Science. Owing to its renowned scientists, this Department has contributed valuable data, in particular concerning the inventory of marine flora and fauna in the Egyptian Mediterranean waters. Nowadays, the research topics of this Department cover mainly coastal processes (current and wave measurements along the Egyptian coastline, sediment transport and erosion) and environmental modelling (numerical modelling of the eastern Mediterranean Sea, dispersion models of major pollutants, pollutants, biogeochemical modelling) (IMAP, Egypt – Draft Assessment Report).

Non-governmental organisations

Nature Conservation Egypt (NCE)

Nature Conservation Egypt (NCE) (<https://www.birdlife.org/africa/partners/egypt-nature-conservation-egypt>) is a non-governmental organisation dedicated to the conservation of Egypt's natural heritage. The NCE seeks to complement and augment the conservation work of its national and international partners. It achieves these aims through conservation, lobbying and applied studies, awareness-raising activities and the promotion, funding and demonstration of practical conservation measures. NCE participates in many monitoring projects. Among them for example, they cooperate with the Nature Conservation Sector (NCS) of the Egyptian Environmental Affairs Agency (EEAA) to complete a project aimed at boosting efforts towards waterbird conservation in the Red Sea coastal region in Egypt (2011 to 2014). The project's main aim was to improve the availability of data on breeding waterbird populations on the Red Sea islands and this was achieved by building national capacity for conducting systematic surveying and monitoring of waterbirds and their habitats.

Environmental monitoring programmes

National monitoring programme for Mediterranean water from Salloum to Rafah

This is the most important monitoring programme for the Mediterranean waters of Egypt. 'It is in place from the year 1999 and provides data about water quality parameters collected in 30 sites. An Agreement between MEDPOL and EEAA is expected to be signed to support the monitoring activities under this programme' (IMAP, Egypt – Draft Assessment Report). The overall objective of the programme is to provide regular information about the state of the marine environment in the Egyptian Mediterranean waters. This programme is part of the National Programme for Monitoring Coastal Water Quality whose objectives are: identifying the pollution sources and their location on the Egyptian Mediterranean coast; establishing a database for coastal water quality; monitoring water quality and identifying the improvements that may occur, assessing pollution and degradation resulting from various sources of pollution and developing solutions for corrective action; setting pollution indicators and comparing the results during seasons per year and in successive years; following up environmental management programmes and the efforts exerted to correct and mitigate the effect of marine pollution; applying terms of international conventions concerned with the maintenance of the marine environment ratified by Egypt.

Coastal Water Monitoring Programme (CWMP)

The Coastal Water Monitoring Programme (CWMP) (<http://www.eeaa.gov.eg/eimp/cwobj.html>) was established in 1999 and is part of the Environmental Information Monitoring Programme (EIMP), which is directed by a Steering Committee with representatives from the EEAA and Danish International Development Assistance (Danida). The main objective is to establish baseline knowledge of water quality through the continuous surveying of the coastal zone and report the results to decision-makers. In the Egyptian part of the Mediterranean, the EIMP

Coastal Water Monitoring Programme comprises: monitoring of water quality parameters on water samples; monitoring of contaminants in sediments, shellfish, and corals; and monitoring of benthic infauna and coral reefs. The Programme focuses on measurements of marine water samples in the vicinity of: identified major industrial pollution sources along Egyptian coastal waters; pollution from sewage discharges from the major coastal cities; pollution from sewage discharges at the major tourist resort areas, outlets from the River Nile and the major lakes. The goals of the EIMP Coastal Water Monitoring Project are to conduct sampling of marine waters at approximately 45 positions along the Mediterranean coastal waters and 38 in the Red Sea Region and perform analyses of basic, eutrophication and bacteriological parameters. The results are published on the EIMP database.

Its main publication is: Sampling Campaigns for the Mediterranean and Red Seas, Coastal Water Monitoring Programme (CWMP), Egyptian Environmental Affairs Agency (EEAA) and Danish International Development Assistance (DANIDA), Egypt, 2003.

The Environmental Information and Monitoring Programme (EIMP)

The Environmental Information and Monitoring Programme (EIMP) (<http://www.eeaa.gov.eg/eimp/>) aims at establishing a national environmental monitoring programme for ambient air and coastal waters. A reference laboratory was established to assist contractual national monitoring institutions in the development of quality assurance systems. An important output from the Programme will be environmental quality data and database systems which will form an integral part of EEAA's Environmental Information Centre. The Programme, which started in January 1996, was originally for five years with a total budget of US\$14.9 million.

Monitoring Important Bird Areas of Egypt (IBAs)

The primary objective of monitoring IBAs is to assess the effectiveness of conservation measures. The monitoring covers parameters related to bird populations and their habitats. Monitoring the IBAs located along the Mediterranean coast of Egypt could provide data to assess the species' distributional range, the population abundance and demographic characteristics for selected bird species. It may also inform on the occurrence of non-indigenous bird species, if any. Developing monitoring activities under this programme would therefore be useful for the calculation of the IMAI Indicators 3 to 6. Its last publication was in 2017, 'Bimonthly and annual reports'⁴².

Alexandria Coastal Zone Management Project (ACZMP)

This Project (2012–2017) was funded by GEF, managed by the World Bank and implemented by the EEAA. Its main objective is to reduce water pollution reaching the Mediterranean Sea from Lake Mariout. The Project has three components as follows:

- Planning, Institutional Capacity and Monitoring
- Pollution Reduction Measures
- Project Management and Monitoring & Evaluation.

It includes the preparation of an ICZM plan for Alexandria including Lake Mariut, development of an integrated water quality monitoring network for Lake Mariout and the Mediterranean Sea, including a water quality

⁴² http://www.eeaa.gov.eg/eimp/coastalwater_reports.html

and hydraulic model, supporting stakeholders with required equipment, capacity-building programmes and technical support.

Environmental monitoring networks

Egypt is part of the ACCOBAMS Survey Initiative (ASI) project type entitled 'Reduce human pressures on cetaceans; Monitoring cetacean status' (2017–2020). The Project was launched by the Parties to the ACCOBAMS Agreement and aims to monitor cetaceans at the macro-regional level within the Agreement area, which should pave the way for improving conservation efforts for these species. Some data are available in SIG format at the following link: http://www.netccobams.com/PortailCartographique/Default.aspx?Clef_PAGES3=1182. Under the Strategic Partnership for the Mediterranean Sea Large Marine Ecosystem (MedPartnership) Project (2009 -2015), some MEDPOL activities are also conducted in Egypt. It focused on SEIS 2016–2019 activities within the cooperation with UNEP-MAP/MED POL. (The UNEP/MAP contribution to the implementation of SEIS-South Support Mechanism includes activities covering coordination, technical and scientific support)

Environmental information systems

ENP South Region – SEIS Support Mechanism

The EEAA, CAPMAS, the Ministry of Health, the Ministry of Local Development and the Holding Company for Drinking Water & Sanitation are still working on the implementation of an environmental information system in Egypt. They are supported by the ENI SEIS South project which works towards the implementation of the Shared Environmental Information System (SEIS) (<https://eni-seis.eionet.europa.eu/sout>) principles and practices in the ENP South Region – SEIS Support Mechanism. In Egypt, it aims to: promote national principles around data sharing and reporting; set up a national environmental information system which allows the availability of the data flow between various sources and develop the future visions and planning for the data exchange mechanisms.

Egyptian National Oceanographic Data Centre

The Egyptian National Oceanographic Data Centre (ENODC) (<http://www.niof.sci.eg/index.php/res-data/oceanography-fisheries>) was developed and is now hosted by the Egyptian National Institute of Oceanography and Fisheries (NIOF) at its Mediterranean Branch in Qayet-Bey, Alexandria, Egypt. The ENODC is part of the UNESCO Intergovernmental Oceanographic Commission (IOC) network of data centres and has strong links with the international oceanographic data and information exchange system (IODE). This is a national facility for archiving and distributing environmental data concerning the coastal and marine areas, particularly in the Mediterranean and Red Seas.

The mission of the ENODC is to promote marine research through archiving, documentation and making coastal and marine data available to scientists and other users. It also aims to enhance oceanographic services for efficient management and sustainable development of coastal and marine resources through providing these data to resource managers, policy-makers and other stakeholders.

Bibliography

Plan Bleu, 2015 GEF; – Governance and Knowledge Generation Socio-economic Evaluation of Maritime Activities – Mediterranean Regional Activity: Egypt, Lebanon, Morocco, Tunisia – Report Egypt – 108 pages

European Environment Agency ENPI Egypt Country Report of Project Shared Environmental Information System (SEIS) ;—96 pages

A Report on SEIS-phase II National Workshop which took place in Holiday Inn Hotel – Cairo-Egypt from 30/11 – 1/12/2016 It is available here: https://eni-seis.eionet.europa.eu/south/communication/events/project-related-events/1st-steering-committee-meeting-and-7th-meeting-of-the-horizon-2020-review-and-monitoring-group-rm/presentations/day-2/country-presentations/egypt/egypt_draft-report-national-workshop-cairo-3011-01-12 (accessed on 29/08/2020)

Egypt state of environment (2017 for 2016) (arabic only) <http://www.eea.gov.eg/portals/0/eeaReports/SoE2017AR/Egypt-SOE-2016-FINAL.pdf>

Egypt state of environment, summary for policymakers (in english): <http://www.eea.gov.eg/portals/0/eeaReports/SoE-2017/Egypt%20SOE%202017%20-%20SPM%20English.pdf>

Samy, M., Sánchez Lizaso, J. L. & Forcada, A., 2011. Status of marine protected areas in Egypt. *Animal Biodiversity and Conservation*, 34.1: 165–177.

France

I. General overview

In the French National Strategy for the Sea and Coast (Decree 2017-222 of 23 February 2017), “getting to know the sea better, developing a marine and maritime knowledge society” and “defining relevant maritime policy monitoring indicators” are two of the 26 priority actions established. The Ministry of Ecological and Inclusive Transition is primarily responsible for the implementation of the European Commission directives and international conventions regarding protection and monitoring of coastal and marine environments. Its monitoring activities are supported by several agencies, as well as science-oriented public institutions that have been developing and structuring coastal observation since the 1980s (such as Ifremer, MNHN, SHOM, and several Marine Universities) (Cocquempont et al, 2019). In 2014, the French Ministry of Higher Education, Research and Innovation established ILICO (*Infrastructure de Recherche Littorale et Côtière*), dedicated to structuring research in the field of natural coastal and nearshore system dynamics. Thirty-two of its field sites are located along the Mediterranean coastline. The country benefits as well from a wide variety of monitoring networks. Thus, structuring and harmonising the flourishing monitoring activities of the coastal and marine environments and activities is still in progress. It can be noted that a wide range of participatory observation has been developing in the field of oceanography, whose objective is to use monitoring activities as a tool for improving both scientific knowledge and citizens’ awareness.

Legal, administrative or other obligations involving monitoring

In France, the Environmental Code⁴³ brings together legal texts relating to environmental law. It also transposes into French laws the 1996 Air Quality Assessment and Management Directive (updated 2008), of the 2000 Water Framework Directive (updated in 2014), of the Directive on industrial emissions known as “IED” of 2010, of the 2008 Waste Directive. Title II of Book II thoroughly enumerates the French legislative framework on environmental monitoring, information and participation of citizens on subjects relating to the environment. The public authorities subject to the obligation to communicate and disseminate environmental information are defined in Article L. 124-3. The table below only highlights some legislative provisions of particular importance.

Legal framework

Content

Law no. 76-629 of July 10, 1976	This law relates to the protection of nature.
Law no. 95-101, JO February 3, 1995	This law relates to strengthening environmental protection: it provides a departmental inventory of natural heritage, established by the State in each Department.

⁴³ https://www.legifrance.gouv.fr/codes/texte_lc/LEGITEXT000006074220

Law no. 2016-1087 of August 8, 2016	This law relates to the recovery of biodiversity, nature and landscapes and establishes the French Agency for Biodiversity, responsible for developing knowledge, resources, uses and ecosystem services related to biodiversity. Article 159 establishes that the administrative authority must take all the necessary measures to achieve or maintain a good ecological state of the marine environment and establishes a monitoring programme with the permanent evaluation and periodic updating of the objectives.
Law no. 86-2 of January 3, 1986	This law relates to the development, protection and enhancement of the coast.
Law no. 2013-431 of May 28, 2013 - art. 3	This law defines the competent bodies in terms of research and collection of offenses constituting the offense of pollution of sea water.
Law no. 2016-1087 of August 8, 2016	This law relates to the water status monitoring programme, established by the administrative authority and updated for each basin or group of basins, after consulting the basin committee. The analyses of water, biota and sediments necessary for the implementation of the monitoring programme are carried out by laboratories approved for the protection of the environment.
Rural and Marine Fishing Code	This Code enumerates the different laws on fishing activities.
Order of April 17, 2012	This Order relates to the organisation and missions of the National Fisheries Monitoring Centre and establishes the National Fisheries Monitoring Centre. It acts as a fisheries monitoring centre under European Union regulations, recommendations and resolutions adopted within regional fisheries management organisations, international fisheries agreements and national regulations.
Constitutional law No. 2005-205 of March 1, 2005	This law relates to the Environmental Charter (Art. 7): everyone has the right, under the conditions and within the limits defined by law, to access information relating to the environment held by public authorities and to participate in the development of public decisions having an impact on the environment.

National environmental institutions/organisations

The Ministry of Ecological Transition/Ministère de la Transition écologique (<https://www.ecologie.gouv.fr/>). Its mission is to prepare and implement government policy in all areas related to ecology, energy transition and protection of biodiversity. The General Commission for Sustainable Development (CGDD - *Commissariat général au développement durable*) and the Observation and Statistics Service (SOeS- *Service de l'observation et des statistiques*) - successor to IFEN - are the national agencies designated to collect and disseminate environmental information. The SOeS website (<https://www.statistiques.developpement-durable.gouv.fr/>) presents the data and information produced by the SOeS on the topics of housing and construction, transport, energy and climate, the environment, and sustainable development.

The Maritime Affairs Department of the Ministry of Ecological and Inclusive Transition participates in the control of fisheries, in order to ensure effective compliance with European and national regulations. To carry out this mission, the Maritime Affairs Department relies on:

- the National Fisheries Monitoring Centre (CNSP). It ensures the piloting of controls at sea and the coordination of the action of the nautical and air resources of the administrations engaged in a mission of surveillance of maritime fisheries;

- the means of the control and surveillance system (DCS). It is made up of Coastal Maritime Affairs Units (ULAM), Regional Surveillance Vessels (VRS), as well as Maritime Affairs Patrol Vessels (PAM);
- satellite surveillance for overseas areas;
- experiments with the monitoring of fishing activities by drones.

French Office of Biodiversity (<https://ofb.gouv.fr/>)

A public institution dedicated to safeguarding biodiversity, it was established on January 1, 2020. It is responsible for developing knowledge, research and expertise on species, environments and their uses; the environmental police and the wildlife health police; the support for the implementation of public policies and the management and support for managers of natural areas. Its Mediterranean Regional Agencies are:

- The Regional Agency of Biodiversity of Occitanie
- The Regional Agency of Biodiversity of PACA
- To lead its action in Corsica, the OFB is associated with the Office of the Environment of Corsica (L'Office de l'environnement de la Corse, OEC)

Regional Directorate of Environment, Planning and Housing/Direction régionale de l'Environnement, de l'Aménagement et du Logement: this Directorate is in charge of organising, coordinating, collecting, sharing and disseminating all data and knowledge relating to the environment at the regional level. Its Mediterranean Directorates are:

- DREAL Occitanie (<http://www.occitanie.developpement-durable.gouv.fr/>)
- DREAL PACA (<http://www.paca.developpement-durable.gouv.fr/>)
- DREAL Corsica (<http://www.corse.developpement-durable.gouv.fr/>)

Monitoring institutions / observatories

Public agencies

National level

Environmental Information Sub-Directorate of the Data and Statistical Studies Department (SDES)

The Environmental Information Sub-Directorate of the Data and Statistical Studies Department (SDES) (<https://ree.developpement-durable.gouv.fr/themes/milieux-et-territoires-a-enjeux/mer-et-littoral>) gathers statistical data on the environment in France. It is attached to the General Commission for Sustainable Development (CGDD), within the Ministry of Ecological Transition. It was formerly led by the National Observatory of the Sea and the Coast (*Observatoire national de la mer et du littoral, ONML*). SDES carries out surveys, on behalf of the Government. At the European level, it is part of the European statistical system, as the national statistical authority. The SDES is also the correspondent in France, by delegation of the INSEE, for various international organisations including: Eurostat (statistical service of the European Commission), the International Energy Agency and the European Environmental Agency. Today, the website gathers data used to construct indicators to monitor the state of the coastline, the pressures and responses weighing on it and to assess the quality of management and the exploitation of marine environments and resources, in particular for the development

and evaluation of public policies on the coast. It gathers geographic data (land use, protected sites, etc.) and statistics (agriculture, demography, fishing, tourism, etc.), which are presented through maps, graphs, indicators, annual reports on the state of the environment, reports on the quality of bathing water, marine pollution, reports on the evolution of sea levels, on marine and coastal biodiversity, risks and on perceptions of marine environments. The Environmental Information Sub-Directorate is based in Orleans. SDES also has a network of correspondents in each regional directorate for the environment, development and housing (Dreal). It is in charge of the promotion and local dissemination of all statistics within the responsibilities of the Ministry (planning, construction, housing, environmental data, energy, transport, sustainable development, etc.).

Coastal Natural Heritage Observatory

The Coastal Natural Heritage Observatory (*Observatoire du Patrimoine Naturel Littoral*) (<http://www.reserves-naturelles.org/rnf/projets/observatoire-du-patrimoine-naturel-littoral>) was initiated in 1999. Run by Réserves Naturelles de France (RNF) and developed since 2009 with the support of the French Biodiversity Office (OFB), it is a national and collective monitoring instrument. It aims to assess the state of conservation of environments and their associated ecological functions. It is carried by and for managers of Marine Protected Areas in order to guide their management strategies. It is generalised for all types of MPAs (Natura 2000 sites, nature reserves, marine natural parks, hunting reserves, etc.) and other associated territories (without specific protection status). More than 90 locations on the national coast, including overseas. The Observatory collects data on coastal shorebirds, sedimentary habitats, salt meadows and fish, and has developed several indicators. Reports of the annual meetings are available online, as well as some documentation on the activities of the Observatory. The last document was published in July 2020.

National Biodiversity Observatory (ONB)

The National Biodiversity Observatory (*Observatoire national de la biodiversité, ONB*) (<http://indicateurs-biodiversite.naturefrance.fr/fr/>) was established in 2011. It is a partnership that makes information available on the state of biodiversity in France, the pressures exerted on it, and the responses provided. Since 2012, it has been publishing its first indicators on a dedicated website. Since 2020, it is piloted by the French Office of Biodiversity with the support of the Data and Statistical Studies Department (SDES) of the Ministry of Ecological and Inclusive Transition. The ONB established 4 sets of indicators: a synthesis at the national level, one specifically on ultra-peripheral regions, one on nature, and one on knowledge. The ONB publishes annual reviews. Regarding coastal and marine environments and activities, it publishes multiple indicators, such as, for example, indicators on the evolution of the state of coral reefs, on the state of conservation of marine and coastal habitats, mangrove areas subject to conservation measures and the ecological quality of coastal surface water. Its website is operational and updated.

The French Research Institute for the Exploitation of the Sea (IFREMER)

The French Research Institute for the Exploitation of the Sea (*Institut Français de Recherche pour l'Exploitation de la Mer - IFREMER*) (<https://www.ifremer.fr/>) is a public industrial and commercial establishment under the supervision of the Ministry of Ecology, Sustainable Development and Energy and the Ministry of Higher Education and Research. It was established in 1984. It conducts research, provides expertise and creates innovations to protect and restore the ocean. The Institute is implemented around the Indian Ocean, the Atlantic and the Pacific. On behalf of the Government, it operates the French Oceanographic Fleet for the benefit of the national scientific community. Its Mediterranean centre is based in La Seyne-sur-Mer, and uses facilities located in Sète, Palavas and Bastia. Its activities focus on aquaculture through the activity of the Languedoc Roussillon Aquaculture Laboratory (Palavas and Montpellier); on the marine environment through the activity of the Languedoc-Roussillon and PACA Corsica coastal laboratories; and on fisheries with the

«Mediterranean and Tropical Fisheries» research unit, made up of four laboratories specialising in fisheries resources (in Sète, in Martinique, in Guyana, and Reunion Island). With the Géoazur Laboratory (University of Nice Sophia Antipolis/CNRS/IRD/OCA), the Institute developed in 2016 an underwater observatory in the Baïdes Angès (PRIMA observatory). This wired observatory sends information on the behaviour of the seabed.

The Institute leads a variety of monitoring networks in the Mediterranean Sea:

- The RINBIO network⁴⁴, which uses mussel caging to assess the bioavailable chemical contamination of a body of water
- The PASSIVE SAMPLERS network⁴⁵ makes it possible to assess the presence of chemical molecules dissolved in the body of water
- The FLUX A LA MER network makes it possible to make the link between the assessment of the flows of coastal rivers and their fate at sea, but also to assess the levels of contaminants at the level of the main urban discharges
- The REMTOX⁴⁶ network assesses the toxicity of marine sediments and in particular port sediments
- The ROCCh⁴⁷ Sédiments network assesses the levels of chemical contamination in the sedimentary matrix
- The MICROPLASTICS network focuses on the quantification of microplastics in the coastal zone

Data from Ifremer's monitoring networks are stored in the Quadrigé database (<http://envlit.ifremer.fr> <https://wwwz.ifremer.fr/mediterranee/>).

Hydrographic and Oceanographic Service of the Navy (SHOM)

The Hydrographic and Oceanographic Service of the Navy (*Service Hydrographique et Océanographique de la Marine, SHOM*) (<https://www.shom.fr/fr/>) is a public administrative establishment created in 2007. It is placed under the supervision of the Ministry of the Armed Forces, with its headquarters located in Brest. It is the public reference agency for maritime and coastal geographic information. Its mission is to know and describe the physical marine environment in its relations with the atmosphere, with the seabed and coastal areas, to predict its evolution and to ensure the dissemination of the corresponding information. It supports public policies for the sea and the coast, by making data available to public authorities, and more generally to all stakeholders regarding the sea and the coast (<https://data.shom.fr/>). Its areas of expertise include: bathymetry, sedimentology, coastal hydrodynamics, oceanography, engineering of marine acquisition systems, maritime and coastal geographic information. Its annual budget is 58 million EUR, and its infrastructures include 4 specialised vessels of the French Navy and an oceanographic vessel employed jointly with Ifremer. It also benefits from the support of national defence and the French Navy, in particular in hydrography, oceanography and meteorology in an area covering 60 million km².

Centre for Studies and Expertise on Risks, the Environment, Mobility and Planning (CEREMA)

The Centre for Studies and Expertise on Risks, the Environment, Mobility and Planning (*Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement, CEREMA*) (<https://www.cerema.fr/fr/>) is a

⁴⁴ <https://wwwz.ifremer.fr/mediterranee/environnement-et-ressources/Languedoc-Roussillon/Surveillance/Integrateurs-Biologiques>

⁴⁵ <https://wwwz.ifremer.fr/pollution/Echantillonneurs-passifs/>

⁴⁶ <https://sextant.ifremer.fr/record/689250b5-4ccb-4755-abaf-35461ddcdac5/>

⁴⁷ <https://wwwz.ifremer.fr/littoral/Reseaux-de-surveillance/Environnement/ROCCH-Reseau-d-Observation-de-la-Contamination-Chimique-du-littoral>

public establishment focused on supporting public policies, placed under the dual supervision of the Ministry of Ecological Transition and the Ministry of Territorial Cohesion and Relations with Local Authorities. Among its areas of expertise are the sea and coasts. CEREMA participates in the observation of the coastline and the research to reduce the impact of activities on the marine environment. It also contributes to the modernization of international maritime signaling systems and the development of traffic supervision systems. Its website presents an online library and a catalogue of data (<https://www.cdata.cerema.fr/geonetwork/srv/fre/catalog.search#/search>). CEREMA participates in the national network of coastline observatories. However, CEREMA also takes part in the dissemination of environmental information without seeking homogeneity and is not required to do so for the public.

Geological and Mining Research Office (BRGM)

The Geological and Mining Research Office (*Bureau de recherches géologiques et minières-BRGM*) (<https://www.brgm.fr/fr>) is a national agency in charge of earth science applications to manage soil and subsoil resources and risks with a view to sustainable development. It was formed in 1959. It is placed under the supervision of the ministries in charge of research, ecology and the economy. It focuses on understanding geological phenomena and associated risks, developing new methodologies and techniques, producing and disseminating data for soil, subsoil and resource management and providing the tools necessary for the prevention of risks and pollution, and policies to respond to climate change. It operates at national, European and international levels. BRGM is a major player in the collection, use and provision of georeferenced data on geosciences and the environment. On its InfoTerre portal (<http://infoterre.brgm.fr/>), the BRGM offers open access to its geological reports and maps, to the data in its information banks (underground bank, industrial sites, natural hazards, etc.) and to many other data. At the request of the public authorities, the BRGM also manages websites and databases in the fields of geology, risks (<https://www.georisques.gouv.fr>), water (<https://ades.eaufrance.fr/>), mineral resources (www.mineralinfo.fr), geothermal energy (<https://www.geothermies.fr/>), etc. The BRGM is also one of the main contributors to the definition of the rules and standards of the European INSPIRE directive.

French Mediterranean level

Rhône – Mediterranean – Corsica Water Agency

The Rhône – Mediterranean – Corsica Water Agency (*Agence de l'eau Rhône - Méditerranée - Corse*) (https://www.eaurmc.fr/jcms/vmr_6386/fr/) is located in Lyon. It is a public establishment of the Ministry of the Environment, dedicated to the preservation of water. It collects the water tax paid by all users. The Agency must contribute to the knowledge necessary for the implementation of European and national regulations and assess the impact on the natural environment of urban and industrial discharges, diffuse pollution and sampling structures and/or changes in the water regime and morphology of aquatic environments. It also aims to bring together and make environmental knowledge available to water stakeholders and the public, develop management methods and tools and inform all users about water quality and its evolution. The Agency collects data on aquatic environments and water uses via environmental monitoring networks which allow regular assessments of the state of water. It also carries out studies and supports the production of knowledge, particularly in partnership with scientific research organisations, to provide methodological or decision-making support elements for recurring or new issues in the Rhône-Mediterranean basins and Corsica. It publishes reports on the state of water (last one published in 2018). The RMC Water Agency took part in the establishment of several observatories, such as:

- Observatory of Uses at Sea (MEDOBS)

Initiated in 2011, the Observatory of Uses at Sea (*Observatoire des usages en mer - MEDOBS-Sub*) (https://medtrix.fr/portfolio_page/medobs/, *no proper website*) is an aerial monitoring system of the state of health of the marine

environment on the French Mediterranean coast. It is coordinated by the CPIE Côte Provençale and funded by the Rhône-Méditerranéen-Corsica Water Agency (RMC Water Agency). It was implemented by the Medobs Association with the support of the RMC Water Agency. It aims to quantify and detect uses at sea on the coast of Provence-Alpes-Côte d'Azur, Languedoc-Roussillon and Corsica. Aerial monitoring is carried out each year between April and October at regular intervals (once a week in summer and once every two weeks in spring and autumn). The objective of the network is to assess the pressures on the territory rather than to conduct exhaustive monitoring of the uses of the environment over time. The information collected makes it possible to work on the governance of uses. Seven parameters are monitored through this observatory: presence of mooring areas (with counting of boats present - and sail/engine distribution), presence of recreational nautical uses (type of use - location - quantification), location of professional fishing (fishing boats - fishing nets - aquaculture parks), river plume detection, observation of erosion phenomena, detection of pollution by hydrocarbons, or macro-waste, presence of cetaceans or any other significant event. It publishes monitoring notebooks online (last one in July 2020) and scientific articles.

- Socioeconomic Observatory of the Uses of the Coasts and the Sea (OSEMED)

The Socioeconomic Observatory of the Uses of the Coasts and the Sea (*Observatoire socio économique des usages du littoral et de la mer, OSEMED*) (https://medtrix.fr/portfolio_page/ose-med/, no proper website) was initiated in 2009 through a partnership established between IRSN and the RMC Water Agency. It aims to acquire socio-economic information at the level of the Mediterranean coastline on coastal and sea uses. Observatory data is updated every 5 to 10 years through the performance of a specific study that incorporates a methodology and indicators. Seven socio-economic activities directly linked to the quality of the marine environment are evaluated: professional fishing, aquaculture, marinas, yacht clubs, club diving, sea trips and leisure activities (swimming, underwater trails, recreational fishing, etc.) as well as activities benefiting from proximity to the sea, such as accommodation and catering for coastal communities in nearby watersheds. For each of these activities, a monetary valuation by area is carried out on the basis of the calculated or estimated turnover and according to the available data.

Regional level

Provence-Alpes-Côte d'Azur Regional Water and Aquatic Environment Observatory

The Provence-Alpes-Côte d'Azur Regional Water and Aquatic Environment Observatory (*Observatoire Régional Eau et Milieux Aquatiques en PACA, OREMA*) (<http://www.arpe-paca-sercad.org/index.php/eots/>) is a regional water portal, which collects, analyses and disseminates regional information on water and aquatic environments, for local communities and institutions through 8 themes. It is implemented and led by the Provence-Alpes-Côte d'Azur Regional Agency for Biodiversity and the Environment (ARBE). This regional water portal offers information and data by municipality and by watershed. Data collected are organised on uses and pressures; water and risks; water and territory management; aquatic ecosystems protection; sea and Mediterranean coasts; actors; and regulations (https://www.eaurmc.fr/jcms/vmr_6386/fr/). It has developed interactive maps which gather data on the management of aquatic environments and partnership policies, regional environment contract, hydrography, watersheds sustainable development approaches in the region, regulatory zoning, entrance by municipality, objectives for achieving good water status, protected natural areas, natural inventories, regional scheme for ecological coherence (SRCE) and land use. It has also developed various partnerships with national (OFB, DRAL, ARS) and regional institutions.

Provence-Alpes-Côte d'Azur Regional Observatory of Major Risks

The Provence-Alpes-Côte d'Azur Regional Observatory of Major Risks (*Observatoire Régional des Risques Majeurs PACA, ORRM*) (<http://observatoire-regional-risques-paca.fr/>) is the result of the collaboration of the Provence-Alpes-Côte d'Azur Region, the Regional Directorate for the Environment, Planning and Housing (DREAL)

and the BRGM (Bureau de Recherches Géologiques et Minières). It was created in 2014. It aims to improve knowledge and disseminate information relating to the various major risks that may affect the PACA Region. A first phase of work (2007-2013) made it possible to develop a portal for accessing risk data in the Provence Alpes-Côte d'Azur Region (<http://riskpaca.brgm.fr/Home/Carto>). This approach has resulted in the creation of a Regional Observatory for Major Risks in Provence-Alpes-Côte d'Azur (ORRM-PACA). Today, the observatory seeks to further the federation of a regional network of actors (government, region, communities, associations, manufacturers, insurers, the general public, etc.). It publishes reports on risks and prevention, indicators, and perceptions of natural risks.

PACA Regional Biodiversity Observatory

The PACA Regional Biodiversity Observatory (*Observatoire régional de la biodiversité de PACA*) (<http://www.observatoire-biodiversite-paca.org/>) started in 2012. The Region has entrusted the Regional Agency for the Environment and Ecodevelopment with the establishment and management of the regional biodiversity observatory. With the help of the technical and scientific committee of the observatory, an analytical framework for monitoring the state and evolution of biodiversity was developed in order to link the objectives with the themes and indicators that will be monitored. The scientific and technical committee participates in the development of the observatory's content, the definition of indicators, and proposes an annual activity programme to the steering committee. It is composed of public establishments, naturalist associations, managers of natural areas, research organisations or universities and experts. The Observatory initiated the Nature Barometer in the Region, the first inventory of nature in the Provence-Alpes-Côte d'Azur Region produced in partnership with Terre Sauvage. It publishes reports on the state of biodiversity in the Region, newsletters, and naturalistic data.

Occitania Regional Biodiversity Observatory - ORB

The Occitania Regional Biodiversity Observatory (*Observatoire régional de la biodiversité Occitanie, ORB*) (<https://www.arb-occitanie.fr/L-Observatoire-Regional-de-la-Biodiversite-Occitanie>) was initiated in 2020. It is managed by the Occitania Regional Biodiversity Agency. It aims to develop and disseminate information to enable better understanding of biodiversity issues by the general public and elected officials. Its missions are to monitor the state of biodiversity and its evolution, to raise awareness among regional players and the general public of biodiversity issues and to contribute to the evaluation of public policies. To produce indicators, the ORB relies heavily on data pooled within the framework of the Occitania Information System on Nature and Landscapes (SINP) as well as on any other source of data that would make it possible to characterise the pressures exerted on biodiversity but also the answers provided. The Regional Scientific Council for Natural Heritage is consulted to provide scientific advice on the indicators and outputs of the ORB. The Occitania Regional Biodiversity Observatory has dedicated one employee to run the ORB, however, members of the project group and the ORB office carry out their missions and participate in meetings on a voluntary basis, without special compensation (Occitanie Biodiversité, 2020).

Corsica Coast Observation Network (ROL)

The Corsica Coast Observation Network (*Réseau d'observation du littoral de la Corse, ROL*) (<http://www.littoral-corse.fr/>) was launched in 2001. This geomorphological follow-up of the Corsica coast is carried out by the BRGM (*Bureau de Recherches Géologiques et Minières*) on the initiative of the Corsica Environment Office (OEC), with the support of the DREAL of Corsica and the Community of Ajaccio (CAPA). This is a multi-year programme for collecting the data necessary for understanding the sedimentary phenomena that act on the coast of Corsica. The BRGM has installed, as part of this programme, webcams to ensure real-time morphological monitoring of three beaches (Bastia, Moriani and Calvi) and has initiated a partnership network to monitor the impact of storms on the coast. ROL contributes to the development of an integrated management strategy

for the Corsica coastal strip and is also part of joint cross-border reflections with Italy, as part of the INTERREG MAREGOT Project. ROL leads the monitoring of the geomorphological evolution of 17 beaches and promotes knowledge via an internet portal. BRGM also publishes reports accessible on the portal.

Local level

These local-level observatories collect data on more or less specific domains, in order to help local authorities to develop coherent public decisions. Without evaluating their long-term trajectory, their presence in this list permits access to pertinent local data.

Marine Observatory of Saint Tropez

The Marine Observatory of the Community of Municipalities of the Gulf of Saint Tropez (*Observatoire marin de la Communauté de communes du golfe de Saint Tropez*) (<https://www.observatoire-marin.com/accueil.htm>) is an intercommunal scientific, technical and educational advisory structure. It aims to act in favor of sustainable development by increasing knowledge of coastal environments and user awareness. Its history goes back to 1994, with the creation of the Marine Observatory of Cavalaire Bay. In 1996 it brought together the three localities of Rayol-Canadel, Cavalaire-sur-Mer and La Croix Valmer. In 2014, the Community of Municipalities of the Gulf of Saint-Tropez was created, and a dozen intermunicipal unions and municipal services, including the Marine Observatory, were transferred to this new local authority. Its mission is to develop knowledge of coastal environments, improve user awareness and the management of coastal environments and their uses. Its facilities include two semi-rigid boats (7.5 m and 4.8 m), diving equipment, digital still camera, waterproof case and underwater flash, networked computer equipment and geographic information system. It publishes monitoring data on organized moorings, the Posidonia meadows, the monitoring of physicochemical parameters in sediments and the quality of bathing water. It receives fundings from the twelve Municipalities of the Gulf of Saint-Tropez as well as various partners, such as the RMC Water Agency, the PACA Regional Council, the Var General Council and the EU.

Observatory of the Thau Basin

The Observatory of the Thau Basin (*Observatoire du Syndicatmixte du bassin de Thau*) (<https://www.smbt.fr/content/observatoire>) is a public/private management and information tool. It makes available a selection of mapped indicators, data, analyses and resources. It collects data on water quality, pollution tracking, protected species and habitats. Since 2007, it has set up with various partners regular monitoring of the Thau Lagoon to detect a possible departure of malaïgue - due to a drop in the oxygen content of the water, favoured by high temperatures and the absence of wind. This device is intended for shellfish farmers. This data is available online through sheets and maps. A network of sensors is also installed on the Lagoon, linked to a central platform, and performs a real-time monitoring of pollution.

Observatory of the Catalan Sandy Coast (ObsCat)

The Observatory of the Catalan Sandy Coast (*Observatoire de la côte sableuse catalane, ObsCat*) (<http://obs-cat.fr/>), aims to collect data to better understand the risks of erosion and marine submersion. It is a tool for knowledge and decision-making on the Catalan sandy coastline, at the level of the hydro-sedimentary unit between Racou (Argelès-sur-Mer) and Cap Leucate. Since 2019, its funding has been provided by 5 project owners: Perpignan Méditerranée Métropole (PMM), the Municipality of Leucate, the South Roussillon Community of Municipalities, the Albères Côte Vermeille Illibérus Community of Municipalities. The Geological and Mining Research Office (BRGM) is the main scientific expert and co-owner of the expertise it carries out. ObsCat is a member of the national network of coastline observatories.

Departmental Observatory of Coastal Climatology, Water and the Environment (Hérault)

The Departmental Observatory of Coastal Climatology, Water and the Environment (*Observatoire Départemental Climatologie Eau Environnement Littoral - ODCEEL*) (<https://odee.herault.fr/>) of Hérault is in charge of collecting, saving, organising and exchanging data on water and the environment. It is managed within the Department of Hérault by the Climatology, Water, Environment and Coastline Observatory Service. Its database gathers data collected by the measurement stations of the Departmental networks set up in partnership with local authorities, Government services, and the RMC Water Agency. The Observatory focuses on water quality, the coast, sanitation, climatology, the environment and energy. The information is available through tables, graphs, atlases or maps published on the website. Data from the piezometric monitoring network and the Departmental water quality network are accessible online, as well as climatological data. Its partners are the RMC Water Agency, the Regional Health Agency (ARS), DREAL Occitanie and the French Biodiversity Office (OFB).

Laboratories and research centres

National Museum of Natural History (MNHN)

The National Museum of Natural History (*Muséum Nationale d'Histoire Naturelle, MNHN*) (<https://www.mnhn.fr/>) is a research centre established more than 400 years ago, studying nature and its relationship with humans. One of its missions consists of the enhancement, enrichment, conservation and provision of collections and data from natural and cultural heritage. It draws on laboratory work and expeditions around the world, through a wide range of disciplines. Its facilities include 13 locations in France and two marine biology stations, in Concarneau and Dinard. The Museum also maintains databases of global importance for research, such as the National Inventory of Natural Heritage – the portal for biodiversity and geodiversity in France, in mainland France and overseas⁴⁸. It is one of the institutions that provides the data for the OSPAR Quality Status Report, as it leads the description of the status of biodiversity and non-indigenous species. The MNHN leads several participatory observatories, like the Living Beaches Programme (a participatory observatory of the biodiversity of the upper beaches to better understand and predict the effects of global and local changes). It also leads “Vigie-Nature”, a participatory science programme. Some monitor coastal and marine environments, such as BioLit, the national programme of participatory sciences on coastal biodiversity (BioLit is described below).

Institut Universitaire Européen de la Mer (Université de Bretagne Occidentale)

The European University Institute of the Sea (*IUEM*) (<https://www-iuem.univ-brest.fr/observatoire/l-observatoire/>) was created in 1997 in Plouzané (Brittany). It is an observatory of the sciences of the universe of the National Centre for Scientific Research (CNRS) belonging to the school of the University of Western Brittany (UBO). It is dedicated to knowledge of the marine and coastal areas. The Institute and its laboratories are also linked to the French Research Institute for the Exploitation of the Sea (Ifremer) as well as to the Research Institute for Development (IRD) and the University of Bretagne-Sud. Its facilities include a marine observatory, specialised in the collection of data on the states of coastal and offshore marine environments and their responses to global changes. It measures biological, chemical and physical parameters in coastal and offshore marine environments. It is part of the RESOMAR (Network of Marine Stations and Observatories) and is a local coordinator for SOMLIT. IUEM also includes seven research laboratories: LGO Ocean Geosciences, LOPS Oceanographic and Space Physics, LEMAR Marine Environmental Sciences, LETG-Brest Geography, Environmental microbiology extremes LMEE, Biotechnologies and Marine Chemistry LBCM, and law and Economics of the Sea AMURE.

⁴⁸ <https://inpn.mnhn.fr/accueil/index>

Mediterranean Research Observatory for the Environment (OREME)

The Mediterranean Research Observatory for the Environment (*Observatoire de Recherche Méditerranéen de l'Environnement, OREME*) (<https://oreme.org/>) is a laboratory attached to the University of Montpellier, CRNS, IRD and INRAE. It focuses its scientific activities on natural risks and the impact of global and anthropogenic changes in the Mediterranean area, through expertise in geosciences, hydrosociences, biodiversity sciences and ecology. Its missions are to support the activity or development of systematic observation in the sciences of the universe and the environment, to support the construction of open, shared, internationally referenced environmental databases, to encourage the pooling of analytical means (observation, experimentation, modeling) and know-how, to constitute the local relay for national observation networks and to position itself as a strong player in actions focused on the Mediterranean environment. It focuses on mobilising long-lasting observation means on diverse aspects of the Mediterranean physical, chemical and biological environment: geodesy, hydrogeological, water and geophysical monitoring of aquifers, monitoring the Languedoc coast, the interface between watershed and marine space, coastline, pollution and biological adaptability downstream of old mining sites, flow measurements (CO₂, water, gas) and ecosystem functioning, phenology of terrestrial flora and fauna. Its facilities include the Marine station of Sète.

Its data is available on a data portal:

(https://data.oreme.org/?_ga=2.166311486.1273078298.1603842351-151548433.1603842351).

Banyuls-sur-Mer Oceanology Observatory (OOB)

The history of the Banyuls-sur-Mer Oceanology Observatory (*Observatoire océanologie de Banyuls sur Mer, OOB*) (<https://www.php.obs-banyuls.fr/>) dates back to 1882. It is today attached to the Sorbonne Université and CNRS. The missions of the Observatory revolve around research, training, observation and scientific reception and also scientific mediation. The marine observation service of Banyuls-Sur-Mer was officially created in 1997 and is part of the Service d'Observation en Milieu Littoral (SOMLIT) national observation network of the National Institute of the Sciences of the Universe (INSU). OOB has three fixed observation stations located at varying distances from the coast which are regularly monitored for physical, chemical and biological parameters. These data are recorded in databases accessible on the observatory's website. Some parameters are acquired in real time. Inventories of species are also available online (soob.obs-banyuls.fr).

PELAGIS Observatory

The PELAGIS Observatory (*Observatoire PELAGIS*) (<https://www.observatoire-pelagis.cnrs.fr/>), brings together observation and expertise programmes on the conservation of populations of sea mammals and birds as well as the management of associated databases. It is attached to the CEBC research laboratory (UMR 7372 - CNRS & University of La Rochelle). The unit is based on a set of databases and a bank of biological samples. Its monitoring activities focus on abundance and demography, the determination of the distribution and critical habitats as well as the estimation of the biological parameters of marine mammals and birds. Different methods are used, in particular the monitoring of strandings, observations at sea, telemetry or even acoustics. In addition, the PELAGIS Observatory ensures the production of regulatory summaries and reports, the evaluation of management scenarios and conservation units, and the maintenance of databases on marine top predators. A variety of data is available online, through maps, histograms, metadata catalogues. Its financial partners are the Ministry of Ecological Transition; the La Rochelle Urban Community, and the OFB. Its data base is available online (<https://www.observatoire-pelagis.cnrs.fr/catalogueSI/>).

Villefranche sur Mer Sea Institute

Part of the Sorbonne University and CNRS, the Villefranche sur Mer Sea Institute (*Institut de la Mer*) (<http://www.obs-vlfr.fr/web/index.php>) was formerly called the Oceanological Observatory of Villefranche sur Mer. Its history

dates back to 1885. One of the three missions of the Villefranche Sea Institute is the systematic monitoring of the marine environment. It is situated on the harbour of Villefranche sur Mer, and aims to improve the understanding of the functioning of the Ligurian Sea and more generally of the Mediterranean Sea. Coastal and offshore observation stations and platforms collect hydrological, meteorological and biological data. The observatory manages its own informations systems on hydrology (<http://rade.obs-vlfr.fr/Hydro.htm>) and plankton (<http://rade.obs-vlfr.fr/RadeZoo/RadZoo/Accueil.html>), and also participates in various observation systems at the national and international level:

- SOMLIT (LITtoral Environment Observation Service)
- MOOSE (Mediterranean Ocean Observation System for the Environment)
- Argo FRANCE

Human-environment observatories “French mediterranean coastal zone” (OHM)

Human-Environment observatories (*Observatoire Hommes-Milieus, OHM*) (<http://www.ohm-littoral-mediterranee.fr/>) were created in 2012 by the Institute of Ecology and the Environment (INEE in French) and the Institute of Human and Social Sciences (InSHS in French) of the French National Centre for Scientific Research (CNRS in French). This interdisciplinary observatory is dedicated to the study of the French Mediterranean coastal zone, focusing on four study areas: the Greater Marseilles area (from the port complex of Fos-sur-Mer in the West to La Ciotat in the East); the coast of Balagne and Biguglia Lagoon in Corsica; the Aigues-Mortes Gulf between Sète and Le Grau du Roi. The particularity of this observatory is that the research activities focus not just on the shoreline, but also on the marine and terrestrial zone, recognising the mutual influence on each other (ecological, hydrological and societal influence). Researchers mainly monitor environmental and life quality (state of coastal water, watersheds, air, soil, etc; health, living standards, demographics, identity) and also study ecosystem services, environmental amenities.

The French Mediterranean coastal zone is part of an international human-environment observatory network, the DRIHM LabEx (<https://www.drihm.fr/en>) Device for interdisciplinary Research on Human-environment interactions composed of 13 observatories). This LabEx was set up for 8 years (February 2012-December 2019) with a 6.5 million EUR budget and now, for another five years (2020-2024). The OHM has a geo-referenced data catalogue that provides access to some data produced by the scientists within the Observatory. It is possible to access the catalogue⁴⁹.

Non-governmental organisations

Planète Mer

Planète Mer (<https://www.planetemer.org/>) is an association created in 2007, which aims to preserve marine life and the human activities that depend on it. Its mission is to allow everyone to act on their environment through information and knowledge and to rethink human activities thanks to the evolution of knowledge, to better protect, manage or repair the marine environment. It is financed by private donors, corporate foundations, public foundations and public funds. In 2019, Planète Mer’s financial resources amounted to EUR 500,000. It launched the BioLit participatory monitoring programme (described below), which aims to respond to scientific questions related to coastal biodiversity, by mobilising citizens in monitoring activities.

⁴⁹ <http://datacatalog.ohm-littoral-mediterranee.fr/geonetworklittmed/srv/fre/search>

MIRACETI

MIRACETI (<https://www.gis3m.org/>; <http://www.souffleursdecume.com/>; <https://www.gecem.org/>) is an association formed in 2020 that unites three NGOs around the preservation of the marine environment in the Mediterranean (Souffleurs d'Ecume, founded in 2000; the Mediterranean Cetacean Study Group, founded in 1991; GIS3M, founded in 2007). MIRACETI's objectives are to deepen knowledge on cetaceans and promote their conservation through a multidisciplinary approach, both scientific and operational, in consultation with institutions, economic players and conservation players. It brings together field and academic scientists in order to lead with its partners scientific studies on cetaceans around different themes: populations, methodology and threats. The common website is in the making, but data on cetacean population, risks and conservation policies may be found on their respective websites.

Thau Basin Permanent Centre for Environmental Initiatives (CPIE)

The Thau Basin CPIE (Permanent Centre for Environmental Initiatives) (<https://www.cpiebassindethau.fr/>) is an associative network anchored in the territory of Thau, the purpose of which is the promotion of initiatives in the field of the environment and sustainable development. This network unites 18 member structures: LPO Hérault, Odyssée Plongée, La Clé des Arts, Cap au large, Peau-Bleue, Garrigues de Thau, ADENA, Civam Racines 34, CRCM (Regional Committee of Mediterranean Shellfish), Prud'homme de l'Etang de Thau, Cooperatives des 5 Ports, Kimiyo, Ceparlmar, Par Amour des Abeilles, Scopie, CRPMEM (Regional Committee for Maritime Fisheries and Marine Breeding), Company of the imprint and Terre Marine. It leads various initiatives in participatory monitoring programmes, like the Sentinelles of the Sea (Occitania) described below.

Citizen science

Participatory monitoring of marine and coastal environments is flourishing. Thirty-two initiatives have been reported, solely along the French Mediterranean coast (Kundasamy, 2014). Some of them are described below.

BioLit

BioLit "Coastal Observatories" (<https://www.biolit.fr/>) is a national programme of participatory sciences on coastal biodiversity. Created and supported by the Planète Mer Association, it is carried out under the scientific responsibility of the marine station of the National Museum of Natural History (MNHN) of Dinard, with the support of a scientific council. It developed partnerships with structures of education in the environment and sustainable development, of local authorities, government services, and managers of protected areas and natural resources. The Observatory developed several thematic programmes, around a census of coastal biodiversity ("A vos observations") and a surveillance network on what the sea deposits on the shore ("Saisons de mer"), a network for alerting and monitoring introduced marine and coastal species, some of which can be invasive ("Nouveaux arrivants"), and a network of pollution and elements of artificialisation ("attention menace"). Users are invited to transmit via the online platform their observations concerning the biodiversity of the coast, the content of the sea leash, introduced species, halophyte vegetation or threats. Observations are mapped on the website, and photographs published. BioLit is supported by a variety of public institutions, such as the Department of Bouches du Rhône, the City of Marseille, the RMC Water Agency; DREAL PACA; and several private donors, such as Total, la Fondation Nature et Découverte and de Bouygues.

BioObs

The BioObs Project (Basis for the inventory of underwater observations) (<https://bioobs.fr/>) combines an application and a website allowing identification records of species encountered during dives. It is aimed at all divers and constitutes a personal and collective database of observations made at different locations and at different times of the year. BioObs' online logbook is managed by the association "Les Amis de BioObs". BioObs

participates in a variety of monitoring networks and programmes around the Mediterranean Sea. As part of a call for projects launched by the Gulf of Lion Marine Natural Park and the French Biodiversity Office, BioObs participates in the monitoring of biodiversity in the park area. BioObs also participated in the the National Inventory of Natural Heritage managed by UMS Patrinat (AFB/CNRS/MNHN). BioObs makes observation data available on a regular basis in accordance with the rules according to which naturalistic observations are used and disseminated by the INPN and the GBIF, as part of the System of 'Information on Nature and Landscapes (SINP).

DONIA

DONIA (<https://donia.fr/>) is a participatory marine cartography application for smartphones and tablets. It is intended for boaters, divers, fishermen and other users of the sea who wish to benefit from precise maps, enriched with data on marine life and real-time information on surface activities. DONIA contributes in particular to protecting the Posidonia meadows by providing detailed maps of the nature of the seabed to boaters so that they can avoid anchoring in the meadows. DONIA is based on an interactive and enriched map integrating marine habitats up to 50 meters deep, certain restricted areas, the positions of other boats and isobaths.

Cybelle Mediterranean Programme

CybellePlanète (<https://www.cybelle-planete.org/>) is an association of participatory ecology created in 2005 and located in Villeneuve-lès-Maguelone. The Cybelle Mediterranean Programme (Programme CybelleMéditerranée) allows all users of the sea, amateurs or professionals, to monitor Mediterranean marine species: cetaceans, marine turtles, rays and sharks. It consists of following the evolution over time of different indicators: species richness and/or species abundance. More than 35 pelagic species belonging to 4 groups are studied: cetaceans, fish, sea turtles and jellyfish. The OBSenMER mobile application enables reporting an animal sighting at sea. The data collected since 2009 is gathered in a database which is freely shared with the scientific community. All the information transmitted by contributors, via the mobile application, joins a database: OBSenMER. Information collected as part of a public programme is freely shared under a Creative Commons by NC (CC-by-NC) license.

The Occitania Sentinels of the Sea Programme

The Occitania Sentinels of the Sea Programme (Sentinelles de la Mer Occitanie) (<https://www.sentinellesdelamer-occitanie.fr/>) initiated and supported by the Thau Basin CPIE, aims to relay participatory science projects at sea, in lagoons and on coastlines in the Occitania Region. It was initiated in 2015, and is now relaying 20 projects in participatory science led by 16 structures. This work, carried out in consultation with the national Vigie-Mer network, aims to give better visibility to existing programmes and facilitate access to participatory science for all users of the sea through a calendar of events, a newsletter and a website. A large panel of public partners contribute to the structuring of the projects via the Steering Committee and the Scientific Committee. Its financial partners are the Occitania Region, the Hérault Department, the Fondation Léa Nature and the Fondation Nicolas Hulot.

Monitoring activities within MPAs

Gulf of Lion Marine Nature Park

Created in 2011, the Gulf of Lion Marine Nature Park (<https://parc-marin-golfe-lion.fr/>) protects 4 010 km² of maritime surface. Its headquarters are in Argelès-sur-Mer in the Eastern Pyrenees. It includes 12 coastal municipalities over more than 100 kilometres of coast. Its eastern limit offshore is set at 60 km. Since January

1, 2020, the Gulf of Lion Marine Nature Park has been part of the French Biodiversity Office (OFB). One of its missions is to develop knowledge of the marine environment. The Park team has 18 permanent agents, and 2 semi-rigid boats which allow them to carry out their missions at sea. The park leads various monitoring activities, such as:

- The environmental monitoring by SATellite (SENVISAT) Project aims to verify the feasibility of implementing the monitoring of several coastal identifiers by satellite imagery, whether terrestrial or marine. The visualisation of the results of environmental monitoring work by satellite is ensured via a cartographic portal.
- Sea-floor mapping work is underway in the Park by the University of Perpignan and the OFB. It has so far made it possible to specify the entire rocky coastline as well as sites of interest such as the heads of canyons.
- Monitoring programme of the exotic species *Caulerpa racemos*
- Monitoring programme of the *Posidonia* meadows
- Monitoring of discharges from gray water or black water vessels, non-compliant discharges from land, arrival of pollution from rivers or offshore oil discharges.

Cap Corse and Agriate Marine Nature Park

The Cap Corse and Agriate Marine Nature Park was created in 2016. It extends from the coasts of Cap Corse and Agriates to a hundred kilometres offshore from Balagne and covers 6 830 km². Since 2020, it is part of the French Biodiversity Office (OFB). The management plan for the park provides for improving the development of knowledge of the coastal and marine areas around Cap Corse and Agriate in their natural and cultural components, through the inventory, collection and deepening of scientific knowledge, local knowledge and participatory research. The Park website is in the making, and the details of the monitoring programmes are not yet accessible to the public.

Blue Coast Marine Park

The Blue Coast Marine Park (Parc Marin de la Côte Bleue) (<https://www.parcmarincotebleue.fr/>, not updated) was created in 1983. It is managed by the “Syndicat Mixte Parc Marin de la Côte Bleue”, which brings together the Provence-Alpes-Côte d’Azur Regional Council, the du-Rhône General Council, and the five municipalities of the Côte Bleue: Carry-le-Rouet, Ensuès-la-redonne, Martigues, Sausset les Pins and Le Rove. It is inscribed on the IUCN Green List of Protected Areas. The Park has been developing a variety of monitoring activities, such as:

- Monitoring of the Marine Protected Zone of Carry le Rouet (BIOMEX campaign; Monitoring of fish populations in the Carry-le-Rouet Reserve)
- Monitoring of the Protected Marine Zone of Cap Couronne (Monitoring of fish populations in the CAP-COURONNE Reserve)
- Monitoring of the Blue Coast (Sensitivity of target fish species to certain forms of fishing pressure on the Côte Bleue)
- Monitoring of Artificial Reefs (Artificial reef fish populations submerged in the Marine Park)

- Monitoring of sea urchin populations (Sea urchin counts in the MARTIGUES District - April 2005)
- Monitoring of the *Posidonia* herbarium (Marking of the herbarium of the calanque of CAP-ROUSSET)

Camargue Regional Natural Park

The Camargue Regional Nature Park (http://www.parc-camargue.fr/observatoire_territorial.html) is located in the South of France, West of the Provence-Alpes-Côte d'Azur Region. It was created in 1970, and is now managed by a public entity (also named Camargue Regional Nature Park). It includes a large part of the Grande Camargue between the arms of the Rhône delta. For the period 2011/2022, the Camargue Regional Nature Park has set the objective to share knowledge and open the delta to Mediterranean cooperation. Some of its monitoring activities (such as the counting of waterbirds) is available on its website. The Camargue Regional Nature Park has an internal geographic information system (<http://geo.pnrpaca.org/>), which enables it to follow the development of the territory, and gathers data on natural and cultural heritage, landscape, and local economy. The Territorial Information System provides technical information and presents actions to promote and protect the park, carried out by the Park and other actors in the territory. In partnership with the Mixed Syndicate for the Protection and Management of the Gard Camargue, the Camargue Regional Nature Park is also the coordinators of the Camargue Biosphere Reserve.

Port-Cros National Park

The Port-Cros National Park (<http://www.portcros-parcnational.fr/fr/>) was created on December 14, 1963. It was extended to a large part of Porquerolles on May 4, 2012, and includes a large part of the Island of Porquerolles, the Islands of Port-Cros and Bagaud, the Islet of Gabinière and the Rock of Rascas as well as the surrounding waters, representing 1 700 ha on land and 2 900 ha at sea. Marine uses, frequentation of the islands and the natural heritage are the subject of inventories and regular monitoring by park officials. Faced with the threats to Mediterranean biodiversity, the National Park has developed two observatories, designed as decision-making and management tools for the marine territories it monitors:

- **Bountiles, Observation Base for Nautical and Terrestrial Uses of Islands and Coastlines:** it was developed in 2003 in partnership with a geography research laboratory (Géomer), and operational since 2005. It provides the National Park with quantified elements enabling it to orient its management policy towards greater control of attendance on the islands of Port-Cros and Porquerolles, on the basis of observations of nautical and terrestrial uses. The construction of this observatory is part of an applied research project which is still ongoing.
- **Port-Cros Observatory of Biodiversity and Marine and Coastal Uses:** measures the pressures exerted on the biodiversity of the marine territories of the Hyères Islands (Porquerolles, Port-Cros, the Levant) and the Giens Peninsula, measures the management efforts developed in response to pressures and assesses their effects.

The Park website publishes scientific reports and maps.

Environmental monitoring networks

Coastal Research Infrastructure (ILICO)

Coastal Research Infrastructure (*L'infrastructure de recherche littorale et côtière, ILICO*) (<https://www.ir-ilico.fr/>) was created in 2015. Research infrastructures are strategic tools which aim to structure initiatives and

investments made in the field of research (Cocquempot et al, 2019). It aims to monitor and understand coastal and marine environments and ecosystems through structuring this field of research. ILICO brings together a set of observation devices to collect samples and deploy different measurement instruments by federating 8 networks: COAST HF (Dynamics and long-term evolution of the coastal water hydrology), CORAIL (Coral Reef evolution linked with environmental changes), DYNALIT (Coastline geomorphology and dynamics), MOOSE (Integrated regional observation system in the Mediterranean Sea), PHYTOBS (Phytoplankton dynamics), ReefTemps (monitor short to long-term temperature evolution upon shallow coastal reefs), SOMLIT (Seashore and coastal pelagic ecosystem evolution) and SONEL (Study on the long-term sea-level trends). Data collected include physical oceanography, coastal geomorphology, hydrology, sedimentology, meteorology, biogeochemistry and marine biology. It mobilizes approximately 420 employees corresponding to 90 full-time positions, and has a total annual budget (including salaries) of approximately 10 million EUR (Cocquempot et al, 2019, p.3).

National Network of Coastline Observatories

The National Network of Coastline Observatories (*Réseau national des observatoires du trait de côte*) (<http://observatoires-littoral.developpement-durable.gouv.fr/>) aims to support local initiatives to develop, at the national level, good practices for acquiring and sharing data on the coastline and its developments. It is in line with the objectives of the National Strategy for Integrated Coastline Management, adopted by France in 2012. In 2019 was held the first orientation committee, which stated its orientations and presented its web portal. Its main functions are to promote the production and sharing of reliable and homogeneous data through harmonised acquisition protocols and to promote and participate in actions intended to communicate, support the emergence of new local observatories and the consolidation of existing observatories. Its 19 members include several previously described Mediterranean structures, like ROL and ObsCat.

Coastal Observation Service of the National Network of Marine Stations and Laboratories (SOMLIT)

The Coastal Observation Service (*Service d'Observation en Milieu Littoral, SOMLIT*) (<https://www.somlit.fr/>) has been a National Observation Service of the National Institute of Sciences of the Universe (CNRS) since 1996. It is hosted by the Aquitaine Observatory of Sciences of the Universe (University of Bordeaux/CNRS). Marine stations of the National Network of Marine Stations and Laboratories (RESOMAR) have been monitoring 15 physico-chemical coastal water parameters. RESOMAR is a multidisciplinary structure bringing together French marine stations, observatories and laboratories with the intention of structuring the community. Three of these stations are located on the Mediterranean coasts, in Banyuls, Marseille and Villefranche. It has strong links with the MOOSE (Mediterranean Ocean Observing System on Environment), PHYTOBS (phytoplankton observation) and COAST-HF (Coastal Ocean observing SysTem - High Frequency) networks.

National Network for Monitoring the Quality of Marine Ports Sediments (REPOM)

Created in 1997 by the Director of Water, the National Network for Monitoring the Quality of Marine Ports Sediments (*Réseau national de surveillance de la qualité des sédiments des Ports Maritimes, REPOM*) originally aimed to monitor the quality of water and sediments in seaports. In 2010, the monitoring programme for the "water" chapter was suspended and the sediment programme was improved by taking into account the recommendation of the international OSPAR Convention and to extend the range of parameters monitored to the priorities of the Water Framework Directive of the EU. This network aims to assess and monitor changes in the quality of sediments in port basins. With the results obtained, it must assess the impact of these port facilities on the uses of the environment. From 2015, the frequency of monitoring was reassessed given the

minimal changes in sediment quality from one year to the next. In order to optimise sampling and analysis costs, it was agreed that the programme would henceforth be fully followed in each port every three years.

Network of Biodiversity Observatories

The Network of Biodiversity Observatories (*Réseau d'observatoires de la biodiversité*) was launched in 2010 as a working group aiming to network the numerous observatories and observatory creation projects directly or more marginally concerning biodiversity. It is piloted by the CEREMA. The working group is a place for consultation, the conduct of joint actions and harmonisation. It brings together representatives of observatories wishing to collaborate with each other and with the ONB. It was gradually organised into a national network of biodiversity observatories. Since 2016 a sharing and collaborative work space has been implemented⁵⁰.

Environmental information systems

Water Information System (SIE)

Established in 2006 (by the law on Water and Aquatic Environments of December 30, 2006) the Water Information System (*Système d'information sur l'eau, SIE*) is a system for sharing and provision of public sector water data. It gathers data on water resources, aquatic environments, their uses as well as public water and sanitation services across the country. Governance of the SIE is organized at the national level under the authority of the Water and Biodiversity Directorate. The French Biodiversity Agency provides national technical coordination. The data produced or held for the performance of each of the missions of the Water Information System are managed respectively within the framework of the thematic information systems (such as the water and nature police control information system, or the information system for the protection and preservation of the marine environment). Data is available online (<http://www.data.eaufrance.fr/>).

Nature and Landscapes Information System (SINP)

The Nature and Landscapes Information System (*Système d'information sur la Nature et les paysages, SINP*) (<http://www.naturefrance.fr/sinp/presentation-du-sinp>) is a collaborative organisation created in 2005. It promotes synergy between actors for the production, management, processing, promotion and dissemination of data on nature and landscapes. It is a partnership between the Ministry responsible for the environment, associations, local authorities, public establishments and agencies and government services. It is organised in three networks: earth, sea, and landscape. This network of actors is structured by several bodies at regional and national levels. It disseminates knowledge on animal and plant species, natural environments, protected areas and geological heritage. It collects data on more than 60 million species

Biodiversity Information System (SIB)

The Biodiversity Information System (*Système d'information sur la biodiversité, SIB*) (<http://www.naturefrance.fr/>) was established in 2020 to organise and promote the dissemination of all relevant knowledge on biodiversity. This knowledge relates to the state of biodiversity, but also to the pressures exerted on it and the responses provided for its preservation. The SIB is based on existing information systems, such as the SINP or the SI Natura 2000.

⁵⁰ <http://reseau-biodiversite.atspace.eu/index.php?disconnect=1>

Marine Environment Information System

The information system (www.milieumarinfrance.fr) on the marine environment is still in the making. It is based on public data systems which gather data relating to the marine environment in French maritime areas. This information, centralised within the system, must characterise the activities/uses at sea, and on the coast, identify the pressures generated by these activities on the marine and coastal environment, assess the impacts on the marine and coastal environment, describe and characterise the state of marine and coastal ecosystems, and the different responses of the public authorities.

MEDAM

MEDAM (<http://www.medam.org/index.php/fr/>) is a database of the Marine Strategy Framework Directive (MSFD) monitoring programme for the Mediterranean Sea. It is managed by the Ecoseas Laboratory of the University of Côte d'Azur (Nice). This information system is related to the observatory on the impact of the accumulation of developments built on the sea (MEDAMP). It covers all of the French Mediterranean coasts and of the Principality of Monaco. All data is made available by administrative entities (regions, departments and municipalities). It publishes synthesis reports on the initial state of the coast, surfaces reclaimed from the sea by type of urban planning, linear of artificialized coastline, occupancy rate of shallow water, coastline artificialization rate.

Regional exchange platform on integrated coastline management - DREAL PACA

The regional exchange platform on integrated coastline management (*Plateforme d'échange régionale sur la gestion intégrée du littoral*) was initiated by DREAL PACA. This platform is named "MonLittoral Provence-Côte d'Azur". It aims to provide the region with a tool for referencing all the existing data on the coast, in order to allow the implementation of strategies on the sustainable development of coastal areas and to develop, exchange and raise awareness of good practices in the context of adaptation to climate change. The project is supported by a Scientific Council, made up of DREAL, CEREGE, CEREMA, CNRS and BRGM. A roadmap is being defined with the Region for the years to come. This project takes place in the context of the 2012 National Strategy for Integrated Coastline Management. A prototype is under construction in the Department of Var, and the platform will subsequently be extended to the Departments of Bouches-du-Rhône and Alpes-Maritimes. The project involves local authorities, decentralised government services, research and educational establishments, town planning agencies, consultancies, associations and enlightened citizens.

Bibliography

Cocquempot L, Delacourt C, Paillet J, Riou P, Aucas J, Castelle B, Charria G, Claudet J, Conan P, Coppola L, Hocdé R, Planes S, Raimbault P, Savoye N, Testut L and Vuillemin R, 2019. "Coastal Ocean and Nearshore Observation: A French Case Study". *Front. Mar. Sci.* 6:324

Kalaydjian Regis, Girard Sophie, 2017. "Données économiques maritimes françaises 2016". Ifremer.
<https://doi.org/10.13155/49962>

Ministère de la transition écologique et solidaire, 2019. "L'Environnement en France, rapport de synthèse", La Documentation française. Available at : https://ree.developpement-durable.gouv.fr/IMG/pdf/9782111570573_lenvironnementenfrance_edition2019_rapportdesynthese_v24_web_light.pdf (accessed on 05/09/2020)

Ministère de l'Ecologie, du Développement durable et de l'Energie, 2016. "Développer la connaissance et l'observation du trait de côte – Contribution nationale pour une gestion intégrée". 24 p.
URL: http://www.geolittoral.developpement-durable.gouv.fr/IMG/pdf/synthese_nationale_connaissance_trait-de-cote_fev_2016.pdf

OccitanieBiodiversitéAgenceRégionale, 2020. "ObservatoireRégional de la BiodiversitéOccitanie. Charte de fonctionnement". 11 pages.
URL: https://www.arb-occitanie.fr/IMG/pdf/orb_occ_charte_v3.1-def.pdf

ONML, 2016. "Synthèsestatistique de la façade méditerranéenne". 69 pages.
URL: http://www.dirm.mediterranee.developpement-durable.gouv.fr/IMG/pdf/annexe_1_-_situation_de_l_existant.pdf

OSPAR Commission, 2019. "Identification of ecological monitoring parameters to assess Good Environmental Status of marine waters".
50 pages.

Greece

I. General overview

Greece's environmental information system is centralized. The energy portal provides access to this information. However, the country needs to increase its capacity to assess coastal and marine habitats. The economic crisis has accentuated the logic of overexploitation of nature (WWF, 2014). In 2010, the establishment of a national environment fund (the Green Fund) was the result of a long-awaited process. The Fund sits on approx. 2.5 billion EUR, and is the only national source of environmental funding (WWF, 2014). Measures to protect two areas have been presented for public consultation: the estuaries of Axios, Loudias and Aliakmonas as a national park and the area of Karla-Mavrovouni as a regional park. However, the country needs to improve the documentation of spatial data and its publication of air quality data (EC, 2019). Regarding the protection of nature, Greece has recently developed its Natura 2000 marine network, and adopted its first national biodiversity strategy and action plan in 2014. It reorganised its management of protected areas in 2020. It is too early to evaluate if it will contribute to reduce the major issues in the management of the various management entities.

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Framework law 1650/ 1986	"For the protection of the environment": the basic aims of this law are the prevention of pollution and the degradation of the environment; safety for human health and the renewal of natural sources
The Hellenic Republic, law 3937/2011	Law on the conservation of biodiversity: it establishes the acquisition of sufficient knowledge on the state of species and ecosystems as the main tool for the effective conservation and management of biodiversity, and establishes monitoring mechanisms.
Law 4546/2018 published in the Official Journal on June 12, 2018	This law delimits coastal areas, sea waters and maritime areas and sets the objectives of maritime spatial planning. Marine spatial planning must be completed as soon as possible and no later than March 31, 2021. The competent authority under Article 14 shall assess the implementation of spatial planning every five years.
Law 743/1977 - Official Journal 319/A/ October 17, 1977	This law relates to the protection of the marine environment and the regulation of related matters.
Law 3983/2011	Law on coastal environmental data and climate change. Article 19 provides that it must prepare monitoring programmes, and suggests their approval by the Minister of Environment, Energy and Climate Change

Ministerial Decision 126635/2016 - Official Journal 3799/B /November 25, 2016	Approval of monitoring programmes for the continuous assessment of the environmental state of marine waters
Joint Ministerial Decision 126,856/2017 - Official Journal of 11/B/ January 11, 2017	This Decision designates the competent bodies for the quality control of seawater and determination of their obligations. The Hellenic Centre for Marine Research and the Fisheries Research Institute is designated as bodies responsible for implementing the actions required for monitoring the quality of seawater.
Decision no. 4451, April 2015	This Decision establishes the Business Monitoring Committee; for the implementation of the uninterrupted functioning of the Integrated Fisheries Monitoring and Recording System (OSPA)
Law 4495/2017	This law creates a «Structured Environmental Monitoring Board» made up of seven members, at the headquarters of each region, for the study and use of structured environmental data and for submission of proposals to the competent Regional Council.

National environmental institutions/organisations

The Ministry of the Environment and Energy/Υπουργείο Περιβάλλοντος και Ενέργειας (<https://ypen.gov.gr/>): is responsible for the development of a global environmental policy, the preparation of plans and programmes and their monitoring. An environmental inspectorate has been operating since 2004 (WWF, 2014). Its current strategic policy is to fight against climate change by moving to a competitive low-carbon economy; protect and manage natural resources strengthened for sustainability; improve the quality of life; and strengthen the mechanisms and institutions of environmental governance. Its General Secretariat for the Natural Environment and Water supervises the Directorate of Protection and Management of the Aquatic Environment, the Directorate of Planning and Management of Water Services, and the Directorate General of Electronic Governance and Geospatial Environmental Information.

The General Directorate of Territorial Planning of the Ministry of the Environment and Energy / Γενική Γραμματεία Χωροταξίας και Αστικού Περιβάλλοντος (<https://ypen.gov.gr/>): set up a Directorate of «Structured Observatory for Environmental Control and Design Implementation», which is responsible for monitoring, recording, controlling and taking measures to protect the built environment and ensure its quality. At the headquarters of each Region, as an organ of the Region, a Regional Directorate of «Regional Building Control Observatories» was created. A «Structured Environment Monitoring Board» of seven members was recommended to the headquarters of each region, for the study and use of data and data relating to the structured environment and the submission of proposals to the relevant Regional Council. The local Structured Environment Observatories prepare a progress report on the issues within their competence, which they submit to the Regional Observatory and to the Structured Monitoring Council for the environment concerned.

Monitoring institutions/observatories

National agencies

Organisation for the Natural Environment and Climate Change (OFYPEKA)

The Organisation for the Natural Environment and Climate Change (*Οργανισμός Φυσικού Περιβάλλοντος και Κλιματικής Αλλαγής, OFYPEKA*) (<https://ekpa.ypeka.gr/>) is a recently created legal entity under the supervision of the Ministry of the Environment and Energy (RIS). OFYPEKA was designated in 2020 as the successor of

the National Centre for the Environment and Sustainable Development (EKPAΑ) with administrative and financial independence (law 4685/2020). Its executive board was nominated in August 2020. It is in charge of the implementation of the policy defined by the Ministry of the Environment and Energy in terms of the management of protected areas in Greece, the conservation of biodiversity and the promotion and implementation of actions for sustainable development and the fight against climate change. As such, it supports natural state monitoring networks and collects and processes data on the environment and climate change. It also aims to coordinate and centralise the management of protected areas, which are led by a variety of public and private entities (WWF, 2014). It publishes updated thematic reports on the State of the environment on biodiversity, on the management of water resources, climate change, waste management (in Greek).

Hellenic Centre for Marine Research (HCMR-HNODC)

Based in Attika, the Hellenic Centre for Marine Research of the Institute of Oceanography (<https://hnodc.hcmr.gr/about-us/>) was founded in 1986. This agency is a national facility for international data and information exchange. Its missions are the acquisition, formatting, quality control, cataloging, archiving, dissemination and exchange of marine data and information. It promotes the international exchange of data within the framework of its cooperation with the UNESCO Intergovernmental Oceanographic Commission (IOC) and is responsible for the coordination of the international exchange of data (IODE) in Greece. HNODC is connected to the National Academic network with a 1 Gbps fiber optic line. The network is protected by a firewall and an IDS system and is monitored using the Nagios monitoring system. Remote access, VPN services and cloud storage service are also provided. A volume of over 320,000 station data relating to physical, chemical and biological oceanographic information is stored. HNODC provides access to numerous online databases on a centralised server (http://mapserver.ath.hcmr.gr/pagin/v27/index_new.php), as well as specialised national databases (The National Observation System Database - EDIOS, which provides access to marine observation information in the eastern Mediterranean and the Black Sea; the National Cruise Summary Report Database - describes the oceanographic cruise carried out by Hellenic ships and reported to HNODC by scientists.)

HNODC is part of the international network of NODCs, operating within the framework of IOC/IODE; SeaDataNet; EMODnet Seabed Mapping; ODIP. The HNODC database currently hosts data from the POSEIDON system (<http://poseidon.hcmr.gr/>) which is a monitoring, forecasting and information system for Greek seas. Poseidon is based on an established network of observation buoys. The network of observation buoys continuously records the physical, biological and chemical parameters of the Greek seas. These data are then transmitted to the operational centre where they are sorted and fed into forecast models. The Centre makes accessible CD-Roms of data, scientific articles in PDF format, as well as reports.

Local level observatories

Coastal Zone Observatory of Kavala Municipality

The Coastal Zone Observatory of Kavala Municipality (*Παρατηρητήριο Παρακτίας Ζώνης, Δήμος Καβάλας*) (<https://kavala.gov.gr/gia-tous-dimotes/symmetexw/paratitirio-paraktias-zwnis?lang=en-gb>) aims to assist the daily operations of the Municipality, by collecting, analyzing and processing historical, present and forecast ICZM datasets on the environment, socio-economic, and legal institutions collected from various sources. The data is presented in a series of structured layers imported into a Geographic Information System (GIS) web-based environment, to help decision-makers at municipal, regional and national levels formulate policies on ICZM issues; provide reliable data sets to scientists and engineers; involve active citizens and the general public in the problems of coastal areas; promote the dissemination of information among coastal managers, stakeholders and the general public. The coastal zone of the Municipality of Kavala (i.e. 500 meters on either side of the

coast). Static data sets such as topographic, bathymetric, geological base maps, urban and rural planning maps, local municipal laws, public networks and places of public interest were digitised and integrated into the system. Historical environmental data as well as dynamic data produced daily by a series of operational models (meteorological, hydrological, hydrodynamic, waves and eutrophication) and climate change datasets. Mussel farmers of the Gulf of Kavala, the local port authority and decision-makers on the location of seaplane landing zones are the main user groups of the ICZM Observatory. Data are available online⁵¹.

[in the making] Environmental Observatory of Agrinio Municipality

The project concerning the “Environmental Observatory of Agrinio Municipality” (*Περιβαλλοντικό Παρατηρητήριο στο Δήμο Αγρινίου*) (<https://sinidisi.gr/espas-dytikis-elladas-perivallontiko-paratiririo-dimo-agrinioy/>) was included in the Western Greece CRSN with a budget of 291,400 EUR. The operation includes the following subsystems: air pollution monitoring system; water quality monitoring system; environmental monitoring system using near real-time satellite data; performance appraisal system using quantitative indicators; data portal, studies and open environmental data; a platform for communication and participatory land use planning. On March 2020, the Mayor of Agrinio announced an open call for tenders, above the limits, in accordance with the provisions of law 4412/2016, for the supply, installation and operation of the Environmental Observatory of Agrinio Municipality with a budget of 235,000 EUR.

Observatories members of LTER-Greece

Greek Long-Term Ecosystem Research Network (LTER-Greece)

LTER-Greece (<https://www.lter-greece.gr/en/home/>) is a national network founded in 2017, member of the European Long-Term Ecosystem Research Network (LTER-Europe) and of the International Long-Term Ecological Research Network (ILTER). Its collaborative network of scientists and their stakeholders engaged in long-term, site-based ecological, social and economic research in Greece. Its missions are to deliver to the scientific community, policy-makers, and society in general scientific information and predictive understanding of ecological and socio-economic processes. It monitors the evolution of selected ecosystems through the collection and analysis of long-term environmental data. Data collected are ecological, social and economic. LTER-Greece operates with the EU, the HCMR, the National Technical University of Athens, the Navarino Environmental Observatory, Samaria National Park, the Technical University of Crete, the University of Crete, the University of the Aegean, the Hellenic Agricultural Organisation (DIMITRA).

Koiliaris Critical Zone Observatory (CZO)

The Koiliaris Critical Zone Observatory of the Technical University of Crete (<https://www.koiliaris-czo.tuc.gr/>) was founded in 2004. Critical Zone Observatories focus on severely degraded soils due to a significant agricultural impact such as grazing. The Koiliaris Critical Zone Observatory focuses on Mediterranean mixed land ecosystem (forest, grassland, rural, touristic), around the Koiliaris River watershed. It operates within an area of 130 km², within 17 localities. It collects data on biodiversity, terrestrial ecology, sediment chemistry, soil chemistry, soil solution chemistry, water chemistry, geology, hydrology hydrography, agriculture, meteorology, climatology, climate monitoring, history, land use history

Past projects:

- SoilTrec⁵² (2009-2014) Soil Transformations in European Catchments, Funded by EU,

⁵¹ <https://dkavalas.maps.arcgis.com/apps/PublicGallery/index.html?appid=f3c948945d1f488991c9de8b6960e82d>

⁵² <https://esdac.jrc.ec.europa.eu/projects/SoilTrec/>

- EnviNET (2010-2013, Intelligent Environmental Sensor Network with Adaptive Sampling, funded by Ministry of Education, EPEAEK Programme);
- FloodRisk (Funded by: Ministry of Education, EPEAEK Programme - 2010-2013)

A list of scientific publications is accessible online, as well as summary sheets of results per research projects.

Samothraki Nature Observatory (SNO)

The Samothraki Nature Observatory (<http://samothraki-observatory.hcmr.gr/>) was born in 2013 from the cooperation between the HCMR and the Municipality of Samothraki. It is an ecosystem observatory and linking-network among scientists and the local community on Samothraki Island. Its missions are the establishment of a research station for systematic research and long-term monitoring of the natural environment and biodiversity, to contribute to the management and protection of natural resources and biodiversity. The SNO organises summer schools every year. It uses the facilities of the Institute of Marine Biological Resources and Inland waters (IMBRIW) and meteorological station (placed by HCMR). Scientists from various universities participate (Universität Klagenfurt, Austria; University of Waterloo, Canada; Institut für Soziale Ökologie, Vienne; Université de Lisbonne; Université de Patras). It collects data on water chemistry, hydro-meteorology, freshwater biology, riparian ecosystems, landscape assessments, wetlands, coastal ecological status, integrated coastal zone management, soil erosion, and windfarms. Scientists from the HCMR's Institute of Marine Biological Resources & Inland Waters (IMBRIW, <http://imbriw.hcmr.gr/en/>) have been focusing on Samothraki's water resources for the last twenty years (Skoulidakis et al. 2014) in the framework of European Research Projects (AQEM & STAR, 1999-2002). It publishes the results of various research programmes, technical reports and scientific articles.

Its main partners are the Hellenic Centre for Marine Research, and Samothraki Municipality. Numerous projects are implemented:

- SamoMAB (2017-2020) - Water Metabolism and Water Management in Samothraki Island. Financed by Austrian Academy of Sciences;
- National Ecological Quality Monitoring Programme (WFD, 2012-2015)
- Contribution to a proposal to designate the island as a UNESCO 'Man and Biosphere Reserve' (Cooperation with the Institute for Social Ecology, Vienna, Alpen Adria University)
- Establishment of the "Samothraki Nature Observatory" (since 2013);
- Monitoring and Recording of the Water Status (Quality, Quantity, Pressures, Use) in Greece (WFD, 2018-2023).

Navarino Environmental Observatory

The Navarino Environmental Observatory (<https://www.navarinoneo.se/>) was formed in 2010 by Stockholm University, the Academy of Athens (BRFAA) and TEMES S.A. It is an international cooperation between academia and the private sector for research and education on climate change and its impacts on the natural environment and human activities in the Mediterranean region. It collects data on the Mediterranean coastal ecosystem (coastal zone, wetland-agricultural ecosystems); atmospheric composition, water research through an observation station and an equipped laboratory. NEO has become a member of ACTRIS, the European Research Infrastructure for the observation of Aerosol, Clouds and Trace Gases; GWEN, a Global Wetland

Ecohydrology Network, and LTER-Greece, the Greek Long-term Ecosystem Research Network. It receives private and public funding. It publishes annual reports, frequent newsletters, publications of scientific articles.

Lesvos Biodiversity Observatory

Founded in 2002, the Lesvos Biodiversity Observatory (<https://deims.org/5a29e045-e8e0-49bc-b60c-fe640389aa8f>) of the University of the Aegean operates on the Island of Lesvos. It collects data on biodiversity, species diversity, marine ecology, soil chemistry, geology, meteorology, climatology, climate monitoring. Metadata access is available online⁵³. It is part of the ILTER, LTER Europe and LTER Greece.

Athens Hydrological Observatory

The Athens Hydrological Observatory of the National Technical University of Athens (<http://hoa.ntua.gr/>) was founded in 2005. It operates environmental monitoring, basic and applied research. It collects data on rainfall, temperature, relative humidity, evaporation, air pressure, solar radiation, sunshine duration, wind direction and velocity. Its monitoring network is equipped with 11 fully-automated hydrometeorological stations, 3 conventional rain gauges and 4 fully-automated streamflow gauges in the broader Athens area. It covers an area of approximately 700 km² and an “experimental” catchment in eastern Attica, covering an area of 15.18 km². NTUA's hydrological monitoring network is operational since 2005.

AGIAOBS - Pinios Hydrological Observatory

The Pinios Hydrological Observatory⁵⁴ was founded in 2015 by the Greek Agricultural Organization, DEMETER, Forschungszentrum Jülich. It focuses on rural ecosystem by collecting data on agriculture, hydrography, chemistry, meteorology. Its facilities include three fully equipped precipitation and climate stations; a wireless sensor network for measuring spatial soil water content variability as a data basis for determining vegetation specific evapotranspiration parameters, and a groundwater observation network and pumping wells for determining hydraulic parameters and seasonal patterns of groundwater velocity in the transition zone. It covers an area of about 45 km² around the River Pinios Basin. It is part of the European network of hydrological observatories (Enoha). Data is accessible through LTER⁵⁵.

Laboratories and research centres

Institute for Environmental research and sustainable development (IERSD)

Part of the National Observatory of Athens (<http://www.iersd.noa.gr/projects.html>), founded in the 1850s, the IERSD is responsible for the study of the environment following an integrated/multidisciplinary approach. Its main activities are the extension of its nation-wide weather monitoring networks and the development of reliable databases; integrated monitoring of environmental pressures, focusing on atmospheric quality; the development of tools and methodologies for the analysis of future climate projections in Europe/the Mediterranean Basin, the estimation of the impacts of climate change and the assessment of adaptation and mitigation strategies. The Institute collects data through its atmospheric chemistry laboratory, the Laboratory for Meteorological Devices Calibration, its historical meteorological station (Thissio site) operating since 1858; two actinometric stations (Thissio and Penteli sites), a network of 255 automated surface meteorological stations deployed throughout Greece; a network (ZEUS) of six VLF lightning detectors. It measures precipitation,

⁵³ <https://deims.org/pycsw/catalogue/csw?verb=GetRecord&metadataPrefix=iso19139&identifier=b426ea65-7ce8-52c2-b20a-804c77177c37>

⁵⁴ http://teodoor.icg.kfa-juelich.de/ddp/dispatch?sosurls=Agia%2Chttp%3A//ibg3wradar.ibg.kfa-juelich.de%3A8080/agia_quality/sos&autozoom=lomeparu

⁵⁵ <https://b2share.eudat.eu/records/2881c2d899454519b52d7594979c9c9a>

air quality, solar radiation, energy, environmental monitoring, atmospheric pollution and greenhouse gas emissions. Papers published by the Institute are listed on the website. Data on climate change are available online (<http://www.iersd.noa.gr/oikoskopio/index.php?lng=en-US>) as well as data on weather and solar radiation (<http://meteosearch.meteo.gr/>).

AEGIS Coastal Environmental Observatory

The AEGIS Coastal Environmental Observatory (<https://www.mar.aegean.gr/>) is part of the Department of Oceanography and Marine Life Sciences of the University of the Aegean. Its missions are to support in the North Aegean Region the creation and operation of diving parks and underwater tourist routes; create a promotion and registration file for products with Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI) (for example Kalloni sardines); provide immediate response to coastal environmental crises; offer services for recording environmental data and fingerprints of coastal activities and/or climate change required by European (eg 2008/56 / EC) and national (eg Official Journal 3983/2011) legislation; provide the general public with high quality commercial forecasts of the marine situation (e.g. temperature, salinity, currents) via the TET website and the POSEIDON system (ELKETHE); support infrastructure projects (eg water reservoirs, coastal protection projects) ; contribute to civil protection; contribute to coastal protection against pollution, search and rescue ; locate and support the uses of marine and coastal space (aquaculture, fishing, marine wind farms, underwater aggregates, water sports). Data of physical and chemical oceanography is collected through a mobile observatory, remote sensing, standard continuous surveillance infrastructures, sea state production; information and education office. It publishes scientific papers.

Citizen science

Ionian Dolphin Project (Tethys Institute)

The Ionian Dolphin Project (<https://www.ioniandolphinsproject.org/>) is a citizen-science programme for the research and conservation of dolphins and Mediterranean monk seals in the Ionian Sea, Greece. Led by the Tethys Institute since 1991, it aims to ensure the long-term viability of marine mammals living in coastal waters of the eastern Ionian Sea. Its mission is to ensure a "continued monitoring of marine mammals through field research methods including boat surveys and individual photo-identification, to detect population trends and identify critical habitat; dissemination of information in the scientific literature and delivery of management proposals to international agreements and bodies concerned with the protection of marine biodiversity". Observations are made on different portals of the website of the project. Since 1991, over 1,500 non-specialists from more than forty countries have participated in the Ionian Dolphin Project.

Monitoring activities within MPAs

National Marine Park of Alonissos and Northern Sporades (NMPANS)

The first MPA of the country, the National Marine Park of Alonissos and Northern Sporades (NMPANS) (<https://alonissos.gr/en/marine-park/overview.html>) is also one of the largest MPAs of Europe. It was established in 1992 by Presidential Decree. Its management body was founded in 2003. The law 4519/2018 defines new areas under NMPANS responsibility. This MPA's objectives are the protection of one of the most important Mediterranean monk seal (*Monachus monachus*) populations and the biotopes of other rare and threatened species of flora and fauna; the protection, conservation and management of wildlife, natural landscapes, cultural heritage and fisheries resources; and the effective management of human activities impacts, aiming at preserving and restoring the natural ecosystem and the cultural heritage.

Its missions are to implement a scientific programme for monitoring the environmental condition of NMPANS and in particular the population of the Mediterranean monk seal and its habitats, in the wider area of the Marine Park; develop monitoring, surveillance and guarding of the Park; deliver environmental education, information and public awareness and information for visitors and users of the Park; to inform and organise the cooperation of all stakeholders in the operation and management of NMPANS. In 2007, trained scientific and technical staff were hired by the management body of the National Marine Park, registered in Alonissos, for the implementation of protection and research programmes, as well as public awareness and sensitisation campaigns. A five-year management plan is also in the course of preparation. It is a member of MedPAN. Studies developed on the MPA are available online⁵⁶.

MPA of Messolonghi-Aetoliko Lagoons, estuaries of Acheloos, Evinos and Echinades Islands

Listed as a Ramsar site in 1975, the Messolonghi-Aetoliko Lagoons (<https://www.fdlmes.gr/>) and the estuaries of the Acheloos, Evinos and Echinades Islands became a National Park in 2006. It is also a Natura 2000 site. Its management agency is a semipublic organisation supervised by the Hellenic Ministry of Environment Energy and Climate Change. Its staff proposes and implements projects for the protection and promotion of the territory; monitors the quality factors of the natural environment and develops public awareness. Its facilities include boats and rooms for classes and research labs. The MPA monitors and evaluates the state of lagoon, lake and river ecosystems; collects data on sea turtles; conducts impact studies on fish breeding farms, mapping of fish farming infrastructure and seabed cartography. Its projects are funded by Green Funds, the EU and the EZMA. Data are available online (<https://www.fdlmes.gr/2014-06-26-20-01-48.html>). It is member of MedPAN.

Two ongoing research programmes:

- 2020: subsidisation of environmental monitoring activities which provides for the creation of a database for matters of competence and interest of the management agency, which will include geospatial and meteorological data, studies and a bibliography;
- 2019-2023: the creation of a database for matters of competence and interest of the management agency, which will include geospatial and meteorological data, studies, a bibliography, etc.

Zakynthos Marine Park

This national park was founded in 1999 to protect *Caretta-caretta* sea turtles (http://www.nmp-zak.org/index.php?l=EN&t=content&pn=home&r=home_menu). It is part of Natura 2000 and a member of MedPAN. The Zakynthos Marine Park must defend the particular fauna of the southern part of the island. It developed a series of programmes and actions, such as scientific monitoring programme; the environmental education programme; actions for the development of tourism; actions for the preservation of traditional uses (fishing, grazing, agriculture, etc.); and actions for the preservation of the natural and cultural landscape. It leads various scientific monitoring programmes, like the recording of sea turtle activity in parts of the marine area of Laganas Bay. Data is gathered in a special database connected to GIS. The Park publishes scientific articles, pedagogical material and books.

Ongoing projects:

- The park is part of the European project MPA Engage (2019-2022)⁵⁷, for the establishment of

⁵⁶ https://www.researchgate.net/publication/332538725_The_National_Marine_Park_of_Alonissos_Northern_Sporades

⁵⁷ <https://futureoceanslab.org/mpa-engage/>

scientific protocols to monitor the effects of climate change and the assessment of the vulnerability of biodiversity.

- It benefits from the programme “Ionian Islands 2014-2020”⁵⁸ for the creation/updating of information material to include information with new scientific data obtained through scientific monitoring studies).
- It is part of the Interreg IPA II Cross-border Cooperation Programme “Greece – Albania 2014–2020”⁵⁹ (Blue Coast);
- It was also part of the programme CIGESMED (2013-2016)⁶⁰ led by the University of the Aegean and the Hellenic Centre for Marine Research, which enabled the creation of the underwater research station at ETHPZ for long-term coral monitoring, at CMET.

Environmental monitoring programmes

National monitoring programme for the quality of surface waters

This programme is led by six General Chemical State Laboratories (G.C.S.L.) (<http://nmwn.ypeka.gr/>). They monitor physico-chemical and microbiological variables in surface and coastal waters of their prefectures within the framework of national monitoring networks and in accordance with EU directives. These laboratories take the samples, carry out the analyses and report the information to the Ministry of the Environment. It also includes monitoring of coastal waters. The monitoring programme was initiated in 1993 but is not yet in normal operating order (EEA, 2017).

The PORTODIMARE Project (Interreg/UE, 2018-2020)

The PORTODIMARE⁶¹ (Geoportal tools and data for sustainable coastal and marine environment management) Project aims to create a common platform (Geoportal) for data, information and tools centred on the coastal regions and the Adriatic-Ionian Seas, integrating existing databases, portals and tools developed in previous EU funded projects (SHAPE, ADRIPLAN, etc.). The activities of the Project are to implement a unique virtual space (Geoportal) where most of the knowledge and resources available on the coastal and marine areas in the region of the Adriatic-Ionian Seas will be available for decision-makers, scientific and professional institutions and all other interests. The main outcome of the Project is the design and implementation of the Geoportal - a permanently open platform that provides access to all the information, data and tools necessary and relevant for the sustainable development and strategic planning of coastal and marine areas from the region of the Adriatic-Ionian Seas. Eleven partners from 6 countries (Italy, Greece, Slovenia, Montenegro, Croatia and Bosnia-Herzegovina) are participating in the project. The Hellenic Centre for Marine Research is the partner for this Project in Greece.

⁵⁸ https://www.euro-access.eu/calls/rop_ionian_islands_2014-2020

⁵⁹ <https://interreg.eu/programme/interreg-greece-albania/>

⁶⁰ <http://www.cigesmed.eu/-CIGESMED-final-meeting-2016->

⁶¹ <https://www.msp-platform.eu/projects/portodimare-geoportal-tools-data-sustainable-management-coastal-and-marine>

Mediterranean Pollution Monitoring and Research Programme (MED POL/UNEP)

The National Centre for Marine Research takes part in the Mediterranean Pollution Monitoring and Research Programme (MED POL/UNEP). It carries out an extensive programme of monitoring pollution variables in the Aegean and the Ionian Seas and in the Saronic Gulf. This programme has been in operation since 1985 with approximately 4 samples per year and includes measurement of general water quality variables and heavy metals in biota (EEA, 2017).

Environmental information systems

GEODATA.gov.gr

GEODATA⁶² has operated since 2010 as the first data directory of the country following the INSPIRE directive. It contains 247 datasets (last one published on May 22, 2020). It gathers various data on the environment, town planning, land use planning and socioeconomic data. The participating organisations are as follows: decentralised administration of the Peloponnese, western Greece and the Ionian Sea; AD of Epirus; General Secretariat of Civil Protection; Special Secretariat for Water; DIAZOMA Association; 3rd Thessalonica Laboratory Centre; National Land Registry and Mapping SA; Greek Statistical Authority; Messolonghi Lagoon Management Agency; Oiti National Park Management Agency; VikosAaos and Pindos National Parks Management Agency; Hydroscope; CRES - Centre for Renewable Sources and Energy Savings; different communes and municipalities; OKHE Hellenic Organisation for Cadastre and Cartography; ORSA: Athens Organisation for Planning and Environmental Protection; the Ministry of Culture, Education and Religion; the Ministry of Productive Reconstruction, Environment and Energy; the Ministry of the Interior and Administrative Reconstruction.

POSEIDON System

POSEIDON⁶³ is a marine monitoring and forecasting system led by the HCMR. It aims to improve environmental surveillance and facilitate sea transport, rescue and safety of life at sea, fishing and aquaculture, as well as the protection of the marine ecosystem. It established a network of observation buoys and created a specialised operational centre for the processing of the data collected and the production of forecasts. The network of observation buoys records continuously the physical, biological and chemical parameters of the Greek seas. Those data are then transmitted to the operational centre. It provides oil spill drift services, weather forecast, sea state forecast, sea level forecast and ecosystem forecasts. Its database is available online. This marine monitoring system participated in EuroGOOS, MonGOOS, Copernicus, EuroArgo and GreekArgo.

Integrated Monitoring System and Recording System for Fishing Activities

The Integrated Monitoring and Recording System for Fishing Activities (<http://www.alieia.minagric.gr/?q=ospa>) has been led by the Ministry of Agriculture since 2014. It gathers data on fishing, aquaculture and biodiversity and is accessible on a webportal (in Greek).

⁶² <https://geodata.gov.gr/group/17c96f5c-9e24-4ab2-b269-2ceea05e271d?resformat=shapefile&tags=%CE%BA%CE%BF%CE%BB%CE%8D%CE%BC%CE%B2%CE%B7%CE%83%CE%B7>

⁶³ <http://poseidon.hcmr.gr/>

Bibliography

European Commission, 2019. "The Environmental Implementation Review 2019. Country Report: Greece". 34 pages. URL: https://ec.europa.eu/environment/eir/pdf/report_el_en.pdf

European Environment Agency, 2017. "Surface water quality monitoring - summary: Greece". 4 pages. URL: <https://www.eea.europa.eu/publications/92-9167-001-4/page010.html> (Accessed on 2/12/2020)

National Center for the Environment and Sustainable Development, 2018. "Greece State of the Environment Report Summary 2018". 126 pages. URL : https://ekpa.ypeka.gr/wp-content/uploads/2019/10/Greece-State-of-the-Environment-Report-Summary-2018-English-Version_WEB.pdf

Valavanidis, Athanasios, 2018. "Environmental Pollution of Marine and Coastal Areas in Greece. Review on marine pollution, monitoring and quality of seawater", Department of Chemistry, National and Kapodistrian University of Athens. 31 pages.

WWF, 2014. "Environmental legislation in Greece". 28 pages. URL: <https://www.contentarchive.wwf.gr/images/pdfs/WWF-NOMOreport-2014-summary-ENG.pdf> (Accessed on 02/12/2020)

Israel

I. General overview

Israel's national monitoring plan has been operating since 1978 but focused mainly on chemical and physical aspects, with only a minor portion concerning biological aspects. Through its commitment for the conservation of marine biodiversity and protection from pollution, Israel has extended biodiversity monitoring. In 2017, a revised, IMAP-based National Monitoring Plan for the Mediterranean marine environment was developed by the Israel Oceanographic and Limnological Research Institute (IOLR) and approved by the government, owing to the Israel Ministry of Environmental Protection (MoEP) and the Ministry of Energy. Israel is also engaged in deep-water monitoring and developed the first deep-sea mooring station in the eastern Levantine Basin. Israel also has a comprehensive web of compliance monitoring programmes as required by discharge permits, business licenses, oil and gas leases and sediment dumping permits. The Israeli Nature and Parks Authority (INPA) performs additional biodiversity monitoring in established and planned marine reserves. Israel's Ministry of Agriculture and Rural Development has a fishery monitoring programme of landed catch. Lastly, owing to its Marine Data Centre (ISRAMAR), Israel shares oceanographic data which is broadly available to the public.

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Law 5772-2012	The Protection of the Environment (Releases and Transfers to the Environment Reporting and Registering Obligations) law, 5772-2012: it imposes reporting obligations on facilities that have a significant impact on the environment. The appendix to the law includes a list of 114 pollutants and seventy-four activities by several industrial sectors requiring reporting. This information is publicly accessible on an internet-based PRTR.
Law 5723-1963	This law relates to the National Parks and Nature Reserve: it sets out provisions for the establishment of several public bodies for the administration of national parks and nature reserves and for the declaration of parks and reserves.
Section 33 of law 5758-1998 and 5765-2005 Proclamation	This Section of the law 5758 relates to national parks, nature reserves, national sites and memorial sites (Protected Natural Assets): this Proclamation, under the 1998 law, provides that scientists in the Nature and Parks Authority, in cooperation with academic experts, prepare an updated list on the basis of scientific surveys and research, including the information compiled for Israel's Red Data Book on Vertebrates and its Red List of wild plants.
Law 5764-2004 and its 2008 amendment	This law relates to the Protection of the Coastal Environment: it aims to protect the coastal environment, its natural and heritage assets, to restore and conserve them as a resource of unique value, and to prevent and reduce as far as possible any damage to them. Its 2008 amendment provides regulations for seacoast water surveys and monitoring.

Ordinance 5740-1980	Ordinance on the Prevention of Seawater Pollution by Oil (New Version): this law provides the legal basis for controlling marine oil pollution.
Regulations 5744-1983	Prevention of Sea Pollution (Dumping Waste): these regulations relate to dumping permits granted by the Permits Issue Committee. It details procedures of permit applications, types of permits, permit conditions (e.g., nature and quantity of the material, method of packaging, method of dumping, special precautions), monitoring requirements, and reporting procedures.
Law 5719-1959	Water law: the law establishes a framework for the control and protection of Israel's water resources, and it gives the inspectors of the Marine and Coastal Environment Division of the Ministry of Environmental Protection various enforcement powers including monitoring.
Law 5744-1994	Maintenance of Cleanliness law. Prohibits disposal of waste into the public domain, establishes a system of penalties and fines, and creates a cleanliness fund whose purpose is to provide budgets for educational activities, inspections and enforcement of the cleanliness laws which includes monitoring. It gives the inspectors of the Marine and Coastal Environment Division of the Ministry of Environmental Protection enforcement powers including monitoring.
Law 5728-1968	Licensing of Businesses law: the law authorises the Minister of the Interior, in consultation with the Minister of Environmental Protection, to designate and define those businesses requiring a license, in order to ensure appropriate sanitary conditions; the prevention of nuisances and compliance planning and building regulations. This law gives the inspectors of the Marine and Coastal Environment Division of the Ministry of Environmental Protection enforcement powers including monitoring.
Law 5753-1993	Hazardous Substances law: provides the Ministry of Environmental Protection with the authority for comprehensive management of hazardous substances, including the manufacture, import, export, packaging, commerce, issue, transfer, storage and use of hazardous substances. The law gives the inspectors of the Marine and Coastal Environment Division of the Ministry of Environmental Protection enforcement powers including monitoring.
Ports Ordinance of 1975	Ports (Loading and Unloading of Oil) Ordinance: defines notification and record-keeping requirements of all tanker vessels entering Israel's territorial waters and ports. This Ordinance also specifies the activities that are to be carried out at port terminal facilities regarding loading and unloading of oils, ballast waters, and wastes. The Ordinance requires removal of ballast waters to a terminal holding/treatment installation and prohibits dumping of oil-containing materials to the sea. In addition, the Ordinance gives the inspectors of the Marine and Coastal Environment Division of the Ministry of Environmental Protection enforcement powers including monitoring.
Ports Ordinance of 1971	Ports Ordinance (New Version): prescribes the proper operation of a port, including powers and functions of port officers, licensing requirements, and delivery and handling of goods. The Ordinance gives the inspectors of the Marine and Coastal Environment Division of the Ministry of Environmental Protection enforcement powers including monitoring.

Ports Ordinance of 2010	Ports Ordinance (Prohibition of waste disposal from vessels): regulation that provides powers of enforcement and monitoring on vessels in ports.
Law 5748-1988	Law on the Prevention of Sea Pollution from Land-Based Sources: prohibits unpermitted disposal of wastes or sewage to the sea. Permits are issued by a committee consisting of representatives from various government ministries. This law also defines the powers of inspectors under the Ministry of Environmental Protection, and establishes penalties for contravention of the provisions of the law. The law gives the inspectors of the Marine and Coastal Environment Division of the Ministry of Environmental Protection enforcement powers including monitoring
Regulation 5743-1983	Prevention of Seawater Pollution (Marine Environment Protection Fee): the regulation imposes a fee on the owners of vessels, according to the size and nature of the vessel, on terminals (apparatus used for mooring vessels for the transfer of oil between coastal installations and vessels). Fees collected will be paid into the Fund for the Prevention of Sea Water Pollution. The fund supports monitoring among other activities.
Ordinance of 1937 as amended in 1939, 1944, and 1946.	Fishing Ordinance: this includes fishery management and conservation; marine fisheries; foreign fishing; landing; fishing gear/ fishing method; marine mammals; enforcement/compliance; offences/ penalties; fishing permits; port measures; hunting/capture; turtles.
Law, 5771-2011	Environmental Protection (Inspection and Enforcement Authorities) law: this law authorises the Minister of Environmental Protection to appoint inspectors for the investigation of violations of various environmental laws. The law further provides the inspectors with supervision and enforcement authority. Accordingly, they are authorised to request any person to provide identification and any relevant information and documents, conduct measurements, and take samples.

Government environmental institutions

Israel Ministry of Environmental Protection (MoEP) (https://www.gov.il/he/departments/ministry_of_environmental_protection). This Ministry was formed in 1988 and operates on three levels: national, regional and local. At the national level, it is responsible for the formulation of a nationwide integrated policy for the protection of the environment. At the regional level, through its six districts, it oversees the implementation of the national environmental policy, engages in local planning processes, assists municipalities with their environmental responsibilities. Lastly, at the local level, the Ministry lends support to environmental units and towns associations that have been established in municipalities throughout the country. The Ministry publishes the Israel Environment Bulletin periodically. It also provides reports on scientific research studies,

reports published for internal purposes, government plans, explanatory pamphlets and booklets, and reports that are submitted to international organisations that contain environmental monitoring data and analyses. All compliance and national monitoring programmes are found on the Ministry's website. The programmes are mapped on the GovMap GIS platform⁶⁴ with links to the reports of each programme.

Marine and Coastal Environment Division of the Ministry of the Environment / תימיההביבסהתנגהלתיצראהדיחיה, הביבסהתנגהלדרשמה (https://www.gov.il/en/Departments/Units/marine_environment_protection_unit). This Division is focused on protecting the seas and beaches of the Mediterranean Sea, the Gulf of Eilat, and the Dead Sea. It is responsible for the coordination of sea monitoring programmes and of research and information on the marine environment; the prevention of marine pollution and the planning and supervision of coastal environmental protection.

Ministry of Energy / היגרנאה דרשמ (<http://www.energy-sea.gov.il/English-Site>). This Ministry was established in 1977 and is responsible for the supply of energy and management of natural resources of the State of Israel. The main objectives of the Ministry are to regulate and manage the supply of electricity, liquid fuels, natural gas, energy conservation, exploration and production of oil and gas, mineral and ore mining and more' (official website of the Ministry). The Ministry also provides geoscience datasets and maps on its website. There is a large amount of information collected, including 2D and 3D seismic reflection surveys, gravity and magnetic surveys and bathymetric data. These datasets are stored and managed by the Petroleum Unit of the Ministry of Energy and its affiliated research centres, the GSI and the GII⁶⁵. The Ministry's Chief Scientist co-chairs, together with the Chief Scientist of the Ministry of Environmental Protection, the Inter-Governmental Board of the National Monitoring Programme for the Mediterranean Sea and funds half the costs of the programme.

Ministry of Science and Technology / היגולונכטהועדמהדרשמ: This Ministry issues an annual call for scientific studies that are based on monitoring results for the development of novel and applicable marine monitoring protocols and technologies.

Monitoring institutions/observatories

National agencies

Israel Nature and Parks Authority (INPA)

The Israel Nature and Parks Authority (INPA) (<https://www.parks.org.il/en/about/>) is a government agency established by law in 1998, and it enforces the law of 1998 on National Parks, Nature Reserves, National Sites and Memorial Sites and the law of 1955 on Wildlife Protection. The INPA is also in charge of overseeing and managing marine protected areas (MPAs) and of enforcing all fishing regulations inside and outside the MPAs. In the Mediterranean Sea, the INPA conducts surveys of a wide variety of habitats and species and examines the impact of marine reserves on the fauna and flora both inside their boundaries and in the surrounding areas. The INPA also represents Israel in diverse international networks and data infrastructures, among them the Global Biodiversity Information Facility (GBIF), where they maintain a dataset on biodiversity in Israel, which is also available online (<https://www.biogis.huji.ac.il/>). As part of their monitoring programme, the INPA performs intensive and simultaneous sampling and documentation of various taxonomic groups (fish, invertebrates, and algae), assisted by the IOLR, Haifa University and Tel Aviv University. The monitoring programme has been ongoing since 2015, inside MPAs and also at control sites outside them. The control sites have similar substrate characteristics in terms of depth, type (rocky), and complexity.

⁶⁴ https://www.gov.il/he/Departments/Guides/marine_environment_monitoring?chapterIndex=4

⁶⁵ <http://www.energy-sea.gov.il/English-Site/Pages/Data%20and%20Maps/Data-sources.aspx>

Laboratories and research structures

Israel Oceanographic and Limnological Research (IOLR) Institute

The Israel Oceanographic and Limnological Research (IOLR) Institute (<https://naf-iolr.org.il/>) was established in 1967, to generate knowledge for the sustainable use and protection of Israel's marine, coastal and freshwater resources. It conducts scientific research in the fields of oceanography, mariculture and marine biotechnology. IOLR is affiliated with the Earth Sciences Research Administration of the Ministry of Energy and includes three research centres. It is also part of the European Marine Research Network. IOLR's focus is on research, but also on monitoring and assessment of the environmental status of neighbouring seas, predicting their response to human and natural disturbances. This programme of research, environmental monitoring and technology development bridges many scientific disciplines. It has a national repository for oceanographic data: the Israel Marine Data Centre (ISRAMAR) (see below).

Natural Resources and Environmental Research Centre (NRERC)

The Natural Resources and Environmental Research Centre (NRERC) (<https://nrerc.haifa.ac.il/>) of Haifa University was established in 1985, to carry out interdisciplinary research in the area of natural resources and environmental resource management. It was the first scientific organisation dealing with the socio-economic aspects of the environment in Israel. It conducts studies in the areas of environmental resource management (water and air quality, solid waste, noise pollution, preservation of natural areas and open spaces), and natural resource management (depleting and renewable resources: water, energy, non-fuel minerals).

Deep Sea Research Station – DeepLev

The Deep Sea Research Station (DeepLev), was a project first launched in November 2017, that led to the creation of the first deep-sea mooring station in the eastern Levantine basin and Israel's permanent marine research station to study the Mediterranean Sea. It is moored fifty kilometres from the Haifa coast at a depth of 1,500 meters. The Research Station is run primarily by staff from Bar-Ilan University (Faculty of Life Sciences) and the Israel Oceanographic and Limnological Research (IOLR) Institute. DeepLev monitors environmental changes in the open Mediterranean Sea that may be the result of global warming or gas drilling. The water in the Mediterranean Sea is unusually warm, so DeepLev's research will be important as ocean temperatures around the world continue to rise due to global warming. The station contains many measuring instruments enabling continuous study of the physical and ecological system in the eastern Mediterranean Sea⁶⁶.

Steinhardt Museum of Natural History – Tel Aviv University

The Steinhardt Museum of Natural History (<https://smnh.tau.ac.il/en/research/>) is a national enterprise operating under the auspices of the Israel Academy of Sciences and Humanities, a National Research Infrastructure recognised by the National Council for Research and Development, and a Knowledge Centre for Biology, Environment and Agriculture recognised by the Ministry of Science and Technology. The Museum's collections are utilised for academic and applied research, as well as public education. Having brought together collections assembled over decades, the Steinhardt Museum is now able to offer millions of items that document the fauna and flora of the eastern Mediterranean Sea in the past century, alongside the history and development of the human species. The Museum's collections and teams are divided into six groups: Terrestrial vertebrates; Entomology; Aquatic & marine; Herbarium; Paleobiology; and the Dan David Centre. Additionally, the Steinhardt

⁶⁶ Timor Katz and al. (2020). "The first deep-sea mooring station in the eastern Levantine basin (DeepLev), outlines and provides insights into regional sedimentological processes, Deep Sea Research Part II": *Topical Studies in Oceanography*, Volume 171, <https://doi.org/10.1016/j.dsr2.2019.104663>.

Museum is home to three applied policy-relevant centres: the Open Landscape Institute; HaMaarag, Israel's Terrestrial National Ecosystem Assessment Programme; and the Israel Centre for Aquatic Ecology. The Museum also operates several special projects which provide scientific support in different fields: the ancient DNA lab; the entomological laboratory for applied ecology; the feather identification lab; marine biodiversity programme; agricultural biodiversity programme; a molecular systematics lab; and the Israel Taxonomy Initiative.

Non-governmental organisations

Society for the Protection of Nature in Israel (SPNI)

The Society for the Protection of Nature in Israel (SPNI), in Hebrew עֵבְרָה תְּנִיחָה לְהַגָּנָה *Ha Hevra Le Haganat Ha Teva* (<https://natureisrael.org/>) is an NGO founded in 1953 by a small group of teachers, scientists and members of kibbutz who were attempting to save the Hula Wetlands. The Society has an Environmental Protection Division (EPD), which works on river rehabilitation. River Rehabilitation Campaigns strategically research the problems, monitor, suggest solutions and network with various organisations on a master plan, while running a public awareness campaign on river, stream and water management issues. They also work on the integrated coastal management of the Mediterranean Sea, working at every level to keep Israel's beaches clean, ecologically natural, and accessible to all. They also lead research and surveying activities in the Bird Division of the Society. There are no available data or reports about coastal activities or environmental monitoring on their website.

Environmental monitoring programmes

There are many monitoring programmes in the Israeli marine areas, including compliance monitoring programmes and a National Monitoring Programme (NMP) co-financed and guided by the Ministry of Environmental Protection and the Ministry of Energy. Most of these programmes are coordinated by the Ministry of Environmental Protection and are accompanied by the Israel Oceanographic and Limnological Research (IOLR) Institute.

National Marine Environmental Monitoring Programme (NMEMP)

The National Marine Environmental Monitoring Programme (http://www.sviva.gov.il/English/env_topics/marineandcoastalenvironment/Pages/MarineMonitoringProgram.aspx#GovXParagraphTitle6) is carried out by the Israel Oceanographic and Limnological Research Institute, under the guidance of a scientific committee and an inter-governmental administrative board including the Ministry of Environmental Protection (co-chairman), The Ministry of Energy (co-chairman), the Ministry of Health, the Ministry of Science and Technology, the Planning Division of the Ministry of Finance, the Ministry of Transportation, the Israeli Navy and representatives from academia and NGOs. Data collected from the monitoring programme are transferred to the UNEP Programme, Assessment and Control of Pollution in the Mediterranean region (MED POL), within the framework of a Memorandum of Understanding signed in 2004 and since 2016 to the IMAP Info System. The IMAP-based Programme includes five chapters: oceanographic report (climate change, sea level rise, temperature, etc), pollution and eutrophication, biodiversity, seafloor integrity and marine and coastal litter. All reports are available on the Ministry and IOLR websites in pdf format. The reports are in Hebrew with an English abstract, and all graphs, tables and figure legends are presented in both Hebrew and English.

INPA "BioBlitz" Marine Reserves Biodiversity Monitoring Programme

Since 2015, the Israel Nature and Parks Authority (INPA), assisted by the IOLR, Haifa University and Tel Aviv University, performs intensive and simultaneous sampling and documentation of various taxonomic groups (fish, invertebrates, and algae in the benthic zone), inside the reserves and outside them, in control sites that have similar substrate characteristics in terms of depth, type (rocky), and complexity as part of their monitoring programme. The BioBlitz website is only in Hebrew⁶⁷.

Gulf of Eilat/Aqaba National Monitoring Programme

This Programme began in 2003 and was carried out by the Institute for Marine Science in Eilat, under the guidance of and funds provided by the Ministry of Environmental Protection. It monitors habitats at the northern end of the Gulf of Eilat/Aqaba (Red Sea), within Israel's borders and aims to provide policy makers with scientific data. The programme scope includes both deep and shallow habitats: monthly cruises sample the water column (to depths >700 m) and shallow waters along the Israeli coast. Reefs and other shallow habitats are surveyed annually and various supplementary measurements aid data analyses. An annual report and all data are available online (but the website is only in Hebrew, with English abstracts and figure legends)⁶⁸.

Compliance monitoring programmes

Israel has a network of compliance monitoring programmes that are required under the terms of discharge permits. These include 2 sewage treatment plants, 5 desalination plants and 4 water-cooled power plants, 8 treated industrial wastewater discharges (6 of them to the Qishon River), 2 gas treatment rigs and 3 aquaculture projects, one inland (fishponds) and two sets of offshore fish cages. Also all drilling activities for the oil and gas industry require monitoring before and after drilling. Compliance monitoring is also required in dredging and beach improvement projects. All the reports are available on the Ministry of Environmental Protection website. The programmes are mapped on the GovMap GIS platform with links to the reports of each programme⁶⁹.

Environmental Information Systems*Israel Marine Data Centre (ISRAMAR)*

The Israel Marine Data Centre (ISRAMAR) (<https://isramar.ocean.org.il/isramar2009/siscal/description.aspx>) was established in 2001 at the IOLR as the national repository for oceanographic data at the Israel Oceanographic and Limnological Research (IOLR) Institute in Haifa. ISRAMAR acquires, archives and distributes data and information on Israel's marine environment and is a member of the International Oceanographic Data and Information Exchange (IODE) network.

ISRAMAR is linked to the SISCAL server (Satellite-based Information System on Coastal Areas and Lakes). It is an internet-based service for on-demand generation and distribution of earth observation (EO) data products on aquatic ecosystems. It was funded by the European Commission (EC) and now operated by Infomus GmbH in Berlin and the IOLR in Haifa. The SISCAL server provides maps on parameters such as: sea surface temperature (SST), chlorophyll-a concentration, total suspended matter (TSM) and secchi depth, obtained from operational ocean observing instruments such as MODIS, MERIS or AVHRR. Through direct access to satellite

⁶⁷ <https://www.parks.org.il/article/%D7%91%D7%99%D7%95-D7%91%D7%9C%D7%99%D7%A5-%D7%99%D7%9E%D7%99/>

⁶⁸ <https://iui-eilat.huji.ac.il/Research/NMPReports.aspx>

⁶⁹ https://www.gov.il/en/departments/guides/marine_environment_monitoring?chapterIndex=4

data providers, products are available for most areas of the world either in near-real-time (defined here as 6–48 h after the satellite overpass) or from archived data. The observation instruments are: MODIS (from the NASA), MEPRIS (from ESA) and NPP/VIIRS.

ISRAMAR also publishes reports, (the last one dates from 2020) but they are accessible only in Hebrew⁷⁰. These reports present the results of ISRAMAR activity, major features of infrastructure, etc. The last report available in English in pdf format was published in 2004⁷¹. However, the reports include an English abstract and all figures and graph legends are also in English.

Bibliography

Israel Ministry of Environmental Protection, Marine Monitoring Program [online] (09/02/2021)

https://www.gov.il/en/departments/guides/marine_environment_monitoring?chapterIndex=4

Ministry of National Infrastructures Energy and Water Resources, Strategic Environmental Assessment (SEA), 2016. 'Offshore Oil and Gas Exploration and Production'; by Geo-prospect Ltd. and Israel Oceanographic and Limnological Research

UN Environment/MAP-SPA/RAC, 2019. "National monitoring programme for marine biodiversity in Israel"; by: Barneah O., Roditi-Elasar M., and Kerem D., Mayrose A, Hatzofe O., EcAp Med II project, SPA/RAC, 84p

UN Environment/MEDPOL/2019. « IMAP-based National Marine Monitoring Program for Israeli Mediterranean Waters», Israel Ministry of Environmental Protection and Israel Oceanographic and Limnological Research Institute.

National Park and Nature Reserve, INPA BoiBlitz [online] (09/02/2021) <https://www.parks.org.il/en/>

FAO, Fishery and Agriculture Country Profile, The State of Israel [online] (09/02/2021) <http://www.fao.org/fishery/facp/ISR/en>

⁷⁰ https://isramar.ocean.org.il/isramar2009/report_activity.aspx

⁷¹ <https://isramar.ocean.org.il/isramar2009/Downloads/IsrCoastWaterQuality2004.pdf>

Italy

I. General overview

In Italy, the regionalised structure implies that marine and coastal monitoring responsibilities are shared between the national and regional levels. Thus, the main challenge for the Italian information system is effective coordination within a system of multi-level governance. As a EU Member State, Italy developed a marine strategy in order to achieve Good Environmental Status (GES). In 2017, Italy reported its measures to reach GES to the European Commission, but still has not reported whether GES is expected to be achieved by 2020. Since 2017, Italy has made some progress in waste management but has to improve air quality management and the Natura 2000 marine network (EIR, 2019). To address this issue, Italy was still trying to identify and designate the necessary sites by the end of 2019 (MATTM, 2010). Furthermore, providing adequate resources and building capacity of competent authorities (at regional and site level) to fully implement site conservation measures and marine environmental management system is still a priority action. At the international level, Italy institutions and research centers are engaged in transnational cooperation, important actions in the field of marine litter, marine spatial planning and integrated coastal zone management and marine protected areas. Owing to national programmes such as the '2010 Environment Programme', the Ministry (MATTM), the Regions (with ARPA's agency) and peripheral laboratories (such as the Santa Teresa Marine Environment Research Centre) have succeeded in creating a quality control system for the coastal marine environment, which is one of the best at the Mediterranean level in terms of quantity, quality and completeness of the information collected (MATTM, 2010).

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Title V of the Italian Constitution (Art 117)	This section of the Constitution assigned the exclusive legislative power to the Government in the field of 'Protection of the environment and ecosystems' while it transferred specific management competence in various sectors to the Regions and other local bodies.
Law no. 124 of February 14, 1994	Law on the Development of a National Strategy for Biodiversity: it is part of the commitment undertaken by Italy after the ratification of the Convention on Biological Diversity (CBD, Rio de Janeiro, 1992).
Law no. 394 of 1991	Framework law on Protected Areas: this law sets out general principles for the creation and management of protected nature areas, in order to ensure and promote the conservation and enhancement of the national natural resources. In Title 1, it contains some provisions about environmental information.
Legislative Decree 112/1998	This Decree established that the tasks relating to the protection, safety and quality of the marine environment are of national significance and that the functions relating to coastal environment protection should be carried out concurrently with the Regions.

Law no. 979 of December 31, 1982	This law sets out provisions for Sea Protection and a Coastal Plan: it identifies four pillars of the sea protection policy: coastal plan, emergency service of defence against pollution caused by accidents, coastal marine monitoring and establishment of marine protected areas. It outlined a coastal plan that directs, 'promotes and coordinate operations and activities concerning coastal and sea protection against pollution and marine environment conservation, according to planning criteria and with particular emphasis on forecasts of potentially dangerous events and on the actions that are needed to curb and counteract the related effects'. It also requires the creation of a national network for observation of the marine environment.
Law no. 61 of January 21, 1994	On the organisation of environmental controls and the establishment of the Regional Environmental Protection Agency (ARPA) for the protection of environment. This law provides that the ARPA is responsible for 'monitoring air, water, soil, noise, and electromagnetic pollution'
Article 1 of law 979/82	This law relates to a general plan for sea and marine coast protection against pollution and marine environment conservation, to be developed in consultation with the Regions: it provides for the creation of a network for observation of the marine environment quality which performed periodic monitoring of the sea while collecting oceanographic, chemical, biological and microbiological data as well as the establishment of a 'National Centre for overall coordination and data collection'.
Article 28 of law 96/2010, Article 22 of Legislative Decree 4/2012	These laws allocate the functions of surveillance and control on IUU fishing activities carried out by vessels flying the Italian flag. They identify the Ministry of Agricultural, Food and Forestry Policy, General Direction of Maritime Fisheries and Aquaculture as the competent authority under Article 5 of the Control Regulation, which is entrusted with the coordination of all control activities. All data concerning the vessel's owner or charterer and the vessel itself are entered into an electronic database on fishing licences that will enable the control of the Italian fishing fleet in real time.
Legislative Decree no. 182, June 24, 2003	Port collection facilities for ship waste and cargo residues
Legislative Decree no. 82 dated March 7, 2005 and its amendments	'Code of digital administration' provided for the Committee for the technical rules on territorial data of the public administration established at DigitPA (formerly C.N.I.P.A.)
The State-Region Agreement on the Geographic Reference System (GIS Agreement of 1996)	It has defined, in compliance with the ISO TC 211 specifics, the standards for the construction of the Topo Cartographic Database.
Legislative Decree No. 32 dated January 27, 2010	Implementation and transposition of the Directive 2007/2/CE (INSPIRE). It established the Nation State for territorial and environmental information. It should be emphasized that Legislative Decree 32/2010 provides as a reference infrastructure the National Geoportal that replaces for all purposes the cooperative mapping System the National Carto-geographic Portal of the MATTM.
Legislative Decree n. 190/2010	Implementation and transposition of the Marine Strategy Framework Directive. State must define the environmental targets and the monitoring programmes for continuous assessment checks to verify the conditions of the marine waters affected. It includes the definition of specific parameters that may indicate the initial states of the various environmental components and the possible impacts resulting from human activities such as fishing, transport and offshore exploitation of hydrocarbons.

Governmental environmental institutions

Ministry for the Environment, Land and Sea Protection /*Ministero dell'Ambiente e della tutela del territorio e del mare (MATTM)* (<https://www.minambiente.it/>). The MATTM was founded in 1986 and it carries out functions in the fields of: protection of biodiversity, ecosystems and marine-coastal heritage, land and water protection, policies to combat climate change and global warming, sustainable development, integrated management of the waste cycle, environmental assessment of strategic works, fight against atmospheric-acoustic-electromagnetic pollution and the risks deriving from chemical products. It plays a role of guidance and supervision over the activities of the Higher Institute for Environmental Protection and Research (ISPRA) and of national parks and marine protected areas. To meet the regulatory requirement of Article 1 of law 979/82, since 1989, the MATTM has organised, coordinated and funded the monitoring programmes for the Italian coastal marine environments in cooperation with 15 Italian coastal Regions and peripheral public laboratories (Italian Biodiversity Strategy Convention, p. 72).

Directorate of Nature Protection/- At the Directorate for Nature Protection, the MATTM also set up a database that collects, processes and publishes data arising from the analysis and an operation centre that coordinates anti-pollution measures in case of accidents.

The Port Authority Corps/*Guardia costiera* (<https://www.guardiacostiera.gov.it/en/Pages/protection-of-the-marine-and-coastal-environment.aspx>) The Port Authorities are historically entrusted with the supervision of all maritime and port activities, recognised with the Royal Decree, which on July 20, 1865 sanctioned the formal creation of the Corps. The Port Authority Corps – Coast Guard depends for its environmental vocation on the Ministry of the Environment and the Protection of the Territory and the Sea, exercising supervisory and control functions regarding the protection of the marine and coastal environment. There are in charge of 'Control, monitoring and protection of the marine environment'; 'monitoring of the marine coastal strip', etc.

Monitoring institutions/observatories

National agencies

Marine Environmental Department (RAM)

The Marine Environmental Department (RAM), which is based at the Ministry of the Environment and the Protection of the Territory and the Sea, was established by law no.179 of July 1, 2002 (Article 20) and was placed under the authority of the Ministry of the Environment to obtain more rapid and effective support for the activities of protection and defence of the marine and coastal environment. In the current internal configuration, the Marine Environmental Department (RAM) carries out liaison activities between the Ministry of the Environment and the Protection of the Territory and the Sea and the General Command of the Port Authority Corps – Coast Guard in all matters involving the tasks carried out by the same body in the field of protection of the marine environment and coasts. It is in charge to develop, processes and maintains the computer system concerning the flow of data in the environmental field concerning the activities carried out by the Commands of the Port Authority Corps.

Italian National Institute for Environmental Protection and Research (ISPRA)

In Italian, 'Istituto Superiore per la Protezione e la Ricerca Ambientale', (ISPRA) (<https://www.isprambiente.gov.it/en>) is a public legal entity subject to the vigilance of the Italian Ministry for the Environment, Territory and Sea, and provided with technical, scientific, organisational, managerial, administrative and financial autonomy. The Institute performs scientific, technical and research functions as well as assessment, monitoring, control, communication, training and education activities. It supports the Ministry in several environmental sectors such

as marine and water environments, soil, air, habitats, ecosystems and biodiversity. Furthermore, it facilitates the coherent implementation of national environmental policies through scientific and technical coordination with the 21 environmental agencies of the Italian regions and autonomous provinces. In 2012, ISPRA total budget was approximately 176M EUR, the 47,7% out of which from core government funding and the remaining from ad hoc programmes, including EU projects. The total number of employees in 2012 was 1 264. The Institute owns an oceanographic vessel (M/N ASTREA) endowed with multibeam, to obtain bathymetric data and the backscatter of the seabed as well as with a ROV equipped with an underwater positioning system USBL (Ultra Short BaseLine System) TraLink 1500 MA interfaced with the on-board navigation system (gyro and differential GPS) and with the main tools to collect marine samples (EUROGOS Website). ISPRA is the national data provider on sea levels and waves. Data gathered are used for analysis and reanalysis and they are the core of Mediterranean, national and local forecasting. ISPRA provides, comprehensively and systematically, the high-resolution estimation of the physical state of Italian seas as well as real time monitoring. On the ASPRA website, 'Data and indicators' are available for public with several database collections are publicly available on internet⁷². For instance, there are real-time data collected by ISPRA monitoring networks relating to tide heights, wave with associated meteorological data and published in Linked Open Data format.

National Agency for New Technologies, Energy and Sustainable Development (ENEA)

In Italian, 'Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile' (ENEA) (<https://www.enea.it/it>) is a research and development agency created in 1952 under the authority of the Ministry of Economic Development. It provides 'research, technological innovation and advanced services' to enterprises, public administration and citizens in the sectors of energy, the environment and sustainable economic development. ENEA marine and coastal monitoring activities are conducted mainly by its Santa Teresa Marine Environment Research Centre.

Regional agencies

Regional Agency for Environment Protection (ARPA)

The Regional Agency for Environmental Protection (ARPA), 'Agenzia regionale per la protezione ambientale' was created in 1994 and is the Italian environmental agency, a public body established in each Italian Region and in the autonomous Provinces of Trento and Bolzano. The agencies come under regional or provincial administration and their main role is the natural environmental protection of Italy with the task of keeping under control the natural environment and enforcing environmental regulations. They are responsible for monitoring air, water, soil, noise, and electromagnetic pollution; monitoring compliance with current legislation and provisions issued by the competent authorities in environmental matters; and giving technical-scientific support to bodies with planning functions in environmental matters, such as the ISPRA or MATTM.

Laboratories and research structures

Santa Teresa Marine Environment Research Centre

In Italian, the 'Centro Ricerche Ambiente Marino di S. Teresa' (<http://www.santateresa.enea.it/>), was set up in 1958 and it is an ENEA laboratory. In 1983, it moved to the headquarters in the Gulf of La Spezia, over an area a little larger than half a hectare and hosts 31 employees. The Centre was especially designed to accommodate experimental oceanography activities and aims to protect marine ecosystems, their variability and their response to natural or anthropogenic changes. To do that, the Centre monitors, analyses and interprets the

⁷² <https://www.isprambiente.gov.it/en/databases/data-base-collection/sea>

physical, chemical and biological processes occurring in the marine environment, their interactions and natural or human-induced variations and it is specialised in the fields of physics, chemistry, biology, sedimentology and environmental radioactivity. Observations and process studies are mainly carried out in key areas of the Mediterranean Sea. These activities refer to the major international research programmes on global changes (GOOS, etc.), to the VI Framework Programme of the European Union for the topic 'Global Change and Ecosystems' and at national level, to the National Plan for MIUR Research.

Marine Science Interdisciplinary Research Group (MSG)

The Marine Science Interdisciplinary Research Group (MSG) (<http://www.marinesciencigroup.org/?lang=en>) was founded in 1997 and its fields are marine biology and ecology. It is specialised in ecological distribution, reproductive biology, and population dynamics of tropical and Mediterranean coral. It also works on the effect of climate change on Mediterranean and Red Sea coral biology and ecology and since 1999, particular effort has been made for biodiversity monitoring, with special attention to species at risk of extinction.

MSG marine environmental monitoring studies have the peculiarity of being performed in collaboration with recreational divers (citizen science). In this field, MSG conceived three research projects, 'Mediterranean Hippocampus Mission', 'Divers for the Environment – Mediterranean Underwater Biodiversity Project', and 'STE – Scuba Tourism for the Environment'. They benefit from the patronage of the Ministry of the Environment.

Non-governmental organisations

Marevivo

Marevivo is an Italian NGO (<https://marevivo.it/en/about-us/>) founded in 1985, specialised in the protection of the sea and its resources. They work for biodiversity conservation, sustainable development, enhancements and promotion of marine protected areas. They also fight against pollution and illegal fishing and promote environmental education in schools and universities.

Citizen science

Cybelle Mediterranean Programme

The Cybelle Méditerranée Programme (<https://www.cybelle-planete.org/agir-en-mer-mediterranee/cybelle-mediterranee-2/>) is based on the contribution of amateur boat crew members to observe offshore species at sea (cetaceans, sea turtles and jellyfish). Simple and precise methods (counting, observations of species, etc.) have been established by specialists so as to be applicable by all and without prior training. The data are returned by amateurs and are added to a database, which is made freely available to the scientific community via the programme website. It took place in the North-western Mediterranean zone (France, Italy, Monaco, Italy). (More information in the French datasheet).

Meteo medusa

Meteo Medusa was first a programme that developed an application allowing anyone to report a jellyfish sighting in order to map in real time the presence of jellyfish on the Italian coast and to study the phenomenon.

Divers for the Environment – Mediterranean Underwater Biodiversity Project

This research project (<http://dueproject.org/en/>) is part of three citizen science projects undertaken by the Marine Science Interdisciplinary Research Group. It started in 2017 for three years and aims to assess the biodiversity degree of marine environments along the Mediterranean coasts, by considering the distribution

of some organisms considered as indicators. Data are collected by recreational divers through the recording of a special questionnaire. This research is the continuation of a previous survey like the 'Mediterranean Hippocampus Mission'. Some results and a report are available on the project's website but data are not accessible online.

Monitoring activities within MPAs

In Italy, monitoring activities within MPAs is carried out mainly through Office I of the Marine Environmental Department (RAM) entitled: 'Marine Protected Areas. Protection of coasts from marine erosion: nourishment, state-owned issues related to Marine Protected Areas'. The RAM collaborates with the General Directorate for the Protection of Nature and the Sea on all issues relating to founding projects, drafting the regulations for the implementation of the Institutional Decrees of the Marine Protected Areas, as well as the management and supervision of the MPAs.

Environmental monitoring programmes Safeguarding Mediterranean biodiversity (Medsealitter Project)

The Medsealitter Project (https://europa.eu/investeu/projects/safeguarding-mediterranean-biodiversity_en) began in 2016 and aims to develop and apply common protocols to manage the impact of plastic waste in the sea, considered among the most serious pollutants for biodiversity in the Mediterranean Sea and to create a collaborative network of marine protected areas. It works in collaboration with the Institute for Environmental Protection and Research, the NGO Legambiente but also the University of Barcelona, the University of Valencia in Spain, and the Ass Medassets and Hellenic Centre for Marine Research in Greece. It is funded by the European Union with over 2 million EUR. The Project has a deliverable database with some protocol for monitoring practices⁷³.

2010 Environmental System

The '2010 Environmental System' is a project that started up in 2006 for digital innovation in Italy for the protection of nature with reference to biodiversity and to protected natural areas. It is co-financed by the MATTM and the Committee of Ministers for the Information Society (CMSI) at the Presidency of the Council of Ministers. In 2009, the project implementation launched two integrated measures: the National Biodiversity Network (NBN) for the collection, coordination and production of scientific knowledge on biodiversity; and the NaturalItalia Portal for the promotion and online dissemination of contents and innovative digital services dedicated to the public. It also aimed to create an advanced technological infrastructure at the national level with a National Cartographic Portal and formed a network of bodies for establishing a national system of partnership between the Public Administration and the scientific community for using thematic knowledge (Italian National Biodiversity Strategy, 2010).

National Research Programme (PNR)

In Italian, the 'Programma Nazionale della Ricerca' (PNR) (<https://www.miur.gov.it/programma-nazionale-della-ricerca>), began in 2010 and is funded by the Ministry of Education, Universities and Research (MIUR). It aimed to identify priorities, objectives and actions aimed at supporting the coherence, efficiency and effectiveness of the national research system and contains guidelines at national level. The PNR adopts an innovative approach

⁷³ <https://medsealitter.interreg-med.eu/what-we-achieve/deliverable-database/>

where there is no interruption between public and private research, between knowledge-driven research and applied research. In the previous PNR, the integration of public and private research was suggested: the public-private laboratories, the enhancement of high technology districts and support for large strategic research programmes (Italian National Biodiversity Strategy, 2010). In 2015 another National Research Programme was launched until 2020 and proposed a taxonomy of applied and translational research in Blue Growth.

Environmental information systems

National Biodiversity Network (NBN)

In Italian, the 'Network Nazionale per la Biodiversità' (NBN) was created by the '2010 Environmental System', a network of *Centres of Excellence* (CoE) and *National Focal Points* (FP), accredited to international and national level for the management, sharing and information about data on biodiversity (NNB website). It contains aggregation of the current state of knowledge on biodiversity in Italy and aims at achieving the objectives of improving the dissemination and sharing of biodiversity data, making them available for pure research, to those applied for the education and for training and to represent a national strategic tool for conscious policy decisions. The NBN is a shared data management system consisting of a central node, which allows access to databases that have primary biodiversity data⁷⁴. The Network is able to interoperate with similar international infrastructure (LifeWatch, GBIF, etc..) and the National Geoportal. It is consistent with the requirements of the INSPIRE Directive. NBN uses the European Biocache cooperative network for the sharing of biological data from collections and databases of observations. It was developed in the framework of a system of European initiatives coordinated through the ENBI (European Network for Biodiversity Information, 2003 - 2005) with which Europe intended to make an organic contribution to the Global Biodiversity Information Facilities (GBIF). The network Biocache is therefore integrated within the GBIF network world which is the focus at European level.

SINANet – National Environmental Information System (SINANet)

In Italian, the 'Sistema Informativo Nazionale Ambientale' (SINANet) (<http://www.sinanet.isprambiente.it/it>) manages a network of environmental information produced by the Regions and ARPA. It is linked to the EIONet, the network of the European Environmental Agencies. The creation of the national infrastructure for territorial information and environmental monitoring (INITMA) is the national transposition of the INSPIRE Directive. The SINANet network represents the tool for collecting and integrating the information elements provided by public authorities, necessary to ensure the interoperability of spatial data sets and environmental monitoring and related services. In this site ISPRA data on the status of the Italian environment are available through searches based on INSPIRE metadata or by viewing them directly using thematic Web Viewers. The geoportal is available online⁷⁵.

Sea Defence System Database (Si.Di.Mar.)

In Italian, 'La banca dati del Sistema Difesa Mare' (Si.Di.Mar.) (<https://www.sidimar.tutelamare.it/>) collects at national level the data relating to the marine and coastal environment, based on the ecological conditions and in relation to the anthropic, economic and industrial activities that intervene on the emerged coastal strip and submerged (Si.Di.Mar website). In Si.Di.Mar, all the data collected from 2001 to 2009 as part of the Monitoring

⁷⁴ http://193.206.192.106/portalino/home_en/dati.php

⁷⁵ <http://geoportale.isprambiente.it/?lang=en>.

Programme for the control of the coastal marine environment are georeferenced and accessible online. The environmental subjects investigated: water, sediments, mussels, plankton and benthic communities. This is the first totally georeferenced database, an information system capable of providing a complete and coordinated panorama on the condition of our marine and coastal territory, both on the basis of the relative conditions ecological, both in relation to the anthropic, economic and industrial activities that intervene on the emerged and submerged coastal strip. The database is available online⁷⁶.

National Maritime Technology Platform (PTNM)

In Italian, '*La Piattaforma Tecnologica Nazionale Marittima*' (PTNM) (<http://www.mit.gov.it/progetti/piattaforma-tecnologica-nazionale-marittima>) was created in 2005 by the Italian Ministry of Infrastructure and Transport and aims to provide a unique meeting place between industry, research system and administrations in the field of research and innovation. The PTNM is recognised by the European Commission as a strong point of the country system and as a mirror group of the European Platform WATERBORNETP, for its greater correspondence to the integrated approach to marine sectors. The portal is available online⁷⁷. However, it seems that it not been updated since 2016.

National System for Marine Observation (ISPRA)

There are several other national systems linked to ISPRA and dealing with marine and coastal monitoring. Among these: the Italian national data buoy network (RON – Rete Ondametrica Nazionale) for sea wind wave measurements; the Italian national tide gauge network (RMN – Rete Mareografica Nazionale) that continuously monitors the sea level and a number of related meteorological and physical parameters; the Venice Lagoon and North Adriatic tide gauge network (RMLV) supporting the real-time storm surge prediction and warning system (7 tide stations in the North Adriatic Sea and coastal lagoons).

Bibliography

European Commission, Commission staff working document, 'EU environmental implementation review 2019. Country Report – Italy'. 2019, Brussels⁷⁸.

Environmental Implementation Review (EIR), 2017.

MATTM, 2010, Strategia Nazionale per la Biodiversità, 120 pages

MATTM and MSE, 2017, 'Towards a model of circular economy in Italy'

⁷⁶ <https://www.naturaitalia.it/cartografia.do>

⁷⁷ https://www.mit.gov.it/mit/site.php?o=vh&id_cat=172

⁷⁸ https://ec.europa.eu/environment/eir/pdf/report_it_en.pdf

Lebanon

I. General overview

In Lebanon, marine water quality is monitored mainly by the National Centre for Marine Sciences of the CNRS which conducts regular monitoring not only on marine water but also on biodiversity and sediments along the Lebanese coast. As a result of the EcAp-MED II project and UNEP, Lebanon has developed some programmes like the National Monitoring Programme for Marine Biodiversity and the Environmental Resources Monitoring Programme, led by Lebanon's Ministry of the Environment and the Lebanon National Council for Scientific Research. However, currently, and despite these isolated initiatives, public and academic/research institutions generate a substantial amount of data about Marine and Coastal monitoring. Unfortunately, data collected is often unpublished, 'which results in duplications of efforts at the collection and generation levels in the absence of appropriate sharing processes and dissemination activities' (ENPI-SEIS, 2015). Furthermore, former observatories, like LEDO and TEDO are no longer updated and there are very little data available for public access. Finally, Lebanon is part of many international agreements on marine monitoring, such as the Convention on Biological Diversity, the ACCOBAMS, the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) and the Protocol on Integrated Coastal Zone Management in the Mediterranean. Legal, administrative and other requirements about monitoring

Legal, administrative and other requirements about monitoring

<i>Legal framework</i>	<i>Content</i>
Law 444 of July 29, 2002	The Environmental law: this law is the most important framework for environmental legislation in Lebanon; it provides an overarching legal instrument for environmental protection and management. It contains several elements related to environmental monitoring: it indicates that compliance with environmental monitoring (pollution sources and pollution abatement systems) is one of the principles to respect to prevent and control pollution of the air, water and soils (Article 4).
MoE Decree 4810 of June 24, 1966	Regulation of the maritime public domain.
Decree 4869 of September 2, 2010 (Ar)	Sustainable management of marine and coastal biodiversity and habitats through policy and legislative development for mainstreaming in Lebanon.
Decision 8/1 of 2001	Specifications and Standards Relative To Air Pollutants, and Liquid Discharges from Classified Industries and Wastewater Treatment Plants
Decision 52/1 of 1996	Specifications and Standards for Environmental Quality and Emission Limit Values into the Air, Water, and Soil
Law issued as Decision no. 2775 of September 28, 1929	Monitoring of coastal and marine fishing: it provides measures related to the organisation and monitoring of fisheries and fishing by several vessels; identifying fishing, delimiting coastal fisheries, monitoring coastal fisheries and designating staff.

Article 4 of law 444/2002	Environmental monitoring (pollution sources and pollution abatement systems) and public participation (free access to information and disclosure).
Law 221 and 241/2000	Chapter 3 (on water): this law reorganised Lebanon's 21 water authorities and over 200 local water committees into four new Water Establishments plus the Litani River Authority. This chapter is also dedicated to the implementation of an environmental information system, supervised by the Ministry of the Environment.
MoE Decree 8213 of 2012	Strategic Environmental Assessment Decree: it includes provisions relating to environmental management plans which shall include an environmental monitoring plan (Article 7).
MoE Decree 8633 of 2012	Environmental Impact Assessment Decree: in Appendix 7, the environmental plan and the cost of evaluation are required in the Environmental impact assessment.

Governmental environmental institutions

Ministry of the Environment (MOE) (<http://www.moe.gov.lb/>): This Ministry was created in 1992 (by the law 216/1993) and its missions were modified in 2005 (by the law 690/2005). Since 2009, it has been structured as a General Directorate supported on the technical level by five Departments. All these services are concerned with environmental monitoring, in particular through the establishment of standards for pollutants. However, the Planning and Programming Department is explicitly responsible for environmental monitoring through its Department of Environmental Monitoring and Statistics.

Department of Environmental Monitoring and Statistics: According to law 690/2005, the Department is in charge of preparing strategies, plans and projects to introduce the concepts of environmental monitoring into the work of the General Directorate of the Environment; to collect data relating to the environment at local, regional and international levels in collaboration with specialised centres; to calculate environmental and development indicators and monitor the state of natural resources and sources of pollution. This same Department has a service responsible for information systems. Within the framework of the missions conferred on it by law 690/2005, this service must ensure the introduction of the use of information systems and the establishment of the databases necessary for the activities of the General Directorate of the Environment.

Monitoring institutions/observatories

National agencies

Central Administration of Statistics (CAS)

The Central Administration of Statistics (CAS) (<http://www.cas.gov.lb/>) is a public administration within the Presidency of the Council of Ministers (CoM). Today it has 100 full-time employees. CAS collects data from many sources in Lebanon including ministries, institutions, ports, airports, etc. but also generates data on a number of environmental and socio-economic issues (ENPI-SEIS, 2015). Under the UN Fundamental Principles of Official Statistics and the EU Statistics Code of Practice, the institution produces data and indicators on environmental statistics at the national level, like water resources, rainfall series, forest fires, etc. It also produced indicators on Social and Economic statistics (sea transport: loaded/unloaded cargo, air transport, etc.). CAS has published regular reports about health and environmental data for which interested stakeholder groups or individuals require special authorisation to obtain, along with other CAS bulletins. However, some

of the data is aggregated and posted on the CAS website. The last environmental report available for public access dates back to 2006 and is available online⁷⁹.

Other Committees and Intergovernmental Agencies

The MoE and the Parliamentary Committee for the Environment deal with many other agencies. Among others, the Council for Development and Reconstruction (Department of Land Use Planning and Environment) and the Ministry of Public Works and Transport (General Directorate of Roads and Buildings/Department of the Environment and Traffic). Additionally, the MoE is a member of several intergovernmental agencies such as the Higher Council of Urban Planning (member), the National Council for Quarries (chaired by the MoE), and the Higher Council for Hunting (also chaired by MoE), the Lebanese Standards and Norms Organisation Institute (LIBNOR). Lebanon also has so-called regional Industrial Permitting Committees (including the Ministry of Industry - MoI, the Ministry of the Environment - MoE, the Ministry of Public Health - MoPH, and the Ministry of Public Works and Transportation - MoPWT Urban Planning) and Health Councils at the Mohafaza level.

Non-updated observatories

Lebanese Environment and Development Observatory (LEDO)

This Observatory (<http://www.moe.gov.lb/ledo/brief.html>) is one of a group of observatories launched along the Mediterranean coast by an initiative of the Plan Bleu Office and funded by the European Commission LIFE-Third Countries Programme. It is executed by the Ministry of the Environment under the management supervision of the UNDP. It was initially effective in December 1999 for two years and it ceased to operate in 2002. This Project identifies 90 indicators to collect data about the 14 environmental and development themes. The scope of the Lebanese Environment and Development Observatory (LEDO) activities are: gathering, collection, analysis, and publication of well-defined environment and environment-related development data and indicators' (e.g., air and water pollution levels, industrial wastewater discharges, costs of environmental degradation). The LEDO Project was hosted by the MoE in 2002 to develop the State of the Environment Report (SOER) in 2002 and State and Trends of the Lebanese Environment Report in 2010. In 2001, it published the Lebanon State of the Environment Report⁸⁰.

The Observatory became part of the Ministry's new organisational structure, but no updated information about it is publicly available.

Tripoli Environmental and Development Observatory (TEDO)

The Tripoli Environmental and Development Observatory (TEDO) (<http://www.medcities.org/web/ktc-malaga/-/best-practices-tedo>) was established in Al Fayhaa in 2000 to assist the Urban Community of Al Fayhaa (UCF) and member municipalities in the management of environmental problems while maintaining sustainable development. It assists with knowledge on the actual state of the environment and enables a quantified dialogue with the National Authorities, Al Fayhaa stakeholders and associations. TEDO was closed in 2013. The function of TEDO was to improve the decision-making process: follow-up the progress of the environment and development by observing the path of predefined indicators on a cause – effect basis (pressure, state & response); identify local hot spots; disseminate, share and make accessible the gathered information; improve the planning and management system: use analytical tools and geographic information systems: analyse information and display it for more effective public communication. TEDO monitored some indicators such as population density; number of beds in hospitals; MSW Qty/cap/day; Quantity of gas extracted; total built

⁷⁹ <http://www.cas.gov.lb/index.php/environment-en>

⁸⁰ <http://www.moe.gov.lb/ledo/soer2001.html>

area; SO₂ emissions; cost of MSW management; square miles of green area per capita; visitors to historical sites; cost of street cleaning.

Laboratories and research structures

National Council for Scientific Research (CNRS)

The National Council for Scientific Research (CNRS) (<https://www.aub.edu.lb/ogc/Pages/cnrs.aspx>) was created in 1962 as a public body with administrative and financial autonomy and operating under the authority of the Prime Minister. Its functions consist of setting the broad lines of scientific policy for the country and implementing it. The CNRS conducts several studies on marine sciences, land cover and land use in the country and the environment, in collaboration with the different concerned ministries. To this end, the CNRS has 4 scientific centres, the following two of which can play a role in the implementation of IMAP: the National Centre for Marine Sciences (CNSM) and National Centre for Remote Sensing (NCRS).

- **The National Centre for Marine Sciences (CNSM):** The National Centre for Marine Sciences (CNSM) (<http://www.cnrs.edu.lb/site/SubPage.aspx?pageid=109>) was established in 1977. The decision to establish such a centre (1975) was the national response to the 1972 Stockholm Conference. The centre is a recognized institute within the Mediterranean network of marine centres and is integrated in several regional and international activities. It is part of the National Council for Scientific Research in Lebanon. Its mandate is to maintain permanent monitoring on the coastal zone and the marine environment of the country, in particular, through a national observation network for monitoring water and sediment quality as well as the study of species and habitats. The CNSM has laboratories in Jounieh and Batroun as well as a research vessel (CANA-CNRS). The scientific disciplines covered are hydrobiology, plankton, oceanography, coastal hydrodynamics, chemistry, biology, cetology, microbiology, etc. The CNSM maintains a research vessel and conducts regular monitoring activities on water quality and marine biodiversity at multiple locations along the Lebanon coast (up to 25 locations representing the different geomorphological states found on the coast). However, it seems that there is no mechanism for data sharing among public institutions nor is the data accessible. Such data is communicated to interested parties upon special request.
- **National Centre for Remote Sensing (NCRS)** (<http://rsensing.cnrs.edu.lb>): The National Centre for Remote Sensing (NCRS) was created within the CNRS in 1995. Its objective is to provide the country with the benefit of progress in the field of remote sensing and geographic information systems. Its services are currently used for decision support by several ministries. Its mandate concerns in particular: the use of remote sensing and information systems to produce reports and studies on the country's land resources; comply with environmental and development concerns; ensure the timely establishment of databases based on satellite images covering different fields and disciplines and make the information available to the public and the private sector. In environmental monitoring, the NCRS collects information, contributes to the acquisition of data in various sectors and produces various thematic maps. Its work concerns the monitoring of land use and coastal degradation.

Other Universities

There are many other universities involved in marine and coastal monitoring, such as: the University of Balamand with the Marine Resources and Coastal Zone Management Programme of the Institute of the Environment; the American University of Beirut (AUB); the University of Saint Joseph in Beirut and the University of Saint Esprit in Kaslik.

Non-governmental organisations

In Lebanon, more than 150 national NGOs are performing small jobs or conducting environmental campaigns all over the country. Among others, these following two have an important role.

Society for the Protection of Nature in Lebanon (SPNL)

This is a Lebanese NGO (<https://www.spnl.org/>) established in 1983 under Lebanese law and authorised by the Ministry of the Interior by Decision no. 6/AD dated January 8, 1986. It is particularly active in the monitoring of avifauna. It is a partner of BirdLife and aims to protect nature, birds and biodiversity in Lebanon and to promote the sustainable use of resources. It conducts mainly the monitoring of avifauna in Lebanon. It works in partnership with government institutions, municipalities and other NGOs as well as the private sector. It is engaged in a lot of biodiversity monitoring projects, including projects on the Lebanese coast, such as the Protected Areas Project. SPNL has also established the Environment Information Centre (EIC) that serves as a key resource for the provision of environmental information to students, teachers, and researchers in this field.

Bahr Loubnan (BL)

This is a Lebanese environmental NGO founded in 2002 that aims to preserve biodiversity, combat pollution and promote the sustainable management of the coast and the sea. It played a major role in the decontamination and cleaning of the coasts and the seabed during the 2006 oil spill.

No official website is available, but a short description is available online⁸¹.

Environmental monitoring programmes

Monitoring activities within MPAs

Supporting the Management of Important Marine Habitats and Species in Lebanon (2010 - 2012)

In Lebanon, there are two legally declared marine protected areas: the Palm Islands Nature Reserve in the North and the Tyre Coast Nature Reserve in the South. Under the 'Supporting the Management of Important Marine Habitats and Species in Lebanon' (2010–2012), a Project implemented by the Ministry of the Environment and the International Union for Conservation of Nature (IUCN), this Project aims to develop several activities support the development of a network of Marine Protected Areas (MPAs) in Lebanon and an associated monitoring programme to evaluate management effectiveness.

National Monitoring and Assessment Programme for Marine Biodiversity in Lebanon (2019 - 2021)

This National Monitoring Programme for Marine Biodiversity in Lebanon (http://www.rac-spa.org/sites/default/files/ecap/imap_lebanon/imap_liban_eng_2019.pdf) was assisted by SPA/RAC in partnership with the EcAp-MED II Project (Mediterranean implementation of the Ecosystem Approach, in accordance with the EU MSFD). It 'was elaborated by the Ministry of the Environment of Lebanon and the Special Protected Areas Regional Activity Centre (SPA/RAC) 'following a collaborative approach involving national stakeholders, local scientists, national organisations and civil society'.

⁸¹ <https://arab.org/fr/annuaire/bahr-loubnan/>

Environmental Resources Monitoring in Lebanon (ERML)

In response to the conflict of July-August 2006 and the subsequent oil slick on Lebanese shores, the Government of Greece allocated \$1.64 million to the Government of Lebanon for the implementation of an environmental monitoring project in Lebanon (<http://erml.moe.gov.lb/CustomPage.aspx?id=5&menuId=5&title=About-ERML>) to be implemented by the Ministry of the Environment (MoE) in Lebanon, under the management of the United Nations Environment Programme (UNEP) in collaboration with the United Nations Development Programme (UNDP) in Lebanon. The coastal zone of Lebanon was highlighted as a high priority area for action, given its importance in the socio-economic fabric of the country, and considering the growing concerns on health and environmental conditions. As a result, the project addresses two areas of focus, (i) the actual quality and monitoring of the coastal and marine environments, and (ii) reviewing and identifying opportunities for socio-economic development in the coastal zone. The project closed out in 2013, but reports are still available on its website. ERML published regular reports about the environment and socio-economics activities in coastal zones. It is accessible for the public online⁸². The last report was published in 2012, entitled 'Environmental Resources Monitoring in Lebanon – ERML'⁸³.

Environmental information systems and data centre Environment Information Centre (EIC)

The Environment Information Centre (EIC) was a project funded initially by the UNDP-LIFE Programme in 1995. Affiliated to the Society for the Protection of Nature in Lebanon, its mandate is to gather and disseminate data relevant to environment and development, mainly in the areas of environmental education. Its small library allows students and teachers to benefit from the available references. Also, EIC provides lectures, seminars and field sessions in all areas with a focus on remote rural areas. However, it seems that it is not available on the internet.

Bibliography

European Environment Agency. 2012. EUROPEAN NEIGHBOURHOOD AND PARTNERSHIP INSTRUMENT, Towards a Shared Environmental System 'SEIS', LEBANON COUNTRY REPORT. 34 pages.

IUCN. 2012. Lebanon's Marine Protected Area Strategy? Supporting the management of important marine habitats and species in Lebanon. 65 pages.

Lebanon Ministry of Environment. 2004. Biodiversity assessment and monitoring in the protected areas/Lebanon Leb/95/G31. 144 pages. Available at: <http://moe.gov.lb/protectedareas/publications/finalreporttyre.pdf> [Accessed on 17/11/2020].

MOE/UNDP/ECODIT, 2011, The State and Trends of the Lebanese Environment (SOER). 353 pages. http://www.undp.org.lb/communication/publications/downloads/SOER_en.pdf [accessed on 17/11/2020].

SPA/RAC – UN Environment/MAP. 2018. National monitoring programme for marine Biodiversity in Lebanon. Tunis, 111 pages. Available at http://www.rac-spa.org/sites/default/files/ecap/imap_lebanon/imap_liban_eng_2019.pdf. [Accessed on 28/08/2020]

⁸² <http://erml.moe.gov.lb/ViewPublications.aspx?id=31&title=Reports>

⁸³ <https://www.cbd.int/doc/meetings/mar/ebaws-2014-03/other/ebaws-2014-03-submission-lebanon-02-en.pdf>

Libya

I. General overview

In Libya, the coastline extends over 1970 km with important portions that are still in very good natural condition. The most important human activities are fisheries at sea, urbanisation of the coast, and petroleum exploration and exploitation. This latter represents the most consequential risk for pollution (oil spills) because safety and environmental protection measures are not yet properly defined and strictly followed. However, after the civil war in 2011, fish production was directly affected by the poor security situation and high price of equipment, as well as the emigration of foreign workers (which represented 60% of the employees in the fishing sector (Filogh, 2019)).

Libya does not have its proper Environment Impact Assessments (EIA, as required by law 15–2003) yet. Its legal framework on conservation issues is inadequate. It also lacks a comprehensive national study on the status of biodiversity (there is still no list of protected species or habitats, nor any updates of the regulations on hunting and fishing activities). In 2012, the geographical scope of the ENPI-SEIS project was extended to cover Libya as a new partner country. The Libyan General Environment Authority officially appointed a National Focal Point and nominated representatives to the Working Group on Environmental Indicators, which have been engaged in further project activities. The main goal is formulating a national strategy for solid and hazardous waste management and strengthening environmental monitoring systems through the installation of laboratories that meet international standards and enable the GIS Department to become more active. Finally, the Environment General Authority (EGA) is the body responsible for environmental monitoring in general and monitoring the marine environment in particular at the national level, in co-ordinations with all the relevant institutions such as the Marine Biology Research Centre (MBRC), the Water General Authority, and all other stakeholders.

Legal, administrative, or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Law no. 15/2003	Law on the Protection of the Environmental: this law constitutes the national legislative body in the field of environment to formulate the general policy and prepare the necessary plans for the protection of the environment. It includes a section for the Protection of Sea and Marine Wealth (Articles 18–38). (cf above). It constitutes the main legislative instrument for controlling air pollution under this law. It also deals with the protection of groundwater, including the regulation of cesspools and septic tanks.
Resolution no. 263 of the General People's Committee	This Resolution established the Environmental General Authority of Libya (EGA).

Law no. 7/1982	Law regarding the protection of the environment: the third chapter addressed the protection of marine biology and the hazards of oil pollution on fish species.
Law no. 14 of 1989	This is the basic legislation concerning the regulation of the use and conservation of marine wealth (type of equipment allowed for marine fishing, the sizes of fish/species allowed to be caught, and issues relating to the supervision and control of the industry regarding safety issues). It provides that permit has to be obtained from the EGA or the dumping of waste to the sea. (cf above). It provides some procedures for granting permission and licensing requirements for foreign vessels and fishing rules.
Law no. 62 of 1976	This law contains amendments to the Libyan Marine law no. 105 of 1958 and ships' captain's responsibilities with regard to oil logs.
Decision no. 106-1988	This Decision established the basis and procedures for providing subsidies and encouragement to operators in the national marine fisheries.

Governmental environmental institutions

The Environmental General Authority of Libya (EGA): this is the major environmental authority in Libya. It was first established in 1985 as the Technical Centre for Environmental Protection, and then was upgraded to become the Environmental General Authority (EGA) in 2000. The activities of the Environmental General Authority (EGA) include the planning of environmental policy, preparing a national strategy and action plan with concerned bodies, monitoring and controlling pollution in different areas of Libya, as well as sponsoring applied scientific research and projects. It operates on three different levels: national, regional and local. At the national level, the EGA is responsible for formulating an integrated and comprehensive national environmental policy for sustainable development and integrated planning. It also acts to formulate and develop specific strategies, standards and priorities for environmental protection and natural resource conservation.

At the regional level, thirteen branches were established in order to be responsible for the implementation of the national environmental policy (ENPI-SEIS Country report – LIBYA – March 2015, p.4). Monitoring and recording species is one of its main duties, in addition to recording all types of chemicals that may result in contamination of the environment. It is also responsible for state of environmental reporting and assessments, and both water and air quality. Finally, the EGA is responsible for dissemination of information and data related to the environment and is committed to the public by providing access to information which is available to the public. 'It also encourages the EGA to promote scientific environmental research needed for stakeholders, to promote innovative technologies and cleaner production, and help in the development of sustainable environmental indicators and trends'. (ENPI-SEIS Country report – LIBYA – March 2015, p. 6).

Ministry of Local Government: This Ministry is responsible for drinking water quality, water quality, the quality of wastewater treatment and reuse of the treated wastewater in agriculture in cooperation with the Ministry of Agriculture. All the local governments at the municipality level have their own environmental protection units separate from the EGA. They appropriately deal with municipal priorities for water supply and quality, wastewater treatment and reuse, solid waste disposal, landfill operations, recycles of waste and other related issues.

Ministry of Agriculture, Animal and Marine Wealth: In addition to the Environmental General Authority (EGA), the Ministry of Agriculture is responsible for protection of agricultural lands and forests. It is also responsible for protecting animals and marine wealth.

Monitoring institutions/observatories

The main government bodies in charge of monitoring are the Marine Biology Research Centre, the Libyan Petroleum Institute, the Ports and Maritime Transport Authority, the General Authority for Marine Wealth and the National Oil Corporation. Only the main observatories are covered here in detail.

National agencies

National level

General Authority for Water Resources (GAWR)

The General Authority for Water Resources (GAWR) (<http://gwa.ly/en/index/>) was established in 1972. It is a national body responsible for all water assessment, planning, management of water resources and monitoring. It has a documentation centre and has recently established a system for data storage and retrieval linked to GIS. It also has a central laboratory equipped for various analyses related to water and soils. However, this GIS is not accessible online.

General Authority for Marine Wealth (GAMW)

This Authority was established by Decree no. 159/2007. This Decree regulates the fishing activities and indicates the responsibility for granting licenses, inspection, and management of all fishing activities. The concern for the marine environment is the responsibility of the Office of Environmental Protection and Maritime Inspection, its duties is inspections of marine fishing ports.

Marine Biology Research Centre (MBRC)

The Marine Biology Research Centre (MBRC) was established in 1984 by law no. 1582/1981. In 2002, the Centre came under the authority of the Secretariat of Marine and Fisheries. The Centre has been providing and disseminating data and information on marine resources. Its main missions were to conduct studies and field surveys on marine organisms, habitats and resources. It is also to provide technical advice and consultation on marine wealth issues to the Government. In addition, it cooperates with national, regional and international similar institutions and organizations through the exchange of information and work on joint research projects.

Man-Made River Authority (MRA)

This organisation operates under the General Authority for Water Resources and is responsible for designing and constructing water structures (distribution and drainage networks, reservoirs, irrigation systems) necessary to make use of the water transported from the South for agricultural purposes. It is responsible for the management of transported water supplied by the MRA to irrigation projects set up by the Government. It is responsible for groundwater exploitation and its transport from the southern fields well to the coastal area.

National Centre of Statistics

The National Centre of Statistics (<http://www.bsc.ly/>) collects and publishes data including some environmental indicators. These data include information on water resources and water quality, biodiversity and waste in

coordination with the relevant institutions in order to prepare and publish jointly the annual report and to update all the necessary information needed. It also strengthens the national capacities to produce and publish complete, reliable and relevant environmental statistics and indicators. Currently the Centre is very active on regional and international programmes for monitoring and reporting such as System for Environment-Economic Accounting (SEEA) organised by UNSD and the German GIZ.

National Centre for Standardisation and Specification

This is a governmental body for the preparation and publication of Libyan standards and specifications including the environmental standard. It is responsible for the preparation of standards that covers environmental issues. The Centre is currently engaged in the certification and training activities and providing testing and inspection services to industry and commerce, as well as regulatory services to the government.

Local level

Municipalities

The municipalities work under the supervision of the Ministry of Local Government. All the local governments at the municipality level have their own environmental protection units separate from the EGA. They appropriately deal with municipal priorities of water supply and quality, wastewater treatment and reuse, solid waste disposal, landfill operations, recycles of waste and other related issues.

Laboratories and research structures

Marine Biology Research Centre (MBRC)

Three laboratories were specifically working to measure pollution in the marine environments, such as heavy metals in marine organisms and water, sand and sediments. The laboratories are equipped with several instruments that are needed for the routine monitoring work particularly nutrients, chlorophyll and heavy metals. It has no official website but, there many recent studies published on researchgate/google scholars about the state of the marine environment and pollution monitoring.

Libyan Centre for Remote Sensing and Space Sciences (LCRSSS)

The Libyan Centre for Remote Sensing and Space Sciences (LCRSSS) (<http://www.lcrsss.ly/>) was established in 1989 as a governmental research organisation dedicated to research in remote sensing, space, and earthquake sciences, currently has more than 5 research stations.

Laboratory of the Environmental General Authority (EGA)

The Laboratory was equipped with several instruments that covers most of the water analysis generally needed, residue poison as microbiological analysis and detect of radiation. Also the Laboratory has a mobile laboratory and field instruments introduced as a part of the continuous development to provide most of the necessary analysis through field visits and monitoring the resources of air pollution emission.

The Laboratory has not been operated efficiently and most of its devices need installation, operation and calibration, chemicals and reagents. The technical staff also needs to build up their capacity in a more effective way so that they can be successfully utilised in a programme designed to monitor the marine environment.

Laboratory of the Libyan Petroleum Institute (LPI)

This Laboratory provides analytical support and advice to NOC petroleum companies and to many private and government agencies. Moreover, a mobile laboratory was introduced as a part of the continuous development to provide most of the necessary analysis through field visits.

Other universities

On researchgate, one can find publications that reveal monitoring activities from various universities.

Private Observatories

Besides the EGA, some national oil companies have their own mobile air monitoring stations, which is the case for Zueitina Oil Company, for example and the Melita complex. The companies monitor air quality in the surrounding area but not on a regular basis. They also launched a survey recently in order to detect the level of air pollution (source emissions and ambient air quality) occurring in various locations in each field and assess the risk for the health of employees and the environment during operations and maintenance. However, a large number of companies still have not complied with the regulations, particularly in the monitoring and recording pollutants emission (ENPI-SEIS Country Report – LIBYA – March 2015, p. 9).

Monitoring activities within MPAs

Between 2011 and 2012, the IUCN published the report 'Towards a Representative Network of Marine Protected Areas in Libya' (published in 2014). It was prepared within the framework of the MedRAS Project (Mediterranean Representative Areas and Species) in coordination with the Environmental General Authority of Libya. The report contains a compilation of information from national and international experts and from documentation available on marine and coastal biodiversity in Libya. Only two areas have been selected to be Marine Protected Areas: Ain Al-Ghazalla and Farwa lagoon. They are managed by the Ministry of Agriculture, Animal and Marine Wealth. Several studies have been carried out in these areas by national institutions and international organisations⁸⁴.

Environmental Monitoring Programmes

The Libyan Government invested largely between 2005–2010 on setting up the infrastructure for many Ministries of which the laboratory equipment was one of the main areas targeted for investment and a number of new laboratories were established. There are several laboratories that are capable of carrying out the monitoring programme for the marine environment as their equipment is the best in the field of analysis, but no information is available on the internet.

Libya National Monitoring Programme for the Mediterranean Sea

It is carried out and led by the Environmental General Authority (EGA), the Libya Marine Research Centre, the National Agency for Scientific Research and National Universities. The overall goal of such activity was to provide a scientific basis for decision-making regarding the protection of the coastal environment, including

⁸⁴ <https://www.cbd.int/doc/meetings/mar/ebsaws-2014-03/other/ebsaws-2014-03-submission-iucn-04-en.pdf>

enforcement of relevant national legislation and international conventions. The programme includes the following components: monitoring of heavy metals in coastal waters, monitoring of the introduction of nutrients and particulate metals into coastal waters, monitoring of nutrient levels and algal populations of the coastal waters, monitoring of the biological effects of pollution of the coastal waters. The Environmental General Authority also worked within the framework of the Integrated Monitoring and Assessment Programme (IMAP) to prepare in Libya a monitoring programme that included: a National Monitoring Programme for Biodiversity (2016); a National Integrated Monitoring and Assessment Programme for Coastal and Hydrographical Indicators in Libya (2018) and a National Integrated Monitoring and Assessment Programme for Pollution and Marine Litter in Libya (2019).

Bibliography

European Environment Agency, 2015. [ENPI-SEIS project Country Report – LIBYA], by [Sabah Nait], Copenhagen, 16 pp. Available at: https://ceobs.org/wp-content/uploads/2018/03/Country_report-Libya-March2015.pdf [accessed on 04/10/2020]

Environment Protection Act (Chapter 549)

IUCN, 2014. [Towards a Representative Network of Marine Protected Areas in Libya], Gland, Switzerland and Málaga, Spain, 68 pp. Available at: <https://www.cbd.int/doc/meetings/mar/ebsaws-2014-03/other/ebsaws-2014-03-submission-iucn-04-en.pdf> [accessed on: accessed on 04/10/2020]

Malta

I. General overview

Observation of coastal areas has been strengthened in Malta, due in particular to the application of European directives and the implementation of European projects (Interreg, LifeProject, MedPAN, etc.). In particular, LIFE projects, which started in October 2013 and ended in June 2018, contributed to the designation of additional protected areas in the marine environment which now cover more than 35% of Maltese waters (SoER – Summary Report, 2018). Currently, the majority of the natural coastal water bodies are considered to be in ‘high/good ecological status and coastal waters generally show low levels of nutrients’ (SoER – Summary Report, 2018). The number of monitoring stations (rivers, lakes, bathing water) has increased since 2013, but there is still a data gap about the state of Malta’s coastal and marine state. The European Maritime and Fisheries Fund is working with Malta’s Environment and Resources Authority to address these current knowledge gaps. They are still working on a web-enabled information management and monitoring system (EMFF Database) in which key information on each operation shall be recorded. For now, the main institutions in charge of Malta’s coastal and marine monitoring are research centres – such as the Physical Oceanography Research Group and the Faculty of Science of Malta’s University – and NGOs like BirdLife Malta and Nature Trust Malta are particularly active.

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Environment and Development Planning Act, 2010 (Chapter 504)	This Act established the duty of the Government to employ the necessary remedial and preventive measures to abate the problems of pollution and environmental degradation (Article 3). It provides the framework within which the Malta Environment and Planning Authority operates.
Environment Protection Act (Chapter 549), 2016 (‘New Environment Protection Act’); the Development Planning Act, 2016 (‘New Planning Act’) and the Environment and Planning Review Tribunal Act, 2016 (‘New Review Tribunal Act’).	This Act provides the framework within which the Environment Resources Authority operates, it replaces the former MEPA.
Environment and Development Planning Act, 2010 (Chapter 504)	This Act established the duty of the Government to safeguard biological diversity.
Environment Protection Act (Chapter 549), 2016 (‘New Environment Protection Act’)	This Act replaced the Environment and Development Planning Act. It contains provisions about protected areas and the protection of fauna and flora.

Ambient Air Quality Regulations (amendment), 2015	These Regulations contain provisions for air quality monitoring.
Environment and Development Planning Act, 2010 (Chapter 504)	This Act established the duty of the Government to ensure the sustainable management of water, soil and wastes and the proper use, reuse and recovery of matter and energy.
Environmental Protection Act (Chapter 549), 2016 (' New Environment Protection Act ') Malta Resources Act of 2000	This Act contains some provisions about waste management, water and air quality.
Fisheries Conservation and Management Act, 2001 (No. II of 2001)	This Act provides for the regulation, conservation and management of the fisheries of Malta

Governmental environmental institutions

Ministry for the Environment, Sustainable Development and Climate Change/Ministru għall-Ambjent, Żvilupp Sostenibbli u Tbidil fil-Klima (MESDC) (<https://environment.gov.mt/en/Pages/mdsec%20main.aspx>): Amongst other responsibilities, the Sustainable Development Directorate is to ensure the development and implementation of Malta's Sustainable Development Strategy. It is empowered to provide data or information or to collect data or information about any topic that could have a bearing on sustainable development and environmental monitoring. In the 'download' tab of its website, some report about environmental states are available for public access (the last one was published in 2016).

Environmental Health Directorate/Direttorat għas-Saħħa Ambjentali (EHD) (<https://deputyprimeminister.gov.mt/en/Pages/health.aspx>): The Environmental Health Directorate of the Ministry of Health promotes and safeguards the well-being and health of the public from adverse environmental effects. 'It regularly monitors coastal bathing water, establishing good quality as per criteria set by the Bathing Water Quality Directive 2006/77/EC and the Barcelona Convention'. In the Health Inspectorate Services, the Water Regulatory and Auditing Unit made available some Bathing Water Profiles for public access (The last one was published in 2020).

Monitoring institutions/observatories

National Agencies

The Regulator for Energy and Water Services (the '**REWS**'), which to a degree takes over the functions of the Malta Resources Authority (the '**MRA**') and the Sustainable Energy and Water Conservation Unit (the '**SEWCU**').

The Environment and Resources Authority (ERA)

The Environment and Resources Authority (ERA) (<https://era.org.mt/about-era/>) was formed from the demerging of the Malta Environment and Planning Authority (MEPA), the national agency responsible for the environment and planning in Malta. The main mission of the ERA is 'to safeguard the environment for a sustainable quality of life'. It aims in particular to 'develop evidence-based policy backed by a robust data gathering structure'

and 'provide a licensing regime and monitor activities having an environmental impact and to integrate environmental considerations within the development control process'. It collects its own statistical data for its internal purpose. Like the MEPA, it also acted as the national representation under a number of international environmental conventions and multilateral agreements. This included information supported by the Aarhus Convention: access to information; public participation in decision-making; and access to justice in environmental matters.

It has published numerous reports on the state of the environment, all available online. The last one '*Annual Report 2019 & Financial Statements*' can be accessed in PDF format on internet (last one in 2019)⁸⁵.

Malta Resources Authority (MRA)

The Malta Resources Authority (MRA) (<https://mra.org.mt/>) was set up in 2000, through the Malta Resources Act to regulate water, energy and mineral resources, to promote energy efficiency and renewables, and with responsibilities in the areas of oil exploitation and climate change. The Regulator for Energy and Water Services Act in 2015 changed the MRA's responsibilities mainly to registration and metering of boreholes, mineral resource regulation, climate change reporting and operation of the emission trading scheme. Operators of stationary installations have to submit a monitoring plan to the Authority describing the means by which annual emissions from the installation will be monitored and reported. The Authority also issues Annual Reports on emission monitoring. They are available for download in PDF format⁸⁶.

National Statistics Office (NSO)

The National Statistics Office (NSO) (<https://nso.gov.mt/en/Pages/NSO-Home.aspx>) was created in March 1947 and it is in charge of compiling and publishing official national statistics and analysis for public decision. It is the executive arm of the Malta Statistics Authority. Information provided to the NSO is treated as confidential and no information on individual returns can be given to any external public or private entity. However, some information is available in the compilation of statistical reports. These reports are annually published since 2002 and can be accessed in PDF format online (last one in 2019)⁸⁷. On its website, there is also a geographic information system (GIS) to visualise some socio-demographic data about the coastal zone⁸⁸.

Laboratories and research structures

Physical Oceanography Research Group (UoM)

UoM group (<https://www.um.edu.mt/science/geosciences/physicaloceanography/about>) undertakes oceanographic research including observations and forecasts, specialised data management analysis and participation in international cooperative ventures. Their research themes cover coastal meteorology, hydrography, and physical oceanography. More specifically, it works on the hydrodynamics of the sea in the Maltese Island. It also participates in monitoring activities by the maintenance of permanent sea monitoring systems and the provision of meteo/marine forecasts. As a national oceanographic data centre, it promotes the product of the ICO Committee on the International Oceanographic Data and Information Exchange) and oceanographic data management activities in Malta (IODE National Report). It collects data from scientists, local agencies and

⁸⁵ <https://era.org.mt/topic/soer/>

⁸⁶ <https://mra.org.mt/library/annual-reports/>

⁸⁷ https://nso.gov.mt/Home/ABOUT_NSQ/Pages/Annual-Reports.aspx#

⁸⁸ <https://mangomap.com/nsomaps/data>

governmental departments under one database with international standardised formats. Services of the group include: Atmospheric Alert System; Climatology; Malta Blue Pages; Meteo-Marine Observations; MyOcean Service Platform; Numerical Modelling. All the operational services can be accessed from the Capemalta portal⁸⁹.

Marine Ecotoxicology Laboratory, Faculty of Science of the University of Malta

The Marine Ecotoxicology Laboratory of the Faculty of Science of the University of Malta (<https://www.um.edu.mt/science/biology/ourresearch/marineecotoxicology>) aims to 'contribute towards the development of Malta's capabilities in assessing marine contamination hazards which may threaten our marine resources and thus jeopardize the sustainability of our national economic growth'. The Laboratory has developed capabilities in environmental monitoring and field investigations of a number of biological responses to coastal pollution and have a wide range of pollution monitoring tools including biochemical/molecular bioassays and remote sensing by satellite which may be applied within the Mediterranean region. Its laboratory resources include a marine recirculating aquarium complex, biochemical ecotoxicology lab, controlled environment room, water quality lab and a full range of electronic field monitoring equipment. Researchers from this Laboratory participate in the Mediterranean Pollution Monitoring and Research Programme (MEDPOL) of the UNEP and FAO (effects of pollutants on marine; biological impact of oil dispersants; monitoring of jellyfish swarming in Malta; effects of pesticides in the Mediterranean; application of biomonitoring techniques in the Mediterranean).

A four-year Programme was initiated in 1997 with the aim of developing a data bank of information about water quality using satellite imagery data which may be periodically updated and which would provide the necessary information for comprehensive marine environmental management. The Programme is being funded through the fourth Italo-Maltese Financial Protocol.

Non-governmental organisations

BirdLife Malta

Birdlife Malta (<https://birdlifemalta.org/us/>) was founded in 1962 and is an environmental NGO in Malta, committed to the protection of wild birds and their habitats. It is also part of the BirdLife International network (NGO) working towards conserving global biodiversity and the sustainability of natural resources. Birdlife Malta manages four nature reserves and several EU LIFE-funded research projects on Malta's seabirds. They were committed in the creation of the first eight marine Special Protection Areas (SPAs) for Malta. Beyond the LIFE Project, the NGO provided continuous monitoring of seabirds. Birdlife Malta also provides some available data in the International Birdlife Data Zone.

Nature Trust Malta (NTM)

Nature Trust Malta (<https://naturetrustmalta.org>) was founded in 1962 and is an environmental NGO in Malta committed to the protection of the Maltese Island's animals and plants. Nature Trust Malta is also carrying out many environmental projects in Malta such as re-forestation, and habitat conservation and the creation of marine protected areas. They also participate in the MEDTRENDS Project (see below). NTM was the publication leader for the report of the Project 'Nature Trust Malta 2015', 'Current and Future Impacts on the Marine Environment: The Challenge to Achieve Good Environmental Status. A Summary Report – Malta MedTrends Project'. 110 pages.

⁸⁹ <http://www.capemalta.net/>

Monitoring activities within MPAs

Malta is one of the few Mediterranean countries which currently has no marine SPAs declared yet. A Marine Protection Area Steering Committee has been set up with a view to declaring Marine Protection Areas including marine SPAs, but no particular research by the Government is aimed at identifying marine SPAs. BirdLife Malta is the only entity carrying out such research and is awaiting analysis of data.

Environmental monitoring programmes

Marine environmental monitoring: towards effective management of Malta's marine waters

This Project (2014- 2020)⁹⁰ was supported by the European Maritime and Fisheries Fund (EMFF) for the period of 2014–2020. It aims to assess the state of Malta's marine waters on a continuous basis and address current knowledge gaps. The Project collated data on activities taking place in the marine environment to provide a sound knowledge base for effective management of anthropogenic activities and work towards the achievement of Good Environmental Status (GES) in marine waters. The construction of an Environmental INSPIRE compliant database system is one of the programme objectives. The specific objectives of the programme are: 'Fostering the implementation of the Common Fisheries'; 'Improvement and supply of scientific knowledge and collection and management of data'. The Project was 75% co-financed by the EU EMFF (European Maritime and Fisheries Fund) Funding Programme for 1,600,00 EUR and 25% from national funds. The beneficiary is the Environment and Resources Authority (ERA).

Currently, the database is still in the trial mode. However, the Managing Authority will set up a web-enabled information management and monitoring system (EMFF Database) in which key information on each operation shall be recorded. The system will be a centralised one, which provides the necessary access requirements to the relevant stakeholders namely: the Managing Authority, Treasury, Certifying Authority, Audit Authority, Line Ministries, and Beneficiaries. In this regard, the system shall be interoperable among the stakeholders mentioned above. The main sources of data for the monitoring and evaluation will be:

- Beneficiaries through project reporting mainly on the EMFF Information System of the Department of Fisheries and Aquaculture
- Ministry for Sustainable Development, the Environment and Climate Change
- Joint Research Centre and STECF Reports, National Statistics Office and Eurostat
- Malta Environment and Planning Authority

Main publications available from the programme:

- Environment and Resources Authority Report, 2017, Marine environmental monitoring: towards effective management of Malta's marine waters', 17 p.⁹¹

⁹⁰ <https://era.org.mt/projects/marine-environmental-monitoring-towards-effective-management-of-maltas-marine-waters/>

⁹¹ <https://eufunds.gov.mt/en/EU%20Funds%20Programmes/Agricultural%20Fisheries%20Fund/Documents/EMFF%20links%20and%20downloads/4th%20EMFF%20MA%20workshop%20-%203rd-4th%20Oct%2017/Marine%20Environmental%20Monitoring%20-%20ERA%20Presentation.pdf>

- Some other reports are available on the EMFF website⁹².

Environmental monitoring networks

MedPAN Project in Malta

A series of programmes were conducted after the execution of the MedPAN Project in Malta (Mediterranean Marine Protected Areas Network) which aimed to format a network of managers of marine protected areas in the Mediterranean. The first one was conducted in (2004–2007) and the MEPA participated in the formation of this network. As a result, a financial interpretation manual for marine habitats (within the fisheries management zone) was established along with the establishment of two underwater trails and communication/awareness measures. In line with the provisions of the NBSAP, Malta embarked on various EU-funded biodiversity-related projects, mainly under the LIFE+ programme (LIFE+ Malta Seabird Project, LIFE+ Migrate, LIFE+ ArcipelaguGarnija, etc).

LIFE BaHAR for N2K (LIFE12 NAT/MT/000845)

LIFE BaHAR for N2K (2013- 2018) (<https://lifebahar.org.mt/>) which commenced in October 2013 and ran until June 2018 is an example of the projects mentioned above. It aimed to extend existing marine Sites of Community Importance (SCIs) and identify new SCIs for inclusion within the Natura 2000 network. The budget is EUR 2.6 million, 50% of which is co-financed by the EU LIFE funding programme and Natura 2000 funding programme; the Environment and Resources Authority (ERA) was the coordinating beneficiary of the funding. On the website, an integrative map made available data and information collected by the catamaran 'Oceana Ranger' in 2015 and 2016, which aimed to survey shallow and deep waters within the Maltese Fisheries Management Zone. Data were collected through scuba diving and underwater vehicles.

At the end of the project, the LIFE BaHAR project team published a layman's report : Layman's Report on Research for the conservation of reefs and sea caves in Malta, 2018, 23 p.⁹³

Interreg Italia – Malta Calypso South

CALYPSO SOUTH (2007 - 2018) (http://www.calypsosouth.eu/index.php/welcome/open_page/21/0) is an Interreg project between Italy (Sicily) and Malta from 2007. It 'addresses the challenges of safer marine transportation, protection of human lives at sea, and safeguarding of marine and coastal resources from irreversible damages. It is a commitment to put technological advancement and scientific endeavour at the service of humanitarian responses, reducing risks in seafaring and protecting the marine environment'. They provide dataset systems: CALYPSO FO: A Radar monitoring system and response against marine oil spills in the Malta Channel⁹⁴.

Citizen science

Spot the jellyfish (MED-JELLYRISK)

'Spot the jellyfish' (<http://oceania.research.um.edu.mt/jellyfish/>) is a programme supported by the International Ocean Institute (IOI) and the Physical Oceanography Ocean Group, Operational Centre of Malta University. As an IOI-KIDS programme, it engages children and young people during the summer and their teachers and

⁹² <https://eufunds.gov.mt/en/EU%20Funds%20Programmes/Agricultural%20Fisheries%20Fund/Pages/EMFF-2014-2020.aspx>

⁹³ https://lifebahar.org.mt/wp-content/uploads/2018/06/LIFE-Ba%C4%A6AR_Laymans-Report.pdf

⁹⁴ http://oceania.research.um.edu.mt/cms/calypsoweb/index.php?option=com_content&view=article&id=78&Itemid=222&lang=en

parents to help the marine environment by recording the presence and location of various jellyfish species in Maltese coastal waters. A jellyfish report map is available in GIS format, accessed at the following link: <http://oceania.research.um.edu.mt/jellyfish/stats.html>

Environmental information systems

CAPEMALTA (CMEMS)

In 2015, the Physical Oceanography Research Group (<http://www.capemalta.net/#>) joined the Department of Geosciences within the Faculty of Science of the University of Malta. Their website Capemalta.net collects different databases on the Malta coastal and marine environment. Their last report available on the site was published in 2002.

Malta Blue Pages

The Malta Blue Pages (<http://www.capemalta.net/odm/bluepages.php>) is an internet-based directory system for ocean and marine data and information, targeting to establish a single-point online reference, access and repository for a number of marine data sources and descriptions in the field of marine environmental and oceanographic data in Malta. The information system aims to promote data management practices according to established international standards for bringing local datasets together in a coherent manner to allow their integrated access, and aims to support marine-related research initiatives, marine assessments, policy formulation, environmental management and data dissemination. It is a project of the Physical Oceanography Unit of the IOI – Malta Operational Centre at the University of Malta, the local entity responsible for supporting oceanographic data management practices and the local focal point for the Intergovernmental Oceanographic Commission (IOC)/International Oceanographic Data and Information Exchange (IODE). Only metadata is available and two databases⁹⁵ : the National Inventory of Marine MetaData and the National Inventory of Marine Research Projects.

Bibliography

Environment and Resources Authority. 2018. 'State of the environment report, 2018 summary report', 104 p, available at: <https://era.org.mt/wp-content/uploads/2019/05/SoER-Summary-Report-2018.pdf>.

Malta's Sustainable Development Vision for 2050.

MEPA. 2012. Malta's national biodiversity strategy and action plan (2012–2020), 34 p, available at : <https://www.cbd.int/doc/world/mt/mt-nbsap-01-en.pdf>.

Nature Trust Malta. 2015. Current and Future Impacts on the Marine Environment: The Challenge to Achieve Good Environmental Status. A Summary Report – Malta. MedTrends Project. 110 pages.

⁹⁵ <http://www.capemalta.net/odm/level1data.php>

Monaco

I. General overview

The Principality of Monaco is a City-State of 2 km² with 4 km of coastline. Monaco is faced with the same environmental problems as the other metropolises, to which is added the challenge of the smallness of its territory and its high level of urbanisation. As the City-State is an enclave within French territory, so the monitoring of the Monegasque coast is included in many French observatories. But the Principality has a strong history about marine exploration, ocean protection and sea monitoring. One hundred and fifty years ago, Prince Albert Ier developed a strong interest in science and marine explorations, and he founded the Oceanographic Institute, which, with the Monaco Scientific Centre, among the most active institutions in Mediterranean monitoring for Monaco. The Prince Albert II of Monaco Foundation does not directly contribute to marine activities and biodiversity observation, but it finances numerous expeditions, explorations and observation research programmes in the Mediterranean. Lastly, the Directorate of the Environment of the Principality Government is in charge of coordinating all the monitoring activities. However, environmental data and reports are not available on the Internet.

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Ordinance no. 1.464 of January 07, 2008	This law relates to the creation of the Environmental Department.
Law no. 1.198 of March 27, 1998	<p>This law relates to the Code of the Sea – TITLE III – Protection of the marine environment, Article L.230: ‘The provisions of the present title, without prejudice to the provisions of Title II, are designed to ensure, by means of appropriate measures, the natural conservation and development of marine fauna and flora and, to this end, to protect the marine environment against any disturbance and prevent damage which may be caused to the soil and subsoil or to appropriate installations located there. They shall apply to all coasts and shores and all internal and territorial waters; within these limits, particular areas may be designated for specific protection’</p> <p>Article L.230-3 prohibits any act which may impair the conservation of marine fauna or flora, disturb the marine environment, or damage the soil or subsoil or any installations which may be located there</p>
TITLE II Article L.221-4	Anti-pollution measures: ‘The modalities of research into all sources of pollution of the marine environment, their continuous monitoring, and appropriate measures for eliminating them’

Governmental environmental institutions

In Monaco, the Minister of State is assisted by five Ministers, who are appointed by the Sovereign Prince. Each of the five ministries is subdivided into Departments and Offices. **The Ministry of Public Works, the Environment and Urban Development** is charged with responsibility for the Environment. The key departments involved in coastal monitoring are the Department of Maritime Affairs and the Department of the Environment.

Department of Maritime Affairs (<https://en.gouv.mc/Government-Institutions/The-Government/Ministry-of-Public-Works-the-Environment-and-Urban-Development/Department-of-Maritime-Affairs>): The Department of Maritime Affairs has the responsibility of combating all forms of pollution in maritime areas and maintain pollution prevention and monitoring equipment. It also organises scientific trips at the sea in collaboration with the Department of the Environment, the Oceanographic Museum, laboratories and universities.

Department of the Environment (<https://en.gouv.mc/Government-Institutions/The-Government/Ministry-of-Public-Works-the-Environment-and-Urban-Development/Department-of-the-Environment>): Created in 2008, the Department has the responsibility of assisting in defining and implementing Government policy on sustainable development and the environment; to monitor biodiversity, quality of the environment, sources of pollution and risks of natural or technological origin; to provide information and raising the public's awareness of environmental issues.

Monitoring institutions/observatories

Division of the Environment

The Division is in charge of monitoring and evaluating marine biodiversity. It makes systematic inventories and monitors over time a selection of species groups, establishes indicators of species and environments to make possible the understanding of changes in the marine environment's state. For instance, the state of posidonia meadows, the biodiversity of fish stands, benthic endofauna and benthic macrofauna can be used as ecological indices of the state of the environment. The monitoring is based on inventories, cartographies and the follow-up of indicators. Since its creation in 2008, the Division of the Environment has regularly communicated about its action and monitoring of the marine environment. In 2009, it published the first edition of the Principality's collection of environmental data, making available to the public precise scientific information. The last edition available is the fourth edition of 'The Environment in the Principality of Monaco – Data Collection 2013'.

Prince Albert II of Monaco Foundation

The Foundation (<https://www.monacoexplorations.org/>) was created in 2006 by Prince Albert II of Monaco to respond to environmental's threats. The Mediterranean is set to be a priority for the Fondation. The Foundation does not conduct coastal monitoring directly, but it supports many monitoring projects in the Mediterranean Sea. For example, in 2014 it financed the Tara Océans Foundation for its Mediterranean mission. The scientific component of this mission focused on the issue of plastic wastes at sea. The impact is being studied and solutions are being envisaged to reduce pollution. This expedition also features an awareness component regarding the many issues at stake in relation to the Mediterranean, including the promotion of efforts by local and regional associations for the development of Marine Protected Areas. No data has been shared on internet but they shared a travelling exhibition and films with the public. The projects supported by the Foundation are listed on their website⁹⁶.

⁹⁶ <https://www.fpa2.org/development-of-marine-protected-areas.html>

Laboratories and research structures

Oceanographic Museum

This Museum (<https://www.oceano.org/>) was founded in 1906 by Albert I of Monaco. It aims to bring together scientific actors, political, economic, associations and the general public to know, promote and protect the ocean.

Monaco Scientific Centre (CSM)

The Monaco Scientific Centre (CSM) (<https://www.centrescientifique.mc/fr>) was created in 1960 by Prince Rainier III to support scientific research and protection of the ocean. It is specialised in the study of the functioning of Mediterranean coral ecosystems and in relation to global climate change. It also aims to disseminate information and scientific and technical knowledge.

The Oceanographic Institute and the CSM work in close collaboration. The CSM is housed in the offices of the Oceanographic Institute and they also use the same oceanographic vessel. Researchers are called upon to create exhibitions and the museum's services (interior service, library, aquarium) help researchers in their work. The CSM also has scientific equipment to study the various aspects of the metabolism of organisms in the field; it has tools for carrying out biochemical, molecular or histologic studies (photon microscopy, confocal microscopy, epifluorescence, etc.)

In July 2017, HSH Prince Albert II of Monaco initiated 'the Explorations of Monaco'. Created at the initiative of the Prince's Government, they represent a 'platform' for knowledge, sustainable management and protection of the ocean. It brings together the Prince Albert II of Monaco Foundation, the Oceanographic Institute, the Monaco Scientific Centre and the Monaco Yacht Club. They support the actions of these institutions through international missions that combine scientific research, public mediation and government cooperation.

No available data were found on the internet for the Institute and the CSM, but they carry out numerous exhibitions and mediation activities to communicate the results of monitoring activities to the general public.

Monitoring activities within MPAs

The Monegasque coastline comprises two Marine Protected Areas: the marine protected area of Tombant des Spélugues and of the Larvotto.

Marine Protected Area of Tombant des Spélugues

There are many habitats and Mediterranean emblematic species on the site (red coral, sponges, gorgonians, sea urchins, large mother-of-pearl, and several species of noble fish, including several groupers). Its surface area is 9 hectares.

Marine Protected Area of Larvotto

The Marine Protected Area of Larvotto is mainly intended for the conservation and enhancement of a posidonia meadows. Its surface is 33.6 hectares. Since 2019, there is a **Marine Protected Areas Committee** in charge of the governance of MPAs. It is composed of representatives of the Government, the Prince Albert II Foundation, the Oceanographic Institute, the Monaco Scientific Centre and the Directorates for the Environment and

Maritime Affairs. It defines the broad guidelines for the management of these areas. A Coordination Group for MPAs will work to facilitate the implementation of these guidelines, while the Monegasque Association for the Protection of Nature is entrusted with the daily management through a programme of actions to preserve the environment of MPAs.

Environmental monitoring networks

The Department of Maritime Affairs is involved in two main international exercises: RAMOGEPOL and REMPEC. The latter is the Mediterranean Regional Centre for Emergency Response to Accidental Marine Pollution and supports Mediterranean Governments in the transposition, implementation and application of international maritime conventions relating to the prevention, preparation and control of pollution from ships. RAMOGEPOL is described below.

RamogePol – ‘Prévention et Lutte contre la Pollution du Milieu Marin’

During the International Congress of the Mediterranean Science Commission, Prince Rainier III of Monaco proposed to implement joint actions to limit marine pollution and announced his willingness to set up a pilot area that would constitute a laboratory of ideas on the protection of the marine environment. The first RAMOGE Agreement was signed in 1976 between Saint-Raphaël, Monaco and Genes and covered **the protection of coastal waters in the Mediterranean Sea, the combat against the pollution of the marine environment**. In 1993, the Plan RAMOGEPOL (<http://www.ramoge.org/fr/ramogepol.aspx>) extended its jurisdiction to the high seas, from **the mouth of the Grand Rhône in the West, to the mouth of the River Magra in the East**, including Corsica and Sardinia. Finally, it aims to coordinate French, Italian and Monegasque action in the Mediterranean region and increase awareness of the marine environment.

Publications: It publishes regular reports for sea users (fishermen, local authorities, officials) to provide them with the information they need to adopt the most respectful behaviour towards the marine environment, including annual reports about Mediterranean Sea exploration surveys (available in French, English and in Italian) and some data observation collection. The last one was published in 2018.

Environmental information systems

MEDAM – French Mediterranean Coasts, Inventory and Impact of Reclamations from the Sea

The MEDAM database (<http://www.medam.org/index.php/fr/102-medam-main-perimetre-geographique>) covers the whole of the French Mediterranean coast (excluding lagoons, except for the Étang de Berre). The Principality of Monaco, as an enclave within French territory, is included. All data are presented on the basis of administrative divisions: countries (France and Monaco), regions (Provence-Alpes-Côte d’Azur, Corsica and Occitania), departments (counties) and communes (municipal or rural district). The subdivision of the data on the basis of European water masses (Framework Directive ‘Water’ of the European Parliament) is also given.

Bibliography

L’environnement en Principauté de Monaco, recueil de données, 2018, Direction de l’Environnement, 184 p. available at <https://www.gouv.mc/Action-Gouvernementale/L-Environnement/Publications/L-Environnement-en-Principaute-de-Monaco-Recueil-de-donnees> [accessed on 01/11/2020]

Montenegro

I. General overview

In Montenegro, a deficit in environmental monitoring was underlined in 2007 by the Environmental Performance Review of 2007 of the United Nations Economic Commission for Europe (UNECE, 2007). Since then, progress has been noticed, as the country has been producing state of the environment reports annually since 2009 and indicator-based state of environment reports since 2013 (UNECE, 2015). A Strategic Plan for Biodiversity was adopted for 2011-2020, which organised the data collection according to Natura 2000's methodology. However, biodiversity monitoring was still at an initial stage of development in 2015. The measuring network for coastal sea waters is also developing, through two parallel coastal seawater monitoring networks (UNECE, 2015). Coastal and marine monitoring was also triggered by the studies for the establishment of protection measures throughout six different marine sites across the country. Three MPAs included in the state of the environment are Platamuni, the Katici Islands and Old Ulcinj Island. A monitoring programme for biological parameters of the sea was also launched in 2009.

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Law OG 48/08, 40/10, 40/11, 27/14 of 2008	This law on the Environment, replacing the 1996 law on Environment: establishes the principles, mechanisms and institutional framework for environmental protection. It sets up the competence of environmental monitoring of the Environmental Protection Agency, responsible for environmental monitoring and reporting on the state of the environment.
Law OG 51/08, 21/09, 40/11, 62/13, 6/14 of 2008; 054/16 of 2016	This law on Nature Protection, replacing the 1977 law, aims to align the nature protection system with obligations resulting from Montenegro's international commitments and relevant EU directives. The law describes the classification of protected areas. It regulates the conditions for the protection of marine habitats and wetlands. The law from 2016 has been further aligned with relevant EU legislation, in particular Habitats and Birds Directive and Natura 2000 requirements, better defining the proclamation of MPAs and their management.
Law OG 073/19 of 2019	Law on marine environment protection from 2019 transposing MSFD and establishing a framework for marine environmental protection. It provides a basis for the bylaws defining monitoring in line in MSFD and achievement of GES.
Law OG 14/92, No. 14/92 of 3 April 1992, 59/92 of December 22, 1992, 27/94 of July 29, 1994, and «Official Gazette of Montenegro» 51/08 from 22.08.2008, 21/09 from 20.03.2009, 73/10 from 10.12.2010, 40/11 from August 08, 2011	This law regulates the management of marine property, its use, improvement and protection. It delimits the marine public domain. It sets the competence of the Public Company for the Management of Marine Assets of Montenegro.

Law OG 17/07 of December 31, 2007, 06/08 of January 25, 2008, 40/11 of August 8, 2011	Law on the Sea: this law regulates the sea and submarine area of Montenegro, namely: internal sea waters, territorial sea, exclusive economic zone, continental shelf, prohibition of entry, stopping and pursuit of a ship. It adopts the principle of protection of the marine environment.
Law OG 25/10, 40/11 of 2010, amended on April 6, 2018	The 2010 law on Air Protection: this law replaces the 2007 law on air quality in order to detail the competences of the APE and define a strategic framework for air protection. It strengthens the harmonization with the international commitments made by Montenegro and EU directives. In 2018, an amendment organized the establishment of a network of measurement points for monitoring air quality
Law OG 80/05, 54/09, 40/11 of 2005	Law on Integrated Prevention and Control of Environmental Pollution
Law OG 27/07, 32/11 of 2007; OG 32/2011, 47/2011, 48/2015, 52/2016, 2/2017, 80/2017, 55/2016 and 84/2018	The 2007 law on Water, replacing the 1998 law on the Water Regime. The law on Water has been further aligned with WFD, with the version from 2018 providing a basis for balaws which will introduce aligned monitoring and assessment of good status.
Law 027/14 of 2014	Law on Protection of the Sea against Pollution from Ships
Law OG 56/09 of August 14, 2009	Law on marine fishing and mariculture: it requires the establishment of a Management Plan which shall monitor the state of stocks of economically significant species of fish and other marine organisms at the bottom and in free wate.
OG 044/12 of August 9, 2012	Law on Free Access to Information.

National environmental institutions/organisations

Ministry of the Ecology, Spatial and Urban Planning/ *Ministarstvo održivog razvoja* (<https://mrt.gov.me/en/ministry>): restructured in 2011. It is the main government authority responsible for the evaluation of environmental and sustainable development policies. It ensures the implementation of environmental legislation.

Monitoring institutions/observatories

National Agencies

Environmental Protection Agency (EPA)

The Environmental Protection Agency (EPA) (*Agencija za zaštitu životnesredine*) (<https://epa.org.me/>) is the government authority responsible for environmental monitoring and reporting on the state of the environment in Montenegro. It was established in Podgorica in 2008, and has been operational since 2009. It is also in charge of the implementation of strategies, programmes and laws related to the environment, the implementation of international treaties that fall within its competence. Data collected on air quality has been made available online since 2014 in real time. Its monitoring programme of the state of the coastal marine ecosystem is implemented in order to assess the state of marine biodiversity and the quality of seawater, based on the analysis of biological and chemical indicators of pollution. Based on the results obtained through the implementation of the monitoring programme, the degree of pollution is assessed. It is developing an annual national marine ecosystem monitoring programme, preparing information on the state of the marine ecosystem, as well as preparing an annual report for the European Environment Agency (EEA) and the obligations arising from the ratification of the Barcelona Convention and its protocols (MED

POL). The current monitoring of the coastal and marine environment includes a general coastal water quality programme, the monitoring of water quality in port waters, eutrophication monitoring, monitoring pollution trends, biomonitoring, biomarker monitoring, monitoring of effluent intake and mariculture water monitoring. The Agency cooperates with international bodies, in particular with the European Environment Agency and the International Atomic Energy Agency. The last state of environment report was published in 2019 for the year 2017; the last monthly report on air quality in august 2020.

Public Company for the Management of the Marine Assets of Montenegro

This Public Company (*Javnogpreduzeća za upravljanjemorskimdobromCrne Gore*) (<http://www.morskodobro.com/>) headquartered in Budva, was created in accordance with the law on Marine Assets of June 2, 1992. Its mission is to ensure the management of the use of marine resources, as well as to organise the individual rights to use marine assets through contracts with the Public Company. Its Sustainable Development Department coordinates environmental protection, the monitoring of the quality of bathing water (since 1996) and maintains a database on marine resources. Results of the monitoring of quality of bathing water, gathered through 85 sample sites, are published on the website of this Public Company (last one published for the year 2014⁹⁷). In 2011, the Public Company prepared studies for the establishment of protection measures throughout 6 marine sites (Ratac with the beaches of Žukotrlica, Sutomore, Petrovac, Jaz, Slovenska and Bečićka) by engaging the EPA. The studies were submitted to the local authorities of Bar and Budva for follow-up and adoption of the decision on the proclamation of protected areas and the appointment of managers in accordance with Article 55 of the law on Nature Protection. The Public Company is the main partner within the Interreg Project "PORTODIMARE" (see description in the Environmental monitoring programme section below).

National environmental institutions/organisations

Ministry of the Ecology, Spatial and Urban Planning/ *Ministarstvo održivog razvoja* (<https://mrt.gov.me/en/ministry>): restructured in 2011. It is the main government authority responsible for the evaluation of environmental and sustainable development policies. It ensures the implementation of environmental legislation.

Monitoring institutions/observatories

National Agencies

Environmental Protection Agency (EPA)

The Environmental Protection Agency (EPA) (*Agencija za zaštitu životne sredine*) (<https://epa.org.me/>) is the government authority responsible for environmental monitoring and reporting on the state of the environment in Montenegro. It was established in Podgorica in 2008, and has been operational since 2009. It is also in charge of the implementation of strategies, programmes and laws related to the environment, the implementation of international treaties that fall within its competence. Data collected on air quality has been made available online since 2014 in real time. Its monitoring programme of the state of the coastal marine ecosystem is implemented in order to assess the state of marine biodiversity and the quality of seawater, based on the analysis of biological and chemical indicators of pollution. Based on the results obtained through the implementation of the monitoring programme, the degree of pollution is assessed. It

⁹⁷ http://www.monitoring.morskodobro.com/kupalista/?lang=en_US

is developing an annual national marine ecosystem monitoring programme, preparing information on the state of the marine ecosystem, as well as preparing an annual report for the European Environment Agency (EEA) and the obligations arising from the ratification of the Barcelona Convention and its protocols (MED POL). The current monitoring of the coastal and marine environment includes a general coastal water quality programme, the monitoring of water quality in port waters, eutrophication monitoring, monitoring pollution trends, biomonitoring, biomarker monitoring, monitoring of effluent intake and mariculture water monitoring. The Agency cooperates with international bodies, in particular with the European Environment Agency and the International Atomic Energy Agency. The last state of environment report was published in 2019 for the year 2017; the last monthly report on air quality in august 2020.

Public Company for the Management of the Marine Assets of Montenegro

This Public Company (*Javnogpreduzeća za upravljanjemorskimdobromCrne Gore*) (<http://www.morskodobro.com/>) headquartered in Budva, was created in accordance with the law on Marine Assets of June 2, 1992. Its mission is to ensure the management of the use of marine resources, as well as to organise the individual rights to use marine assets through contracts with the Public Company. Its Sustainable Development Department coordinates environmental protection, the monitoring of the quality of bathing water (since 1996) and maintains a database on marine resources. Results of the monitoring of quality of bathing water, gathered through 85 sample sites, are published on the website of this Public Company (last one published for the year 2014⁹⁷). In 2011, the Public Company prepared studies for the establishment of protection measures throughout 6 marine sites (Ratac with the beaches of Žukotrlica, Sutomore, Petrovac, Jaz, Slovenska and Bečićka) by engaging the EPA. The studies were submitted to the local authorities of Bar and Budva for follow-up and adoption of the decision on the proclamation of protected areas and the appointment of managers in accordance with Article 55 of the law on Nature Protection. The Public Company is the main partner within the Interreg Project "PORTODIMARE" (see description in the Environmental monitoring programme section below).

Department of Hydrometeorology and Seismology

Created in 2012, the Institutes of Hydrometeorology and Seismology (<http://www.meteo.co.me/index.php>) were administratively merged into a single administrative body of the Government, now called the Department of Hydrometeorology and Seismology, within the seismology sector of this joint institute. Its "Ecology" service carries out permanent control of the quality of surface and ground water and air in the territory of Montenegro every year. The purpose of these measurements is to determine the condition and changes in the water balance and the qualitative composition of water, ie. the determination of the quality class of surface water, as well as the control and evaluation of the levels of atmospheric pollution in the underground layer of the atmosphere. The assessment of water and air quality is carried out in accordance with legal regulations aligned with the EU water acquis. The working methodology in all phases of sampling, analysis and data processing is fully standardised. The data processed on the state of the environment and the assessment of the state of air and water quality are published in annual reports, which are archived and submitted to the relevant ministry. It participates in the implementation of international programmes: the Transboundary Air Pollution Monitoring Programme (EMEP) and the Mediterranean Sea Pollution Monitoring Programme (MED POL).

Laboratories and research centres

Ecotoxicological Research Centre

The Ecotoxicological Research Centre (*Centar za ekotoksikološkaispitivanja*) (<http://mne.ceti.me/>) was established by decision of the Government of the Republic of Montenegro in 1996. It started its activities in 1998. It became the first accredited laboratory in Montenegro to test all quality parameters of drinking water, surface water, groundwater and wastewater, heavy metals and fish health, sediment, soil analysis and environmental and

food radioactivity testing. The Centre has been given the assignment to perform air quality monitoring at the territory of Podgorica, through mobile monitoring stations. It participates regularly in the monitoring programme of the marine environment (<http://eng.ceti.me/>). It takes part in various international cooperation programmes, such as “Strengthening the capacity of Montenegro for cases of incidents at sea”, in partnership with the Ministry of Foreign Affairs of the Kingdom of Norway (2014-2016), or “Revision and update of the National Implementation Plan of the Stockholm Convention on Persistent Organic Pollutants (POPs)” in Montenegro, in partnership with the UNEP (2016 -).

Koto Institute of Marine Biology (IMBK) - University of Montenegro

The Institute of Marine Biology (Institut za biologiju mora) was founded in 1961. Today it is part of the University of Montenegro. The law establishing the Institute of Marine Biology, adopted by the National Assembly of Montenegro, stipulates that one of its fundamental objectives is the protection and study of the Adriatic Sea. Its facilities include a Marine chemistry and oceanography laboratory, an ichthyology and sea fishing laboratory, a plankton and seawater quality laboratory, a benthos and marine protection laboratory and a developmental research and mariculture laboratory. This institute takes part in a variety of national and international monitoring programmes, such as:

- “Exploring transboundary aquatic biodiversity” (2020-2023), financed by the IPA Interreg CBC Bih-CG
- “EMODnet Chemistry 4” (2019-2023), financed by the European Commission’s General Directorate for Maritime Affairs and Fisheries (DG MARE) of the European Commission. It aims to collect chemical data related to marine micro-litter, to create an infrastructure for the management and access to data, metadata and data products for the protection of marine regions.
- “Investigation of the biological parameters of the sea (polyps and jellyfish) along the Montenegrin coast with a focus on the bathing areas in the Bay of Kotor” (01/03/2020-31/12/2020), financed by the Public Company for the Management of Marine Assets of Montenegro.
- “Assessment of the ecological state of the sea on the basis of the contents of heavy metals and microplastics in sediment and fishes in the coastal sea of Montenegro” (2019-2020), financed by the Ministry of Sciences of Montenegro.

Non-governmental organisations

Montenegrin Ecologists’ Society

The Montenegrin Ecologists Society (*CrnogorskoDruštvoEkologa*) is an independent, non-for-profit civil society organisation founded on August 10, 2012 in Podgorica. It aims to foster conservation and protection of habitats of plant and animal species through the inventory and distribution of species, monitoring biodiversity (algae, plants, habitats, insects, arthropods, mites, leeches, amphibians, reptiles, birds and mammals), mapping of habitats and species in the Montenegro region, and the assessment of the degree of endangerment of species in Montenegro. Within the project “Actions for the ecological valorisation of Buljarica Cove”, financed by Critical Ecosystem Partnership Fund (CEPF), it led the study “Ecosystem-Based Assessment of Biodiversity Values and Threats in Buljarica” (2016-2017) which detailed marine and coastal ecosystems biodiversity in the region. The published report is available on the project’s website (<http://buljarica.drustvoekologa.me/>). Within the project “Support to local communities in the promotion and protection of the future protected area in sea - Katic”, led with the NGO Green Home, the Montenegrin Ecologists’ Society conducted a study of juvenile grouper fish individuals in the area of the future ZPM Katič from June to October, 2019.

Green Home

Green Home is an environmental NGO (<http://www.greenhome.co.me/index.php?jezik=lat>) founded by biology students in 2000. It aims to protect the environment, preserve natural resources and implement the concept of sustainable development. It has six employees and leads a variety of participatory conservation projects, environmental awareness programmes, and leads some monitoring activities. It developed a partnership with the Mediterranean Centre for Environmental Monitoring (MedCEM) in 2019 within the framework of the NGO project "Support to local communities in the promotion and protection of the future marine protected area - Katic". It promotes the creation of an MPA in Katic. It also participated to the "mapping, monitoring and management of the transboundary Natura 2000 network at sea" (2015/2017). Green Home receives funding from a variety of institutions, such as the European Fund for the Balkans, the US Embassy in Podgorici, the European Union, the Rockefeller Brothers Fund, WWF, USAID. It is currently leading the project "Media Centre for Environmental Reporting" (January 2020 - January 2022) with the financial support of the European Commission for the capacity building of journalists in northern Montenegro to report on major environmental issues, using free access to IT tools and databases, in cooperation with the civilian sector in this area.

Environmental monitoring programmes

"Explore transboundary aquatic biodiversity" Project (2020-2023) - Interreg IPA Cross-Border Cooperation Programme for Croatia-Bosnia and Herzegovina-Montenegro

The main objective of the Project is to strengthen and diversify the tourist offer through the search for cross-border aquatic biodiversity and to enable better management and sustainable use of cultural and natural heritage. With this Project, it is planned to develop a new tourist offer in Kotor - the Kotor Tourist Route and the Boka Aquarium. The Project leader is the University of Dubrovnik, Croatia. Partners from Bosnia and Herzegovina are the Tourism Organisation of Herzegovina-Neretva County and the "Hutovo Blato" Nature Park. Besides the Institute, the partner from Montenegro is the Kotor Tourism Organisation. This Project is part of the Interreg IPA Cross-border Cooperation Programme for Croatia-Bosnia and Herzegovina-Montenegro 2014-2020.

The PORTODIMARE Project (Interreg/UE, 2018-2020) - Italy, Greece, Slovenia, Montenegro, Croatia and Bosnia-Herzegovina

The PORTODIMARE (Geoportal tools and data for sustainable coastal and marine environment management) Project aims to create a common platform for data, information and tools centered on the coast and the Adriatic-Ionian Seas, integrating existing databases, portals and tools developed in previous EU-funded projects (SHAPE, ADRIPLAN, etc.). The activities of the Project are to implement a unique virtual space available for decision-makers, scientific and professional institutions and all other interested parties. Eleven partners from 6 countries (Italy, Greece, Slovenia, Montenegro, Croatia and Bosnia-Herzegovina) are participating in the Project. In Montenegro, it is led by the Public Company for the Management of Marine Assets in Montenegro.

"Assessment of the ecological state of the sea based on the content of heavy metals and microplastics in sediments and fish in the coastal waters of Montenegro" (2019-2021)

This Project involves the determination of the heavy metal content in surface sediment samples and selected fish species in two seasons during the research period. Of particular importance is the research carried out for the first time in the study area, which focuses on the identification and determination of microplastic content in surface sediments, as well as the determination of microplastics in some economically important

fish species. It is financed by the Ministry of Sciences of Montenegro for the period of 2019-2021, and led by the Koto Institute of Marine Biology.

“Joint Actions for Sea Pollution Prevention”: JASPPer Programme for Croatia - Montenegro (2013-2015)

“Joint Actions for Sea Pollution Prevention - JASPPer” was an IPA Project from the Component II – Cross-border Cooperation. It was led by the Institute of Hydrometeorology and Seismology of Montenegro and the Institute of Marine Biology in Kotor. This Programme organised the first monitoring of sea quality in the Gulf of Trašte. The specific goal of the project was to create the preconditions for the long-term cooperation of the institutions in the bordering area on the topics of wastewater management and monitoring of the seawater quality.

“Coastal Area Management Programme (CAMP)” for Montenegro (2011-2014)

This Coastal Area Management Programme (CAMP) was implemented in cooperation between the Mediterranean Action Plan and the Montenegrin Ministry of Sustainable Development and Tourism with the involvement of local governments from the project area, the Environmental Protection Agency and the other competent national institutions. It aimed to support, facilitate and propagate the efforts towards the integrated management of the coastal area and to provide for environmental protection and sustainable development, which included contributing to the coastal GIS database with indicators as a core future coastal monitoring observatory (UNEP/MAP, 2015).

Marine Biological Parameters Monitoring Programme (since 2009)

The monitoring programme for biological parameters of the sea, implemented since 2009, includes the analysis of basic oceanographic data, chemical parameters, phytoplankton analysis, bacteriological analysis, analysis of the biodiversity of phytobenthos, analysis of establishments of Posidonia and Cymodocea, and the biodiversity of the zoobenthos. This Programme aims to develop knowledge on marine biodiversity, in order to be able to define measures for its conservation. The data obtained can be used for spatial planning of given areas as well as basic data for possible future protected areas of the sea. The data collected on biodiversity is made available through the “Catalogue of flora and fauna of the coastal sea of Montenegro” (<http://www.morskodobro.com/dokumenti/katalog.html>). Biological parameters of the monitoring programme are led and implemented by the Environmental Protection Agency, as part of the monitoring programme of coastal ecosystem. The Public Company implements the monitoring programme of bathing water quality from 2019 fully aligned with the EU directive on bathing water. (http://www.monitoring.morskodobro.com/kupalista/?lang=en_US).

Fisheries activities assessment in Montenegro: case study of five selected parts of Montenegro in coast (2011) - RAC/SPA - UNEP/MAP

This Programme was part of the framework of the Regional Project for the ‘Development of a Mediterranean Marine and Coastal Protected Areas (MPAs) Network by boosting the Creation and Management of Mediterranean MPAs’ (MedMPAnet Project). The study was conducted in 2011 to determine the fishing activities in Petrovac - Buljarica, Island Lastavica - or Mamula, Cape Platamuni – Cape Žukovica, Old Ulcinj Island, Orahovac – Boka Kotorska Bay. It was conducted through interviews, echo surveys, and sharing of data.

Environmental information systems

Environmental Information System

This Environmental Information System (https://eis.epa.gov.me/#/?_k=dc1kg3) was developed in the framework of the IPA programme of the European Union for Montenegro, in support of the Agency for the Protection of the Environment. It gathers data on biodiversity, waste, soil, agriculture, fishing, energy, traffic and tourism. This EIS enables the Montenegrin network of environmental information providers to submit their data to the Agency electronically through a web service interface. There is a need for further development and upgrade of this system to ensure gathering of data and reporting to the EEA and other international systems.

Fisheries Information System

The Fisheries Information System was created in 2009. It includes the development of the register of subjects interested in fishing, the preparation of the vessel register, the development of the permit register, daily catches, sales registers, development of the biological data register and the development of subsystems for processing statistical and analytical data. It is fed by the “Annual collection of fishing data programme of Montenegro”. The 2014 IPA II project “Strengthening of fisheries control and management” has pushed forward the establishment of this information system. As part of the project, the acquisition and installation of automatic vessel identification devices (AIS) was carried out on registered fishing vessels over 10 meters, and part of the satellite monitoring system of these vessels has been modernised. Data exchange between the information system of the Ministry of Agriculture and the maritime traffic monitoring system of the Ministry of Maritime Affairs and Transport has been established, which has significantly increased the safety of fishing vessels (MPRR, 2020).

Bibliography

European Environmental Agency, 2015, “Montenegro country briefing - The European environment — state and outlook 2015”, 6 pages.

Katnić, A., Jovičević, M., Iković, V, 2017. “Ecosystem-based assessment of biodiversity values and threats in Buljarica”. Montenegrin Ecologists Society and Environmental Programme, 88 pages.

Ministarstvo Poljoprivrede i Ruralnog Razvoja, 2020. “Program prikupljanja podataka o ribarstvu Crne Gore (DCF - DCRF)”, 57 pages.

RAC/SPA - UNEP/MAP, 2015. “Fishery activities assessment in Montenegro : case study of five selected parts of Montenegrin coast”. By Mirko Djurović and Olivera Marković. Ed. RAC/SPA - MedMPAnet Project, Tunis: 39p

UNECE, 2007. “Environmental Performance Reviews: Republic of Montenegro, 2nd Review”, 165 pages.

UNECE, 2015. “Environmental Performance Reviews: Republic of Montenegro, 3rd Review”. 259 pages.

UNEP/MAP, 2015. “CAMP Montenegro, Final Project Report”. 106 pages.

Morocco

I. General overview

The monitoring of marine and coastal biodiversity in Morocco has increased in recent years. The action plan relating to the National Strategy for the Conservation and Sustainable Use of Biodiversity has encouraged the establishment of field studies. This observation activity has developed in particular around marine protected area systems, such as the Al Hoceima National Park (SPAMI since 2009), the Cap des Trois Fourches (Ramsar Site, 2005), the mouth of Moulouya (Ramsar Site, 2005), Sebkh Bou Are (Ramsar Site, 2005), and the Intercontinental Biosphere Reserve of the Mediterranean (recognised in 2006), as well as around the sites being studied in order to be designated as MPAs. The National Environment Observatory is the main institution responsible for collecting and sharing the country's environmental data, and has enabled the development of functional information systems. However, the absence up until July 2020 of a coherent legislative framework on environmental monitoring hindered the development of the monitoring activity (UNECE, 2014).

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Law no. 99-12, of March 20, 2014	This law relates to the national charter for the environment and sustainable development
Law no. 11-03 of May 12, 2003	This law relates to the protection of the environment: Article 57 establishes that the administration set up a national environmental observatory and regional networks of observation, control and continuous monitoring of the quality of the environment.
Law no. 22-07 of July 16, 2010	This law relates to protected areas: the management plan of the protected area should describe the monitoring and control mechanisms, as well as the environmental impact indicators and the estimate of financial needs on a five-year basis.
Law no. 81-12 of July 15, 2015	This law relates to the coast: Article 35 establishes that "bathing water is subject to periodic and regular monitoring with a view to controlling its quality. The Administration classifies the beaches according to the quality of their bathing water on the basis of standards and criteria set by regulation."
Decree no. 2-95-717 of November 22, 1996	This Decree relates to the preparation and the combat against accidental marine pollution: this plan involves the collection of information, directives and instructions necessary for the public authorities to prevent and combat, under the best conditions, any massive marine pollution by oil and other harmful products.
Standard 03-7-199 (2014)	This Regulation relates to the management of bathing water.
Law no. 1-73-255 of 27 chaoual 1393 (November 23, 1973)	This law regulates maritime fishing, with general rules on the exercise of sea fishing, classification of nets, prohibited baits and fishing methods, water pollution, Regulation of the size of the fish caught.

Law no. 15-12 of May 12, 2014	This law relates to the prevention and the combat against illegal, unreported and unregulated fishing
Law no. 12-03 of May 9, 2003.	This law relates to environmental impact studies: the administration must take "all necessary measures to ensure that the information and conclusions relating to the environmental impact study are accessible to the public during the period of the public inquiry, with the exception of information and data which are considered confidential" (Art. 10).
Draft law no. 49-17, July 9, 2020	This law relates to environmental assessment: it establishes the obligation to carry out environmental assessment studies by approved consulting firms and will strengthen the principle of prevention stemming from international environmental law.

National environmental institutions/organisations

Department of the Environment of the Ministry of Energy, Mines and the Environment/ *Département de l'environnement du Ministère de l'énergie, des mines et de l'environnement* (<https://www.mem.gov.ma/Pages/index.aspx>): Created in 2014, the Department is responsible for the monitoring, development and execution of government policy in the field of the environment and sustainable development. It is in charge of the establishment of the structures necessary for the observation and monitoring of the state of the environment and the collection of environmental data and information at national and regional level in collaboration with the other Departments concerned.

Department of Maritime Fisheries/*Département des pêchesmaritimes* (<http://www.mpm.gov.ma/>): one of the key players in the management of the marine environment. It is in charge of ensuring the protection and preservation of the marine environment. This Department is equipped with a research institution, the National Institute for Halieutic Research (INRH) also responsible for ensuring the continuous monitoring of the state of the marine environment, which makes it a major player in the surveillance and monitoring activities suggested.

Monitoring institutions/observatories

National agencies

National Environmental Observatory of Morocco (ONEM)

Created in 1994, the National Environmental Observatory (*Observatoire National de l'Environnement du Maroc, ONEM*) is a directorate located in Rabat placed under the supervision of the Government Secretariat for Sustainable Development (SEDD) - Ministry of Energy, Mines and the Environment - Department of the Environment - Department of Studies, Planning and Foresight (DEPP). This national observation system is responsible for making the information on the environment and sustainable development available. Its missions are to collect data and indicators relating to the environment and sustainable development from national institutions and specialised organisations, process environmental data and information, initiate and carry out studies and surveys, publish and disseminate environmental information and promote data exchange and partnership programmes (national, regional and international). ONEM enabled the setting up of 20 Information and Data Systems on the Environment: see this Plan Bleu Report. ONEM has published reports on the state of the environment in Morocco, and a national report on sustainable development indicators (<http://www.environnement.gov.ma/fr/bd/bd-onem/9-non-categorise>).

National Laboratory for Pollution Monitoring Studies (LNESP)

The National Laboratory for Pollution Monitoring Studies (*Laboratoire national des études surveillance de la pollution*) (LNESP) (<https://labo.environnement.gov.ma/surveillance>) was created in 1994, and its current administrative form was established in 2015. It is located in Rabat. LNESP comes under the authority of the Government Secretariat for Sustainable Development (SEDD) - Ministry in charge of the Environment. This Government laboratory undertakes studies on pollution at the national level in order to meet the country's needs in terms of analyses, measurements, controls and expertise relating to the environment. Its mission is notably to monitor and characterise pollution and nuisances in the environment and contribute to the establishment of thematic surveillance network, participate in the coordination of the network of laboratories operating in the field of the environment and contribute to the establishment of discharge standards. Its observation capacity is based on 3 mobile units for monitoring air quality and controlling industrial emissions; 1 mobile unit for monitoring and controlling waste pollution; 3 utility vehicles for field interventions and sampling equipment (automatic samplers, flowmeters, etc.). It is equipped for collecting physico-chemical and bacteriological parameters concerning water and waste, micropollutants, industrial emissions as well as noise pollution. Its observations are available in annual reports on the quality of bathing water and national reports.

National Institute for Fisheries Research (INRH)

Located in Casablanca, the National Institute for Fisheries Research (*Institut National de Recherche Halieutique, INRH*) (<http://www.inrh.ma/>) was created in 1996, although its history originated in 1884. It is an establishment of a scientific and technical nature with a legal personality and financial autonomy. The Institute comes under the authority of the Minister of Agriculture, Maritime Fisheries, Rural Development, Water and Forests. At the national level, it ensures the evaluation of fishery resources and their monitoring, the study of the functioning of marine and coastal ecosystems as well as the monitoring of the quality and health of the marine environment. Its specific missions are to study the functioning of marine and coastal ecosystems, to monitor the quality and health of the marine environment; to monitor the fishery resources and their exploitation; and contribute to the development of aquaculture.

INRH includes 5 regional centres, including 2 on the Mediterranean coast (Tangier and Nador); 1 centre specialising in aquaculture in M'diq; of a fish pathology laboratory in Tangier. This Institute also has the means of intervention at sea for sampling and monitoring the marine environment, including two research vessels: the Al AMir Moulay Abdellah Research Vessel (38.5m long); and the Charf AL Idrissi Research Vessel (41m long). The INRH laboratories in Casablanca are as follows: microbiology; chemistry; ecotoxicology; biotoxin and phytoplankton; physical oceanography; biological oceanography, algology; aquaculture and shellfish farming; pathology; demersal resources; pelagic resources; genetics and molecular biology; biology-ecology; sampling; mapping.

The INRH collects data relating to the environment, resources (small pelagics, tuna, cephalopods, shrimps, red coral), food health surveillance (molluscs, shellfish production). It develops bilateral partnerships (in the past with Japan, Belgium and France). Its current partners are the IFREMER (France); IEO; IMROP (Mauritania) and the INSTM (Tunisia). The central and regional research structures of the INRH are reinforced by sampling networks which ensure the in-situ collection along the entire Moroccan coast of robust, quantitative and homogeneous data. Five networks are already functional:

- The fishery resources sampling network;
- The quality and health of the marine environment network;
- The zoo-sanitary network;
- The grounding network.

Lastly, the INRH publishes health status inputs by region, reports on the state of Moroccan stocks and fisheries (the last one was published in 2017), scientific publications and newsletters.

Directorate of Environmental Hygiene and Environmental Protection (DHMPE)

Under the supervision of the Ministry of Public Health, the Directorate of Environmental Hygiene and Environmental Protection (*Direction de l'Hygiène du Milieu et de la Protection de l'Environnement, DHMPE*)⁹⁸ ensures the monitoring of pollution of the environment. It has 23 regional environmental hygiene laboratories that collect data on atmospheric pollution, noise pollution, chemical pollution, non-ionizing waves, ionizing waves, solid waste and the quality of bathing water. It publishes the list of beaches prohibited for swimming due to alarming pollution rates.

Marine observatories

ODYSSEA Al Hoceima Marine Observatory

The Al Hoceima Marine Observatory was created in 2019 as part of the ODYSSEA Project (<http://odyseaplatform.eu/>). This Project aims to develop and implement an operational platform for oceanographic information and forecasting over the entire Mediterranean basin, from coastal areas to the open sea. ODYSSEA is a platform that will integrate all existing information systems (Copernicus, GEOSS, GOOS, EMODNet, ESFRI, Lifewatch, Med-OBIS, GBIF, AquaMaps, Marine IBA e-atlas, MAPAMED and others) as well as data from 9 observatories created specifically within the framework of ODYSSEA. It was funded by the European Union. This Observatory must generate data and marine services to support decision-making in North Africa and the Mediterranean. Al Hoceima is the first observatory of the North African Sea. It is operational and has an underwater glider whose mission is to document and map populations of marine mammals. It will also assess the sonar ping echo, maritime traffic, health, marine habitat conditions, human noise, as well as the conduct of engineering studies for environmental protection. It is funded by the EU and AGIR (Association for Integrated Resource Management).

Regional agencies

Regional Observatories for the Environment and Sustainable Development (OREDDs)

The Regional Directorate of the Environment (RDE) established Regional Observatories for the Environment and Sustainable Development (OREDDs) as operational entities within the institutional arrangements at the regional level, under the authority of the OREDD. Its mission is to follow the state and evolution of the environment and sustainable development at the regional level, establish a permanent mechanism for the collection, production, analysis, management and dissemination of information on the state of the environment, in order to help decision makers. Of the twelve OREDDs, two are located along the Mediterranean coasts.

OREDD Oriental

Located in Oujdal, the OREDD Oriental shares socio-economic and environmental data relating to sustainable development. Data is accessible through the SIREDD of the Eastern region, created by the Government Secretariat for Sustainable Development (SEDD) with the technical and financial support of German Cooperation (GIZ), within the framework of the ProGE project. SIREDD has 51 partners (national agencies;

⁹⁸ <http://www.santetunisie.rns.tn/fr/direction-de-l%E2%80%99hygi%C3%A8ne>

associations; municipalities; regional councils; provincial trade directorates; the environment department; the INRNH, Provinces; Mohammed I University). The website is accessible (<https://siredd.environnement.gov.ma/oriental/>) and its user guide was published in July 2020. It also publishes reports on the state of the regional environment; an integrated regional environmental assessment; and an environmental atlas.

OREDD Tanger – Tetouan – Al Hoceïma

Established in 2016, its missions are to allow the establishment and management of pollution observation and measurement networks, the implementation and promotion of national, regional and international exchange and partnership programmes in the field of the environment and the establishment and promotion of systems and mechanisms for monitoring and evaluating the state of the environment (indicators, quality objectives, etc.). It shares and allows access to all available resources concerning sustainable development and the environment (map library, indicators, spreadsheets), including access to the regional information system (<https://siredd.environnement.gov.ma/Tanger-Tetouan-AlHoceima/Home>). Access is conditioned to user accounts. SIREDD has many partners: Tetouan Urban Agency; ORMVA Loukkos, GIZ, Amendis and the Hal Hoceïma Urban Agency. It publishes integrated environmental assessments by region which present the general profile of the region, the state and future of the environmental components of the region concerning water, soil, biodiversity and forests, risks natural and technological, the action plan. It also publishes annual reports on: the state of the environment, the environmental future, a summary for decision-makers (English, French, Arabic), brochures and leaflets. The latest reports were published in 2015.

Basin Agencies

Basin Management Agency - Loukkhos, Tangiers, North-West Basin

Created in 2000, the Basin Management Agency - Loukkhos, Tangiers, North-West Basin (*Agence de Bassin Hydraulique du Loukkhos, Tangérois et côtiers méditerranéens, Bassin Nord-Ouest, ABHL*) (<http://www.abhloukkos.ma/index.php/fr/>) comes under the authority of the Ministry of Equipment, Transport, Logistics and Water. This public establishment has a legal personality and financial autonomy. Located in Tetouan, it is in charge of water policy across the northern watersheds and of establishing concerted proximity management with operators in the water sector. Its missions are to develop the master plan for the development of water resources within its area of action and perform all piezometric and gauging measurements as well as hydrological, hydrogeological, planning and water management studies, both quantitatively and qualitatively. The Agency employs around 100 people, divided between the headquarters of the Agency and the delegation of the Al Hoceïma Agency, hydrometric stations and dams. It uses 93 stations, including 8 located on the Mediterranean coastline. The ABHL covers the Provinces of Tangier, Tétouan, Larache and partially those of Chefchaouen, Al Hoceïma, Kénitra, Sidi Kacem and Taza, and 127 municipalities. It provides studies of the hydrological situation, dams and quality reports. It works with numerous international partners, like the Spanish Agency for International Cooperation for Development; the Autonomous Regional Government of Andalusia; the Foundation Centre for New Water Technologies; the Andalusian Water Agency; the Adour Garonne Water Agency. It has also signed a variety of national research and development partnership agreements: the GIS Rhiss-Nekor Research and Development Agreement (signed in 2014 with the Study and Research Team on Geography and Development of the Faculty of Letters and Human Sciences from Tetouan) and the Convention on the Geomatic Study in the North of Morocco. The ABHL publishes reports on the state of water quality (the last one was published in 2014).

Basin Management Agency - Moulouya Basin (ABHM)

The Basin Management Agency of Moulouya Basin (*Agence de Bassin Moulouya, ABHM*) (<http://www.abhmoulouya.ma/>) was created in 2000 in Oujda, under the supervision of the Ministry of Equipment, Transport, Logistics and Water. A public establishment with a legal personality and financial autonomy, it aims to preserve and protect

water resources. Its missions are to carry out the studies necessary for the evaluation and monitoring of the evolution of the state of water resources, as well as to manage water resources in an integrated manner and control their use. It covers 12 Provinces, carrying out hydrological and hydrogeological studies; impact studies on water resources and domestic water pollution control studies (in 19 rural centres). Its Board of Directors is made up of the ministerial departments concerned; public establishments; communities and users; and the Wilaya of the Oriental Region. Its website was created with the support of Belgian Technical Cooperation (BTC). It developed partnerships with many universities, institutes, national and regional agencies. It publishes Hydrological Situation Reports (last one published on April 17-20, 2020, in Arabic) and reports on the situation of dams (last one published in 03/08/2020, in Arabic).

Local observatories

Marsad Observatory of the MarchichaNador Lagoon

The Marsad Observatory of the MarchichaNador Lagoon (*Observatoire Marsad de la Lagune MarchichaNador*) (<https://sites.google.com/site/olm4nador/home>, *very poorly developed*) ensures at the local level the monitoring of biological diversity, the quality of the state of the environment and the management of pressure-threats in the perimeter of the Nador Lagoon. It was created as part of the “Global Plan for the depollution and protection of the Marchica Lagoon”. This Project was led by the Mohammed VI Foundation for the Protection of the Environment and financed by the French Global Environment Fund (FFEM) in consultation with the French Development Agency (AFD). It is currently coordinated by the INRH - Regional Centre of Nador and Mohammed V University in Rabat. It reports to the OREDD based in Oujda. Among its missions is the development of a dashboard for updated monitoring of the state of the lagoon: collecting, disseminating data and organising meetings at the local, national and international levels. It is hosted by the Medtrix Platform⁹⁹. The data collected concern fish, *Cymodocea nodosa* meadows, benthic invertebrates, socio-economic monitoring of fishing activities, chemical status of the lagoon waters, non-native species, monitoring of ecological engineering actions (Biohuts) and in a near future monitoring of artificial reefs.

Laboratories and Research Centres

Laboratory of Aquatic Ecology and the Environment

Founded in 2005, the Laboratory of Aquatic Ecology and the Environment (Laboratoire d'Ecologie Aquatique et Environnement) of the Hassan II University Aïn Chock, Casablanca, conducts research in the field of ecology, biodiversity and environmental science. The “Biodiversity and Ecosystem Management” team carries out ecological diagnostics and zoning for the development of management plans for coastal wetlands and marine protected areas. Its “Ecology of marine and coastal ecosystems: estuarine and lagoon environments” team analyses the flow of matter between planktonic and nektonic compartments in marine ecosystems. The “Biodiversity, Pollution and Wastewater Treatment” team carries out an ecological assessment of the impacts of marine pollution and other disturbances on marine and coastal ecosystems. Its scientists publish articles on their work.

Tetouan Faculty of Science

The Tetouan Faculty of Science (<http://www.fst.ac.ma/site/>) was established in 1983. It forms part of the Abdelmalek Essaadi University. Several of its research laboratories, such as the “Ecology, Systematics, Biodiversity Conservation Research Team” (in biology); “Water, Environmental Studies and Analysis” and

⁹⁹ <https://medtrix.fr/des-reseaux-de-surveillance-au-service-de-la-connaissance-et-des-actions-de-protection-des-fonds-marins-2/>

“Marine eco-toxicology” (in chemistry) lead scientific research in relation with coastal and marine environments. It conducts research on interactions between Aksissou Mustapha marine turtles and fisheries in Morocco; strandings of Analla Mohamed marine turtles; assessment of the ecological state of Moroccan hydrographic networks: Physico-chemical and biological water quality, assessment of environmental impacts and monitoring programmes of aquatic ecosystems. Scientific articles are published by members of these laboratories and are accessible online.

Non-governmental organisations

Association for the Protection of Marine Turtles in Morocco (ATOMM)

The Association for the Protection of Marine Turtles in Morocco (*Association de Protection des Tortues Marines au Maroc, ATOMM*)(<http://www.atomm.ma/accueil.php?id=pub>) is an NGO created in 2008, headquartered at the Faculty of Sciences of Tetouan. ATOMM's objective is to develop in Morocco the capacity to conserve the environment in general and marine turtles in particular and to create a climate of cooperation with fishermen for better management of living marine resources. ATOMM is developing a database on marine turtles in Morocco. It also publishes scientific articles in the field of marine biology; as well as related to socioeconomic aspects of fisheries in Morocco. Its partners are the INRH, the Faculty of Science in Tetouan, the Arc en Ciel Association, the Sigma Fondation, the AZIR Association and PlagesPropres.

Environmental monitoring programmes

IMAP-MPA project - Towards the Good Environmental Status of the Mediterranean Sea and coasts through a network of ecologically representative, well-managed and monitored marine protected areas

This Project (2019-2022)¹⁰⁰ intends to strengthen and further develop the network of marine protected areas and support the achievement of “Good Environmental Status” in the Mediterranean. Among the expected results is increasing the capacity in each country to report on common indicators linked to the Integrated Monitoring and Assessment Programme of the Mediterranean (IMAP) and harmonizing the monitoring and evaluation of common IMAP indicators for biodiversity and non-native species, pollution and marine litter and hydrography.

Environmental information system

Regional information systems for the Environment and sustainable development of the Tangier Tetouan Al Hoceima Region & for the Oriental region

The Regional Information System on the Environment of the Tangiers Tetouan Al Hoceima Region¹⁰¹ and the Regional Information System on the Environment of the Oriental Region¹⁰² are tools for decision-making and strategic monitoring for the management and protection of the environment and sustainable development. It aims to set up a platform for updating, producing and regularly disseminating the environmental knowledge of the Regional Observatory for the Environment and Sustainable Development. It uses indicators, and it gathers maps and documents.

¹⁰⁰ <https://euneighbours.eu/fr/south/stay-informed/projects/projet-imap-mpa-vers-le-bon-etat-ecologique-de-la-mer-et-des-cotes>

¹⁰¹ <https://siredd.environnement.gov.ma/Tanger-Tetouan-AlHoceima/INDICATEURS/AS>

¹⁰² <https://siredd.environnement.gov.ma/oriental>

Fisheries Information System

The Fisheries Information System¹⁰³ was established through the project launched in February 2009 with the technical support of IFREMER. It has benefited from a financial contribution from the French Development Agency (AFD) of up to 25%. This System enables the management of data on resources and uses (from the coast to the offshore) land-based biological sampling data; biological sampling data at sea; data from scientific prospecting campaigns; data from socio-economic studies; statistical data on catches and fishing activity (logbooks, fishing reports, field surveys among fishermen, etc.). The harmonization of databases, carried out by the INRH in partnership with other institutional producers of information, is still in process.

Bibliography

Agence du BassinHydraulique du Loukkos, 2008. "Commission Régionale de Recherche Scientifique dans le secteur de l'Eau au niveau de la zone d'action de L'Agence du BassinHydraulique du Loukkos". 7 pages

Agence du BassinHydraulique du Loukkos, 2015. "L'état de la qualité des eaux de la zone d'action de l'Agence du BassinHydraulique du Loukkos". 24 pages

FEM, Banque Mondiale, Ministère de l'Energie, des Mines, de l'Eau et de l'Environnement, 2012. "Etude d'évaluation de l'impactenvironnemental et social". 127 pages

Geographic Information System for Decision Support, 2020, "Etude relative à la mise en place des systèmesd'informationsrégionaux de l'environnement et du développement durable (SIREDD) dans les régions de: l'Oriental; Rabat - SAle - Kenitra et Dree-Tafilelet, Guide d'utilisation du SIREDD-Oriental." 63 pages.

Ministèredéléguéauprès du Ministère de l'Energie, des mines, de l'eau et de l'environnement, chargé de l'Environnement et Plan Bleu, 2014. "Analyse du fonctionnement des OREDD du Maroc – Mission. Par EnviroConsulting International". 126 pages.

Ministère de l'Énergie, des Mines, de l'Eau et de l'Environnement / Département de l'Environnement, 2013. "Instrument européen de voisinage et de partenariat. Vers un système de partage d'informations sur l'environnement "SEIS". Rapport pays SEIS Maroc". 58 pages

SPA/RAC et MedPAN, 2019. "Le cadre juridique des Aires Marines Protégées enTunisie : Fiches synthétiques. Par Emmanouilidou P., Seddik W., Webster C., El Asmi S. et Kheriji A." Ed SPA/RAC. ProjetMedMPA Network, Tunis : 11 pages.

UNEP-MAP RAC / SPA, 2009. "Diagnosis of the marine biodiversity of the central Rif (Mediterranean, Morocco) and management guidelines". By S. Ben Haj, H. Bazairi& S. Benhissoune. RAC / SPA contract, N ° 47, 48 and 49: 100 pages.

¹⁰³ <http://www.inrh.ma/fr/centre-dinformation-et-documentation/service-informatique-et-systeme-dinformation>

Palestine

I. General environmental context

The occupied Palestinian territory was divided into 3 administrative zones (A, B, C) by the Oslo Accords in 1993. The division has resulted in the establishment of two different lawmaking processes and the enactment of diverging environmental laws in Gaza and the West Bank (UNCT, 2017). Environmental management and monitoring is also shared between the Palestinian administration and Israel. Mediterranean Sea Palestinian institutions manage civilian governance in Areas A and B in which is located the Mediterranean coastline of the Gaza Strip. It forms only a small section of a larger concave system that extends from Alexandria at the West Side of the Nile Delta, via Port Said, Bardawil Lagoon, El Arish, Gaza, Ashkelon, and Tel Aviv to the Bay of Haifa. In this area, the Palestinian Environmental Quality Authority is the main institution in charge of environmental policy and monitoring. However, if the Hamas retains de facto control of Gaza, this means that Palestinian Authority institutions, including the Environmental Quality Authority, can operate only to a limited extent in Gaza. In zone C, the Government of Israel has assigned responsibility to the Israeli Civil Administration and the Coordinator of Government Activities in the Territories for environmental management. The Coordinator of Government Activities in the Territories is part of the Israeli Ministry of Defence and implements the Israeli Government's civilian policy in the West Bank and the Gaza Strip. The Civil Administration includes an Environmental Protection Unit.

In this overall context, Palestinian civilian monitoring institutions and programmes are described here to balance Israeli institutions developed in the chapter on Israel. In 2020, The United Nations Environment Programme produced a report on the State of the Environment in the occupied Palestinian territory in response to a request from the Palestinian Environmental Quality Authority. It was made in cooperation with Israel, UNEP and the Palestine Government. This Report is the main source for this chapter. Regarding coastal and marine observation capacities, we have identified several difficulties for Palestine. First, environmental monitoring has been affected by restrictions on Palestinian movement and access and by political instability, repeated fiscal crises and persistent internal governance challenges. Thus, the Palestinian Environmental Quality Authority, as with other Palestinian institutions, is often pushed to attend to immediate, visible problems rather than strategic priorities, including addressing the most harmful environmental hazards. In 2017, the Palestinian Authority's vision for development was set out in the State of Palestine National Policy Agenda (2017–2022). The National Policy Agenda has three pillars: Path to independence, Government reform and Sustainable development. Despite this political will, there is still a significant lack of information and reliable data about the state of the coastline and marine activities, a lack of and weak enforcement of legislation and an ambiguity and overlap of responsibility. However, the shortage of energy and waste management capabilities in Gaza have already contributed to a situation in which solid waste and wastewater is contaminating soil and groundwater.

Legal, administrative or other obligations involving monitoring

The Environmental law no. 7 of 1999 is the main governing law for the Environmental Quality Authority. 'This law also gives the Environmental Quality Authority lead responsibility for environmental awareness, monitoring and inspection, and environmental approvals' (p.149). 'It gives a wide mandate to the Environmental Quality Authority, with a leading responsibility in 10 technical fields (solid waste, water quality, wastewater, agricultural

chemicals, marine environment, air and noise pollution, nature resource extraction, nature protection, biodiversity and desertification) and a supporting role in the areas of land use, radiation and environmental emergencies’.

‘The environment is also regulated through other laws, the most important of which are the laws of Public Health, Local Government, Agriculture, Water, Natural Resources and the law of Industry. Some environmental aspects are also regulated in the Labour law and the Mining law’ (p.150).

National environmental institutions

Several Palestinian institutions are involved in environmental governance and management. These include the Ministry of Agriculture, the Ministry of Local Government, the Palestinian Water Authority, the Ministry of Finance and Planning, the Ministry of Health, the Ministry of Interior, the Energy and Natural Resources Authority, the Ministry of Transport, the Department of Meteorology, and the Ministry of National Economy. The Palestinian Environment Quality Authority is the Palestinian institution with lead responsibility for environmental policy development and management, so we chose to more detailed the latter.

Palestinian Environmental Quality Authority

The Palestinian Environmental Quality Authority (<https://environment.pna.ps/ar/>) was created in 1996 through a Presidential Decree and was transformed into the Ministry of Environmental Affairs in 1998. It is located at the central level of the Palestinian government along with sector ministries and other lead agencies and has a policy authority for all environmental issues. Its mission is ‘maintaining and protecting the environment, preserving human health, [...] promoting environmental awareness and ensuring sustainable development’. (SP, 2016). The Environmental Quality Authority has regional offices.

On the Environmental Quality Authority website, there is an environmental information centre where some reports on marine and coastal state are available online¹⁰⁴. For example, there are some recent environmental impact assessment report (2019) about the Gaza Strip.

Palestinian Water Authority (PWA)

During the Oslo peace process, joint Israeli-Palestinian structures were put in place to cooperate on environmental management in the occupied Palestinian territory. A Joint Environmental Experts’ Committee and a Joint Water Committee were included, but they had not met since 1999 (lack of political dialogue, no scientific and technical exchange). In 2017 however, a renewal agreement was signed, according to which the Palestinian Water Authority (<http://www.pwa.ps/english.aspx>) would have authority to implement infrastructure projects in Areas A and B and inside Palestinian villages located in Area C (management of hazardous waste, water tanks, water networks).

Local Governments

Local Governments establish regulations for approval by the local authority, with the authorisation of the Ministry of Local Government. Areas related to the environment that are managed by the local government units include water and electricity supply, sewage management, town planning, building licensing and construction control, monitoring of public health, natural disasters, and flood and fire protection, among others.

¹⁰⁴ <https://environment.pna.ps/ar/index.php?p=datasession>

Monitoring institutions/observatories

Palestinian Central Bureau of Statistics (PCBS)

The Palestinian Central Bureau of Statistics (http://www.pcbs.gov.ps/site/lang_en/538/default.aspx) aims to develop and enhance the Palestinian official statistical system based on legal grounds that organise the process of data collection and utilisation for statistical purposes. It provides some official statistics on the state of the environment. The PCBS provides a portal for the Palestinian Environmental Information System (PEIS). A catalogue named "Public used files" is available on internet¹⁰⁵.

Universities

Some Palestinian academics and researchers publish papers about coastal monitoring and some universities and research centres have strong competence in monitoring, such as, for example, Al Azhar University, Gaza, Palestine (<http://www.alazhar.edu.ps/eng/index.asp>) and the Palestinian Energy and Environment Research Centre (<https://www.medener.org/en/membre/pec-palestine/>).

Below are just few relevant publications:

- Alhin, K. A., & Niemeyer, I. (2009). Coastal monitoring using remote sensing and geoinformation systems: Estimation of erosion and accretion rates along Gaza coastline, 2009, Vol. 4 (IEEE), pp. IV-29. (ISI Cited Publication).
- Abu Alhin, Khaldoun and Niemeyer, Irmgard (2009). Coastal monitoring using remote sensing and geoinformation systems: Estimation of erosion and accretion rates along Gaza coastline, Geoscience and Remote Sensing Symposium, 2009 IEEE International, IGARSS 2009, 12–17 July, Cape Town, IV-29 – IV-32. (ISI Cited Publication)
- K. A. Qahman, Y. Zhou (2001), Monitoring of Seawater Intrusion in the Gaza Strip, Palestine, First International conference on Saltwater Intrusion and Coastal Aquifers Monitoring, Modeling, and Management. Essaouira, Morocco, April 23–25, 2001.

Environmental information systems

Palestinian Environmental Information System (PEIS)

There is no comprehensive national environmental information system in place for monitoring the state of the environment in the occupied Palestinian territory. However, in 2008, the National Team for the Development of an Environmental Information System was formed and later reactivated in 2011, led by the Palestinian Bureau of Statistics, in cooperation with the European Environment Agency. It was developed in cooperation memoranda with ministries and civil society organizations concerning data exchange preparations started with counting and classifying the environmental indicators into 6 groups; water and wastewater, solid waste, land use, energy, climate and air quality. A number of environmental information systems were explored to have an idea about the contents and the structure of such information systems: shred environment information system (SEIS), DevInfo census database (Census info), and the national statistical monitoring system.

¹⁰⁵ <http://www.pcbs.gov.ps/site/601/default.aspx>

Bibliography

SIDA. (2014). Organisational Review of the Palestinian Environment Quality Authority (EQA), Final Report. Framework for Agriculture, Forestry, and Environment. Swedish International Development Cooperation Agency (SIDA). Retrieved May 15, 2019, from <https://erc.undp.org/evaluation/managementresponses/keyaction/documents/download/411>

UNEP (2020), 'State of Environment and Outlook Report for the occupied Palestinian territory 2020', p. 186

Slovenia

I. General overview

The Slovenian portion of the Adriatic coast stretches for about 50 kilometres. Therefore, the monitoring activities regarding coastal and marine environments and activities are very limited. The Slovenian Environment Agency is the main institution in charge of collecting and sharing data on the environment, when the National Institute of Biology of Piran leads the monthly monitoring of the quality of the coastal water. In 2019, the European Commission could not assess whether Slovenia's measures were appropriate to reach a good environmental status following the target of the Marine Strategy Framework Directive (MSFD), given that the country had reported its measures too late to be included in the Commission's assessment (European Commission, 2019). There are few lake and coastal water monitoring sites overall. However, air pollution caused by industrial sources is still one of the biggest environmental problems in Slovenia, and the country developed a rather extensive monitoring network regarding air and groundwater pollution. The number of sites monitored has increased, which improved the monitoring situation of the quantitative status of groundwater bodies. In its National Programme for the Protection of the Environment (2020-2030), it is underlined that if the Slovenian Environment Agency (ARSO) collects data on species occurrence and habitat types are created as part of planned monitoring and research, no information system has been established for them. There is also no comprehensive, publicly accessible and regularly maintained nature protection information system (ReNPVO20-30, 2020).

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Ur.l. RS, No. 41/04	Slovenian Environmental Protection Act
Official Gazette of the Republic of Slovenia, No. 96/04 - consolidated official text, 61/06 - ZDru-1, 8/10 - ZSKZ-B, 46/14, 21 / 18 - ZNOrg, 31/18 and 82/20	Law on Nature Conservation: determines the measures for the conservation of biodiversity and the system of protection of natural values in order to contribute to the conservation of nature.
Water Act of 2002, modified in May, 2020 (Official Gazette of the Republic of Slovenia, No. 67/02, 2/04 - ZZdr1-A, 41/04 - ZVO-1, 57/08, 57/12, 100/13, 40/14, 56/15 and 65/20)	This law governs the management of the sea, inland and groundwater and coastal waters and lands: it establishes that a monitoring programme of groundwater and surface water should be included in every water management plan.
Official Gazette of the Republic of Slovenia, Nos 55/11, 6/15 and 5/17:	Rules for the assessment of ambient air quality: this law establishes the methods and criteria for the assessment of ambient air quality in order to obtain data on air quality and to support the reduction of air pollution and disturbing effects and to monitor long-term trends. It also set the method of regularly informing the public about air quality.

Official Gazette of the Republic of Slovenia, No. 66/17, 4/18 and 77/1:	Applicable regulations on the operational monitoring of groundwater status: determines the rules to evaluate the impact of the discharge of wastewater into groundwater; to carry out operations on activities and installations likely to cause large-scale environmental pollution; to control the disposal of liquid wastes from the production of titanium dioxide in accordance with the regulations governing the emission of substances and the disposal of wastes from the production of titanium dioxide and to monitor the disposal of waste in a landfill.
Official Gazette of the Republic of Slovenia, Nos. 10/09, 81/11 and 73/16:	Surface water monitoring ordinance: the implementation of surface water monitoring includes: setting up a network of sampling points to determine the chemical and ecological status of surface water bodies; the establishment of a network of sampling points to determine compliance with additional requirements in accordance with the regulations governing the status of surface water: sampling and analysis in accordance with the prudential or operational supervision programme referred to in Article 28 of these regulations; keep records of sampling points to determine the chemical and ecological status of surface water bodies.
Ur.l. RS, No. 24/2003	The Act on the Access to Information of Public Character
Official Gazette of the Republic of Slovenia, nos 51/14, 57/15, 26/17 and 105/20	Regulation respecting environmental interventions for which an environmental impact study is required

National environmental institutions/organisations

Ministry of the Environment and Spatial Planning, Kopalnevode (<https://www.gov.si/en/state-authorities/ministries/ministry-of-the-environment-and-spatial-planning/>): Since 1991, the Ministry of the Environment and Regional Planning has been transformed repeatedly. In 2012, the Ministry ceased its activities, the tasks of the environment sector were taken over by the ministry of agriculture and the environment and the space sector tasks were taken over by the infrastructure and regional planning ministry. In 2014, the Ministry of the Environment and Regional Planning was re-established. It gathers important amounts of data on the state of the environment, the state of surface and groundwater, the elaboration of the most recent Riven Basin Management Plan (2022-2027), the Management Plan for the Marine environment (2017-2021), through reports published on its website.

Monitoring institutions and observatories

National Agencies

Slovenian Environment Agency (ARSO)

The Slovenian Environment Agency (*Agencija Republike Slovenije za okolje, ARSO*) (<http://www.arso.gov.si/en/>) is a body of the Ministry of the Environment and Spatial Planning. Established in 2001, it is responsible for monitoring, analysing and forecasting natural phenomena, and reducing the effects of natural threats. Its national meteorology, hydrology, seismology, monitoring and water management services perform several tasks, such as observing, analysing and forecasting natural phenomena and processes in the environment and ensuring environmental data for all target groups. Its laboratories (calibration laboratory, chemical analysis laboratory) collect and analyse data on temperature, air pressure, air humidity air quality and water quality. ARSO also manages a library specialised in environmental topics.

Its Catalogue of Data Sources on the Environment shares the data collected by Slovenian authorities on air, climate change, water, nature, noise, chemicals and biotechnology, waste, energy, radiations, industry and the

environment, environmental impact assessment, soil, natural and other disasters and legislation. Its website publishes hourly and daily values on air quality, reports on exceeding the limit value for ozone per year (last one published in 2019), and chemical analysis. Realtime data is also available on surface water condition (http://www.arso.gov.si/en/water/data/stanje_voda.html) collected by automatic gauging stations. Archives are also published, as well as water quality reports, a Hydrological Yearbook, and detailed analyses of the quality of bathing waters. Archives of data from previous monitoring programmes, such as the one for the ecological and chemical state of the sea (2007-2010) and the monitoring programme for marine quality and inputs of land (2010) are available online. This programme¹⁰⁶ led the monitoring of the state of the coastal and territorial sea on five water bodies (Sea Lazaret - Ankaran, Sea Bay of Koper, Žusterna Sea - Piran, Sea Piran Bay and territorial sea).

The Slovenian Environment Agency participates in the Environmental Information and Observation Network (EIONET) of the European Environment Agency.

Directorate of Water of the Republic of Slovenia

The Directorate of Water (*Direkcija za vode*) (<http://www.evode.gov.si/>) is a body of the Ministry of the Environment and Spatial Planning. Based in Ljubljana, its objective is to set up a water management system that takes into account the water capacity in spatial planning and to reduce the threat to the life, health and property of the population. The integrated water management system is organised and staffed at the national level and by river basins at the regional and local levels. Its dataportal includes current data of automatic hydrological stations of surface waters (flow rate, water level, temperature); current data on the HPP flows on the Drava River; current data of automatic hydrological stations of the southern waters (level, temperature); as well as data on sea temperature and salinity.

Nuclear Safety Administration of the Republic of Slovenia

The Nuclear Safety Administration of the Republic of Slovenia (*Uprava Republike Slovenije za jedrskovarnost*) is a body of the Ministry of the Environment and Regional Planning. It supervises the implementation of radiation activities and activities for the use of ionising radiation sources (except in health or veterinary medicine), the protection of the environment against ionising radiation, the physical protection of materials and installations. As such, the Administration is in charge of the monitoring of radioactivity in the environment, reviewing measurements of radioactivity in the environment, and elaborating annual reports and research studies on the topic of radioactivity in the environment. It publishes annual reports on protection against ionising radiation and nuclear safety (last one published in 2019) available online¹⁰⁷.

Fisheries Institute of the Republic of Slovenia (ZZRS)

The Slovenian Fisheries Institute (<https://www.zzrs.si/page/bios/>) was established in 1961 by the Executive Council of the People's Assembly of the People's Republic of Slovenia as the Ljubljana Fisheries Institute. In 2001, it became a public institution. ZZRS carries out public service activities in the field of freshwater and sea fishing as well as various research activities in the field of fisheries biology. Concerning sea fishing, it is in charge of monitoring sea fishing to ensure the sustainable use of fish populations; monitoring of fish populations and monitoring of fish as part of the ecological status of waters in accordance with environmental and water protection regulations and the provisions of the Marine Fisheries Act; and reporting to state bodies,

¹⁰⁶ <http://www.arso.gov.si/vode/morje/PROGRAM%20MORJE%202010%20splet.pdf>

¹⁰⁷ <https://www.gov.si/drzavni-organi/ministrstva/ministrstvo-za-okolje-in-prostor/o-ministrstvu-za-okolje-in-prostor/>

community bodies and bodies of international fisheries organizations of which the Republic of Slovenia is a member.

ZZRS leads and participates in various monitoring programmes, such as the monitoring of fishery resources by bottom trawling (since 1995); MEDITS - International bottom trawl survey in the Mediterranean (since 1995); MEDIA - Mediterranean acoustic survey (since 2007); SOLEMON - Assessment of the stock of sole (*Solea solea*) in the North and central Adriatic and assessment of the impact of various fishing activities (since 2009); biological sampling of landings (since 2006); research on the biological and ecological characteristics and seasonal dynamics of some economically important fish species in the Portorož fishing reserve (from 1.10.2010 to 30.9.2013); estimation of preys for recreational fishing; logbooks and landing declarations of Slovenian fishing vessels (since 2005).

Biological data are available through "BIOS" (<http://www.biosweb.org/>), which runs on open source software and is designed to allow the storage of biotic and abiotic parameters that are collected in the field of marine and freshwater fisheries. Born in 1995, this data portal is still under development.

Institute of the Republic of Slovenia for Nature Conservation (ZRSVN)

The Institute of the Republic of Slovenia for Nature Conservation (*Zavod Republike Slovenije za varstvo narave, ZRSVN*) (<https://zrsvn-varstvonarave.si/>) was created by the law on the nature conservation (OG no. 4/02 of January 18, 2002; no. 16/07 of February 23, 2007). Its main missions are the collection of data on plant and animal species, their habitats and ecosystems (in cooperation with public service providers in the field of guidance for natural resource management); the management of databases on natural values and elements of biodiversity; and monitoring the state of conservation of nature, biodiversity and the state of natural values. It is also in charge of the management of government-established protected areas. Apart from its headquarters in Ljubljana, its facilities include seven regional centres. It publishes an online journal ("Journal on Nature Conservation") in Slovenian (last article's title published was "Key elements of biodiversity of the Slovenian Sea", 2019); brochures; and books. It participates in 19 EU-financed projects on biodiversity.

Laboratories and research centres

National Institute of Biology (NIB)

The National Institute of Biology (Nacionalni inštitut za biologijo, NIB) of Piran (<https://www.nib.si/mbp/sl/about-us/working-and-research-fields/coastal-oceanography>) leads research in the field of biodiversity, marine phytoplankton research, microbial ecology and coastal oceanography. It leads basic and applied research, coastal sea monitoring and educational work. Its facilities include the Piran Marine Biological Station. It performs experimental oceanography and modelling in coastal waters, as well as research on the dynamics of water masses, which is based on operational oceanographic data, i.e. numerical data forecasts. It ensures continuous monitoring of the quality of sea water in order to study the impacts of human activity on ecological conditions, and the collection of information for the needs of land use planning, tourism and conservation of nature. These activities include monthly monitoring of the quality of the coastal waters, research on the quality of the coastal waters and the effects of pollution, and the implementation of Slovenia's international obligations under the Barcelona Convention. It participates in SeaDataNet and BIOSWEB (statistics on fishing).

Laboratory for Environmental and Life Sciences (LELS), University of Nova Gorica

The Laboratory for Environmental and Life Sciences (LELS) <http://www.ung.si/en/research/laboratory-for-environmental-and-life-sciences/> gathers together scientists in the fields of environmental chemistry, biochemistry, molecular biology, eco-toxicology and ecology. Investigations conducted include study of the

“transport and transformations of pollutants in atmosphere, terrestrial and aquatic environments, food quality and safety, biomedical diagnostic tools”. Its scientists publish articles and PhD theses.

Non-governmental organisations

Regional Development Centre Koper (RDC Koper)

The Regional Development Centre Koper (Regional razvojni center Koper, RDC Koper), is an NGO created in 1993. Since 2001 it is an authorised Regional Development Agency, which promotes regional and local development in the fields of economy, human development, rural development, environmental and spatial planning issues. RDC Koper acts as a secretariat for the Council of South Primorska region, the Regional Development Council and for other stakeholders. It has built on its significant experience in international cooperation in EU partnerships with Italy and Croatia, interregional and transnational programmes, at the EU level and broader. It participates in the PORTODIMARE (2018-2020), the Project geoPORTal of TOols & Data for sustainable Management of coastal and marine Environment (see the section below) of the Interreg Adriatic Programme.

Morigenos – Slovenian Marine Mammal Society

Morigenos - Slovenian Marine Mammal Society (<https://www.morigenos.org/en/>) is an NGO for marine conservation through scientific research and education. Since 2002, it has been leading the “Slovenian Dolphin Project”, a long-term research and monitoring programme, focusing on bottlenose dolphins (*Tursiops truncatus*) in Slovenian and adjacent waters. It is the first systematic and long-term study of any cetaceans (whales, dolphins and porpoises) in Slovenia. The programme is led through systematic boat surveys, land-based watches and photo-identification by Morigeno’s team. Monitoring activities focus on dolphin distribution, abundance, social structure, habitat use, feeding habits, fishery interactions and tourism impact. Archives are published on the NGO’s website, and results are also published through scientific papers (last one published in 2020). Its website includes a participatory monitoring tool through which citizens can report observations of dolphins.

Environmental monitoring programmes

Chemical and ecological water status monitoring programme

The Environmental Agency of the Republic of Slovenia implements a water monitoring programme (2016-2021) on the basis of which it assesses the ecological and chemical status of surface waters and the chemical status of groundwater for the third water management plan and the status of waters in areas with special requirements; identifies the causes of excessive pollution; monitors the effects of basic and additional measures; monitors any other deterioration of water status; monitors the long-term upward trends in pollutant content resulting from human activities; monitor long-term changes in natural conditions; monitors the status of border watercourses and groundwater in accordance with bilateral agreements, flowing across the state border; and monitors the status of waters in accordance with international conventions.

The PORTODIMARE Project (Interreg/UE, 2018-2020)

The PORTODIMARE¹⁰⁸ (Geoportal tools and data for sustainable coastal and marine environment management) Project aims to create a common platform (Geoportal) for data, information and tools centred on the coast

¹⁰⁸ <https://www.portodimare.eu/>

and the region of the Adriatic-Ionian Seas. It must integrate existing databases, portals and tools developed in previous EU funded projects (SHAPE, ADRIPLAN, etc.). The activities of the project are to implement a unique virtual space (Geoportal) where most of the knowledge and resources available on the coastal and marine areas of the Adriatic-Ionian Seas will be available for decision-makers, scientific and professional institutions and all other interested parties. The main outcome of the project is the design and implementation of the Geoportal - a permanently open platform that provides access to all the information, data and tools necessary and relevant for the sustainable development and strategic planning of coastal and marine areas of the Adriatic-Ionian region. 11 partners from 6 countries (Italy, Greece, Slovenia, Montenegro, Croatia and Bosnia-Herzegovina) are participating in the project. The Koper Regional Development Centre is the partner of this project in Slovenia.

Environmental information system BIOS

"BIOS" (<https://www.zzrs.si/page/bios/>) is an information system led by the Slovenian Fisheries Institute to permit the storage of biotic and abiotic parameters that are collected in the field of marine and freshwater fisheries. It was created in 1995, but this data portal is still under development. This data is available to professional associates, and part of the aggregated data is available to the public on the BiosWeb website. The development of the BIOS is still under development. In 2009 data on tagging fish was included, and in 2011, GIS data with telemetric fish tracking was added.

Bibliography

European Commission, 2019. "The Environmental Implementation Review 2019 - Country Report Slovenia", 37 pages https://ec.europa.eu/environment/eir/pdf/report_si_en.pdf

Ministry of Agriculture and the Environment – Slovenian Environmental Agency, 2014. "Environmental indicators in Slovenia". 98 pages. http://nfp-si.eionet.europa.eu/publikacije/Datoteke/Kazalci%20okolja%20v%20Sloveniji/Kazalciokoljavsloveniji_en.pdf

Mlakar, P; Boznar, M. 1995. "Environmental information systems in Slovenia", in *Transactions on Ecology and the Environment* vol 6, WIT Press, pp 259-265

Spain

I. General environmental context

In 2018, the Council of Ministers approved the creation of Spain's five marine strategies: in North Atlantic, South Atlantic, Strait and Alboran, Levantine-Balearic and Canary Islands. For each of them, a series of consecutive tasks are carried out: initial evaluation, determination of good environmental status and the establishment of a series of environmental objectives to achieve the latter. Reports on the state of the marine and coastal environments are published and updated for each strategy's area on the website of the Ministry for the ecological transition, as well as socio-economic analysis on marine and coastal activities. The Spanish Institute of Oceanography is a key actor in marine and coastal monitoring in the country, as it has been commissioned to carry out the necessary work for the application of marine strategies and the monitoring of protected marine areas under government competence for the period of 2018-2021 and beyond. The Institute of Marine Science also plays an important role in the process of sustaining marine and coastal research, through the operation of long-term marine stations along the Mediterranean coasts.

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Law 42/2007, of December 13	On Natural Heritage and Biodiversity: creates the notion of "Marine Protected Area" (AMP), as one of the classification categories of protected natural spaces. Its article 48 provides that the General State Administration and the autonomous communities, within the scope of their respective competences, will monitor the state of conservation of the types of habitats and species of community interest.
Law 41/2010, of December 29	On the protection of the marine environment: formally creates the Network of Marine Protected Areas of Spain (RAMPE), regulates it and establishes its objectives, the natural spaces that comprise it and the mechanisms for its designation and management.
Law 2/2013, of May 29, modification of law 22/1988, of July 28, on Coasts	On the protection and sustainable use of the coastline: environmental control mechanisms are established conditioning the activities and uses that take place in the public domain and in the protection easement zone.
Law 3/2001, March 26	State Maritime Fishing law: organises the monitoring and control of fishing activities.
Law 9/2006, of April 28, Consolidated by Royal Legislative Decree 1/2008, of January 11	This law relates to the evaluation of the effects of certain plans and programmes on the environment.
Law 27/2006, of July 18,	This law regulates the rights of access to information, public participation and access to justice in environmental matters (incorporates Directives 2003/4/EC and 2003/3/EC)
Law 21/2013 of December 9	This law sets out the legal apparatus for environmental assessment
Law 19/2013, December 9	This law relates to transparency, access to public information and good governance

National environmental institutions/organisations

Ministry for the Ecological Transition and the Demographic Challenge (MITERD) (<https://www.miteco.gob.es/es/>). It is in charge of the proposal and implementation of the Government's policy in combating climate change, pollution prevention, protection of natural heritage, biodiversity, forests, sea, water and energy for the transition to a productive model that is more ecological. It prepares the Government legislation on water and coasts, and the direct management of the public hydraulic domain of intercommunity basins, in the maritime-terrestrial public domain.

Its General Directorate of Sustainability of the Coast and the Sea - General Sub-Directorate for the Protection of the Sea: "is the competent authority for the MSFD implementation, marine biodiversity protection and Marine Protected Area designation and management. It is also the Focal Point in what concerns the representation of Spain in the Regional Sea Conventions (OSPAR and Barcelona Convention), as well as for ACCOBAMS and ACAP Agreements." (<https://indicit-europa.eu/partners/dgscm-sgpm/>)

Biodiversity Foundation (Fundación Biodiversidad) of MITERD: created in 1998, its objective is to protect the natural heritage of Spain. To do this, it manages Spanish and European funds and it finances a variety of monitoring programmes on marine and coastal biodiversity.

Ministry of Agriculture and Fisheries and Food (MAPA) (<https://www.mapa.gob.es/es/>): restructured in January 2020, it is competent within the scope of the General Administration of the Government for the proposal and execution of the Government's policy regarding agricultural, livestock and fishing resources, the agro-food industry, rural development and food. Its General Directorate of Fisheries and Aquaculture Management publishes analyses and reports on fishing and aquaculture activities.

Monitoring institutions/observatories

National agencies

Spanish Institute of Oceanography (IEO)

The Spanish Institute of Oceanography (*Instituto Español de Oceanografía, IEO*) (<http://www.ieo.es/es/>) is a public research body under the supervision of the Ministry of Science and Innovation. It is dedicated to research in marine science, especially in relation to scientific knowledge of the oceans, the sustainability of fishery resources and the marine environment. IEO's research extends to marine resources in general, to problems related to oceanography and pollution of the marine environment and to crops. Equipment is available for both fleet vessels and maritime control. Data is collected by a network of oceanographic centres across the Mediterranean basin (in Murcia, in Malaga, in Cadiz, and Gijon). It also has various crop plants for the study and pre-industrial reproduction of species. Data is recorded in the different databases. The Intergovernmental Commission of Oceanography established the Data Centre (*Centro de datos del IEO*) in 1964. However, the development of regulations that regularize the rights and obligations of the generators of data and information as well as the conditions of use of this information is still necessary. IEO also takes part in various networks of marine data: SeaDataNet; IODE; ICES; and GDAC.

IEO functions with multiple partners: EU, FEDER, ArgoEspaña, Fundación Biodiversidad, Portal de la transparencia, Inforiesgo, EMODnet, INDEMAREs and Proyecto FIBREship.

Spanish Aquaculture Observatory (OESA)

The Spanish Aquaculture Observatory (*Observatorio Español de Acuicultura, OESA*) of the Marine Resources Centre (IMIDA) (<https://www.observatorio-acuicultura.es/>) was founded in 2008 by the Biodiversity Foundation

of the Ministry for the Ecological Transition and the Demographic Challenge. OESA integrated the Biodiversity Foundation in 2015. It is used as a platform for monitoring and analysing the development of aquaculture in Spain, promoting its sustainability, supporting the implementation of research projects by promoting the transfer of knowledge and support for international cooperation. It assembles data collected by the various fish farms, aquaculture centres and marine investigation centres. Through its Internet portal, OESA develops a set of databases that constitute one of the most important means to inform the industrial sector of the resources available in Spain to carry out research related to the sector. Data on autonomous communities, taxonomic groups, species and companies are available. OESA publishes annual reports on “Monitoring and Sustainability Indicators in Aquaculture” (last one published in 2019), as well as guides on species diversification in Spanish marine fish farming, on waste minimisation. OESA participates in a variety of cooperation programmes on aquaculture.

The Spanish Aquaculture Observatory participated in the European Project AQUAEXCEL (2015-2020), which allowed the creation of an interactive map of Aquaculture research infrastructures in Europe. Are available data on facility type, country in which facility is located, aquaculture species, water type, culture system, research discipline.

Government ports

Government Ports (*Puertos del Estado*) (<http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx#>) of the Ministry of Transportation, Mobility and the Urban Agenda are responsible for various monitoring activities. They manage the “Deep Water Network”, which consists of buoys measuring waves, currents, wind, atmospheric pressure and temperature, sea surface temperature and salinity. Information from the buoys is transmitted every hour via satellite in order to be quality controlled and distributed in real time via the website of Puertos del Estado (Alvarez Fanjul and Alfonso Alonso Muñoyerro, 2002). It also publishes a yearbook on traffic statistics.

Centre for Port and Coastal Studies (CEPYC)

The Centre for Port and Coastal Studies (*Centro de Estudios de Puertos y Costas, CEPYC*) (http://www.cedex.es/CEDEX/LANG_CASTELLANO/ORGANISMO/CENTYLAB/CEPYC/) was created in 1951. It is based in Madrid. It is one of the bodies of the Centre for Studies and Experimentation of Public Works (CEDEX). In the field of maritime waters and their natural or artificial infrastructures, CEPYC aims to carry out activities for obtaining, researching, experimenting and managing data related to natural resources and phenomena, as well as collaborating and promoting collaboration with other bodies of the public administration and with national and international institutions in technical assistance activities and research. Its infrastructures include a large-scale wave and wind channel, wave tanks, ship maneuvering simulator, a maritime experimentation laboratory and a multidirectional surge tank. Among its current projects are the elaboration of integrated coastal planning and management and the protection of the marine environment and combating pollution.

Technical Commission for the Prevention and Repair of Environmental Damage

The Technical Commission for the Prevention and Repair of Environmental Damage (*Comisión Técnica de Prevención y Reparación de Daños Medioambientales*)¹⁰⁹ was created by Royal Decree 2090/2008. It is a body for technical cooperation and collaboration between the General Government Administration and the autonomous communities for the exchange of information and advice on the prevention and repair of environmental damage. The Technical Commission for the Prevention and Repair of Environmental Damage

¹⁰⁹ <https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/responsabilidad-medioambiental/comision-tecnica-de-prevencion-y-reparacion-de-danos-medioambientales/>

is attached to the Ministry for the Ecological Transition and the Demographic Challenge, through the General Directorate of Environmental Quality and Assessment. It is responsible for the compilation of statistical data on environmental damage and on environmental restoration projects, as well as the preparation of studies on the implementation of environmental risk analysis and management systems, on the execution of environmental damage restoration projects and on the evolution of the financial guarantee market in the environmental field.

National Networks

EMEP/VAG/CAMP network

The Ministry for Ecological Transition and the Demographic Challenge, through the Government Meteorological Agency, manages the EMEP/VAG/CAMP network (<http://www.aemet.es/es/eltiempo/observacion/contaminacionfondo>). It aims to understand the composition of the atmosphere over the national territory; and to obtain information on transboundary pollution ("understood as atmospheric pollution whose physical source is located totally or in part in an area under the national jurisdiction of a State and that produces harmful effects in an area under the jurisdiction of another State") and on background air pollution ("understood as the levels of pollutants present in areas not directly affected by their emission sources and that are representative of a large area of territory"). On the AEMET page, real-time information of the network stations is available, as well as information of the EMEP/VAG/CAMP network. A description of the stations and the historical data obtained are published.

Regional and local air quality networks

Regional and local air quality networks (*Redes de calidad del aire autonómicas y locales*) are led by the Autonomous Communities and Local Entities, which are responsible for managing air quality data measurement networks. The monitoring networks of ambient air quality in Spain have more than 600 fixed measurement stations, distributed throughout the Spanish geography. The number of analysers exceeds 4 000.

Coastal Water Monitoring Network

In Spain, the Autonomous Communities are the competent authorities to establish and implement the control and surveillance programmes for coastal and transitional waters.

- Andalucía:

Data on the Autonomous Community of Andalucía is available online¹¹⁰.

- Murcia:

Red de Control y Vigilancia de la calidad de las aguas litorales de la Región de Murcia. Monitoring is carried out through 60 sampling stations, of which 21 are in the Mar Menor and the other 39 in the rest of the coast (San Pedro del Pinatar, Cartagena, La Unión, Mazarrón and Águilas). This Coastal Network is financed 80 percent with Feder funds from the European Union and the remaining 20 percent by the Community. During the new period 2021-2023, among the priority objectives is the optimisation of its operation, the addition of six new stations located in the Mar Menor and the increase in the frequency of sampling of the water analyses, which will have a monthly frequency. Data are not available online.

¹¹⁰ https://laboratorioediam.cica.es/Visor_DMA?urlFile=http://laboratorioediam.cica.es/Visor_DMA/service_xml/capas_dma.xml

- Valencia:

The Public Entity of Wastewater Sanitation of the Valencian Community (*Entidad Publica de Saneamiento de Aguas Residuales de la Comunidad Valenciana, EPSAR*) publishes yearbooks of data on bathing water quality. Data are available online¹¹¹.

- Cataluña:

The Catalan Water Agency is responsible for controlling the quality of the bathing areas during the bathing season, which include beaches and indoor bathing areas, most of which have been controlled since 1990. It is also responsible for the monitoring of the quality of underground and superficial bodies of water.

The Monitoring Programmes of the State of the Marine Environment within the Framework of the Spanish Marine Strategies

Various monitoring programmes are being conducted within the framework of the Spanish Marine Strategies¹¹²: for example marine litter on beaches; floating garbage; garbage on the seabed; microparticles in water; microparticles in sediment; microparticles on beaches; citizen science (additional data); and marine litter in biota (this programme is being implemented through the European Union INDICIT II Project¹¹³). Data collected through each of these programmes and on other topics are available on the website of the Ministry for the Ecological Transition and the Demographic Challenge, though annual reports.

Laboratories and research centres

Institute of Marine Sciences (ICM/CSIC)

Based in Barcelona, the Institute of Marine Sciences (*Institut de Ciències del Mar, ICM*) (<https://www.icm.csic.es/en>) is the largest Spanish research institute dedicated to marine research. It belongs to the Spanish National Research Council (CSIC). It was created in 1951 as the Fisheries Research Institute, and became the Institute of Marine Sciences in 1987, creating the Departments of Physical Oceanography and Marine Geology. The Institute conducts research on topics related to ocean and climate interactions, conservation and sustainable use of marine life and ecosystems, and impact mitigation of natural and anthropogenic hazards. Among its activities of environmental monitoring are fisheries monitoring, oceanographic engineering, remote sensing and in situ observation and sampling. Among its research groups are the Barcelona Centre for Subsurface Imaging, Biology and Reproduction, Ecology and Conservation of Marine Living Resources, Littoral Biological Processes, as well as Plankton Ecology and Ocean Health. It benefits from public funds from the Ministry of Science and Innovation, as well as from the European Regional Development Fund. It also receives funding from public national and international projects, as well as from private companies and administration through technology transfer. The Institute publishes its own journal of marine sciences called "Scientia Marina".

Coastal Ocean Observatory (COO)

The Coastal Ocean Observatory (COO) was initiated by the Institute of Marine Sciences (*Institut de Ciències del Mar - ICM/CSIC*) (<https://coo.icm.csic.es/site-page/coastal-ocean-observatory>) in its Strategic Plan of 2010-2014. It was formerly part of the ICM as the "Marine Station" service. COO is a response to the lack of long-term marine stations along the Mediterranean coast. It is dedicated to the acquisition, management and visualisation of oceanographic data. Its facilities include a current meter (with temperature, salinity, turbulence,

¹¹¹ <http://www.agroambient.gva.es/va/web/agua/calificacion-anual>

¹¹² <https://www.miteco.gob.es/es/costas/temas/proteccion-medio-marino/basuras-marinas/basura-programas.aspx>

¹¹³ <https://indicit-europa.eu/>

pressure, velocity and direction of water flow sensors), a EUMETSAT antenna, two video monitoring stations, a meteorological station and a small boat. Nine other stations are also associated with COO. Its objectives are to monitor the coastal dynamics, the storm impacts on the beaches, the trends in coastline evolution and the effects of human interventions on the beaches (artificial nourishments and construction of shore protection structures); to provide infrastructure to support easy access to electrical power and data; to contribute to the network of observatories and platforms for real-time observations to help to verify and improve ocean and atmospheric models; and to provide continuous long term observations for different types of studies, which means building a long-term time series of data. Data are available online (video monitoring, satellite data, oceanographic data, meteorological data), as well as published papers.

The Santa Pola Marine Research Centre (CIMAR)

The Santa Pola Marine Research Centre (*Centro de Investigación Marina de Santa Pola, CIMAR*) (<https://web.ua.es/es/cimar/>) is the result of an agreement between the University of Alicante and the Santa Pola City Council. It was created in 2005, located within the University of Alicante. Its mission is to develop knowledge on the marine environment in order to teach how to manage it in a sustainable way. The Centre's facilities include a specialised library, research and practical laboratories and an exhibition room on marine life. It investigates marine biodiversity (taxonomy, biology, ecology and biogeography of benthic tunicates), introduced species, exotic species, and patrimonial species of the Gulf of Gabs.

It is part of several international monitoring projects:

- MedMPAnet: CIMAR is responsible for the establishment of the priority activities necessary for the creation of Marine Protected Areas in Lebanon, within the MedMPAnet project coordinated by the Regional Activity Centre for Special Protected Areas (UNEP/MAP-RAC/SPA) and with the financial support of the European Commission, the Spanish Agency for Cooperation and Development (AECID) and the Global Environment Facility (GEM).
- Signals Project: Continuation of the monitoring of the appearance and evaluation of exotic species in the Tabarca Marine Reserve, within the Mediterranean network of coastal laboratories. Renewal of the temperature sensors in the water column (5 m, 10 m, 20 m, 30 m and 40 m deep) located in the NE buoy of the Tabarca Marine Reserve.

It has published annual reports of activities (last one published in 2012).

OBSEA Underwater Observatory

The OBSEA Underwater Observatory (<https://obsea.es/index.php>) is located on the seabed off the coast of Vilanova i la Geltrú. Operated by the Universitat Politècnica de Catalunya, it provides since 2009 real-time observation of multiple parameters of the marine environment, collected through cabled underwater seabed observation at a depth of 20 meters. Its facilities include a sea station and a ground station, which have a surface buoy equipped with a weather station and camera and a coastal cabled system. Data such as hydrophone data, wave and current direction and seismology are available online. OBSEA is funded by the Fundación Biodiversidad, the Ministry of Science and Innovation. It is part of the European Multidisciplinary Seafloor and Water Column Observatory (EMSO), a system of regional facilities placed at key sites around Europe, from the North-East to the Atlantic, through the Mediterranean, to the Black Sea. OBSEA is also an associate partner of EMODnet; a member of the Fixed Point Open Ocean Observatory Network (FixO3), which seeks to integrate European open ocean fixed point observatories and to improve access to these key installations for the broader community; as well as part of the NeXOX Project, a collaborative project funded by the European Commission 7th Framework Programme, which aims to develop integrated multifunctional

sensor systems (ocean optics, ocean passive acoustics, and sensors for an Ecosystem Approach to Fisheries (EAF)).

Non-governmental organisations

The Observatory of Protected Areas

The Observatory of Protected Areas (*Observatorio de Áreas Protegidas*) (<http://redeuroparc.org/observatorio>) of EUROPARC-Spain is a tool to facilitate the exchange and dissemination of information on the planning and management of protected areas, both among professionals and with civil society. EUROPARC is an NGO founded in 1973 aiming to federate national parks across Europe in order to improve their protection. Based in Madrid, its Spanish section brings together 24 institutions involved in the planning and management of protected areas in Spain, such as the Ministry of the Environment, regions and autonomous communities and certain cities. The Observatory incorporates the databases of protected areas that the organisation has maintained since 1994, and offers a system for consulting, viewing, printing and exporting the results through the Geoportal and the Database. It published a Yearbook of the state of protected areas in Spain (last one published for the year 2018).

Citizen science

Sea Watchers

The Sea Watchers (*Observadores del Mar*) (<https://www.observadoresdelmar.es/About>) initiative is a participatory science platform aimed at all users of the sea. Based in Barcelona, its objective is to monitor the marine environment and the pressures it undergoes through the observation of different elements: coralligenous, crustaceans, jellyfish, invasive species and macro-waste. Data collected by citizens are coordinated by fifty researchers from a variety of institutions, such as ICS, CSIC, and CEA. It is currently leading fourteen different teams organised by themes (alien fishes, corals, decapod crustaceans, etc.). Data is made available through an online map. It receives fundings from the Ministry for ecological transition, Fundacion Biodiversidad, Natura 2000, Intemares and Marilles Foundations. A newsletter is also available, and very active on Facebook.

Environmental monitoring programmes

The LIFE SEGURA RIVERLINK

The LIFE SEGURA RIVERLINK Project (2013-2017)¹¹⁴ was coordinated by the Confederación Hidrográfica del Segura and financed by the LIFE + programme of the European Union. It aimed to promote and support the environmental recovery of the Segura River basin. Specifically, this involved management measures for developing a green infrastructure approach to river basin management. The project includes hydraulic analysis of the fish passages. A document summarises all the monitoring carried out in the monitoring of fish fauna both in the passages and in the sections of the affected rivers.

The Implementation of Indicators of Marine Litter on Sea Turtles and Biota in Regional Sea Conventions and Marine Strategy Framework Directive Areas (INDICIT II)

The Implementation of Indicators of Marine Litter on Sea Turtles and Biota in Regional Sea Conventions and Marine Strategy Framework Directive Areas (2019-2022)¹¹⁵ is a two-year project (February 2019 – February 2021) funded by the European Union. It continues the INDICIT I Project which ran from 2017 – 2019. The

¹¹⁴ <http://www.chsegura.es/chs/cuenca/segurariverlink/resultados/>

¹¹⁵ <https://indicit-europa.eu/indicit-documents/>

consortium, composed of researchers from 12 partners in 8 different countries (France, Greece, Italy, Portugal, Spain, Tunisia, Turkey and the United Kingdom), is committed to supporting the implementation of the EU's Marine Strategy Framework Directive (MSFD) and other international environmental policies aiming at protecting the marine environment (especially the Barcelona Convention, the OSPAR Convention, the HELCOM etc). It aims to develop a set of standardised tools for monitoring the impacts of litter on marine fauna as bio-indicators. Its partners in Spain are the DGSCM and the Universitat de Valencia.

Environmental information systems

The Natural Heritage and Biodiversity Spanish Inventory (NHBSI)

Created by law 42/2007, the Natural Heritage and Biodiversity Spanish Inventory (NHBSI)¹¹⁶ is operational since 2011. It contains biodiversity data with over 30 inventories of species, an indicator system to evaluate the state of biodiversity, and an annual report to communicate the information (OCDE, 2015). Information is gathered in the Nature Data Bank, established by Royal Decree in 2011 in order to analyse and harmonise information in the NHBSI. It still needs harmonisation, when efforts need to be made to generate coherent information systems on marine species and marine ecosystems (OCDE, 2015).

The Spanish Inventory of Marine Habitats and Species (IEHEM)

The Spanish Inventory of Marine Habitats and Species (*Inventario Español de Hábitats y Especies Marinos*)¹¹⁷ was initiated in 2015. It feeds into the Marine Strategy Information system. It aims to develop a Standard List of marine species present in Spain, collected in the Resolution of February 17, 2017, of the Secretary of State for the Environment. It published the "Interpretive Guide to the Spanish Inventory of Marine Habitats", records marine species and habitats.

Portal of the Spanish Institute of Oceanography (IEO)

The IEO Data Centre (Centro de Datos del IEO¹¹⁸) was recognised in 1964 as a National Oceanographic Data Centre of the IODE (International Oceanographic Data and Information Exchange), the programme of the UNESCO International Oceanographic Commission (IOC). Its mission is to receive oceanographic data from national, regional and international acquisition programmes, verify the quality of the data (using agreed standards), ensure long-term preservation of data and associated metadata and make data available nationally and internationally.

Bibliography

Alvarez Fanjul, Enrique; de Alfonso Alonso Muñoyero, Mata, 2003. "Real time monitoring of Spanish coastal waters: The deep water network", Elsevier Oceanography Series, 69.

European Union, 2019. "Environmental Implementation Review 2019 – Spain". 45 pages

Gobierno de España, 2019. "Spain's Report for the 2018 Voluntary National Review". 181 pages.

OECD, 2015. "OECD Environmental Performance Reviews: Spain 2015", OECD Publishing. https://read.oecd-ilibrary.org/environment/oecd-environmental-performance-reviews-spain-2015_9789264226883-en#page153

¹¹⁶ <https://www.miteco.gob.es/es/biodiversidad/temas/inventarios-nacionales/inventario-espanol-patrimonio-natural-biodiv/default.aspx>

¹¹⁷ <https://www.miteco.gob.es/es/costas/temas/proteccion-medio-marino/biodiversidad-marina/habitats-especies-marinos/inventario-espanol-habitats-especies-marinos/inventario-habitats-especies.aspx>

¹¹⁸ <http://wiki.ieo.es/books/centro-nacional-de-datos-oceanogr%C3%A1ficos/page/el-ieo-como-centro-nacional-de-datos-oceanogr%C3%A1ficos>

Syria

I. General overview

Syria has 183 kilometres of coast. Only a few recent scientific studies about the state of the environment and coastal monitoring activities led by universities can be found. Updated reports are available on the university website. Published papers are also available on ResearchGate. For example, a study was published on *environmental processes*. The water environment in the Syrian coastal basins was already under pressure over the past decade (2000–2010) due to recurring drought and increased water demand. The armed conflict, which started in 2011, had resulted in the displacement of more than 1.45 million people from the inland regions towards the coastal area. This study investigates the impact of war and conflict on the water environment in the coastal river basins of Syria. Those in charge of environmental monitoring on Syrian territory are (or were) the Ministry of State for Environmental Affairs and representatives from Latakia Governorate, Tartous Governorate and the General Directorate of Ports.

The Department of Geology of the Atomic Energy Commission of Syria (<http://tishreen.edu.sy/high-institute/eng/sea-research>) and the Higher Institute of Marine Research lead monitoring activities. The latter is located in Latakia, Syria, and part of the Tishreen University. It conducts marine monitoring, especially marine biodiversity monitoring, pollution monitoring and bioaccumulation. Its main research fields are marine biology, chemistry, physics, geology. Its facilities include one wooden vessel with equipment for collection of water and sediment samples, atomic absorption spectrometer – gas chromatography, high performance liquid chromatography, infra-red, ultra-violet fluorescence, spectrophotometer. The Institute publishes regular study available on its website (library and references).

Bibliography

Faour, G., Fayad, A. Water Environment in the Coastal Basins of Syria – Assessing the Impacts of the War. *Environ. Process.* 1, 533–552 (2014).
<https://doi.org/10.1007/s40710-014-0043-5>

Tunisia

I. General overview

Tunisia has been developing various networks and systems for monitoring the environment, such as the bathing water monitoring system, the air quality monitoring network, and a variety of information systems on coastal ecosystems. It also leads the national monitoring programme for the quality of the marine environment which is part of the MEDPOL programme. However, data relating to the quality of water resources are collected and managed independently by a multitude of actors, and much of environmental information is only produced as part of project management and rarely for statistical purposes and on an ongoing basis. As a consequence, these different systems are still developed separately. The 2015 Plan Bleu Report underlined that “they do not contribute together to create a real national information system on the environment”. Since then, the Ministry of Local Affairs and the Environment launched a website of open data gathering various sets of data on the environment, which is still under development.

Legal, administrative or other obligations involving monitoring

<i>Legal framework</i>	<i>Content</i>
Law no. 92-115 of November 30, 1992 amending law no. 88-91 of August 2, 1988	This law created a national environmental protection agency in charge of environmental monitoring.
Law no. 2009-49 of July 20, 2009	This law relates to marine and coastal protected areas: deals with the types of marine and coastal ecosystems, marine biodiversity, habitats undergoing extinction, endangered species and important scientific sites.
Decree no. 2014-1844 of May 19, 2014	This law sets the composition and powers of the National Council for Maritime and Coastal Protected Areas. Special legislation and protection regime more rigorous than that of the DPM. Introduction of the zoning technique.
Law no. 95 - 73 of July 24, 1995	This law covers the creation of the Coastal Protection and Development Agency, in charge of monitoring the evolution of coastal ecosystems through the implementation and operation of specialized computer systems.
Law no. 95-73 of July 24, 1995, as amended and supplemented by law no. 2005-33 of April 4, 2005	This law relates to the maritime public domain.
Law no. 99-93 of August 17, 1999	This law relates to hydrocarbon exploitation: Hydrocarbon Code
Law no. 94-13 of January 31, 1994	This law relates to the exercise of fishing and subsequent texts: it organises the fishing effort in the different fishing zones, rationalizes the exploitation of aquatic species, protects them and preserves their living environment

Law no. 62-13 of April 24, 1962, (19 dhoulkaada 1381)	This law promulgates the Code of Maritime Commerce.
Decree no. 2013-4824 of Nov. 25, 2013	This law sets the conditions and procedures for granting the authorisation of temporary occupation of the public domain of commercial seaports
The implementing decree no. 91-362 of March 13, 1991	This law specifies the regulatory provisions and procedures for the preparation and approval of environmental impact studies. This decree was amended by Decree no. 1991 of July 11, 2005 relating to impact studies and setting the categories of units subject to the environmental impact study and the categories of units subject to the specifications. charges.
Law no. 2016-22	This law is the organic law on the right of access to information

National environmental institutions/organisations

The Ministry of State and Land Affairs/*Miministère des domaines de l'Etat et des affaires foncières (MDEAF)* (<https://www.domainetat.tn/fr/>): responsible for all aspects relating to the delimitation of the public maritime domain and the public port domain.

The Ministry of Agriculture, Water Resources and Fisheries/*Ministre de l'Agriculture, des Ressources Hydrauliques et de la Pêche Maritime (MARHP)* (<http://fr.tunisie.gov.tn/annuaire/2/9-minist%C3%A8re-de-l%E2%80%99agriculture-des-ressources-hydrauliques-et-de-la-p%C3%AAche-maritime.htm>): with regard to the management of dunes on the coast and the conservation of water and soil, it being specified that it has specific powers in matters of protected areas. The ministry has the largest number of cells involved in environmental protection.

The Ministry of the Environment/*Ministère de l'environnement (MALE, 2017)* (<http://www.environnement.gov.tn/index.php/fr/?id=3&L=1>): for all that relates more particularly to the protection of the coast, the establishment of inventories of natural resources, the preparation of sustainable development strategies, monitoring of EIAs, etc.; it being specified that since the merger of environmental issues with local affairs (previously managed by the Ministry of the Interior), it is the Department in charge of Local Affairs (and the environment) which develops and supervises the implementation by the municipalities of the National Cleanliness and Environmental Protection Programme.

The Ministries of the Interior and of National Defence: in the event of a natural disaster and/or pollution accident justifying the implementation of a rescue organization plan or the national emergency response plan at sea.

Monitoring institutions/observatories

National Agencies

APAL Coastal Observatory of the Coastal Protection and Development Agency

Created in 1995, the APAL Coastal Observatory of the Coastal Protection and Development Agency (*Observatoire du littoral d'APAL*) (http://www.apal.nat.tn/site_web/) comes under the supervision of the Ministry

of the Environment and Sustainable Development. This public establishment is responsible for monitoring the evolution of coastal ecosystems through the establishment and operation of specialised computer systems in order to facilitate decision-making in terms of management and coastal protection. It manages the monitoring of the evolution of coastal ecosystems; the development of relevant tools promoting the inclusion of the results of surveillance in decision-making processes; and the dissemination of monitoring results and promotion of already developed decision support tools. Although its headquarters are based in Tunis, it has eleven regional units.

The APAL Coastal Observatory has assembled an important collection of data on various natural aspects of the Tunisian coast. Data are organised through thematic geographic information systems (listed in the section “information systems” below) with topographic maps; satellite images and aerial photographs; thematic studies. It also sets up three major information systems for the coast (<http://www.sigapal.tn/sigapal/>): a coastal surveillance system (SIL); a coastal information system; and the “Environment-Energy Programme” (PEE), for the acquisition and installation of equipment for collecting and transmitting oceanographic and hydrodynamic data in real-time¹¹⁹. This programme must allow the acquisition of 2 large, fixed buoys and 2 small, light buoys in order to strengthen the capacity of the Observatory through training actions and ad hoc technical expertise.

It publishes reports on the vulnerability of urban areas, on socio-economic vulnerability to sea level rise; metadata sheets of GIS data in vector mode, published in PDF form the “new figures on the Tunisian coast” (last one published in 2015).

The APAL Coastal Observatory benefits from long-term funding from APAL as well as short-term programme based funding from GEF/Special Climate Change Fund; UNDP; European Neighborhood and Partnership Instrument (ENPI).

National Environmental Protection Agency (ANPE)

The National Environmental Protection Agency (*Agence nationale de protection de l'environnement, ANPE*) (<http://www.anpe.nat.tn/Fr/>) is a public industrial and commercial establishment created in 1988 and reorganised in 1992, consequently to the creation of a Ministry responsible for the environment and sustainable development. Under the supervision of the Ministry of the Environment, the ANPE participates in the development of the general government policy in terms of pollution control and environmental protection, and the combat against all forms of environmental degradation. It is the coordinator for the National Programme for Ongoing Monitoring of the Quality of the Marine Environment. Since 2004, the ANPE has developed a monitoring network for the quality of surface water and groundwater which has benefited from 2008 from the support of the European Union within the framework of the COPEAU-Life project. The measurement and analysis campaigns are carried out twice a year. The ANPE also manages a national air quality monitoring network, RNSQA. The network consists of 30 stations, installed in various places of the Tunisian territory, especially in the most urbanised and industrialised areas (Plan Bleu, 2015). The ANPE is equipped with mobile laboratories. It developed multiple partnerships with UNEP, GIZ, AFD, KFW, UNIDO, Plan Bleu; CAR/ASP; EEA and the European Union. It hosts the Tunisian Observatory for the Environment and Sustainable Development (OTEDD).

Tunisian Observatory for the Environment and Sustainable Development (OTEDD)

The Tunisian Observatory for the Environment and Sustainable Development (*Observatoire Tunisien de l'Environnement et du Développement Durable*)¹²⁰ was created in 1995 and instituted in 2000 through fundings

¹¹⁹ <https://www.climamed.eu/wp-content/uploads/files/Observation-Suivi-et-Veille-d%E2%80%99un-littoral-vulnérable.pdf>

¹²⁰ <http://www.environnement.gov.tn/index.php/fr/indicates-et-reporting/etats-de-l-environnement-national-et-regional>

from the UNDP. It is hosted by the National Agency for Environmental Protection (ANPE) in Tunis, and placed under the supervision of the Ministry of the Environment and Sustainable Development. OTEDD acts as a dashboard for monitoring sustainable development activities in the country, and aims to set up a permanent system for collecting, producing, analysing, managing and disseminating information on the state of the environment and sustainable development, as a tool for decision-makers. It must play the role of the national focal point for: the Plan Bleu (BP/RAC); the MAB Programme (UNESCO); the African Environmental Information Network (UNEP); and the MARCOST Project (REMPEC).

The data collected concerns climate change, sustainable development, sanitation, waste, quality of life, desertification and water resources and has been available since 2017 on the Open Data Platform (<http://open-data2.webglinse.pw/page/la-demarche>). It contains 42 datasets, the last of which was updated in 2016. OTEDD publishes an annual national report on the state of the environment (the last one online for the period 2012-2013), environmental indicators and sustainable development at national and regional levels; sustainable development reports and guides by business sector. Regional reports are struggling to be established: while the reports relating to the Governorates of Ben Arous, Béja, Sousse, Sfax, Kairouan and Tozeur were updated (Arabic version) between 2009 and 2020, the others are still underway.

National Institute of Statistics (INS)

Since 1999, the National Institute of Statistics (Institut National de Statistiques, INS) operates an environmental information system. This environmental database covers seven environmental themes (Inland water, soil, waste, air, biodiversity, indicators for sustainable development and forests), which contains more than 2500 variables resulting from a questionnaire developed at the time by Eurostat-OECD. The work of collecting environmental statistical data was carried out via collection questionnaires by data source and by soliciting the national partners responsible for the data. Unfortunately, statistical information is fragmented and heterogeneous (Plan Bleu, 2015).

Laboratories and research centres

National Institute of Science and Technology of the Sea (INSTM)

The National Institute of Science and Technology of the Sea (*Institut National des Sciences et Technologies de la Mer, INSTM*) (<http://www.instm.agrinet.tn/index.php/fr/>) is a public research establishment under the supervision of the Ministry of Agriculture, Hydraulic Resources and Fisheries. Its current administrative status was established in 1992, although its origins date back to 1928. Its headquarters are located in Salammbô. It aims to identify and disseminate data relating to the marine environment, by carrying out contract research programmes related to the sea and its resources, by participating in the various national, regional and international networks related to the sea. It must also be a tool for decision-makers for the sustainable management of the sea and its resources.

INSTM manages 7 coastal centres (in Mahdia, Gabes, Monastir, Zarzis, Sfax, Kheireddin, Tabarka, Goulette). It has been equipped with a HANNIBAL fishery and oceanographic research vessel since 1998, built in Japan (33.7 m long). It allows pelagic and benthic trawling up to 800 meters, the prospecting of pelagic fish by scientific sounders, the sampling of sediments, phytoplankton, water samples down to depths of 4000 meters, the measurement in continuous salinity, temperature and other hydro – biological parameters. A Sea Observatory is also located at INSTM headquarters. INSTM laboratories collect and analyse data relating to the marine environment, aquaculture, biodiversity and biotechnology, marine, fisheries sciences, blue biotechnology and aquatic bioproducts. These data are accessible on request for access, linked to law no. 22 of 2016 of March 24, 2016. It publishes a newsletter on the activities of the Institute (latest to date: 2018), activity reports (latest to date: 2004), theses and scientific articles, book chapters.

INSTM has many partners, including the Autonomous Region of Sardinia; the European Union; IEV CTFMED; ANPE; FAO, UNDP; RAC/SPA; UNESCO CIESM IODE. It is a member of the UNESCO IODE network.

Tunis International Centre for Environmental Technologies of Tunis (CITET)

The Tunis International Center for Environmental Technologies (*Centre International des Technologies de l'Environnement de Tunis, CITET*) (<http://www.citet.nat.tn/Portail/presentation.aspx>) was created in 1996. It comes under the supervision of the Ministry of Local Affairs and the Environment. This public establishment is based in Tunis. It is committed to developing Tunisian skills to ensure a transfer of environmental technologies (law no. 96-25 of March 25, 1996). Its missions are to acquire, adapt and develop new techniques, and promote environmental technologies and their production and strengthen national capacities and develop environmental scientific and technical knowledge appropriate to specific national and regional needs. Its laboratories cover a large part of the parameters relating to pollution in water, atmospheric and soil environments; as well as three mobile laboratories for the continuous analysis of water quality, ambient air and emission air. It collects measurement data for physico-chemical parameters (pH, conductivity, turbidity, temperature); measurement of parameters and indicators of organic and inorganic pollution; nutrient analysis; micropollutants analysis; flow measurement; noise measurement. Accessibility to data is made on request. CITET publishes studies and activity reports, puts online a "green library" which lists journals, books, reports and studies. It has developed many partnerships and cooperation at the international level.

Its current projects have been updated on its website. Two projects were launched in 2019:

- The AQUACYCLE Project "Towards a sustainable treatment and reuse of wastewater in the Mediterranean region", launched in Thessaloniki (Greece) on September 30, 2019. It brings together 11 partners from 8 countries of the Mediterranean region, of which 4 are associate partners. These countries are Greece (Project Lead), Lebanon, Malta, Spain, Tunisia, Algeria, France and Morocco. The Project is to promote an innovative eco-technology for wastewater treatment, which will be tested in Lebanon, Spain and Tunisia. The Project is funded and supported by the European Union within the framework of the ENI CBC Mediterranean Sea Basin Programme.
- The CLIMA Project: launched in September 2019, this consortium will bring together Italian, Tunisian and Lebanese municipalities, public bodies and NGOs. Funded by the ENI CBCMed Programme, it aims to develop political tools such as municipal integrated waste management plans (PCGD), innovative technical solutions such as drum composting and vermicomposting, as well as support actions to local businesses active in the circular economy, information and advocacy campaigns aimed at influencing attitudes towards the zero waste paradigm and the circular economy, at the public and industrial level.

Marine observatories

[in the making] Observatory of the Gulf of Gabès (ODYSSEA)

The ODYSSEA Project¹²¹ is creating the Observatory of the Gulf of Gabès ODYSSEA (*Observatoire du Golfe de Gabès ODYSSEA*). The ODYSSEA Project was launched in Tunisia on February 15, 2018 for a period of five years, in order to participate in the networking of nine observatories, including one in Tunisia, the creation of which

¹²¹ http://odysseaplatform.eu/download/meeting_reports/Rapport_Atelier-national-de-lancement-du-projet-ODYSSEA-Tunisie-1.pdf

is underway in the Gulf of Gabès. This observatory must ensure relations between the sectors of health, fishing and tourism. It works with two components:

- a monitoring module (drones, lasers which will be used to collect data from the water surface, the water column, and the benthos of the ODYSSEA observatories)
- a modeling module: a computer programme with data and parameters projected over time.

ODYSSEA must network coastal and marine observatories at the European level. This Project is being conducted in partnership with APAL.

Local observatories

Urban Planning Agency of Greater Tunis (AUGT)

Created in 1995, the Urban Planning Agency of Greater Tunis (*Agence d'Urbanisme du Grand Tunis, AUGT*) (<http://www.augt.gov.tn/fr/services-2/observation-urbaine.html>) comes under the authority of the Ministry of Housing Equipment and Regional Planning. This public administrative establishment manages the observation of urban development through the creation of thematic and sectoral databases; assists local communities in development and urban planning; and conducts studies and applied research in urban planning. To do so, it carries out an urban observation activity at the level of four governorates (Tunis, Ariana, Ben Arous, Manouba). In 1994, AUGT set up an Urban Data Bank (BDU) in partnership with IRSIT (Tunisian Computer Science Research Institute). It gathers data on the population growth rate; unemployment; area of dwellings; sanitation; linear tracks; weight of household waste, organized in databases (collective social facilities). The Regional Urban Observatory of Greater Tunis is being created in order to build a unified basic geographical reference for all the works and activities of the AUGT (urban observation, urban studies, realization and revision of urban development plans, urban transport studies, etc.); have a structured and unified system for the different thematic data processed by all AUGT services and stored by the Urban Data Bank. It must focus its observations on the socio-economic field (population and activities), the urban domain (urbanisation and habitat), the equipment domain (socio-collective facilities and services), the natural domain (territory and environment), the infrastructure domain (various networks and transport) and the prospective domain (urban trends and projects). AUGT is in partnership with INS, SONEDE, CNCT. It publishes analysis reports (population, housing, household) (last one published in 2016).

Citizen science

COastal Management and MONitoring Network for tackling marine litter in Mediterranean Sea (COMMON)

The COastal Management and MONitoring Network for tackling marine litter in the Mediterranean Sea (2019-2022) is a EU-funded (2.2 million EUR) Project conducted in Italy, Tunisia and Lebanon for the period 2019-2022. It aims to “apply the Integrated Coastal Zone Management (ICZM) principles to the challenge of marine monitoring, improving knowledge of the phenomenon, enhancing the environmental performance of 5 pilot coastal areas in Italy, Tunisia and Lebanon, and engaging local stakeholders in marine litter management”. In June 2020, monitoring activities of beach litter in Tunisia began as a citizen science activity. The data collected by citizens is collected through the counting and subdividing of the waste found in the list of items. The key partner in Tunisia for the project is the National Institute of Marine Sciences and Technologies. On October 22, the Tunisian Institut National des Sciences et Technologies de la Mer obtained a new instrument to monitor and reduce marine litter: the FTIR spectrometer for quantitative analysis of microplastics in seawater and biota.

Environmental monitoring programmes

National marine biodiversity monitoring programme in Tunisia

The National marine biodiversity monitoring programme in Tunisia (*Programme national de surveillance de la biodiversité marine en Tunisie*, 2019) is a study requested and financed by the EcAP-Med II Project - Regional Activity Centre for Special Protected Areas (SPA/RAC)¹²². It was delivered in 2019. This biodiversity monitoring programme aims to collect data allowing habitat mapping. It includes a marine habitat monitoring programme in the absence of a national reference state and nationally recognised sustainable protocols; a breeding seabird monitoring programme (although already in place, must ensure regular annual monitoring within marine protected areas); a marine mammal monitoring programme (by INSTM, ICCAT); a reptile monitoring programme: marine turtles (based on the systems in place, in order to increase the frequency of observation); monitoring programme for non-native species (in the absence of regular monitoring mechanisms) (SPA/RAC - ONU Environnement/PAM, 2017). It is funded by the EcApMedII Project in conjunction with the EU, UNEP, SPA / RAC and APAL.

National Integrated Monitoring Programme for Coastal and Hydrographic Indicators

Given that Tunisia does not have a national monitoring programme for the state of the marine and coastal environment, the 2017 report covers the development of the national IMAP integrated monitoring program for Tunisia based on the implementation of the three common indicators relating to hydrography (OE7) and coasts (OE8) for monitoring the state of the marine and coastal environment in an approach based on the identification and assessment of the risk and the degree of threat to ecosystems from an alert and decision-making perspective.

Cetacean Stranding Network

The Cetacean Stranding Network (*Réseau d'échouage des cétacés*) was launched by INSTM in 2013 to formalize the network and by the creation of a committee chaired by the Director General of INSTM, made up of members of administrations such as APAL and the National Marine Guard. Meets once a year¹²³. The results of surveys are communicated on the MEDACES database via RAC/SPA. The establishment of a tissue bank is done in collaboration with the tissue banks of Barcelona (Spain) and Padua (Italy). The strengthening of the network was funded over 2 years (2012-2014) by ACCOBAMS from INSTM.

Publication: Bradai Mohamed Nejdmeddine et Karra Sami (2015) Les tortues, les dauphins et les baleines de Tunisie: Biodiversité et effort de conservation. 56 pages.

https://www.rac-spa.org/sites/default/files/doc_turtles/turtles_cetaceans.pdf

Monitoring of the nesting of the *Caretta caretta* marine turtle on the Kuriat Islands in Tunisia (APAL, ISTM, CAR/ASP, IFF)

The Monitoring of the nesting of the *Caretta caretta* marine turtle on the Kuriat Islands in Tunisia (Suivi de la nidification de la tortue marine *Caretta caretta* sur les îles Kuriat en Tunisie) has been initiated in the 1990s. Within the framework of the implementation of the Action Plan for the Conservation of Mediterranean Sea

¹²² https://www.rac-spa.org/sites/default/files/ecap/imap_tunisia/imap_tunis_web.pdf

¹²³ https://www.accobams.org/wp-content/uploads/2018/12/Call2012_Rapport-Final_INSTM.pdf

Turtles, the National Institute of Science and Technology of the Sea (INSTM) with the collaboration and the support from the Regional Activities Center for Specially Protected Areas (RAC / SPA), the Coastal Protection and Planning Agency (APAL) and the Faculty of Sciences of Sfax, ensure during the summer months the protection and monitoring the spawning of sea turtles nesting on the beaches of the Kuriat Islands. It aims to improve knowledge on the reproductive biology and ecology of the “loggerhead” *Caretta caretta* marine turtle and to protect nesting beaches on the Kuriat Islands by guarding the nests throughout the summer season and ensuring maximum success for nesting female climbing operations and emerging newborns. Report between 2010 and 2014 are available online¹²⁴.

National monitoring programme for the quality of the marine environment (MEDPOL Network)

The National Monitoring Programme for the Quality of the Marine Environment (*Programme national de surveillance continue de la qualité du milieu marin*) is part of the MEDPOL Network. Tunisia participates in the Programme for the Assessment and Control of Marine and Coastal Pollution in the Mediterranean Region (MEDPOL) launched in 1981, which includes monitoring of sources of land-based pollution, pollution hot spots (estuary, water stations, coastal treatment) and bathing water compliance, analysis of coastal areas, biomonitoring and trend monitoring, as well as supporting measures. As such, the INSTM and DHMPE transmit annually data relating to nutrients, chlorophyll-a, trace metals in biota, organic contaminants in biota, trace metals in sediments, organic contaminants in sediments, nutrients in rivers and streams, oceanographic parameters.

The Implementation of Indicators of Marine Litter on Sea Turtles and Biota in Regional Sea Conventions and Marine Strategy Framework Directive Areas (INDICIT II)

The Implementation of Indicators of Marine Litter on Sea Turtles and Biota in Regional Sea Conventions and Marine Strategy Framework Directive Areas (2019-2021)¹²⁵ is a two-year Project (February 2019 – February 2021) funded by the European Union and continues from the INDICIT I Project which ran from 2017 – 2019. The consortium, composed of researchers from 12 partners in 8 different countries (France, Greece, Italy, Portugal, Spain, Tunisia, Turkey and the United Kingdom), is committed to support the implementation of the EU’s Marine Strategy Framework Directive (MSFD) and other international environmental policies aiming at protecting the marine environment (especially the Barcelona convention, the OSPAR convention, the HELCOM etc). The overarching aim is to develop a set of standardised tools for monitoring the impacts of litter on marine fauna as bio-indicators: “macro-litter ingested by sea turtle (debris items >1 mm)”, “Marine wildlife entanglement in floating debris (turtles, mammals, birds)” and “micro-litter ingested by fish/ sea turtle (debris items <1mm)”. Its partner in Tunisia is the INSTM.

Monitoring activities within MPAs

In application of law no. 49-2009 of July 20, 2009, the National Council of Marine and Coastal Protected Areas approved the creation of four MPAs in June 2017 around the National Park of Zembra and Zembretta (RB), the

¹²⁴ http://www.rac-spa.org/sites/default/files/doc_medmpanet/final_docs_tunisia/41_suivi_tortue_tinisie_2010.pdf;
http://www.rac-spa.org/sites/default/files/doc_medmpanet/final_docs_tunisia/42_suivi_tortue_tinisie_2011.pdf;
http://www.rac-spa.org/sites/default/files/doc_medmpanet/final_docs_tunisia/43_suivi_tortue_tinisie_2012.pdf;
http://www.rac-spa.org/sites/default/files/doc_medmpanet/final_docs_tunisia/44_suivi_tortue_tinisie_2013.pdf;
http://www.rac-spa.org/sites/default/files/doc_medmpanet/final_docs_tunisia/45_suivi_tortue_tinisie_2014.pdf

¹²⁵ <https://indicit-europa.eu/indicit-documents/>

Kneiss Islands, Kuriat Islands, and the Galite Archipelago. The public inquiry relating to the creation of these Marine and Coastal Protected Areas (MCPA) was launched in 2018.

Zembra and Zembretta National Park - future MPA

Declared a Biosphere Reserve in 1977 by UNESCO, it became a National Park by Decree the same year. It is also classified as a "Specially Protected Area of Mediterranean Importance" within the meaning of the Barcelona Convention. The management plan (2003-2008) of the marine part of the Zembra and Zembretta National Park was drawn up within the framework of the Regional Project for the Development of Marine and Coastal Protected Areas in the Mediterranean Region (MedMPA Project), funded by the European Commission and implemented by the Regional Activity Centre for Special Protected Areas (RAC/SPA, Tunis)¹²⁶. It provides for the establishment of a scientific monitoring programme in order to adjust the restrictions and activities in each area.

Future MPA of Kuriat

The first and second phases of development of the Kuriat Islands MPA Management Plan were completed in 2015 (CAR/ASP & PNUE/PAM, 2014). The diagnostic phase made it possible to establish the state of knowledge regarding the socio-economic context, the physical environment, the natural heritage, the cultural and historical heritage. The management plan as it is developed provides for a "strong scientific vocation" for the AMP. Phase 2 (management of the MCPA) provides for 4 objectives aimed at conservation, management, development and mesological and scientific enhancement, one linked to governance (CAR/ASP - PNUE/PAM, 2015).

Future MPA of the Kneiss Islands

Kneiss Islands have been a Nature reserve since 1993 by a decree of the Minister of Agriculture, and were included in the ASPIM list in 2001. It has been a RAMSAR site since 2007. The Kneiss Islands are on the list of MPAs planned by APAL since 2018. A mission to study the flora and vegetation of the Kneiss Islands was carried out by the PIM in April 2015 as part of the cooperation between the French Coastal Conservatory and APAL. This mission also makes it possible to contribute directly to the PIM encyclopedic Atlas project to complete the state of knowledge on the islands and islets of the "East-Tunisian" sub-basin. The SAR-Dyn Programme funded by Labex Dynamite (Support for collective research actions by LabExDynamite) has also launched for 2019-2020 an observation programme of the hydrosystem of the Kneiss Islands and the Leuben basin: socio-environmental interactions and enhancement of a protected territory¹²⁷. Its partner is the Higher Institute of Water Sciences and Technology of Gabès (ISSTEG), Gabès, Tunisia; and the SYFACTE Laboratory, Sfax, Tunisia.

Environmental information systems

The Open Data Platform of the Ministry of Local Affairs and the Environment

Open in 2017, this website gathers sets of data from the different Divisions of the Ministry of Local Affairs and the Environment. It compiles and harmonizes data about climate change, sustainable development, sanitation, waste, quality of life, desertification and water resources. (<http://open-data2.webglinse.pw/page/la-demarche>)

¹²⁶ <http://medmpa.rac-spa.org/pdf/Rapports/Tunisie/FINAL.pdf>

¹²⁷ <https://www.prodig.cnrs.fr/spip.php?article2663>

The Decision-making Information and Support System (SIAD) of APAL

This EIS aims at the surveillance and protection of the Tunisian coast. The SIAD facilitates the operations of measurement, storage, collection, management, practical processing, analysis and interpretation of oceanographic and physico-chemical data. The data is measured and transmitted to the APAL Coastal Observatory in real-time owing to a device made up of three fixed buoys, four mobile buoys and four tide gauges equipped with sensors and located at sea.

APAL also developed numerous environmental informations systems: the coastal wetlands information system; the information system relating to the geomorphology of the coast; the information system on the sources of nuisance on the coast; the coastal dunes information system; the information system relating to the project for the protection of marine and coastal resources in the Gulf of Gabes; the information system relating to the DPM. It also developed a Centralised Geographic Information System, thematically organised as follows: Coastal geomorphology; Coastal Sensitive Areas; Coastal Wetlands; Maritime Public Domain and Coastal and Marine Resources of the Gulf of Gabès.

The environmental information system of the National Institute of Statistics

Since 1999, the National Institute of Statistics (Institut National de Statistiques, INS) has operated an environmental information system. This environmental database covers seven environmental themes (Inland water, soil, waste, air, biodiversity, indicators for sustainable development and forests), which contains more than 2500 variables resulting from a questionnaire developed at the time by Eurostat-OECD. The work of collecting environmental statistical data was carried out via collection questionnaires by data source and by soliciting the national partners responsible for the data. Unfortunately, statistical information is fragmented and heterogeneous (Plan Bleu, 2015).

The Ministry of Health's bathing water monitoring system

The Ministry of Health monitors seawater throughout the year with an accelerated frequency in summer. The purpose of the control is to monitor the quality of the bathing water, but also the impact of discharges into the sea, whether liquid or solid (treated wastewater, blackwater, solid waste). Samples for analysis are taken from a network made up of 517 fixed points whose separation distance depends on the level of attendance. The analyses of this network relate only to the microbiological analyses. Data is available online (<https://baignades.sante.gouv.fr/baignades/navigAccessible.do#a>).

Marine Environment Information System, MEDPOL

Coordinated by the ANPE, the national programme for continuous monitoring of the quality of the marine environment, which is part of the MEDPOL programme (Programme for the Assessment and Control of Pollution in the Mediterranean Region), includes the monitoring of land-based pollution sources, estuary pollution hotspots, coastal sewage treatment plants; monitoring the compliance of bathing water; analysis of coastal areas; biosurveillance and trend monitoring and support measures. Data are annually provided by the INSTM, the Department of Environmental Hygiene and Environmental Protection and the ANPE through excel files (Plan Bleu, 2014).

Bibliography

AEE, 2014. "Rapport Horizon 2020 sur la Méditerranée - Tunisie". 28 pages.

Agence Européenne pour l'Environnement, 2014. "Rapport Horizon 2020 sur la Méditerranée. Annexe 6 : Tunisie". 28 pages URL:

CAR/ASP - PNUE/PAM, 2014. "Elaboration d'un Plan de Gestion pour l'Aire Marine et Côtière Protégée des îles Kuriat (Tunisie) - Phase 1: Bilan et Diagnostic". Par Thetis-Cabinet Sami Ben Haj. Ed. CAR/ASP - Projet MedMPAnet, Tunis : 72 p

URL: <https://docplayer.fr/27563420-Elaboration-d-un-plan-de-gestion-pour-l-aire-marine-et-cotiere-protgee-des-iles-kuriat-tunisie-phase-1-bilan-et-diagnostic.html>

CAR/ASP - PNUE/PAM, 2015. "Elaboration d'un Plan de Gestion pour l'Aire Marine et Côtière Protégée des îles Kuriat (Tunisie) - Phase 2 : Gestion de l'AMCP, définition des objectifs et planification des opérations". Par Thetis-Cabinet Sami Ben Haj. Ed. CAR/ASP - Projet MedMPAnet, Tunis : 56 p. URL: http://www.rac-spa.org/sites/default/files/doc_medmpanet/final_docs_tunisia/47_plan_de_gestion_kuriat_tunisie.pdf

Médail F., Charrier M., Charrier L. & Chaieb M., 2016. "Flora and vegetation of the Kneiss islands (south-eastern Tunisia). Assessment of terrestrial plant biodiversity, environmental impacts and management recommendations". PIM naturalist note, Aix-en-Provence: 49 p

Ministère de l'Environnement et du Développement Durable, 2015. "Observatoire et indicateurs de l'environnement et du développement durable, Tunisie, Rapport de Synthèse". 181 pages.

URL https://planbleu.org/sites/default/files/upload/files/ReGoKo_Observatoires_rapport_de_synth%C3%A8se_Tunisie%281%29.pdf

Ministère de l'Équipement, de l'Aménagement du Territoire et du Développement Durable, Agence Nationale de Protection de l'Environnement, 2014. "Les indicateurs du développement durable". 114 pages

Observatoire Tunisien de l'Environnement et du Développement Durable, 2014. "Les indicateurs de Développement Durable en Tunisie". 114 pages

ODYSSEA, 2018. "Operating a network of integrated observatory systems in the Mediterranean Sea. Report - National workshop on Launching ODYSSEA- Tunisia". 21 pages. URL: <https://cordis.europa.eu/project/id/727277/fr> (Accessed on 2/12/2020)

PAM/UNEP, 2011. "Examen des activités MED POL de surveillance continue du milieu marin et planification du nouveau système de surveillance continue intégré du PAM". 46 pages

PAP/RAC, UE, UNEP/MAP, 2017. "Programme national de surveillance intégrée pour les indicateurs relatifs à la côte et à l'hydrographie". 176 pages.

PedPartnership, 2015. "Rapport national : expérience tunisienne pour faire face à la Variabilité et au Changement Climatique en Zones Côtières", 40 pages https://planbleu.org/sites/default/files/publications/rapport_national_tunisie_october_2015.pdf

Plan Bleu, 2014. "Étude d'Évaluation Socioéconomique des Activités Maritimes en Tunisie". 103 pages.

http://www.environnement.gov.tn/images/fichiers/developpement_durable/Plan_Bleu_Evaluation_Socioeconomique_Activites_Maritimes.pdf

SPA/RAC et MedPAN, 2019. "Le cadre juridique des Aires Marines Protégées en Tunisie : Fiches synthétiques". Par Emmanouilidou P., Seddik W., Webster C., El Asmi S. et Kheriji A. Ed SPA/RAC. Projet MedMPA Network, Tunis : 11 pages

Turkey

I. General overview

Located on the crossroads of three continents, Turkey has a rich marine and terrestrial biological diversity because of its geographical position and structure. This country is surrounded by seas on three sides and has 8,333 km of shoreline with high productivity, economic value and a rich ecological structure (Ministry of Development, 2012). Since 2012, Turkey has placed a special emphasis on preventing degradation of marine ecosystems caused by land-based polluters, particularly in Special Environmental Protection Areas. Turkey seems to have a well-developed marine and coastal information system and a strong link with other international systems. Environmental data are reported to MEDPOL, the Black Sea Commission, the European Environment Agency (EEA) and to national authorities (Ministry of Environment and Urbanisation, TURKSTAT, Ministry of Agriculture and Forestry).

In Turkey, the “Integrated Marine Pollution Monitoring Programme” is implemented by the Ministry of Environment and Urbanisation and coordinated by the Scientific and Technological Research Council of Turkey-Marmara Research Centre for a three-year period. A lot of national marine institutes and marine experts are involved in the programme that are also well equipped and very active in marine research.

Legal, administrative or other obligations involving monitoring

Legal framework

Content

Law no. 2872 (1983), amended in 2006	Environment law: this is Turkey's main environmental statute. There are more than 50 regulations under the Environment law.
Regulation on Environmental Impact Assessment dated November 25, 2014 (EIA Regulation)	<p>Turkey introduced EIA in the Environment law, but the first regulation implementing this instrument went into force in 1993. The latest regulation on its administrative and technical procedures was adopted in 2017. The EIA system is mostly in line with EU EIA Directive 2014/52/EU. (OECD, EPR, 2019)</p> <p>SEA regulation was published on April 8, 2017 and is currently implemented in 7 different sectors (in coastal management, spatial planning, water management, agriculture, tourism, fishery and forestry)</p>
Law no. 2872 (1983), amended in 2006	This law provides for the Water Pollution Control Regulation (2004), the By-law on Surface Water Quality (2012), the Regulation on the Control of Industrial Air Pollution (2009, revised in 2014), and the Regulation on Waste Management (2015). Turkey has aligned its surface water quality parameters and standards with those of the EU (By-law on Surface Water Quality) and following a recommendation of the 2008 EPR, a new comprehensive Water law based on a holistic watershed management approach has been prepared and is pending approval by Parliament.

Regulation on Control of Pollution Caused by Dangerous Substances in Aquatic Environment dated November 26, 2005	“Environmental Permits and Licences Regulation introduced an integrated permit regime for emissions. To start the operation of facilities, companies must obtain an integrated environmental permit, which covers air, noise, wastewater and deep-water emissions. All facilities are divided into two categories (Appendices 1 and 2) based on the degree of potential impacts. Appendix 1 facilities receive their permits from the central office of the MEU; Appendix 2 facilities receive theirs from the MEU provincial directorates’ (https://www.oecd-ilibrary.org/sites/). ‘Water pollution is subject to a separate regulatory regime. Where there is a risk of water pollution by a facility, an additional certificate (licence) must be obtained from the Ministry of the Environment and Urbanisation (Ministry) showing that the facility complies with measures for containing and cleaning any pollution should it occur’ ¹²⁸ .
Regulation on Control of Water Pollution dated December 31, 2004.	
2010 Regulation on environmental permits and licensing (updated in 2020)	
By-Law on Surface Water Quality dated November 30, 2012 (updated in 2015 and 2016, respectively)	
Law no. 1380 of 1971, as amended by laws no. 3288 of 1986, no. 4916 -no. 4950 of 2003, No. 5957-no.5996 of 2010, no. KHK/698 of 2018 and no. 7191 of 2019	This is the framework law for fisheries and aquaculture related activities. The law provides the basis for the regulations and communiqués, issued under the authority of the competent minister (the Minister of Agriculture and Forestry), which are used to regulate fisheries and aquaculture. Article 13 sets out rules for monitoring and control of aquaculture farming activities and environmental impacts and protection.
2003 law on the Right to Information and its 2004 implementation regulation	This law covers access to environmental information held by public institutions.
Regulation on Monitoring of the Surface Water and Groundwater dated February 11, 2014.	<p>The main aim of this Regulation is to provide a framework for water quality monitoring. With the establishment of Natural Water Information Network, the data obtained from the monitoring activities that are conducted within the framework of basin monitoring programmes will be downloaded to the Natural Water Information System where it will be shared with the relevant institutions and organizations.</p> <p>With this Regulation, coordination and standardisation in institutions and organisations that perform monitoring activities will be provided by monitoring quantity, quality and hydro- morphological elements of intra-continental surface, ground, transition and natural mineral waters except other coastal waters except geothermal sources and sea waters, including coastal waters at the points where the water sources flows into sea without concerning the purpose of water usage, with an approach based on integrity of ecosystem.</p>
Communique on Sampling of Surface Water, Groundwater and Sediment and Biological Sampling dated February 21, 2015	The aim of this communique is to specify the rules and procedures for sampling, handling, preserving and storage of the surface water, groundwater and sediment samples, sampling and storage of the biological quality elements in surface waters. Communique covers the issues of sampling of sediment and surface, ground and transition waters of inland waters except geothermal resources and marine waters, including coastal waters at points that the water resources flow into sea and issues related to sampling and storage of biological quality elements in the surface waters. Standardisation on sampling of surface and ground waters, minimisation of the errors resulting from the sampling by ensuring that the samples is the representative of the sampling resources will be provided by communique.

¹²⁸ <https://uk.practicallaw.thomsonreuters.com/7-522-2040?transitionType=Default&contextData=-sc.Default-&firstPage=true>

Communique on Biological Monitoring published in the Official Gazette No. 30808 dated June 21, 2019

This Communique was prepared with the intent to standardise the biological monitoring studies by determining the procedures and principles regarding the monitoring of the biological quality elements in surface waters. To that end, the Communique covers the issues concerning the determination of the sampling points/sites, sampling periods and monitoring frequencies, the sampling method and the selection of sampling equipment together with the transportation, storage, analysis and identification of the samples for each biological quality element.

Governmental environmental institutions

In Turkey, water-related responsibilities are divided between the MEU and the MAF. The MEU oversees wastewater management, monitors, controls water, and marine pollution. Monitoring of marine pollution and taking necessary measures such as developing policies, strategies and action plans are also under MEU's responsibility. The MAF is responsible for river basin management, protection of water resources, water quality and quantity management, and surface water quality monitoring. The Ministry of Health is responsible for monitoring drinking and bathing water quality in collaboration with the MEU. The Ministry of Energy and Natural Resources is, among others, responsible for energy efficiency and renewable energy policies.

Ministry of Environment and Urbanisation (MEU) (<https://www.csb.gov.tr/>). In Turkish '*Türkiye Cumhuriyeti Çevre Şehircilik Bakanlığı*' the Ministry of the Environment and Urbanisation was established in 2011, by replacing the former Ministry of the Environment and Forestry, it is the main organisation for environmental monitoring and protecting. It sets policies and takes measures regarding prevention of pollution; monitoring and inspection facilities and plants; issuing permits; sustainable development; global warming; climate change.

'State of the Environment Report for the Republic of Turkey' prepared by the Ministry of Environment and Urbanisation every four years in coordination with the General Directorate of Environmental Impact Assessment, Permits and Inspections with the contributions of related institutions and organisations. This Report contains an environmental inventory, data and some statistics about the state of the air, climate change, water and wastewater management, waste, management of chemicals, nature conservation and biological diversity. They are available online¹²⁹ (last one in English version in 2016). The sixth «State of the Environment Report for the Republic of Turkey» was prepared and published at the end of 2020 (and it will also be published in English). The new Report covers the data for the years 2016-2019 (for some sectors, the data from 2020 and 2014 are also included). After an overview of the country, the Report contains titles such as: Air, Climate Change, Water and Wastewater Management, Waste, Chemical Management, Nature Conservation and Biodiversity, Land Use and the Ministry of the Environment and Urbanisation Institutional Structure and Activities Performed and lastly, Environmental Expenditures and Financial Liability Insurance. In addition to the national level, the State of the Environmental Reports are also published on the provincial level.

Ministry of Agriculture and Forestry (MAF) (<https://www.tarimorman.gov.tr/Sayfalar/EN/AnaSayfa.aspx>). In Turkish, Türkiye Cumhuriyeti Tarımve Orman Bakanlığı, the Ministry of Agriculture and Forestry of the Republic of Turkey was established in 2018 with the former Ministry of Forestry and Water Affairs. In addition to its water-related responsibilities, the MAF manages fisheries in line with a code of conduct for responsible and sustainable fisheries, carries out effective inspection, control and monitoring activities for the conservation of fishery stocks, oversees biodiversity protection, natural parks and forest management, and promotes good land management and agricultural practices¹³⁰. The Ministry has been conducting monitoring activities for

¹²⁹ <https://www.tarimorman.gov.tr/DKMP/Menu/36/Tabiati-Koruma-Durum-Raporlari>

¹³⁰ <http://www.oecd.org/env/country-reviews/Highlights-Turkey-2019-ENGLISH-WEB.pdf>

endangered marine species and invasive species. It is also regularly monitoring sea turtle nesting beaches in the country. Conservation activities are being carried out with the support of universities and non-governmental organisations.

Monitoring institutions/observatories

National agencies

General Directorate of Environmental Impact Assessment, Permits and Inspections

The General Directorate of Environmental Impact Assessment, Permits and Inspections (<https://ced.csb.gov.tr/>) of the Ministry of the Environment and Urbanisation is responsible for monitoring the receiving environments to create the relevant infrastructure; for determining, implementation and implementing measurement and analysis criteria in relation to all kinds of environmental pollution. Moreover, it authorises laboratories that will carry out all kinds of environmental measurements, monitoring, analysis and controls and carries out their accreditation procedures, for determining the institutions that will measure the receiving environments. In short, the General Directorate has the mission of monitoring all kinds of activities and facilities aimed at preventing environmental pollution and improving environmental quality and taking the necessary measures, to inspect, to issue environmental permits and licenses and to monitor and control the emission, discharge, wastes and treatment and disposal systems of activities and facilities that cause environmental pollution.

General Directorate of Environmental Impact Assessment Permits and Inspections also prepares environmental indicators and publishes annually in the form of booklets and web-based information¹³¹. Environmental indicators consist of 90 indicators under 16 topics, covers marine and coastal information besides other environmental topics and other related fields.

The “Report on the Environmental Problems and Priorities of Turkey” is also prepared and published by the General Directorate of Environmental Impact Assessment, Permits and Inspections. Based on the surveys carried out through the provinces, the report summarises the priority environmental problems, their sources and mitigation efforts of the provincial environmental authorities.

To inform the public about the environment, there are other publications, some of which may also be available in English (such as the Environmental Inspection Reports) under the «publications» section¹³².

General Directorate for the Protection of Natural Assets

In 2011, Decree no. 644 delivered the responsibility of “Naturally Protected Areas” (NPAs) to the Ministry of the Environment and Urbanisation. Today, this task has been given to the General Directorate for the Protection of Natural Assets of the Ministry of the Environment and Urbanisation under the Presidential Decree no. 1, dated July 10, 2018. The General Directorate for the Protection of Natural Assets is responsible for planning at various levels, monitoring compliance with spatial plans, preparing maps and implement infrastructure projects and installations. It conducts research and studies on natural resource protection, development, productivity and manages the regional commissions for protection of natural assets.

Terrestrial and marine Special Environmental Protection Areas (SEPAs), Natural Protected Areas (NPAs), Natural Monuments (NMs) and Monumental Trees (MTS) come under the management of the General Directorate

¹³¹ <https://cevreselgostergeler.csb.gov.tr/>

¹³² <https://ced.csb.gov.tr>

for the Protection of Natural Assets, in line with national regulations and international agreements. Turkey's national protected area system includes several marine and coastal protected areas (MCPAs). In most cases, these combine terrestrial and marine coverage within a single Protected Area (PA). Since 1988, 18 Special Protected Areas, or SPAs (later renamed Special Environmental Protected Areas, or SEPAs) were established along the Mediterranean and Aegean coasts, based on the Barcelona Convention. Once managed by the Environmental Protection Agency for Special Areas (EPASA), the General Directorate for the Protection of Natural Assets (DGPNA) has been authorised as the managing governmental body to deal with not only the SEPAs but also other Natural Protected Areas (NPAs). Additionally, between the years 1991 and 2020, twenty-two species were monitored via national and international projects as well as in coordination with NGOs such as the WWF, the Ecological Research Society, the Sea Turtle Rehabilitation & Rescue Centre, the Mediterranean Conservation Society and the Underwater Research Society.

General Directorate of Water Management

The General Directorate of Water Management (<https://www.tarimorman.gov.tr/SYGM/Sayfalar/EN/AnaSayfa.aspx>) was established under the Ministry of Agriculture and Forestry and has a special 'Monitoring and Water Information System Department' and 'Water Quality Department'. The Monitoring and Water Information System Department is responsible for determining principles, strategies and policies of water quality monitoring in line with the EU Water Framework Directive (WFD), preparing and updating the basin monitoring programmes, identifying monitoring stations, monitoring parameters including the parameters (i.e. chemical and physicochemical parameters, specific pollutants, priority substances) that are determined by the Water Quality Department, monitoring intervals and monitoring methods and trace to publish guidance documents, ensuring monitoring of inland waters, groundwater, coastal and transitional waters in terms of quantity and quality, to set up data processing and evaluation system, coordinating the institutions and organisations to develop a common monitoring standards to avoid duplication in monitoring. It is also in charge of collecting data. The Water Quality Department, on the other hand, is responsible for setting and updating the water quality standards and environmental quality standards for the water quality parameters, evaluating the surface water and groundwater quality monitoring data, classifying and reporting them at the basin level. The Directorate has an open access *Journal of Water Science and Management* available online¹³³. However, it seems that there is no data available for public access.

General Directorate of State Hydraulic Works

The General Directorate of State Hydraulic Works (<https://www.dsi.gov.tr>) is a Government agency under the authority of the Ministry of Agriculture and Forestry, responsible for the utilisation of water resources. The DSI's purpose «to develop water and land resources in Turkey» covers a wide range of interrelated functions. These include irrigation, hydroelectric power generation; domestic and industrial water supplies for large cities; recreation and research on water-related planning, design and construction materials.

Projects, master plan and feasibility reports are prepared for the development of water resources. In this respect, required main data are collected by DSI from the river basin surveys, which are related with flow, water quality and meteorological, soil classification, agricultural economy, erosion, maps, and geological conditions etc issues.

It conducts monitoring processes related with flow and water quality in rivers according to the monitoring programmes prepared by the General Directorate of Water Management in 25 basins throughout the country.

¹³³ <https://dergipark.org.tr/tr/pub/tjwsm>

In this respect, it is responsible for the measurement and analysis of requested parameters, evaluation and reporting of all monitoring results according to relevant legislation, entering DSI SVT-Water Quality Module with basin-based coordinates. When the «National Water Information System» is activated, data is transferred to this system via SVT.

General Directorate of Mapping (GDM)

Founded in 1895 under the name of the Map Commission, it is by law the National Mapping Agency of Turkey (<https://www.harita.gov.tr/english/kurumsal>) and provides geospatial data of various levels of detail, types and scales which form the basis of today's geospatial data infrastructure. It is also an indispensable national asset for sustainable development of the country and many other applications. As a National Mapping Agency of Turkey, the General Directorate of Mapping (GDM) is responsible for the establishment and maintenance of geodetic networks, collecting and structuring topographic data and producing standard topographic map series of Turkey. The mission of the GDM is to provide military and civilian users with all kinds of adequate, consistent, up-to date printed and digital geospatial products in a timely and economic manner.

Turkish Coast Guard Command

The Turkish Coast Guard Command (<https://en.sg.gov.tr/>) is an old Turkish Agency and its foundation dates back to the second half of the 19th century. Its main mission is to provide maritime security and safety, but also protecting maritime environment and marine resources, safeguarding national interests at sea. It comes under the authority of the Turkish Ministry of the Interior and oversees reporting marine pollution incidents to other competent authorities (such as Port Authorities; Metropolitan Municipalities; Provincial Directorates of Environment and Urbanisation). The Turkish Coast Guard Command also provides statistical data on environmental pollution detections at seas and legal sanctions imposed online.

Turkish Navy Office of Navigation, Hydrography and Oceanography

Hydrography and oceanography have been a concern for the Turkish Navy since the 15th century. Piri Reis, well-known Turkish admiral and mariner, compiled his work known as Kitab-ı Bahriye in 1531. His map dated 1513 is the oldest map which shows the closest point to the Antarctic region.

Turkish Navy Office of Navigation, Hydrography and Oceanography (TN-ONHO) established in 1909 is the official Department that organises national oceanographic research, produces nautical charts and promulgates navigational warnings. TN-ONHO is a member of the International Hydrographic Organisation (IHO) and the UNESCO Intergovernmental Oceanographic Commission (IOC).

Turkish Statistical Institute (TURKSTAT)

TURKSTAT (<https://www.tuik.gov.tr/Home/Index>) aims to compile, evaluate, analyse and publish statistics in the fields of different areas also environmental data. As an example, drinking water networks and water treatment plants information under municipal water statistics, municipal wastewater statistics, and municipal waste statistics have been published biennially since 1994. Variable selection of statistical data is available in the web site of the Institute and data can be exported TÜİK's website as html, cvs, excel, xml and pdf formats¹³⁴.

¹³⁴ <https://data.tuik.gov.tr/Kategori/GetKategori?p=tarim-111&dil=1>

Laboratories and research institutes

The Scientific and Technological Research Council of Turkey - Marmara Research Centre (TUBITAK-MRC)

TUBİTAK-MRC Research Centre (<https://mam.tubitak.gov.tr/>) was established in 1972 in the city of Gebze. The Centre has an oceanographic research vessel, the 'R/V TUBITAK MARMARA' that has an unrestricted operation area through the Mediterranean Sea, the Aegean Sea and the Black Sea covering scientific research capabilities in Turkish Coastal waters. The main role of the vessel is to continuously monitor Turkish Seas employing a decision support system for the protection of the marine environment. The ship is outfitted with acoustic equipment and instruments, scientific payloads, conductivity temperature depth sensor, incubation rooms, a biological research laboratory and a meteorological observation station. R/V TUBITAK MARMARA is designed to have a dynamic positioning system to conduct deep-water research with more precise station maintenance requirements. The vessel is used for diverse purposes: oceanography/hydrography; marine pollution; marine ecosystem; bathymetric and geophysical studies; seafloor acoustic imagery.

Non-governmental organisations

Turkish Marine Research Foundation (TUDAV)

The Turkish Marine Research Foundation (TUDAV) (<http://tudav.org/en/>) was founded in 1996 and now takes action such as monitoring the aquatic environments and their ecology, determining problems and recommending solutions as well protection of clean water sources and connection to human health. Their areas of intervention are the Aegean Sea, the Mediterranean Sea, the Black Sea, the Marmara Sea, and the Turkish Straits and their current major projects are pollution monitoring in the Turkish Strait system. Their main sectors of research are coastal research, systematics and taxonomy, living resources (e.g. fisheries, aquaculture), water quality and pollution. Their permanent staff is composed of ten scientists and they have one vessel (Nautica 16m). They own full-diving equipment, compressor (Bauer), gillnets, trammel nets, dredge, microscopes and a freezer. They publish books, journals, posters and videos for public access on their website. TUDAV created a data bank on accidents at sea between 1948 and 2000 for the purpose of information exchange and it also supports various studies, especially studies on biodiversity, either with its own resources or by getting in contact with related foundations. In this regard, there is a long-term study on the Turkish Straits currently underway. They provide reports to the scientific world in both Turkish and English. In addition, they have prepared guidebooks with the aim of increasing public awareness.

Turkish Marine Environment Protection Association (TURMEPA)

In Turkish, 'Deniz Temiz Derneği' (<https://www.turmepa.org.tr/>), it was founded in 1994 by the Chamber of Shipping and aims to protect Turkish seas and coasts from pollution. As Turkey's principal marine NGO, the Association has nearly 1,000 members, 350 of which are corporate; together with branch and regional coordinators and volunteers, it engages in work to sustain marine life in the 8,333-kilometre coastal strip, which extends from Hopa to Iskenderun, including the islands. It is also part of INTERMEPA, the International Marine Environment Protection Association. They publish an annual report for public access available in pdf form online¹³⁵ (in Turkish only).

¹³⁵ <https://www.turmepa.org.tr/hakimizda/faaliyet-raporlari>

Environmental monitoring programmes and networks

Integrated Marine Pollution Monitoring Programme of Turkey

The '*Denizlerde Bütünleşik Kirlilik İzleme Çalışması*' (DEN-İZ) in Turkish, is a marine monitoring programme carried out under the name of 'Integrated Marine Pollution Monitoring Programme' since 2011. It is conducted by the Ministry of Environment and Urbanization and coordinated by TÜBİTAK-MAM along with several universities and the Turkish Atomic Energy Agency (TAEK). The study aims to monitor the quality and pollution of the marine environment and coasts of Turkey – the Aegean Sea, the Black Sea, the Mediterranean Sea and the Marmara Sea – which provides the basis for national marine and coastal management policy and strategies. It also aims to assess the ecological status of marines of Turkey and to prevent marine pollution, to assess the effectiveness of the measures taken by the authorities and compliance with national legislation and Regional Marine Conventions (Bucharest and Barcelona Conventions and their monitoring programmes: IMAP and BSIMAP). Data are collected about the pollution situation, risk areas for phytoplanktonic algal blooms, new species and exotic species, micro plastic (since 2013), radioactivity (since 2014), etc. Pollution maps and graphs are created based upon the results of the study and the quality indices. Since 2014, the programme has been designed as a three-year programme to obtain regular and continuous data. It now covers monitoring in marine water, sediment, biota and sea floor of some specific indicators of biodiversity, commercial fisheries, food web, eutrophication, sea floor integrity, hydrographical conditions, contaminants and marine litter descriptors. The monitoring network consists of 364 monitoring stations. These data are reported to MEDPOL, the Black Sea Commission, and the European Environment Agency (EEA) and data with evaluations are reported to national authorities.

Standardisation of Marine Monitoring Project (2015–2017)

This project was carried out during 2015–2017 and its aims were to standardise sampling and analysis methods, monitoring variables, reporting formats and evaluation criteria according to IMAP, MSFD and the Regional Conventions requirements and preparing a strategy document to support the development of National Monitoring Legislation. Twelve guidelines were prepared both Turkish and English, and they are sharing on our Ministry's website under the published materials part (<https://ced.csb.gov.tr/>).

Turkish Sea Level Monitoring System (TUDES)

Sea level monitoring activities in Turkey date back as early as the mid-1930s when the first float-operated tide gauge was installed at Antalya Harbour to determine the national vertical datum. Since then, a considerable number of temporary mechanical and analogue tide gauges have been deployed at different spots. It was in 1999 that the Turkish National Sea Level Monitoring System (TUDES) programme was initiated by the General Directorate of Mapping¹³⁶. Under the programme, a continuous network consisting of 20 digital tide gauges with acoustic sounding tubes was established up until 2011. Due to the maintenance problems encountered in the acoustic gauges and the strong need for the vertical land movement monitoring, 18 of the TUDES stations were replaced with GNSS co-located radar gauges after 2015. Sea level and atmospheric pressure data are observed at each TUDES station with high precision and accuracy. The data, averaged at intervals of 30 seconds and 15 minutes, are transmitted to the data centre in Ankara in nearreal-time through GSM and internet. Real-time and delayed mode quality controls, data analysis, database management, and data distribution activities are performed at the data centre. TUDES is one of the unique tide gauge networks in the eastern

¹³⁶ <https://tudes.harita.gov.tr/?lang=us>

Mediterranean and the Black Sea delivering sea level data to the geoscience communities and providing support to global and regional networks (e.g. ICG/NEAMTWS) within some programmes and projects.

Environmental Information systems and database TUDES Web Portal

On March 2016, the TUDES Web Portal was created to provide sea-level data to the users effectively. With the use of the portal, accessing sea level data at the local datum has been freely open to users. Users can also reach the sea-level data at the national height datum after paying a standard annual subscription fee. The TUDES Web Portal is available online¹³⁷.

Noah's Ark National Biological Diversity Database

In Turkish 'Nuh'un Gemisi Biyolojik Çeşitlilik Ulusal Veri Tabanı' opened in 2007 (www.nuhungemisi.gov.tr). Noah's Ark is the most important national database on biodiversity available to the public on the internet in which the data collected by the inventory of biological diversity and monitoring are transferred and managed. It is possible to query information about species and protected areas. Biodiversity data were created in 2013 with the 'National Biodiversity Inventory and Monitoring Project' launched across the country during which the number of data entered into the database has increased significantly. The database is managed by the Ministry of Agriculture and Forestry (MAF), the General Directorate for Nature Conservation and National Parks and the Department of Biological Diversity. In 2017–2019, the programme was also carried out with TÜBİTAK-MAM 3 research vessels and 11 institutes are now working in the programme. It is linked to the ITIS, the Integrated Taxonomic Information System¹³⁸.

Bibliography

OECD, 2019, 'OECD Environmental Performance Reviews: Turkey 2019', in the series OECD Environmental Performance Reviews, available at: <https://www.oecd.org/turkey/oecd-environmental-performance-reviews-turkey-2019-9789264309753-en.htm> (accessed on 01/09/2020)

OECD, 2019, 'Highlights, OECD Environmental Performance Reviews: Turkey 2019' available at: <http://www.oecd.org/env/country-reviews/Highlights-Turkey-2019-ENGLISH-WEB.pdf> (accessed on 01/09/2020).

Ministry of Environment and Urbanization. 2016. State of the Environment Report for Republic of Turkey. Ankara, 317 pages. Available at https://webdosya.csb.gov.tr/db/ced/editordosya/tcdr_ing_2015.pdf (accessed on 16/11/2020).

¹³⁷ <https://tudes.harita.gov.tr/?lang=us>

¹³⁸ (<https://www.itis.gov/>)

European Union

I. Legal, administrative or other obligations involving monitoring

Protected water and marine resources – and ensuring their ecological quality – is a cornerstone of EU environmental policy. The two main frameworks for the management of entire water ecosystems are the **Water Framework Directive (WFD)** and the **Marine Strategy Framework Directive (MSFD)**. In addition to the WFD, there are four **water directives to ensure the good status of Europe's waters**: the Urban Waste Water Directive; the Bathing Water Directive; the Nitrate Directive; and the Drinking Water Directive. The Floods Directive which encourages the development of flood risk management plans, also significantly supports the objective of the WFD. Other important EU policies that present a coherent approach to maritime issues with improved coordination between different policy areas are the **Integrated Maritime Policy (IMP)**, **Integrated Coastal Zone Management (ICZM)**, the **Maritime Spatial Planning Directive** (2014/89/EU) and the **Common Fisheries Policy (CFP)**. From the perspective of the EU Commission, the EU's framework for marine environmental protection is one of the most comprehensive and ambitious worldwide.

THE TWO MAIN FRAMEWORKS FOR WATER ECOSYSTEMS MANAGEMENT

The **Water Framework Directive (WFD) – Integrated river basin management for Europe**: The Directive 2000/60/EC Regulation (EU) No 508/2014 of the European Parliament and of the Council establishing a framework for Community action in the field of water policy was adopted in October 2000.

Specific legislation on:

Groundwater Directive 2006/118/EC: developed in response to the requirements of Article 17 of the WFD.
Main Provisions on surface water chemical pollution

The WFD requires Member States to prepare River Basin Management Plans including Programmes of Measures for each River Basin District.

Marine Strategy Framework Directive (MSFD): The Directive 2008/56/EC adopted in June 2008

Specific legislation about:

Good Environmental Status (GES) assessments: in 2017, a set of detailed criteria was revised, leading to the new Commission Decision on Good Environment Status.

It aims to protect more effectively the marine environment across Europe. The Commission produced a set of detailed criteria and methodological standards to help Member States implement the Marine Strategy Framework. In 2012, three important steps in its implementation took place: Member States implement the Marine Strategy Framework. In 2012, three important steps in its implementation took place: Member States

EU Biodiversity Strategy for 2030: it aims to strengthen the protection of marine ecosystems and to restore them to achieve 'good environmental status', including through the expansion of protected areas and the establishment of strictly protected areas for habitats and fish stock recovery

submitted reports on their initial assessment of the current environmental status of their marine water (Art. 8 MSFD); Member States determined what GES means for the marine waters of relevant marine regions and subregions (Art. 9 MSFD); Member States identified environmental targets and associated indicators to guide their progress towards achieving GES by 2020 (Art. 10 MSFD).

DIRECTIVES TO ENSURE THE GOOD STATUS OF EUROPE'S WATERS

Urban Waste Water Directive (91/271/EEC)

It concerns urban waste-water treatment. It defines monitoring measures of water subject to discharges. Art. 15 covers the monitoring of waters subject to discharges from urban waste-water and direct discharges. Subparagraph 3 provides that: 'Member States shall monitor and carry out any other relevant studies to verify that the discharge or disposal does not adversely affect the environment'¹³⁹.

Bathing Water Directive (2006/7/EC)

It concerns the management of bathing water quality. It defines monitoring measures for bathing water.

Subparagraph 8: 'The public should receive appropriate and timely information on the results of the monitoring of bathing water quality and risk management measures in order to prevent health hazards, especially in the context of predictable short-term pollution or abnormal situations'; **Subparagraph 9:** 'For the purpose of monitoring, harmonised methods and practices of analysis need to be applied. Observation and quality assessment over an extended period are necessary in order to achieve a realistic bathing water classification'¹⁴⁰.

Nitrates Directive (91/676/EEC)

It concerns the protection of waters against pollution caused by nitrates from agricultural sources. It provides that it is 'necessary to monitor waters and to apply reference methods of measurement for nitrogen compounds to ensure that measures are effective'.

Drinking Water Directive (98/83/EC)

It concerns the quality of water intended for human consumption

Floods Directive (2007/60/EC)

It concerns the assessment and management of flood risks

CORNERSTONES OF EUROPEAN NATURE CONSERVATION POLICY

Birds Directive (79/409/EEC)

It was adopted in 1979 and amended in 2009, when it became the Directive 2009/147/EC.

The Directive places great emphasis on the protection of habitats for endangered and migratory species. It establishes a network of Special Protection Areas (SPAs) including all the most suitable territories for these species¹⁴¹.

Habitats Directive (92/43/EEC)

The Directive provides for the conservation of natural habitats and of wild fauna and flora aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It establishes the EU-wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments¹⁴².

¹³⁹ <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31991L0271:EN:HTML>

¹⁴⁰ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32006L0007>

¹⁴¹ https://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm

¹⁴² https://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

INFRASTRUCTURE FOR SPATIAL INFORMATION IN EUROPE

INSPIRE Directive (2007/2/EC)

It aims to create a European Union spatial data infrastructure for the purposes of EU environmental policies and policies or activities which may have an impact on the environment. This European Spatial Data Infrastructure enables the sharing of environmental spatial information among public sector organisations, facilitate public access to spatial information across Europe and assist in policy-making across boundaries. The Directive came into force on 15 May 2007 but with full implementation required by 2021.

It ensures that the spatial data infrastructures of the Member States are compatible and usable in a Community and transboundary context, the Directive requires that common Implementing Rules (IR) are adopted in a number of specific areas (Metadata, Data Specifications, Network Services, Data and Service Sharing and Monitoring and Reporting)¹⁴³.

European environmental institutions/organisations

The European Commission: The European Commission is in charge of implementing the Water Framework Directive and the Floods Directive. It monitors the implementation of EU legislation in the EU Member States to ensure that the laws achieve their intended objectives and that all countries of the EU comply with the rules that have been agreed. The most common way of doing this is through reporting and monitoring. In other words, the EU Member States, based on their own internal monitoring, are submitting information and data to the European Commission which then analyses these national reports and presents its findings in various ways. It reports on:

- the state of the environment (e.g. air limit values, water status, etc.);
- emissions (e.g. under European Pollutant Release and Transfer Register);
- pressures (e.g. under Marine Strategy Framework Directive);
- individual measures (e.g. under Nitrates Directive);
- plans and programmes (e.g. air quality management plans, river basin management plans, etc.)

In general, environmental monitoring leads to data collection and reporting. Initially, monitoring may be undertaken by competent authorities, businesses, or other stakeholders. Data is often reported up a chain i.e. from stakeholders to competent authority to the European Environment Agency to the Commission, which may then in turn report to the European Parliament and the Council. The European Commission (DG Environment) collaborates closely with Eurostat, the Joint Research Centre and the EEA or other agencies (e.g. EFSA) depending on the legislation concerned. The European Commission must publish a report for the European Parliament and for the Council on the implementation of these Directives after each update of the

¹⁴³ <https://inspire.ec.europa.eu/about-inspire/563>

River Basin Management Plans and Flood Risk Management Plans respectively. The 5th Implementation Report was adopted on 26/02/2019.

- European Commission, 2019, Report from the Commission to the European parliament and the council on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC), Second River Basin Management Plans and First Flood Risk Management Plans. It is available online¹⁴⁴.
- In June 2020, the Commission adopted a report on the first implementation cycle of the Marine Strategy Framework Directive: European Commission, 2020, Report from the Commission to the European Parliament and the Council on the implementation of the Marine Strategy Framework Directive). It is available online¹⁴⁵.

All the reports are available online¹⁴⁶.

The European Environmental Agency (EEA)(<https://www.eea.europa.eu>): it was created in 1993 as a European Agency with the main mission of ensuring the collection, organisation and dissemination of reliable and comparable data for decision-makers and the public. The European Environment Information and Observation Network (EIONet) is a partnership network between the EEA and its member and cooperating countries. Through this network, the EEA brings together environmental information from different countries, with an emphasis on providing timely, quality, nationally validated data. The EEA made the Mediterranean database available in 2014. The dataset is available online¹⁴⁷.

Monitoring institutions/observatories

Eurostat

Eurostat (<https://ec.europa.eu/eurostat/fr/home>) was created in 1953 in order to meet the needs of the European Coal and Steel Community (ECSC) whose Treaty authorised the Community to collect and provide reliable statistical data at Community level. Within the European Statistical System and in collaboration with all the National Statistical Institutes of each Member State, Eurostat aims to harmonise European work so as to make accessible the dissemination of comparable statistical information to the various audiences of the European Union. It alone is competent to decide on the statistical processes, methods, standards and procedures, as well as the content and timing of statistical publications¹⁴⁸. It provides a set of data about maritime transport and maritime economy statistics on coastal regions.

European Multidisciplinary Seafloor Observatory (EMSO ERIC)

The EMSO ERIC (<http://data.emso.eu/>) is a large-scale European distributed research infrastructure for ocean observation, enabling real-time interactive long-term monitoring of ocean processes. It consists of a system

¹⁴⁴ https://ec.europa.eu/environment/water/water-framework/impl_reports.htm

¹⁴⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1593613439738&uri=CELEX:52020DC0259>

¹⁴⁶ https://eurlex.europa.eu/search.html?DC_CODED=2891&SUBDOM_INIT=ALL_ALL&DTS_SUBDOM=ALL_ALL&DTS_DOM=ALL&lang=en&type=advanced&qid=1603543197761

¹⁴⁷ <https://www.eea.europa.eu/data-and-maps/data/meddb/mediterranean-data-base>

¹⁴⁸ <https://ec.europa.eu/eurostat/fr/data/database>

of regional facilities placed at key sites around Europe and has developed a key site in the Mediterranean. It allows study of the interaction between the geosphere, the biosphere, the hydrosphere, and the lithosphere, including natural hazards, climate change, and marine ecosystems. Its observatories are platforms hosting sensors monitoring various parameters, such as temperature, pH, salinity, water circulation, seabed movements. These parameters are of great interest for different disciplines, ranging from geosciences and physical oceanography, to biogeochemistry and marine ecology. In the Mediterranean, they have different regional facilities/sites: Hellenic Arc; western Ionian Sea, Ligurian Sea; OBSEA (Balearic Sea). It offers data and services to a large and diverse group of users, from scientists and industries to institutions and policy-makers.

Environmental monitoring programmes

Copernicus European Earth Observation programme and its marine side, MyOcean

Copernicus (<https://www.copernicus.eu/en>) is a European Union's earth observation programme coordinated and managed by the European Commission in partnership with the European Space Agency (ESA), the EU Member States and EU Agencies. The programme was established by the Regulation (EU) No 377/2014 in 2014, building on the previous EU's Earth monitoring initiative GMES (est. by EU Regulation No 911/2010). It is the successor of the GMES 'Global Monitoring for Environment and Security' programme (1998–2013). It aims to provide accurate, timely and easily accessible information to improve the management of the environment, understand and mitigate the effects of climate change and ensure civil security. Its website provides different kinds of information on the ocean:

- A comprehensive oceanographic data catalogue¹⁴⁹
- A list of essential ocean variables used to monitor the ocean's state¹⁵⁰
- An extensive annual analysis on the state of the ocean with coverage of severe and notable events, including peer-reviewed scientific report and summary for policy-maker (the last one (4th edition) was published in the summer of 2020¹⁵¹)
- A viewing tool (SIG), that enables exploration of the ocean in 4 dimensions¹⁵²

The preoperational version of the services was developed by a series of projects launched by the European Commission, such as the 'MyOcean' Project (<http://www.myocean.eu/>) for the marine sector, which started in January 2009. It covered themes such as maritime security, oil spill prevention, marine resource management, climate change, seasonal forecasts, coastal activities and water pollution. The MyOcean Project is a partnership between Copernicus and Mercator Ocean International. The latter is a private non-profit company. It provides a 'service of general interest to France and Europe as a whole'. It is owned by nine major players in operational oceanography worldwide: CNRS, Ifremer, IRD, Météo-France, SHOM, CMCC, MetOffice, NERSC, and Puertos del Estado. They developed the 'Mercator System' for ocean analysis and forecasting and maintaining it operational. It has its own information system and publishes the Daily Global Bulletin online¹⁵³.

¹⁴⁹ https://resources.marine.copernicus.eu/?option=com_csw&task=results

¹⁵⁰ <http://www.myocean.eu/>

¹⁵¹ <https://www.tandfonline.com/doi/full/10.1080/1755876X.2020.1785097>

¹⁵² <https://www.tandfonline.com/doi/full/10.1080/1755876X.2020.1785097>

¹⁵³ <http://bulletin.mercator-ocean.fr/>

Gathering more Knowledge for a sustainable Use of the Ocean (EuroSea project)

The EuroSea Project (2019-2023) (<https://eurosea.eu/>) aims to improve the European ocean observation and forecasting system, delivering ocean observations and forecasts to advance scientific knowledge about ocean climate, marine ecosystems and their vulnerability to human impacts. Its mission consists of co-designing European ocean observation and forecasting services and products that deliver information and support decision-making in the areas of climate, coastal and maritime activities, and ocean health. It also aims to enable FAIR data, supporting the integration of ocean data into the Copernicus Marine Service, EMODnet and SeaDataNet portfolios, and to demonstrate the value of the ocean observation system to users. This Project has received funding from the European Union's Horizon 2020 research and innovation programme. EuroSea brings together 55 institutes from the EU and third countries and is a contribution to the Global Ocean Observation System, GOOS, and the G7 Future of the Seas and Oceans initiative.

COastal Management and MOnitoring Network for tackling litter in the Mediterranean Sea (COMMON)

The COMMON project (<http://www.enicbcmcd.eu/fr/projets/common>) (2019-2002) aims to apply the Integrated Coastal Zone Management (ICZM) principles to the challenge of marine litter, improving knowledge of the phenomenon, enhancing the environmental performance of 5 pilots coastal areas in Italy, Tunisia and Lebanon, and engaging local stakeholders in marine litter management. It aims to study links between marine litter issues and land-based human activities, establish one ICT platform for sharing methodologies and data on marine litter. The total budget is 2.2 million EUR of which the EU contributes 2 million EUR. This Project is linked to ENI CBC Med.

Environmental information systems INSPIRE

The INSPIRE Directive (<https://inspire.ec.europa.eu/>) aims to create a European Union spatial data infrastructure for the purposes of EU environmental policies and policies or activities which may have an impact on the environment. The Directive came into force in 2007, with full implementation required by 2021. This infrastructure will enable the sharing of environmental spatial information among public sector organisations, facilitate public access to spatial information across Europe and assist in policy-making across boundaries. INSPIRE is based on the infrastructures for spatial information established and operated by the Member States of the European Union. The Directive addresses 34 spatial data themes needed for environmental applications. Its Geoportal is the central European access point to the data provided by EU Member States and several EFTA countries under the INSPIRE Directive.

The Shared Environmental Information System (SEIS)

Initiated in 2008, the Shared Environmental Information System (<https://www.eea.europa.eu/about-us/what/shared-environmental-information-system-1>) is a collaborative initiative of the European Commission and the EEA to establish together with the Member States an integrated and shared EU-wide environmental information system. It was established to improve the collection, exchange and use of environmental data and information across Europe. SEIS aims to create an integrated, web-enabled, EU-wide environmental information systems by simplifying and modernizing existing information systems and processes.

EuroGOOS European Global Ocean Observing System (EOOS)

While space-borne ocean observations are funded through the Copernicus programme, in situ observations are supported through numerous short-term projects, with no guarantee of long-term sustainability. EOOS aims to foster a better integration and a stronger engagement across the different ocean observation sectors. The EOOS framework is driven by the European Community to better coordinate Europe's ocean observation capacity. EOOS will help link the disparate components of the ocean observation system and promote shared strategies, infrastructure development, data standardisation, open access, and capacity building. EuroGOOS (<http://eurogoos.eu/>) is the European component of the Global Ocean Observing System of the UNESCO Intergovernmental Oceanographic Commission (IOC GOOS). The EuroGOOS Secretariat is located in Brussels, serving 44 members and supporting five regional systems (ROOS) in Europe. EuroGOOS has an online data centre¹⁵⁴

Water Information System for Europe (WISE)

The Water Information System for Europe (WISE) (<https://water.europa.eu/marine>) is a partnership between the European Commission (General Directorate for the Environment, Joint Research Centre and Eurostat) and the EEA. WISE is a comprehensive portal to knowledge on fresh water. WISE-Marine is part of WISE. It is being developed as a web-based portal for sharing information on the marine environment at the EU level. Its focus on the state of the marine environment at the European level will complement similar coverage at regional and national levels, such as regional sea conventions and Member States' marine information systems. WISE-Marine will provide data and information in line with common standards, and it will contribute to better decision-making on the conservation and sustainable use of the marine environment. Its dataset catalogue includes information on the metadata of datasets used by Member States in the updated Good Environmental Status assessments. Only those metadata that comply with ISO/TS 19139: 2007 are harvested and displayed in the tool.

The dataset catalogue is available online¹⁵⁵.

European Marine Observation and Data Network (EMODnet)

The European Marine Observation and Data Network (EMODnet) central portal (<https://emodnet.eu/en/mediterranean>) and thematic subportals provide data that cover the Mediterranean basin. Among the different thematic subportals, 'the EMODnet MedSea Checkpoint' is monitoring system assessment activity covering the entire Mediterranean Sea. It aims to support sustainable Blue Growth at the level of the basins of the European Seas, by assessing the adequacy of existing monitoring systems and data mechanisms at the sea-basin level. The EMODnet is financed by the European Union under Regulation (EU) No 508/2014 of the European Parliament and of the Council of May 15, 2014 on the European Maritime and Fisheries Fund. EMODnet centralised the data of various information systems on the Mediterranean Sea. This is the case for EurOBIS, which in 2009 became the backbone of the European Marine Observation and Data Network Biology (EMODnet Biology). It's part of the central Species Information Backbone of LifeWatch and is linked to different portals:

¹⁵⁴ <http://www.mongoos.eu/data-center>

¹⁵⁵ <https://water.europa.eu/marine/data-maps-and-tools/msfd-reporting-information-products/metadata-catalogue>

- The UE Open Data Portal, Catches in the Mediterranean¹⁵⁶
- European Environment Agency, Mediterranean database¹⁵⁷
- SEMIDE – Euro-Mediterranean Information System on know-how in the Water sector

ADRIatic Ionian Maritime Spatial-Planning Data Portal (ADRIPLAN)

The Adriatic-Ionian Maritime Spatial Planning Data Portal (ADRIPLAN) (<http://data.adriplan.eu/>) was a project funded by the European Commission – DG Maritime Affairs and Fisheries (DG MARE) under the theme ‘Maritime Spatial Planning (MSP) in the Mediterranean Sea and/or the Black Sea’. The total project budget was 1.250.000 EUR, for a period between December 2013 and June 2015. It created a geoplatform, along with data and tools supporting maritime spatial planning. Different maps and layers are available for the following categories: coastal defence and sand extraction; environmental protection; environment and ecosystems; fisheries and aquaculture; maritime transport and tourism; miscellaneous; and energy. The data portal is based on the Tools4MSP, a set of web and open source tools developed to support the implementation of Maritime Spatial Planning (MSP), with a specific focus on the analysis of conflicts between marine uses and the analysis of cumulative impacts (CI) of human activities on marine environments.

Freshwater Biodiversity Data Portal

The BioFresh project (<http://www.freshwaterplatform.eu/>), which closed out in 2014, built a freshwater biodiversity information platform to bring together, and make publicly available, the vast amount of information on freshwater biodiversity currently scattered among a wide range of databases. Existing databases on freshwater biodiversity and distribution patterns, along with strict quality controls are completed with the continuous integration of new data. Within BioFresh, this data will be linked with geographical and socio-economic information. The platform includes: an overview of freshwater data: from information about datasets (metadata) to occurrence and species data from Europe and beyond; visualisations, geographic data and thematic maps related to biodiversity, freshwater resources and pressures; a detailed overview of European freshwater species and their ecological preferences; information on current topics in freshwater science and ecosystem management, including tools and research resources as well as policy frameworks; a network of freshwater involved projects, gateways and institutions.

Networks

European Meteorological Services Network (EUMETNET)

The European Meteorological Services Network (EUMETNET) (<https://www.eumetnet.eu/>) is responsible for operating and developing the EUMETNET Composite Observation System (EUCOS) which form a major regional contribution of the WMO integrated Global Observation System (WIGOS). It is also linked to the World Meteorological Organisation (WMO). EUCOS was created as an operational network in 2002 and established a collaborative network across much of Europe with the aim of optimising surface observation activities to improve the quality and cost effectiveness of Numerical Weather Prediction at the European level.

¹⁵⁶ https://data.europa.eu/euodp/en/data/dataset?q=mediterranean+Sea&ext_boolean=all&op=

¹⁵⁷ <https://www.eea.europa.eu/data-and-maps/data/meddb>

Euro-Mediterranean Water Information System (SEMIDE EMWIS)

The Euro-Mediterranean Water Information System (EMWIS) (<http://www.emwis.org/overview>) is an initiative of the Euro-Mediterranean Partnership and was created in 1996. It provides a strategic tool for exchanging information and knowledge on the water sector between and within the Euro-Mediterranean partnership countries. All the countries involved in the Union for the Mediterranean (UfM) are concerned, including the 27 EU Member States and the 16 Mediterranean Partner Countries (Albania, Algeria, Bosnia and Herzegovina, Croatia, Egypt, Jordan, Israel, Lebanon, Mauritania, Monaco, Montenegro, Morocco, Palestinian Authority, Syria, Tunisia, Turkey). Access to EMWIS is open to everyone interested in water management issues. The EMWIS website is multilingual – and currently available in English, French and Arabic, it is open to other languages.

Report: the last publication dates back to 2010.

European Marine Board

European Marine Board (<https://www.marineboard.eu/>) was established in 1995 and is an independent non-governmental advisory body, representing around 10,000 scientists and technical staff, from major national marine or oceanographic institutes, research funding agencies, and national consortia of universities. Based in Oostende, Belgium, it aims to bridge the gap between science and policy. Its activities include identifying scientific challenges and through analysis and studies and bringing together European marine research stakeholders to share knowledge. It publishes a wide variety of reports on marine citizen science, ocean monitoring (such as 'Strengthening Europe's Capability in Biological Ocean Observation', published in July 2018), biodiversity, human impacts. Throughout its activities the EMB works with EuroGOOS, EMODnet, EuroMarine, JPI Oceans, Copernicus CMEMS, and has regular dialogue with the European Commission and the UNESCO Intergovernmental Oceanographic Commission (IOC).

Citizen science

In 1998, the UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, usually known as the Aarhus Convention, was signed on June 25, 1998 in the Danish city of Aarhus. The European Commission and the European Environment Agency have recognised the contribution of this knowledge to environmental research, monitoring and public policies with the establishment of the European Citizen Science Association (ECSA).

Marine LitterWatch

The European Environment Agency developed the Marine LitterWatch (<https://www.eea.europa.eu/themes/water/europes-seas-and-coasts/assessments/marine-litterwatch/at-a-glance/marine-litterwatch-in-a-nutshell>), which aims to empower citizen communities to provide relevant data while creating more awareness at the local level on marine litter. Marine LitterWatch offers tools – a mobile app, a web portal and a public database – to collect and share comparable data on marine litter on beaches. It also provides a platform for marine litter communities to come together, share their knowledge and co-create approaches to monitoring marine litter. It was designed to support data collection events on beaches and other stretches of coast. Currently, it does not support monitoring on seas and rivers. An interactive map of events is available online¹⁵⁸.

¹⁵⁸ <https://www.eea.europa.eu/themes/water/europes-seas-and-coasts/assessments/marine-litterwatch/data-and-results/marine-litterwatch-data-viewer>

Intergovernmental Mediterranean Networks

I. Monitoring systems and networks

Mediterranean Ocean Observation System for the Environment (MOOSE)

The Mediterranean Ocean Observation System for the Environment (MOOSE) (<https://www.moose-network.fr/>) is a long-term and integrated observation network in the Mediterranean, operated within the framework of European cooperation for the support of research and monitoring of Mediterranean marine ecosystems. It was established in 2008 and operational in 2010 to determine the effects of climate change and those induced by human activities in the western Mediterranean, and to provide data essential for establishing future scenarios. MOOSE must maintain an observation system collecting and sharing data on marine biogeochemistry; marine biology; climatology; hydrology; meteorology; physical oceanography; water and ecosystem quality. It uses 16 sites across the Mediterranean Basin. Data graphs of atmospheric deposition, hydrological stations, particulate fluxes, river inputs and meteorology are available online¹⁵⁹.

Observatory of Mediterranean Wetlands (MedWet)

The Observatory of Mediterranean Wetlands (MedWet) (Observatoire des zones humides méditerranéennes, MWO) was established in 2008 in Arles (France) (<https://medwet.org/fr/observatory/>), at the request of the Mediterranean Wetlands Committee (MedWet/Com). It is a multi-partner project coordinated by the Tour du Valat (TdV), Research Centre for the conservation of Mediterranean Wetlands. It aims to assess the state of conservation of wetlands in the Mediterranean and to measure their evolution over the long term, in order to develop awareness among policy makers and the general public on the value of their protection. It brings together the 27 Mediterranean countries, members of the MedWet initiative, scientific and technical structures (NGOs, associations, universities, etc.), institutional and financial support. The Observatory prepares reports on the state and trends of Mediterranean wetlands through two key elements: water and biodiversity, analysing them according to environmental policies. However, the impact on decision-makers concerned with wetlands has so far been limited.

Mediterranean Oceanography Network for the global ocean observation system (MONGOOS)

The Mediterranean Operational Network for the Global Ocean Observation System (MONGOOS) (<http://www.mongoos.eu/>) was established in 2012 to further develop operational oceanography in the Mediterranean Sea. It is promoting partnerships and capacity building for the Global Ocean Observation System (GOOS) in

¹⁵⁹ <https://www.moose-network.fr/data-graphs/>

the Mediterranean Sea. GOOS is a global network of ships, buoys (fixed and drifting), subsurface floats, tide gauges and satellites that collect real-time data on the physical state as well as the biogeochemical profile of the world's oceans. It is led by the Intergovernmental Oceanographic Commission (UNESCO-IOC). Thirty-one institutions are members of MONGOOS. It works with EuroGOOS and GOOS Africa in order to define common roles and activities in the Mediterranean Sea, and foster collaboration with the Black Sea GOOS and global ocean GOOS initiatives. The MONGOOS data centre allows access to a map of the different facilities conducting monitoring for the network. Its website also publishes a map of Open Ocean Fixed Oceanographic Stations that are in operation in the Mediterranean Sea, a map of the known High Frequency Radar Systems that are or have ever been in operation in the Mediterranean Sea and provides access to satellite data.

Mediterranean & Black Seas Argo Centre (MedArgo)

Launched in 2000 by the UNESCO Intergovernmental Oceanographic Commission (IOC) and the World Meteorological Organization (WMO) (<http://nettuno.ojs.trieste.it/sire/medargo/active/index.php>), the international Argo programme is an element of the global ocean observation system set up to monitor, understand and forecast the role of the ocean in the planet's climate. The Argo international network is made up of nearly 4,000 autonomous profiling floats that measure temperature and salinity in real-time from the surface up to 2,000 meters deep across all oceans. The Mediterranean & Black Sea Argo Centre (MedArgo) is the official Argo Regional Centre (MED-ARC) for the Mediterranean and Black Seas. It is part of the Mediterranean Operational Network for the Global Ocean Observing System (MONGOOS) and provides data to the Copernicus Marine Environment Monitoring Service (CMEMS). Data is available online:

Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast (IMAP)

The Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria (IMAP) (<https://www.medqsr.org/>) was established by the 19th Meeting of Contracting Parties of the Barcelona Convention in 2016. Its Decision IG. 22/7 lays down the principles for integrated monitoring, which will monitor biodiversity and non-indigenous species, pollution and marine litter, coast and hydrography in an integrated manner. The IMAP implementation complies with Article 12 of the Barcelona Convention and several monitoring-related provisions under different protocols with the main objective of assessing the GES. 'The first integrated assessment based on IMAP is the 2017 Quality Status Report. It builds upon an initial Integrated Ecosystem Assessment developed in 2011, the 2012 Mediterranean State of the Environment Report, as well as several thematic assessments undertaken in recent years.'

The Intergovernmental Coordination Group of the Tsunami Early Warning and Mitigation System in the North-East Atlantic, Mediterranean and Adjacent Seas (ICG/NEAMTWS)

The Intergovernmental Coordination Group of the Tsunami Early Warning and Mitigation System in the North-East Atlantic, Mediterranean and Adjacent Seas (ICG/NEAMTWS) (<http://www.ioc-tsunami.org/>) was created in the aftermath of the tsunami of December 26, 2004. The international community has entrusted the UNESCO Intergovernmental Oceanographic Commission (IOC-UNESCO) with the task of coordinating the establishment of the system during the course of several international and regional meetings, including the World Conference on Disaster Reduction (Kobe, Japan, January 18–22, 2005) and the Ministerial Meeting on Regional Cooperation in Tsunami Early Warning Systems (Phuket, Thailand, January 28 and 29, 2005). At its 23rd Session (21–30 June 2005), the IOC Assembly formally established the ICG/NEAMTWS by its Resolution IOC-XXIII-14. One of its working groups is responsible for the 'collection and exchange of sea-level data, including at-sea tsunami detection instruments'.

General Fisheries Commission for the Mediterranean (GFCM)

The General Fisheries Commission for the Mediterranean (GFCM) is a regional fisheries management organisation (RFMO) (<http://www.fao.org/gfcm/data/en/>). It was established in 1949 under the provisions of the Food and Agriculture Organization of the United Nations (FAO). It is composed of 23 contracting parties. Established in 1997, its Scientific Committee on Fisheries collects and assesses data relevant to the conservation and management of fisheries. It publishes reports and makes data available online on catches, fishing effort, fleet capacity, fisheries restricted areas and port records. Its facilities include a headquarters in Rome, and six technical units in Spain, Tunisia, Croatia, Bulgaria and Lebanon.

International Commission for the Scientific Exploration of the Mediterranean Sea (CIESM)

The International Commission for the Scientific Exploration of the Mediterranean Sea (CIESM) (<http://www.ciesm.org/>) has a history dating back to 1908 in Monaco. It aims to promote international research in the Mediterranean Sea and the Black Sea. The Commission promotes communication and active cooperation among marine scientists and the development of scientific standards across the Basin. CIESM operates several monitoring programmes involving a large number of associated research institutes in CIESM Member States. They monitor important parameters for understanding the fast-changing dynamics of the Mediterranean and Black Seas. CIESM archives include historical faunistic records accessible on its website, as well as its Atlas of Exotic Species, and a Guide to Marine Research Institutes that provides practical information on over 90 marine research institutes located on the coasts of the Mediterranean Sea and the Black Sea¹⁶⁰. CIESM deploys oceanographic campaigns targeting poorly researched areas of the Mediterranean Sea.

Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC)

The Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) (<https://www.rempec.org/fr/>) is a Regional Activity Centre of the Mediterranean Action Plan (UNEP/MAP) and is administered by the International Maritime Organisation (IMO). It is hosted by the Government of Malta. REMPEC was first established in 1976 as the 'Regional Oil Pollution Control Centre', when the Contracting Parties of the Barcelona Convention initiated a mandate to strengthen the capacities of coastal states in the Mediterranean region. The objective is to facilitate collaboration between parties to manage massive marine pollution by oil spills and to set up a regional information system that could manage critical marine pollution emergencies. REMPEC aims to prevent pollution of the marine environment from ships and to develop fast and efficient response capacity to accidental marine pollution and cooperation in emergency situations. It publishes regional syntheses, and provides a catalogue of reports. The Mediterranean Integrated Geographic Information System for Risk Assessment and Marine Pollution Control (MEDGIS-MAR) allows access to data (<https://medgis.mar.rempec.org/>), as well as the Integrated Maritime Information and Decision Support System on the Transport of Chemical Substances (MIDSIS-TROCS) (http://midsis.rempec.org/midsis_f.html).

RAMOGEPOL Plan

In 1993, following the sinking of the tanker Haven in 1991, France, Italy and Monaco decided, within the framework of the RAMOGE Agreement (<http://www.ramoge.org/fr/>), to establish an intervention plan to combat

¹⁶⁰ http://www.ciesm.org/online/institutes/CIESM_Institutes.php

accidental marine pollution in the Mediterranean. The RAMOGE agreement is an environmental protection treaty signed in 1976 between these three entities to prevent and combat pollution of the marine environment in the area extending from the Grand Rhône to the West and Capo d'Anzio to the East, encompassing Sardinia and Corsica. Within the framework of the RAMOGE Agreement and the MARPOL Convention, the RAMOGE Plan leads the OSCAR-MED operations responsible for pollution monitoring. Every year, these operations operate the surveillance of ships carrying dangerous or toxic goods, passing through the ports of Genoa, La Spezia, Savonne and Marseille Fos, with the aim of detecting possible illegal discharges. The European Maritime Safety Agency (EMSA) contributes by providing satellite images of the area concerned. The access to the interactive map is reserved to users with an account.

E-SURFMAR

The Surface Marine Observation Programme (E-SURFMAR) (http://www.jcommops.org/sot/vos_esurfmar/vosmetadata_v6/) is coordinated by Météo-France and the Royal Netherlands Meteorological Institute since 2003. It aims to coordinate, optimise, and progressively integrate European activities for surface observations over the sea in support of Numerical Weather Prediction and climate. E-SURFMAR supports the activities of Voluntary Observing Ships (VOS) through technical developments, better coordination and harmonisation of practices, and compensation of participating members for the observations and the communications related to this component. It directly manages a network of about 100 drifting buoys and 26 Shipborne Automated Weather Stations in an integrated VOS fleet. The programme also achieved a significant decrease in the costs of observations carried out by automated systems operated by the Operational Service. An online database was developed to manage VOS metadata: it contains all VOS metadata available in the world (permanently updated) and is now operated by JCOMMOPS.

Online databases/information systems

European Node of the international Ocean Biodiversity Information System (EurOBIS)

Hosted by the Flanders Marine Institute, the European Ocean Biodiversity Information System (EurOBIS)¹⁶¹ is an online database compiling distribution data on marine species, collected within European marine waters or collected by European researchers outside European marine waters. As a European system, EurOBIS can apply for funding on the European level; National, regional or European funding agencies can thus help co-finance the development and maintenance of the EurOBIS data system. It is divided into regional (OBIS Black Sea, MedOBIS and OBIS UK) and thematic nodes. Its Mediterranean node (MedOBIS)¹⁶² is hosted by the Hellenic Centre for Marine Research, (HCMR) at its Institute of Marine Biology, Biotechnology and Aquaculture (IMBBC) in Heraklion (Crete). It is operational since 2005.

International Oceanographic Data and Information Exchange (IODE)

Established in 1961, the International Oceanographic Data and Information Exchange (IODE) (<http://www.oceandataportal.org/>) of the UNESCO Intergovernmental Oceanographic Commission (IOC-UNESCO) aims to facilitate the exchange of oceanographic data and information among participating Member States. One of its objectives is to support the Global Ocean Observation System (GOOS), by developing good practice for management of data and narrowing the digital divide between countries. The IODE structure has two

¹⁶¹ <http://www.eurobis.org/> et <https://obis.org/node/4bf79a01-65a9-4db6-b37b-18434f26ddfc>

¹⁶² <https://obis.org/dataset/4948203e-5c4f-4454-9e49-074f408afb9b>

levels: the coordination of data and information management (such as the Global Data Assembly Centres, which focus on receiving and assembling both marine meteorological data and oceanographic data; or the 80 National Oceanographic Data Centres, which provide access and stewardship for the national resource of oceanographic data), and the programme's structural elements. These programmes aim to develop specific aspects of data collection, such as increasing the volume of historical oceanographic data available on climate change (Global Oceanographic Data Archaeology and Rescue Project, GODAR).

MedMIS Initiative

The MedMIS Initiative (<http://www.iucn-medmis.org/>) is an online information system led by the International Union for the Conservation of Nature (IUCN) for monitoring invasive non-native species in MPAs in the Mediterranean Basin. A mobile application allows volunteers to take part in monitoring through a participatory perspective. The MedMIS Initiative's website publishes interactive maps with access to the different observations made.

BioFresh Project

BioFresh (<http://data.freshwaterbiodiversity.eu/>) is an international project financed by the EU that aims to build an information platform for scientists and ecosystem managers with access to all available databases describing the distribution, status and trends of global freshwater biodiversity. It integrates the freshwater biodiversity (from lakes, rivers and wetlands) competencies and expertise of 19 research institutions. The Freshwater Information Platform provides information on freshwater science, with a focus on Europe. Its perspective, however, is global.

Euro-Mediterranean Water Information System (EMWIS)

The Euro-Mediterranean Water Information System (EMWIS) (<http://www.emwis.org/>) was initiated in 1996 by the EuroMed Partnership. Set up in 1995 in Barcelona, the Barcelona Process assembles 42 countries of the European Basin, and aims to increase integration in the region. The twenty-seven Ministers of Water decided to create a system to facilitate the exchange of information and know-how. Since 2005, EMWIS has been open to countries outside of the Barcelona Process. Its mission is to identify and bring together all the information available, in order to ensure it is accessible to all. Access to the information offered by EMWIS is open to all those interested in questions relating to water management.

The e-Infrastructure for Biodiversity and Ecosystem Research (LifeWatch ERIC)

The e-Infrastructure for Biodiversity and Ecosystem Research (LifeWatch) (<https://www.lifewatch.eu/>) is a research infrastructure for the advancement of biodiversity research in support of environmental preservation. This mission is achieved by providing access to a multitude of data sets. Its headquarters are located in Seville, Spain. LifeWatch has been established as a European Research Infrastructure Consortium (ERIC) since March 2017. One of its virtual laboratories is called the 'LifeWatch Marine VRE', which aims to be the transparent gateway to access, analyse and develop marine data resources.

Networks

Network of Managers of Marine Protected Areas in the Mediterranean (MedPAN)

The Network of Managers of Marine Protected Areas in the Mediterranean (MedPAN) (<http://medpan.org/fr/test-page-business/>) assembles 130 institutions and NGOs of 21 Mediterranean countries which are involved

in either the direct management of Marine Protected Areas (MPAs) or in the development of MPAs in the Mediterranean. The MedPAN network aims to promote the sustainability and functioning of an integrated and efficiently managed Mediterranean network of MPAs contributing to reducing the current rate of depletion of marine biodiversity. It is managed by the MedPAN Association. MedPAN has established a database of MPAs in the Mediterranean (MAPAMED).

Monitoring Programme ODYSSEA (2017–2021)

ODYSSEA (<http://odysseaplatform.eu/>) is a project which aims to implement an integrated network of observatories in the Mediterranean Sea. With a budget of 8.4 million EUR (financed from the European Union's Horizon 2020 research and innovation programme), it gathers 28 partners from 14 different countries. ODYSSEA will develop, operate and exhibit an interoperable platform that fully integrates networks of observation and forecasting systems from across the Mediterranean basin, covering both the high seas and the coastal zone. It gathers data from existing platforms (Copernicus, EMODNet, GOOS...), with a priority given to the collection of missing data. The project is developing a network of coastal observatories in Greece, Egypt, Tunisia, Spain and Turkey, the deployment at sea of new in situ sensors (microplastic sensors), oceanographic modeling and the integration of existing mobile applications for citizen science networks.

ACCOBAMS Survey Initiative

The Agreement on the Conservation of Cetaceans of the Black Sea, the Mediterranean Sea and the Adjacent Atlantic Area (ACCOBAMS) (<https://accobams.org/asi-data-presentation/>) is a cooperative legal tool for biodiversity conservation. It was signed on November 24, 1996 by 24 countries and entered into force on June 1, 2001. Its objective is to reduce the threats to cetaceans, in particular by improving the state of knowledge about these animals. The ACCOBAMS Survey Initiative project aims to establish an integrated, collaborative and coordinated monitoring system for the status of cetacean populations at the ACCOBAMS area level. It must strengthen the conservation efforts and governance for cetacean species. It is implemented by the ACCOBAMS Permanent Secretariat. In 2018-2019, the Initiative led the collection of data on marine wildlife (cetaceans and other marine megafauna species) and anthropic pressures owing to regional surveys conducted throughout the Mediterranean Sea and the Black Sea. Direct access to data is not possible through the website, however, it is available on demand.



Mediterranean
Action Plan
Barcelona
Convention



Plan Bleu pour l'environnement et le développement en Méditerranée

Tour la Marseillaise - 2 bis, Boulevard Euroméditerranée,
Quai d'Arenc, 13002 Marseille - France

www.planbleu.org