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Supplement of

Marine monitoring in Europe: is it adequate to address environmental threats and pressures?

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Supplementary material S1

Content and structure of online questionnaire

Dear WP1 partners,

As agreed at the KO meeting, all participants in WP1 are expected to act as national representatives and support the gathering of background information that is required to develop the JERICO-RI science strategy. Through Task 1.1, a questionnaire has now been developed to obtain this background information. The objectives of Task 1.1 are to identify the main environmental problems and threats within European coastal waters, and to gather a comprehensive (meta)database on current monitoring programmes operated in Europe for the purposes of the WFD and MSFD. A key aspect of the task is the identification of any gaps in monitoring.

This questionnaire is now being distributed to you as national representative.

You are required to respond to the questionnaire to the best of your knowledge and/or take responsibility for completion of the questionnaire.

In some cases, it may be necessary to pass the form on to the relevant institutions or authorities within country. You may also forward the questionnaire to colleagues outside your country and not members of the JERICO-NEXT consortium, if you would find it appropriate. In the latter case, please inform Suzanne Painting and/or Kate Collingridge at CEFAS.

In addition to knowledge at regional and national level, we strongly recommend to use outcomes of other EU projects that focuses on threats in EU waters (ex: EU BON, DEVOTES, KNOWSEAS, etc.), when appropriate.

The questionnaire has been developed in a format which facilitates database analysis of the information returned. It needs to be completed (and submitted) online, using Google forms, and includes two linked forms/questionnaires.

1. The [first questionnaire](#) is to identify threats in European Seas, and to assess whether existing monitoring programs are adequate.
2. The [second questionnaire](#) is to provide information on current monitoring programmes. This form includes a link to a [spreadsheet](#) so that information on monitoring stations can be provided.

Click on the link to begin the questionnaire/s: [Environmental Threats and Monitoring](#). Instructions are provided in the questionnaire, and some tips for completing it are attached to this email.

FORM 1 Threats and gaps in monitoring

SECTION 1

Q1 Name*

Please provide the name of the person filling in the questionnaire

Q3 Email address*

Please provide the email address of the person filling in the questionnaire

Q4 Institute/affiliation*

Please provide the institute or affiliation of the person filling in the questionnaire

Q5 Country (select one)

- Albania
- Belgium
- Bulgaria
- Cyprus
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Ireland
- Italy
- Latvia
- Lithuania
- Malta
- Montenegro
- Netherlands
- Norway
- Poland
- Portugal
- Romania
- Russia
- Slovenia
- Spain
- Sweden
- Turkey
- Ukraine
- United Kingdom

Q6 Region (select one)

(A drop-down list includes regions defined in various ways, e.g. territorial/national/EEZ waters, by ICES, by HELCOM, etc. Some regions have linked sub-regions.)

Region	Go to section
1 Baltic Sea	2 (Baltic Sea Subregions)
2 Belt Sea	12 (Threats)
3 The Sound	12 (Threats)
4 Kattegat	12 (Threats)
5 Skaggeak	12 (Threats)
I Barents Sea	12 (Threats)
II Norwegian Sea, Spitzbergen and Bear Island	3 (Norwegian Sea Subregions)
IV North Sea	4 (North Sea Subregions)
V Iceland and Faroes Grounds	5 (Region V Subregions)
VI Rockall and West of Scotland	6 (Region VI Subregions)
VII Celtic Seas	7 (Region VII Subregions)
VIII Bay of Biscay	8 (Region VIII Subregions)
IX Portuguese Waters	9 (Region IX Subregions)
Mediterranean Sea	10 (Mediterranean Sea Subregions)

Black Sea	11 (Black Sea Subregions)
Territorial Waters (12nm)	12 (Threats)
EEZ/National Waters	12 (Threats)
North East Atlantic	12 (Threats)
Other	12 (Threats)

Section 2 Baltic Sea Subregions (select multiple)

- 1.1 Gulf of Bothnia
 - 1.2 Gulf of Finland
 - 1.3 Gulf of Riga
 - 1.4 Baltic Proper
 - 2.1 Bay of Mecklenburg
 - 2.2 Kiel Bay
 - 2.3 Little Belt
 - 2.4 Great Belt
 - Other
- Go to section 12 (Threats)*

Section 3 Norwegian Sea Subregions (select multiple)

- IIa Norwegian Sea
 - IIb Spitzbergen and Bear Island
 - Other
- Go to section 12 (Threats)*

Section 4 North Sea Subregions (select multiple)

- IVa Northern North Sea
 - IVb Central North Sea
 - IVc Southern North Sea
 - Other
- Go to section 12 (Threats)*

Section 5 Region V Subregions (select multiple)

- Va Iceland Grounds
 - Vb Faroes Grounds
 - Other
- Go to section 12 (Threats)*

Section 6 Region VI Subregions (select multiple)

- VIa NW Coast of Scotland and N Ireland
 - VIb Rockall
 - Other
- Go to section 12 (Threats)*

Section 7 Region VII Celtic Seas Subregions (select multiple)

- VIIa Irish Sea
 - VIIb West of Ireland
 - VIIc Porcupine Bank
 - VIIId Eastern English Channel
 - VIIe Western English Channel
 - VIIIf Bristol Channel
 - VIIg Celtic Sea North
 - VIIh Celtic Sea South
 - VIIj SW of Ireland – East
 - VIIk SW of Ireland – West
 - Other
- Go to section 12 (Threats)*

Section 8 Region VIII Subregions (select multiple)

- VIIIa Bay of Biscay – North

VIIIb Bay of Biscay – Central
VIIIc Bay of Biscay – South
VIId Bay of Biscay- Offshore
VIIE West Bay of Biscay
IXa Portuguese Waters – East
IXb Portuguese Waters – West
Other

Go to section 12 (Threats)

Section 9 Region IX Subregions (select multiple)

IXa Portuguese Waters – East
IXb Portuguese Waters – West
Other

Go to section 12 (Threats)

Section 10 Mediterranean Sea Subregions (select multiple)

1 Northern Alboran Sea
2 Alboran Island
3 Southern Alboran Sea
4 Algeria
5 Balearic Islands
6 Northern Spain
7 Gulf of Lyons
8 Corsica Island
9 Ligurian and North Tyrrhenian Sea
10 South Tyrrhenian Sea
11 Sardinia
12 Northern Tunisia
13 Gulf of Hammamet
14 Gulf of Gabes
15 Malta Island
16 South of Sicily
17 Northern Adriatic Sea
18 Southern Adriatic Sea
19 Western Ionian Sea
20 Eastern Ionian Sea
21 Southern Ionian Sea
22 Aegean Sea
23 Crete Island
24 North Levant
25 Cyprus Island
26 South Levant
27 Levant
28 Marmara Sea
Other

Go to section 12 (Threats)

Section 11 Black Sea Subregions (select multiple)

29 Black Sea
30 Asov Sea
Other

Go to section 12 (Threats)

Section 12 Threats

Threats to the marine environment are considered here in terms of 'pressures' and 'impacts'. Pressures are the human activities which have impacts on ecosystems or parts thereof. Impacts may become threats, but should be able to be linked back to the original pressure. Checklists of pressures and impacts are given below. Multiple options can be selected. Other pressures and impacts can also be added, and details can be given to provide explanation/s.

Q1 Pressures (select multiple)

What are the main pressures from human activities that are affecting the environment in this area? Details can be given below.

- Construction/Obstruction
- Shipping
- Mining
- Dumping
- Extraction (e.g. of aggregates such as gravels or sand)
- Abstraction (removal of water, e.g. for aquaculture)
- Marine litter
- Aquaculture
- Contaminants
- Inorganic nutrient enrichment
- Organic enrichment
- Atmospheric inputs
- Fishing
- Dredging of biota (e.g. scallops, clams)
- Regime change (thermal)
- Regime change (salinity)
- Other

Q2 (free text)

Please provide any necessary details on the above pressures

Q3 Impacts (select multiple)

What are the impacts resulting from the pressures identified above?

- Physical damage (abrasion, material extraction)
- Changes in hydrology
- Underwater noise disturbance
- Changes in sediment/substrate composition
- Habitat loss or destruction
- Changes in suspended sediments/turbidity
- Changes in light availability
- Contamination (with harmful substances etc)
- Biofouling
- Invasive species
- Harmful micro-organisms (such as harmful algal blooms)
- Increased or decreased primary production (e.g. by phytoplankton or macroalgae)
- Undesirable disturbances (e.g. oxygen depletion due to nutrient enrichment (eutrophication))
- Population change/depletion of standing stock
- Changes in species range
- Changes in community composition
- Mortality of marine life
- Other

Q4 (free text)

Please provide any necessary details on the above impacts

Q5 Policy Purposes (select multiple)

What are the main policy or other drivers behind the monitoring programme/s? These may be international conventions, EU Directives, national policies, or other requirements.

- Marine Strategy Framework Directive (MSFD)
- OSPAR
- Water Framework Directive (WFD)
- Urban Waste Water Treatment Directive (UWWTD)
- Local
- Other:

Q6 MSFD Descriptors (select multiple)

The MSFD includes 11 qualitative descriptors. Please link the threats identified to these descriptors, or any others which may be relevant in the area.

- 1 Biodiversity
- 2 Non-native species
- 3 Fish
- 4 Food Webs
- 5 Eutrophication
- 6 Sea Floor Integrity
- 7 Hydrographic conditions
- 8 Contaminants in water
- 9 Contaminants in food
- 10 Marine Litter
- 11 Energy

Q7 Please name any relevant monitoring programmes(s) * (free text)

If there are multiple programs, please separate by commas. A form is provided at the end of the questionnaire to provide details of the programme/s. If there is no relevant monitoring, type 'none'.

Q8 Are existing monitoring programmes sufficient to assess the effects of the environmental threats in the considered area? (select one)

- Yes
- No
- Partly

Q8a If no (or partly), please explain how they are deficient (free text)

For example, no monitoring in the area considered, inadequate monitoring of parameters, insufficient spatial or temporal resolution of the monitoring

Q8b If no (or partly), please suggest what would be appropriate in terms of monitoring to assess the impact of the considered threats (free text)

Please go to the monitoring form to enter details of the monitoring programmes (one form submission per monitoring programme), using the link below. <http://goo.gl/forms/ZZyCrZEu2w1ouFw22>

FORM 2 Monitoring programmes

Please complete one form entry per monitoring programme

Section 1 Country (select one)

- Albania
- Belgium
- Bulgaria
- Cyprus
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Ireland
- Italy
- Latvia
- Lithuania
- Malta
- Montenegro
- Netherlands

- Norway
- Poland
- Portugal
- Romania
- Russia
- Slovenia
- Spain
- Sweden
- Turkey
- Ukraine
- United Kingdom

Section 2 Monitoring details

Q1 Monitoring program name

Q2 Is this monitoring program a statutory/official program or an 'unofficial' project/program?

E.g. An 'official' monitoring program contributes towards obligations under various legal instruments and is likely to be funded by the government/state; an 'unofficial' program includes monitoring for other reasons and is likely to rely on other sources of funding (e.g. EU, commercial).

Q3 Variables measured* (select multiple)

- Temperature
- Salinity
- Nutrients
- Dissolved Gases
- Chlorophyll
- pH
- Plankton
- Benthos
- Macroalgae
- Hydrography
- Contaminants
- Litter
- Fish

Q4 Platform types (select multiple)

- Shore based
- Research Vessel
- Voluntary Observing Ship (VOS)
- Small Boat
- Ferrybox (fixed transects)
- Ferrybox (cruise of opportunity)
- Fixed platform
- Remote Sensing
- Autonomous vehicle (ROV, AUV, Glider etc)
- Other

Q5 Number of stations

Total approximate number of stations monitored

Q6 Is monitoring regular or ad hoc?

- Regular
- Ad hoc
- Other

Q7 If monitoring is regular, what is the monitoring frequency?

- Continuous
- Hourly

- Daily
- Weekly
- Monthly
- Annually

Q8 Start date

Q9 End date

If ongoing please enter today's date

Q10 If the monitoring program has ended, please provide a reason.

E.g. funding not renewed, threats no longer present so monitoring not required.

Monitoring stations

To provide details of the location etc of monitoring stations please follow the link:
https://docs.google.com/spreadsheets/d/126UXCWvEIVwigo6N_1Im6yAgD4YDU2IAPy-CmshEjbo/edit?usp=sharing

Comments (free text)

Section 3 Data Access

Q1 Data access restrictions

Are there restrictions on data access?

- Yes
- No

Q2 Data access details (short answer text)

Details of data access restrictions

Q3 Responsible organisation (short answer text)

Q4 Responsible person (short answer text)

Q5 Postal address (short answer text)

Q6 Email address (short answer text)

Q7 Phone number (short answer text)

Q8 Data source institute(s) (short answer text)

Q9 Database (select multiple)

Database to which the monitoring data are submitted

- BODC MERMAN
- ICES DOME
- EMODNET
- EA
- Local
- Other

Q10 Data flows (select one)

Are data flows to central data holders (e.g. ICES) established and up to date?

- Yes
- No
- Other

Q11 Web links

Link to online location of data

Q12 Comments (free text)

Q13 Research Database (select multiple)

Complementary oceanographic or research databases

- BODC NODB
- ICES OCEAN
- Local
- Other

Q14 Research Data flows (select one)

Are data flows to central data holders (e.g. ICES) established and up to date?

- Yes
- No
- Other

Q15 Web links

Link to online location of data

Q16 Research Comments (free text)

Supplementary Material S2

Regions and Sub-Regions given in the questionnaire



Figure S-2.1. Map showing all regions of relevance to this study. For the North-East Atlantic (purple shading), the map shows ICES Regions I to XII and their sub-regions. For the Baltic Sea and Mediterranean Sea (blue shading), sub-regions are shown in Figures below.



Figure S-2.2. HELCOM Baltic Sea Sub-Regions



Figure S-2.3. FAO Mediterranean Sub-Regions

Supplementary Material S3

Summary of respondents

Respondents to the environmental threats questionnaire provided details of their affiliations, and the sea areas of interest or relevance to their respective countries in terms of monitoring and assessments (see Table S3.1).

Table S 3.1. Summary of respondents to the environmental threats questionnaire. Regions and sub-regions given in the questionnaire are shown in S1. United Kingdom EEZ/National Waters fall within ICES regions IV, VI and VII. The EEZ (Exclusive Economic Zone) extends 200 nautical miles (nm) from territorial sea baselines and is adjacent to the 12 nm territorial seas.

Institute/affiliation	Country	Region	Sub-Regions
OSPAR	United Kingdom	North East Atlantic	
FINNMAI	Finland	1Baltic Sea	1.1 Gulf of Bothnia, 1.2 Gulf of Finland, 1.4 Baltic Proper
EuroGOOS	Sweden	1Baltic Sea	1.4 Baltic Proper
IMGW	Poland	EEZ/National Waters	
Plymouth university	United Kingdom	IV North Sea	IVa Northern North Sea, IVb Central North Sea, IVc Southern North Sea
Marine Scotland	United Kingdom	IV North Sea	IVa Northern North Sea
MCS	United Kingdom	IV North Sea	IVa Northern North Sea, IVb Central North Sea, IVc Southern North Sea, Celtic sea
CEFAS	United Kingdom	IV North Sea	IVa Northern North Sea, IVb Central North Sea, IVc Southern North Sea
MMO	United Kingdom	EEZ/National Waters	
SEPA	United Kingdom	EEZ/National Waters	
Marine Scotland	United Kingdom	EEZ/National Waters	
SAHFOS	United Kingdom	EEZ/National Waters	
JNCC	United Kingdom	EEZ/National Waters	
Scitus Management Ltd	United Kingdom	EEZ/National Waters	
JNCC	United Kingdom	EEZ/National Waters	
EA	United Kingdom	Territorial Waters (12nm)	
Covartec	Norway	EEZ/National Waters	
IFREMER	France	Territorial Waters (12nm)	
CNRS	France	VII Celtic Seas	VIIh Celtic Sea South, VIIe Western English Channel, VII d Eastern English Channel
MI	Ireland	VII Celtic Seas	VIIa Irish Sea, VIIb West of Ireland, VIIc Porcupine Bank, VIIg Celtic Sea North, VIIj SW of Ireland - East,

			VIIIk SW of Ireland - West, VIa and VI b
Bangor university	United Kingdom	VII Celtic Seas	VIIa Irish Sea
CNRS	France	VIII Bay of Biscay	VIIIb Bay of Biscay - Central, VIIIa Bay of Biscay - North
AZTI	Spain	VIII Bay of Biscay	VIIIb Bay of Biscay - Central, VIIIc Bay of Biscay - South, VIId Bay of Biscay- Offshore
EcoLaguna	Germany	IX Portuguese Waters	IXa Portuguese Waters - East, IXb Portuguese Waters - West
HCMR	Greece	Mediterranean Sea	22 Aegean Sea
HCMR	Greece	Mediterranean Sea	19 Western Ionian Sea, 20 Eastern Ionian Sea, 21 Southern Ionian Sea, 22 Aegean Sea, 23 Crete Island
HCMR	Greece	Mediterranean Sea	19 Western Ionian Sea, 20 Eastern Ionian Sea, 21 Southern Ionian Sea, 22 Aegean Sea, 23 Crete Island, 24 North Levant
HCMR	Greece	Mediterranean Sea	20 Eastern Ionian Sea, 21 Southern Ionian Sea, 22 Aegean Sea, 23 Crete Island, 24 North Levant, 25 Cyprus Island, 26 South Levant, 27 Levant
HCMR	Greece	Mediterranean Sea	20 Eastern Ionian Sea, 22 Aegean Sea, 23 Crete Island
CNR-ISMAR	Italy	Mediterranean Sea	17 Northern Adriatic Sea
University of Malta	Malta	Mediterranean Sea	15 Malta Island, 16 South of Sicily
University of Malta	Malta	Mediterranean Sea	15 Malta Island, 16 South of Sicily
UPC	Spain	Mediterranean Sea	6 Northern Spain