Report on the Implementation of the DeCyDe-4-IRIS Method and Tools at the Black Sea Stakeholder Workshop

Constanta, Romania

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Isotech Ltd Environmental Research and Consultancy

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1. The aim of the IRIS-SES stakeholder workshops

Within project IRIS-SES 'Integrated Regional monitoring Implementation Strategy in the South European Seas', four regional stakeholder workshops are planned: one in the Western Mediterranean, one in the Central Mediterranean, one in the Eastern Mediterranean and one in the Black Sea. The aim of these workshops is to help make informed decisions about local and regional monitoring needs by establishing a two-way communication flow between the IRIS-SES project and the bodies responsible for MSFD monitoring.

The first workshop was organized in Athens, Greece on 24 October 2014 and involved stakeholders from the Eastern Mediterranean countries of Cyprus, Greece and Turkey[1]. The current report describes the outcomes from the second stakeholder workshop organized within IRIS-SES, held in the Black Sea.

[1] The outcomes from the Eastern Mediterranean stakeholder workshop are described in details in the IRIS-SES 'Report on the Implementation of the DeCyDe-4-IRIS Method and Tools at the Eastern Mediterranean Stakeholder Workshop'

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2. The Black Sea Stakeholder Workshop

The Black Sea stakeholder workshop was held in Constanta, Romania on the 12th of January 2015 and brought together experts and stakeholders from Bulgaria, Romania and Turkey, in order to discuss the implementation of the MSFD monitoring in their countries and identify possible collaboration opportunities. There were three parts to the workshop: the preparatory phase, the development of the toolbox, and the workshop itself. Appendix A shows a schematic representation of each of these phases, whereas the rest of this chapter provides a more detailed description.

2.1. The preparatory phase

This phase was concerned with gathering (a) the relevant information and (b) identifying the most suitable stakeholders and key actors for participation in each workshop, through a dedicated stakeholder mapping exercise per country.

2.1.1. Gathering data and information

To gather the necessary information for the successful implementation of the workshop, Isotech developed factsheets regarding the monitoring of eutrophication (Descriptor 5) and contaminants (Descriptors 8 and 9). The factsheets (Appendix B) aimed to capture information regarding the parameters that are being measured for these Descriptors, the frequency of monitoring, the background and upper limits for each parameter, as defined by national or European legislation, any scales used to assess Good Environmental Status (GES), indicative values for each parameter and the monitoring method used. Where provided information was unclear, Isotech contacted the relevant project partners to clarify it.

2.1.1.1. Stakeholder Mapping: Identifying stakeholders and key actors

This part of the preparatory phase aimed to identify the key stakeholders to be invited to the workshop. Using a stakeholder mapping approach, Isotech facilitated each partner in the identification of stakeholders and key actors in the Marine Strategy Framework Directive (MSFD) process.

The aim of this mapping activity was to bring together and support active participation and commitment from the major groups of key actors and stakeholders in each country/ region, regarding the MSFD and the processes that are included in order to achieve GES.

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Five major key actors and stakeholders groups were identified and subgroups were defined (see Table 1 below):

- The "producers" of pollution;
- The decision makers for "solutions";
- The implementing, inspecting and monitoring actors and authorities;
- Civil society; and
- Media.

Table 1 Indicative list of key actor/ stakeholder categories for IRIS-SES

1	Government and/or policy making	Local
		National
		Other
2	Inspectorates and monitoring bodies/ authorities	It is important to include representatives from the relevant bodies/ authorities responsible for inspecting the major sources of marine pollution. Their input is important.
3	Waste Water Management Councils/ Boards/ Authorities	
4	Coastal and inland industry	Coastal tourism/ hotel industry
		Sewage treatment industries
		Farmers
		Energy industry
		Shipbuilding/ ship repairing industry
		Other
5	Marine industry	Commercial fishing

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		Shipping
		Off-shore industries
		Nautical tourism/ marine related tourism activities
		Aquaculture
		Other
6	Civil Society	NGO / SCO
		Professional Bodies
		Other
7	Media/ Awareness	Newspaper/ Radio/ TV
		Online

2.1.1.2. The role of local IRIS-SES partners

Local IRIS-SES partners were asked to identify key actors and stakeholders from each category in their country (see full list of key actor and stakeholder categories in Table 1). The importance of carefully selecting the representatives from the involved key actor/ stakeholder categories was emphasised, as a means of ensuring that they would provide real site-specific input and expertise and would be committed or willing to incorporate the new IRIS-SES methods in their work/ processes.

The factsheets and the stakeholder mapping documents, together with a description of the DeCyDe-4-IRIS methodology for the workshops (Appendix C), were shared with the IRIS-SES partners in the Black Sea countries of Bulgaria, Romania and Turkey, at least two months ahead of the workshop. The partners were asked to complete the information in the factsheets, for one region within their country that would act as a pilot region, either using their own knowledge or experience or by contacting the relevant authorities in their countries. Likewise, the partners were asked to identify those stakeholders that could be invited to participate in the workshop. Due to the limited number of stakeholders that could be invited, emphasis was placed on

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selecting stakeholders that were involved with the MSFD monitoring and/or with decision-making regarding the MSFD monitoring.

2.2. The development of the DeCyDe-4-IRIS Toolbox

In preparation of the DeCyDe-4-IRIS regional meetings, Isotech developed the DeCyDe-4-IRIS Toolbox, a suite of tools that were necessary for the implementation of the workshop, and comprising of: (1) the scoreboards for each region, i.e. for the south-eastern Mediterranean (workshop held in Athens, October 2014) and the Black Sea (2) the DeCyDe-4-IRIS Self-Assessment Tools (3) the source-pollutant matrix and (4) a list of possible abatement measures per sector.

2.2.1. The DeCyDe-4-IRIS scoreboards for each region

Using the information that each country provided in the factsheets, specifically the background and upper limits and any existing scales for assessing GES, Isotech developed the DeCyDe-4-IRIS Self-Assessment Tools, specifically for each country, i.e. they are country-specific. The excel-based scoreboards use the approach of scoring through ranges to help countries, or regions within countries, visualize the current situation with regards to meeting the goals of good environmental status. The ranges for the scoring are identified by a group of experts from each country, based on national, EU and International Standards, upper and lower limits and GES targets.

Figure 1 shows an extract from the self-assessment tool developed for Bulgaria. These specific tables relate to Descriptor D5, eutrophication, and were developed based on the information that the Bulgarian IRIS-SES partner (IO-BAS) provided in the factsheets. The factsheets provided upper and lower limits for these parameter categories (Nutrients, Phytoplankton and Secchi Depth) and using these values a linear scale of score ranges was defined. Scores were assigned to each of these ranges/scales based on the average monitored values provided by IO-BAS in the completed factsheets. In this way, the current situation is assessed and a number is provided to describe it. The last column, entitled ‘Indicator Score’, automatically calculates the average of all the parameters that describe each of the indicators (e.g. for ‘Nutrients’, the Indicator Score is calculated as the average of the scores for ‘Nitrate-N’ and ‘Ammonia-N’, ‘Nitrite-N’ and ‘Phosphate-P’). When the score assigned to a specific parameter fell below the lower limit

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assigned for that parameter in the completed factsheet, the score was circled, acting as a warning to the decision makers (see for example the score for 'Secchi Depth').

Each of the developed DeCyDe-4-IRIS Self-Assessment Tools (one per country) contains three tabs: one for the assessment of eutrophication such as the one that appears in Figure 1, a similar one for the assessment of contaminants, and one that summarizes the obtained scores and provides the total score for that particular country or region.

D5 - EUTROPHICATION

1	Nutrients	Units	Scoring Ranges				Indicator Score
	1.Nitrate-N	µg/l	>40	28 < x ≤ 40	16 ≤ x ≤ 28	<16	10.00
			1	4	7	10	
						10	
	2. Ammonia-N	µg/l	>22	15 < x ≤ 22	8 ≤ x ≤ 15	<8	
			1	4	7	10	
						10	
	3.Nitrite-N	µg/l	>10	8 < x ≤ 10	6 ≤ x ≤ 8	<6	
			1	4	7	10	
						10	
	4.Phosphate-P	µg/l	>10	7.5 < x ≤ 10	5 ≤ x ≤ 7.5	<5	
			1	4	7	10	
						10	

2	Phytoplankton	Units	Scoring Ranges					Indicator Score
	1. Phytoplankton Biomass	mg/m^3	>950	867 < x ≤ 950	783 < x ≤ 867	700 ≤ x ≤ 783	<700	3.20
			1	3	5	7	10	
							10	
	2. Phytoplankton Abundance	cells/l	>800,000	700,000 < x ≤ 800,000	600,000 < x ≤ 700,000	500,000 ≤ x ≤ 600,000	<500,000	
			1	3	5	7	10	
				3				
	3. Chlorophyll α	mg/m^3	>1.5	1.3 < x ≤ 1.5	1.1 < x ≤ 1.3	0.9 ≤ x ≤1.1	<0.9	
			1	3	5	7	10	
			1					
	4. Diatom:Dinoflaggelates (spring)	N/A	<6.3	6.3 < x ≤ 6.8	6.8 < x ≤ 7.4	7.4 < x ≤ 8.0	>8.0	
			1	3	5	7	10	
			1					
	5. Integrated Phytoplankton Index	N/A	<6.3	4.4 < x ≤ 6.3	2.6 < x ≤ 4.4	0.8 < x ≤ 2.6	>0.8	
			1	3	5	7	10	
			1					

3	Others	Units	Scoring Ranges				Indicator Score
	1. Secchi Depth	m	<5.5	5.5 ≤ x < 6.25	6.25 ≤ x < 7	≥ 7	1
			1	4	7	10	
			1				

Figure 1 Extract from the DeCyDe-4-IRIS Self-Assessment Tool developed for Bulgaria.

2.2.2. The source-pollutant matrix

As the name suggests, the source-pollutant matrix (Figure 2) is an excel-based matrix that, for each of the parameters that characterize Descriptors 5 and 8/9, identifies the main sources of pollution, based on literature and bibliographic references. The matrix was used alongside the

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completed self-assessment tool to assist decision-makers and stakeholders to identify the most likely pollution sources (main polluting sectors) for each of the parameters where the self-assessment tool demonstrated that there was room for improvement.

	Pollutant											
	PO_4	NO_3	NH_4	PAHs	PCBs	Pesticides	Cu	Zn	Cd	Pb	Hg	^{137}Cs
Municipal Waste	X	X	X	X	X	X	X	X	X	X		
Industrial Waste	X	X	X	X	X		X	X	X	X	X	X
Farming Incl. Aquaculture	X	X	X									
Agriculture	X	X	X			X	X					
Shipping	X	X	X	X			X			X		

Figure 2 The DeCyDe-4-IRIS source-pollutant matrix.

2.2.3. The list of abatement measures

For each of the main sectors that could result in the discharge of pollutants related to Descriptors 5, 8 and 9 in the marine environment, Isotech's group of experts also developed a list of possible abatement measures. Mapping the sources of pollutants and identifying solutions/measures per source is very challenging. The DeCyDe-4-IRIS approach aims to assist decision makers to easily pick out those measures that could be implemented in their country or region, based on the previous identification of main pollutant sources (section 2.2.2). The developed Abatement Measures List appears in Appendix D.

2.3. The DeCyDe-4-IRIS workshop

2.3.1. Structure and aims

The Black Sea DeCyDe-4-IRIS workshop took place at the premises of NIMRD "Grigore Antipa" Institute, in Constanta, Romania on 12 January 2015.

The DeCyDe-4-IRIS workshops are structured on group work and have three distinct but interrelated stages, aiming to:

- Guide the partners through the Self Assessment process;
- Identify the gaps, problems and needs of their country/region with regards to the monitoring of eutrophication and contaminants;

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- Discuss possibilities of joint monitoring;
- Improve coordination among neighbouring countries; and
- Discuss possible abatement measures for the improvement of GES.

2.3.2. Attendees

A total of 41 participants attended the Black Sea Regional Stakeholder Workshop, most of them representing universities, academies and institutes from Romania. However, the invited participants also included a representative from the Permanent Secretariat of the Black Sea Commission, two stakeholders/ key actors from Bulgaria representing the Black Sea Basin Directorate, and four stakeholders from Greece (representing the IRIS-SES project management group). The full list of participants appears in Appendix E. Unfortunately, no key actors/ stakeholders from Turkey were able to attend, but the draft version of this report was shared, through the Turkish IRIS-SES partner, with the Directorate General of Environmental Management, Department of coastal and marine management and Directorate General of EIA, Permits and Control, Department of Monitoring of the Turkish Ministry of Environment and Urbanisation, and their opinions on gaps and needs, joint monitoring and proposed abatement measures was obtained and included in this report.

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3. The DeCyDe-4-IRIS Black Sea workshop outcomes

3.1. Outputs from the DeCyDe-4-IRIS Self-Assessment Tools

To begin with, the participants were split into groups according to their country of origin and were guided towards completing the DeCyDe-4-IRIS Self-assessment tools for their country. This allowed the participants to practice using the tool and to get a better feel for how it works. In the interest of time, the completed DeCyDe-4-IRIS self-assessment tool for Bulgaria was presented in plenary.

This exercise highlighted the importance of providing accurate and complete information in the factsheets, as this would determine the overall completeness of the tool.

3.2. Outputs from the identification of monitoring gaps and needs

Following the completion of the self-assessment tools, the stakeholders from each country were asked to identify the monitoring needs for their country and present them in plenary. Stakeholders were encouraged to use the DeCyDe-4-IRIS Self-assessment tools for their country, since they provided an overview of what is being measured and how.

The following monitoring requirements/gaps were identified:

For Bulgaria:

- There is a gap in phytoplankton monitoring frequency for the period of April – September. This was accompanied by a suggestion to increase the phytoplankton monitoring frequency in these months to at least once per month.
- There is a need to conduct nutrient sampling in parallel to the monitoring of macro phytobenthos.
- There is insufficient data for the assessment of the transboundary pollution from the Danube.

For Romania:

- There are no measurements and thus no data regarding the atmospheric deposition of nutrients in the Black Sea.

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- There is a gap in the regular sampling at stations at depths greater than 30 metres.
- There is a need to harmonize the sampling methods, as this would allow for more comparable data and outputs.
- Although there is a very strong scientific community, the public outreach of the work is minimal. There is a need to improve this.
- There is no data for micro-litter in Romania, and in the Black Sea in general.

For Turkey:

- The periods and frequencies of monitoring of different components of the integrated monitoring are not set clearly yet.
- The present application of 2 times/year for hydrochemistry and phytoplankton, once/year for macro-flora and macro-zoobenthos might not be enough to monitor the seasonal and inter-annual variations.
- Winter data are very scarce, therefore there is a need to include winter monitoring in the monitoring programme (initiated from 2015).
- The spatial resolution of the monitoring system is not enough to cover the deeper marine environment.
- Coastal water bodies (as nationally proposed in 2013) are big and are not adequately covered by the small number of macro-flora and zoobenthos monitoring stations. Therefore, there is a need to increase the spatial resolution for these biological quality elements.
- An assessment scale for phytoplankton abundance/ biomass is not being developed and used yet.
- Measurement of contaminants (all groups/parameters) is very time consuming and difficult. Both the matrices / target species as well as the list of contaminants to be monitored need to be limited for any set targets. Today, all groups and parameters are being monitored at a limited number of stations. Not all the coastal water bodies and almost none in the marine area are monitored.
- Monitoring of micro-plastics has recently been included in the monitoring programme as a methodological approach and at a pilot scale. However, appropriate indicators need to

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be set and methods need to be standardized. Analysis and sorting in water and sediment matrices are time consuming.

3.3. Outputs from the identification of collaboration opportunities

The next part of the workshop required all the participants to discuss possible collaboration opportunities between Bulgaria, Romania and Turkey regarding MSFD monitoring. The following were identified:

1. With the Danube River running through so many countries before it reaches Bulgaria and Romania and eventually draining into the Black Sea, it is no surprise that the issue of transboundary pollution featured greatly in discussions about joint monitoring. The participants recognized that this was a complex problem, further exacerbated by the fact that the Danube flows through countries that are not members of the European Union, and thus not bound by European legislation. The suggested solution involved the launch of common progress reporting, that would avoid the placing of blame, but would allow the identification of pollution sources and the means to address them.
2. The development of a Black Sea pollution sources database would allow for the determination of the accumulation of impact from neighbouring sources, such as waste treatment facilities and harbours.
3. A joint monitoring opportunity would arise if the various Black Sea countries would work under the same umbrella, for example through the implementation of common monitoring programmes funded by the EU (or other bodies). This would enable the consistent and comparable reporting of data as well as facilitate the sharing of data between countries.
4. The development of an 'available infrastructure index' was also identified as a possibility for joint collaboration, as it would allow Black Sea countries to share sea time, i.e. organize joint cruises thus sharing the cost, and would therefore optimize MSFD monitoring.
5. Joint monitoring could also take the form of use of common infrastructure such as research vessels, buoys etc. to collect data.

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6. Increasing the role of the Black Sea Commission in data collection and database utilization, including increasing the involvement of non-EU member states.
7. Another opportunity of joint collaboration arises when it comes to the monitoring of marine litter and sound for the requirements of the MSFD. Since this is still at an early stage, it could be developed jointly for the entire Black Sea.
8. The use of automatic systems for joint monitoring, such as buoys or argofloats, would also enable joint monitoring in the Black Sea, as would the use of remote sensing technologies such as radars and satellites.
9. Collaboration on joint monitoring of nutrients and chemical pollution, firstly to identify the source of pollutants.

3.4. Outputs regarding proposed abatement measures

The last part of the workshop saw the participants of each country sitting back together and identifying the main pollution sources and most applicable abatement measures for their countries. This was done in a two step approach. In step one, the participants from each country identified the main sources of pollution via the source-pollutant matrix and in step two they reviewed the possible abatement measures for each identified source and selected those most applicable to their country.

The proposed abatement measures for Bulgaria concerned waste from the municipal sector, and included:

- The implementation of sewerage systems with secondary wastewater treatment and discharge in the sea, or
- The implementation of sewerage systems with primary wastewater treatment and use of treated waste for agricultural or other purposes.

For Romania, participants proposed a range of abatement measures for several polluting sectors:

- For municipal waste:
  - Upgrade or resize the existing wastewater treatment plants of Constanta.
  - Implement sewerage systems with secondary wastewater treatment and use of treated waste for agricultural or other purposes.
  - Establish the connection of coastal hotels with the sewerage system.

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  - Create artificial reef ponds/buffer zones or other areas of vegetation to prevent pollution from other municipal discharges.
- For industrial waste:
  - Reuse industrial waste in other operations.
  - Pre-treat industrial wastewater and transfer it to a central municipal wastewater treatment plant.
  - Develop central industrial wastewater treatment plants in industrial zones.
  - Limit emissions through stricter legislation and practical measures e.g. new equipment that minimizes PAH emissions from diesel central heating engines.
- For farming, including aquaculture:
  - Apply automatic control and feeding systems-codes-technologies in farming aquaculture.
  - Reduction of hatcheries wastewater polluting load through managerial and/or technological interventions.
- For agricultural waste:
  - Apply a code of good agricultural practices, complemented by a certification process, to minimize pollution from agriculture.
  - Provide training/ awareness-raising campaigns on proper agricultural care for the reduction of chemical/ synthetic fertilizers and/or the gradual use of slow release organic soil conditions (e.g. compost).
  - Promote crop rotation with appropriate crops/ species.
- For the shipping industry:
  - Provide incentives for technical modifications/ changes to ship engines to improve combustions and reduce emissions.
  - Impose stricter ship emission limits.
  - Implement an indirect fee system.

The stakeholders from Turkey identified the following abatement measures that are applicable in their country:

- For municipal waste:

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  - Establish municipal waste water treatment plants if possible in every municipality.
- For industrial waste:
  - Implement strict limits, especially for PAH and heavy metals, for deep marine discharges.
- For agriculture:
  - Limit pesticide usage.
  - Promote organic agriculture.
- For the shipping industry:
  - Decrease the number of hydroelectric plants and promote green energy production.

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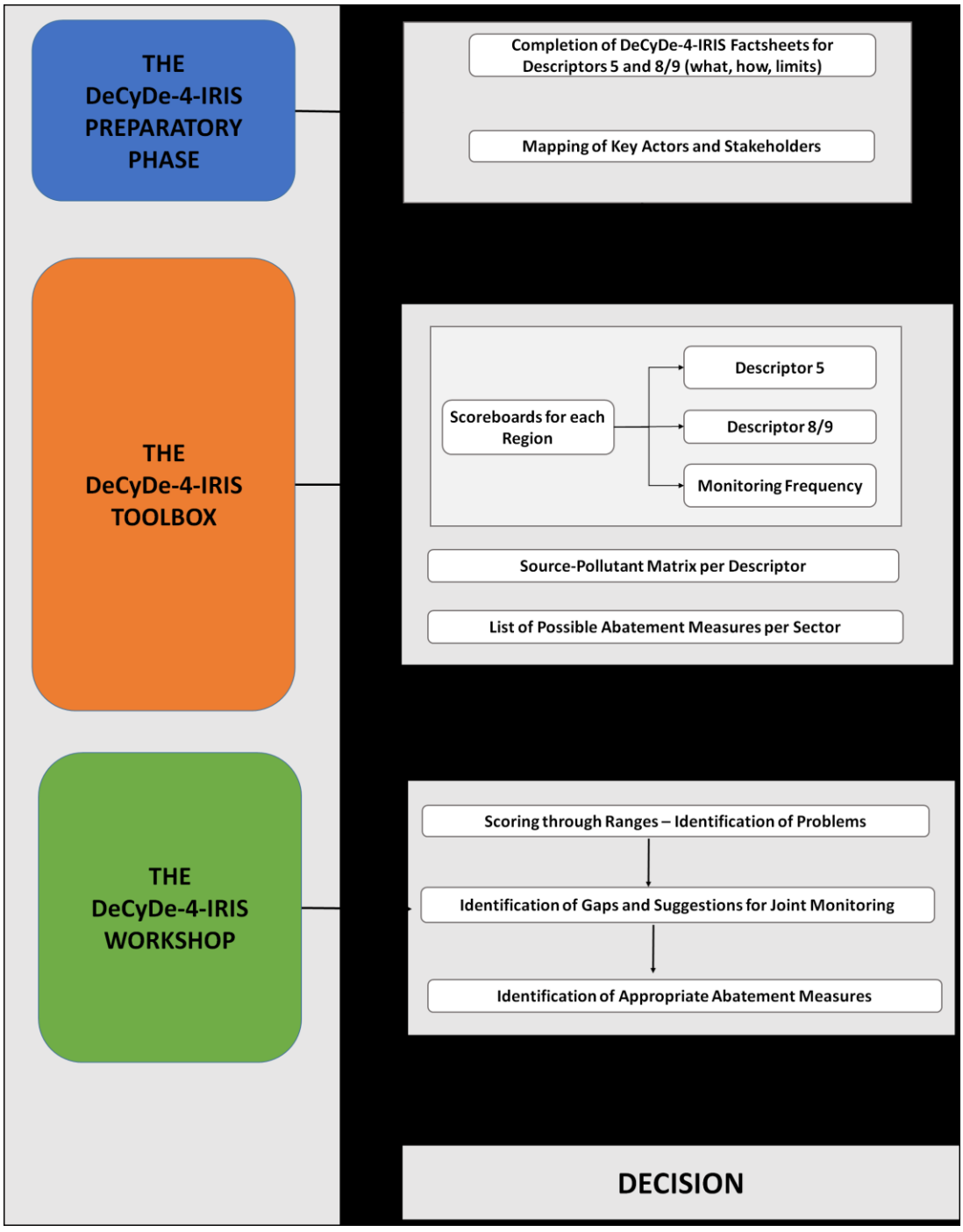
Appendix A – Schematic Representation of the DeCyDe-4-IRIS Workshops



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Appendix B – The DeCyDe-4-IRIS Completed Factsheets for the Eastern Mediterranean Countries

ACTIVITY 3: SELF-ASSESSMENT TOOL FOR ASSESSING GES FOR EUTROPHICATION AND CONTAMINANTS

Country	BULGARIA
Region	Varna
Neighboring Regions	
Partner	IO-BAS

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FACTSHEET 1: Eutrophication – Nutrients

<table>
<tr><td>Descriptor</td><td colspan="5">D5 Eutrophication</td></tr>
<tr><td>Indicator</td><td colspan="5">Nutrients</td></tr>
<tr><td>Parameters</td><td colspan="5">The parameters for nutrients include nitrogen and phosphorus compounds, ammonia and sediment organic matter.
In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).
<table>
<tr><th>Parameter</th><th>Background Level</th><th>Upper Limit</th><th>Unit</th><th>Monitoring Frequency</th></tr>
<tr><td>Nitrate- N</td><td>Spring: <40
Summer:<16</td><td>Spring: 75
Summer: 40</td><td>µg/l</td><td>1-4 per year</td></tr>
<tr><td>Ammonia-N</td><td>Spring: <15
Summer: <8</td><td>Spring: 30
Summer: 22</td><td>µg/l</td><td>1-4</td></tr>
<tr><td>Nitrite-N</td><td>Spring: <10
Summer: <6</td><td>Spring: 13
Summer:10</td><td>µg/l</td><td>1-4</td></tr>
<tr><td>Phosphate-P</td><td>Spring: <10
Summer: <5</td><td>Spring: 15
Summer:10</td><td>µg/l</td><td>1-4</td></tr>
<tr><td>Organic Carbon in sediments</td><td></td><td></td><td>%</td><td>1</td></tr>
</table></td></tr>
<tr><td>Comments regarding background and upper limits</td><td colspan="5">Please state whether there are areas where the background level is higher or lower than that stated above
Used summer values for the development of the DeCyDe-4-IRIS tool as per the Bulgarian partner’s recommendations</td></tr>
<tr><td>Indicative values</td><td colspan="5">For each of the above parameters please give indicative values, as measured by your country’s monitoring plan
<table>
<tr><th>Parameter</th><th>Indicative value</th></tr>
<tr><td>Nitrate- N</td><td>Spring : average 3µg/l, max 12µg/l
Summer: average 4µg/l, max 21µg/l</td></tr>
<tr><td>Ammonia-N</td><td>Spring: 8µg/l, max 11µg/l
Summer: 7µg/l, max 19µg/l</td></tr>
</table></td></tr>
</table>

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	Nitrite-N	***Spring:*** 2μg/l, max 3μg/l ***Summer:*** 2μg/l, max 4μg/l
	Phosphate-P	***Spring:*** 4μg/l, max 5μg/l ***Summer:*** 3μg/l, max 26μg/l
	Organic Carbon in sediments	0.85% , max 1.8%
Method		
	Parameter	**Method used**
	Nitrate- N	Koroleff photometric method with *Cd* reduction (NO3-N to NO2-N) (Grasshoff , 1989)
	Ammonia-N	Indophenol (Koroleff) photometric method using *Trione*
	Nitrite-N	photometric method with 1-naphtil-ethilenediamine (Grasshoff , 1989)
	Phosphate-P	Molibdate photometric method (Grasshoff , 1989)
	Organic carbon	Photometric method after oxidation with $K_2Cr_2O_7$
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	
	The upper limit given above is the threshold value between good/moderate which is the target value	

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FACTSHEET 2: Eutrophication - Phytoplankton

<table>
<tr><td>Descriptor</td><td colspan="5">D5 Eutrophication</td></tr>
<tr><td>Indicator</td><td colspan="5">Phytoplankton</td></tr>
<tr><td>Parameters</td><td colspan="5">The parameters for nutrients include chlorophyll a, primary production, microalgae and phytoplankton.
In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).</td></tr>
<tr><td></td><td>Parameter</td><td>Background Level</td><td>Upper Limit</td><td>Unit</td><td>Monitoring Frequncy</td></tr>
<tr><td></td><td>Phytoplankton biomass (spring)</td><td><2500</td><td>3500</td><td>mg/m^3</td><td>1-2</td></tr>
<tr><td></td><td>Phytoplankton biomass (summer)</td><td><700</td><td>950</td><td>mg/m^3</td><td>1-3</td></tr>
<tr><td></td><td>Phytoplankton abundance (summer)</td><td><500 000</td><td>800 000</td><td>cells/l</td><td>1-3</td></tr>
<tr><td></td><td>Chlorophyll a (spring)</td><td><2.3</td><td>3.3</td><td>mg/m^3</td><td>1-3</td></tr>
<tr><td></td><td>Chlorophyll a (summer)</td><td><0.9</td><td>1.5</td><td>mg/m^3</td><td>1-3</td></tr>
<tr><td></td><td>Biomass ratio Diatoms: Dinoflagellates (spring)</td><td>>8</td><td>6.3</td><td>N/A</td><td>1-2</td></tr>
<tr><td></td><td>Integrated phytoplankton Index (IBI)</td><td>>0.8</td><td>6.3</td><td>N/A</td><td>1-6</td></tr>
<tr><td>Comments regarding background and upper limits</td><td colspan="5">Please state whether there are areas where the background level is higher or lower than that stated above</td></tr>
<tr><td></td><td colspan="5">Used summer values for the development of the DeCyDe-4-IRIS tool as per the Bulgarian partner’s recommendations</td></tr>
<tr><td>Indicative values</td><td colspan="5">For each of the above parameters please give indicative values, as measured by your country’s monitoring plan</td></tr>
<tr><td></td><td>Parameter</td><td colspan="4">Indicative value</td></tr>
<tr><td></td><td>Phytoplankton biomass (spring)</td><td colspan="4">1001 – max 3609</td></tr>
</table>

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	Phytoplankton biomass (summer)	558 (average) – 2582 (max)
	Phytoplankton abundance (summer)	710000 (average) – 1 822 000 (max)
	Chlrorophyll a(spring)	2.9 (average) – 5.6 (max)
	Chlorophyll a (summer)	3.1 (average) - 13.1 (max)
	Biomass ratio Diatoms: Dinoflagellates (spring)	0.8 (average) – 0.3 (min)
	Integrated phytoplankton Index (IBI)	0.50 (average) – 0.33 (min)
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	Phytoplankton biomass	Species specific geometric formula X abundance
	Phytoplankton abundance	Utermol (1938), inverted light microsope, Sedgwick-Rafter цоунтинг chamber
	Chlrorophyll a	Spectrophotometric method (acetone extraction, equations Jeffrey and Humphrey (1975)
	Biomass ratio Diatoms: Dinoflagellates	
	Integrated phytoplankton Index (IBI)	Moncheva, Boicenko, 2011
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	
	The upper limit given above is the threshold value between good/moderate which is the target value	

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FACTSHEET 3: Eutrophication - Other

<table>
<tr><td>Descriptor</td><td colspan="5">D5 Eutrophication</td></tr>
<tr><td>Indicator</td><td colspan="5">Other</td></tr>
<tr><td>Parameters</td><td colspan="5">The parameters for nutrients include secchi depth and dissolved oxygen concentration.
In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).
<table>
<tr><th>Parameter</th><th>Background Level</th><th>Upper Limit</th><th>Unit</th><th>Monitoring Frequency</th></tr>
<tr><td>Oxygen content and saturation in surface water</td><td>Spring: 110
Summer: 95-105</td><td>Spring: 116 %
Summer:110%</td><td>%</td><td>1-4</td></tr>
<tr><td>Oxygen saturation in bottom water</td><td>Summer: >85%</td><td>Summer: >75%</td><td>%</td><td>1-4</td></tr>
<tr><td>Secchi depth (spring)</td><td>7</td><td>4.5</td><td>m</td><td>1-2</td></tr>
<tr><td>Secchi depth (summer)</td><td>7</td><td>5.5</td><td>m</td><td>1-3</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Comments regarding background and upper limits</td><td colspan="5">Please state whether there are areas where the background level is higher or lower than that stated above

Used summer values for the development of the DeCyDe-4-IRIS tool as per the Bulgarian partner’s recommendations</td></tr>
<tr><td>Indicative values</td><td colspan="5">For each of the above parameters please give indicative values, as measured by your country’s monitoring plan
<table>
<tr><th>Parameter</th><th>Indicative value</th></tr>
<tr><td>Oxygen saturation in surface waters</td><td>Spring: 119%, max 134%
Summer: 111%, max 177%</td></tr>
<tr><td>Oxygen saturation in</td><td>%, min 50%</td></tr>
</table></td></tr>
</table>

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	bottom water	
	Secchi depth (spring)	4.5 – min 2.5
	Secchi depth (summer)	5.0 – min 2.0
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	Oxygen content and saturation	"Winkler" method (titration)
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	
	The upper limit given above is the threshold value between good/moderate which is the target value	

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FACTSHEET 4: Contaminants – In Water

Descriptor	**D8/D9 Contaminants**				
Indicator	**In water**				
Parameters	The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).				
	Parameter	**Background Level**	**Upper Limit**	**Unit**	**Monitoring Frequency**
	Poly-aromatic hydrocarbons (PAH)		Benzo(a)anthracene, Crizene, Fluorene-only annual mean concentration, not maximum (Regulation H-4/ BG/2012) Benzo(a)pyrene - 0.1µg/l, Anthracene-0.4... (Reg. for Envir.Quality stand./BG/2010)	µg/l	
	Poly-chlorinated byphenyls (PCB)		Individual PCBs (PCB28, 52, 101, 138, 153, 180)-only annual mean concentration, not maximum (Regulation H-4/ BG/2012)	µg/l	
	Heavy metals (HM)		1.5 Cdµg/l, 14.0 Pbµg/l, 34.0 Niµg/l (MAC-EQS* Directive 2013/39/EU) Regulation for priority substances/BG/2010	µg/l	

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			Maximum content for Cr=32 µg/l, As=25 µg/l (Regulation H-4 /BG/2012), Hg=0.07 (Reg. for Envir.Quality stand./BG/2010)		

Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above	
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan	
	Parameter	**Indicative value**
	Total Petroleum Hydrocarbons	136.7µg/l
	Poly-aromatic hydrocarbons (PAH)	$\sum_{16}$*PAHs=0.914*µg/l*;* CPAHs%=19.9 (the carcinogenic PAHs percentage)
	Poly-chlorinated byphenyls (PCB)	∑ PCBs=0.039µg/l
	Organo-chlorine Pesticides (OCP)	ΣOCPs =0.033µg/l , HCB=0.009 µg/l, Sum DDT<0.0067µg/l
	Heavy metals (HM)	0.12µg Cd/L, 2.38µgPb/L, 6.17µg Ni/L. 0.11µgCu/l , 2.36µgCr/l
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	Total Petroleum Hydrocarbons	Fluorescence method
	Poly-aromatic hydrocarbons (PAH)	GC-MS HPLC
	Poly-chlorinated byphenyls (PCB)	GC-ECD
	Organo-chlorine Pesticides (OCP)	GC-ECD
	Heavy metals (HM)	GF-AAS Flame-AAS WDXRF ICP-MS
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	

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	The upper limit given above is the threshold value

FACTSHEET 5: Contaminants – In Sediment

Descriptor	**D8/D9 Contaminants**				
Indicator	**In sediment**				
Parameters	The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).				
	Parameter	**Background Level**	**Upper Limit**	**Unit**	**Monitoring Frequency**
	Total Petroleum Hydrocarbons		ΣPAHs <250 according Traven classification(Traven *et al.,* 2008)	µg/kg dw	1
	Heavy metals (HM)		"Dutch list" for sediments: 85 Pb, 35Ni , 36 Cu , 140 Zn mg/kg	mg/kg	
Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above				
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan				
	Parameter	**Indicative value**			
	Total Petroleum Hydrocarbons	133.3µg/g dry sed			

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	Poly-aromatic hydrocarbons (PAH)	$\sum_{16}$PAHs =112.7µg/kg dry weight, CPAHs% - the carcinogenic PAHs=57%
	Poly-chlorinated byphenyls (PCB)	ΣPCBs=93.02 µg/kg dry weight , PCB52=82.98 µg/kg dry weight
	Organo-chlorine Pesticides (OCP)	HCB 3.056, µg/kg dry weight, ΣOCPs 7.334 µg/kg dry weight
	Total organic carbon (TOC)	0.82%
	Heavy metals (HM)	0.059µgNi /g dry weight, 31.3µgZn /g dry weight, 18µgPb /g dry weight, 0.159µg Cu/g dry weight
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	Total Petroleum Hydrocarbons	Fluorescence method
	Poly-aromatic hydrocarbons (PAH)	GC-MS HPLC
	Poly-chlorinated byphenyls (PCB)	GC-ECD
	Organo-chlorine Pesticides (OCP)	GC-ECD
	Heavy metals (HM)	GF-AAS Flame-AAS WDXRF ICP-MS
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	

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FACTSHEET 5: Contaminants – In Biota

Not sufficient info on upper limits so not included in self-assessment tool.

<table>
<tr><td>Descriptor</td><td colspan="5">D8/D9 Contaminants</td></tr>
<tr><td>Indicator</td><td colspan="5">In biota</td></tr>
<tr><td>Parameters</td><td colspan="5">The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides.
In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).</td></tr>
<tr><td></td><td>Parameter</td><td>Background Level</td><td>Upper Limit</td><td>Unit</td><td>Monitoring Frequency</td></tr>
<tr><td></td><td>Poly-aromatic hydrocarbons (PAH)</td><td></td><td>benzo[a]pyrene- 10 µg/kg ww Regulation (EC) №1881/2006 10 µg/kg ww according Regulation 31 (BG)-D9</td><td>µg/kg ww</td><td></td></tr>
<tr><td></td><td>Poly-chlorinated byphenyls (PCB)</td><td></td><td>ΣPCBs =75 ng/g ww (Σ-PCB 28, 52, 101, 138, 153, 180) for dioxins, dioxin-like PCBs (EC № 1259/2011 amending Regulation (EC) no. 1881/2006)</td><td>ng/g ww</td><td></td></tr>
<tr><td></td><td>Heavy metals (HM)</td><td></td><td>Regulation (EC) no. 1881/2006,</td><td>µg/kg ww</td><td></td></tr>
</table>

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			D9-Regulation №31/2004 (BG) for maximum pollutants content-1µg/kg ww in mussels (not clear if this is for total Heavy Metals and partner not able to confirm)		

Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above	
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan	
	Parameter	**Indicative value**
	Total Petroleum Hydrocarbons	
	Poly-aromatic hydrocarbons (PAH)	$\sum_{16}$PAHs µg/kg dry weight tissue*: Scapharca – 2561 , Mytilus galloprovincialis- 650, Rapana venosa-3208*
	Poly-chlorinated byphenyls (PCB)	∑PCBs (µg/kg dry weight tissue) *in: Scapharca – 7.4 , Mytilus galloprovincialis- 5.9, Rapana venosa- 22.2*
	Organo-chlorine Pesticides (OCP)	***ΣOCPs*** (µg/kg dry weight tissue) *in: Scapharca – 17.4 , Mytilus galloprovincialis- 30.2, Rapana venosa- 5.2* **HCB**: 0.5ng/g dw in *Mytilus galloprovincialis , Rapana venosa, Scapharca*
	Heavy metals (HM)	***Rapana venosa***- 4.76 µgCu/g wet weight, 5.4 Cd µg/g ww, 0.086Pb µg/g ww, 0.65Ni µg/g ww, 0.24Cr µg/g ww ***Scapharca –*** 2.03 µgCu/g wet weight, 2.47 Cd µg/g ww, 0.05Pb µg/g ww, 4.47Ni µg/g ww, 0.47Cr µg/g ww ***Mytilus galloprovincialis*** -4.48 µgCu/g wet weight, 0.84 Cd µg/g ww, 0.092Pb µg/g ww, 1.0Ni µg/g ww, 0.17Cr µg/g ww
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	Total Petroleum Hydrocarbons	Fluorescence method

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	Poly-aromatic hydrocarbons (PAH)	GC-MS HPLC
	Poly-chlorinated byphenyls (PCB)	GC-ECD
	Organo-chlorine Pesticides (OCP)	GC-ECD
	Total organic carbon (TOC)	
	Heavy metals (HM)	GF-AAS Flame-AAS WDXRF ICP-MS
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	

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ACTIVITY 3: SELF-ASSESSMENT TOOL FOR ASSESSING GES FOR EUTROPHICATION AND CONTAMINANTS

Country	ROMANIA
Region	Black Sea
Neighboring Regions	Mediterranean Sea
Partner	National Institute for Marine and Research Development "Grigore Antipa", NIMRD

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FACTSHEET 1: Eutrophication - Nutrients

<table>
<tr><td>Descriptor</td><td colspan="5">D5 Eutrophication</td></tr>
<tr><td>Indicator</td><td colspan="5">Nutrients</td></tr>
<tr><td>Parameters</td><td colspan="5">The parameters for nutrients include nitrogen and phosphorus compounds, ammonia and sediment organic matter.
In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).
<table>
<tr><th>Parameter</th><th>Background Level Reference conditions</th><th>Upper Limit</th><th>Unit</th><th>Monitoring Frequency</th></tr>
<tr><td>Dissolved Inorganic Phosphorus (orto-phopshate), DIP</td><td>Transitional waters – 0.30µM
Coastal waters – 0.20µM
Marine waters – 0.15µM</td><td>Marine Waters – 0.23µM</td><td>µM</td><td>4 times/year</td></tr>
<tr><td>Dissolved Inorganic Nitrogen (sum of NOx and ammonium), DIN</td><td>Transitional waters – 25.0µM
Coastal waters – 9.0µM
Marine waters – 7.0µM</td><td>Marine Waters – 10.50 µM</td><td>µM</td><td>4 times/year</td></tr>
</table></td></tr>
<tr><td rowspan="2">Comments regarding background and upper limits</td><td colspan="5">Please state whether there are areas where the background level is higher or lower than that stated above</td></tr>
<tr><td colspan="5">As stated in the table, marine areas have lower nutrients concentrations than coastal and transitional bodies.</td></tr>
<tr><td rowspan="3">Indicative values</td><td colspan="5">For each of the above parameters please give indicative values, as measured by your country’s monitoring plan</td></tr>
<tr><td>Parameter</td><td colspan="4">Indicative value (IA 2006-2012)</td></tr>
<tr><td>DIP</td><td colspan="4">0,01- 16,50 µM (average 0,31 µM, median 0,15 µM, stdev. 0,96µM)</td></tr>
</table>

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		Average summer 2013 for marine waters: 0.26 µM
	DIN	1,14 - 160,04 µM (average 10,21 µM, median 6,70 µM, stdev. 13,24 µM) **Average summer 2013 for marine waters: 8.95 µM**
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	Phosphate, PO_4^{3-}	Spectrophotometric, Grasshoff et al., 1999
	Nitrite, NO_2^-	Spectrophotometric, Grasshoff et al., 1999
	Nitrate, NO_3^-	Spectrophotometric, homogenous reduction with hydrazine sulphate, (Mullin and Riley, 1955; Strickland and Parsons, 1960)
	Ammonium, NH_4^+	Spectrophotometric, Grasshoff et al., 1999
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	
	GES is assessed based on target values (reference values + Acceptable deviation 50%) in each water body: 75th percentile of annual mean concentrations of nutrients (DIP and DIN) not less than target values in marine waters.	

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FACTSHEET 2: Eutrophication - Phytoplankton

<table>
<tr><td>Descriptor</td><td colspan="5">D5 Eutrophication</td></tr>
<tr><td>Indicator</td><td colspan="5">Phytoplankton</td></tr>
<tr><td>Parameters</td><td colspan="5">The parameters for nutrients include chlorophyll a, primary production, microalgae and phytoplankton.
In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).</td></tr>
<tr><td></td><td>Parameter</td><td>Background Level Reference conditions (summer season)</td><td>Upper Limit</td><td>Unit</td><td>Monitoring Frequency</td></tr>
<tr><td></td><td>Chlorophyll a</td><td>Transitional waters – 3.90µg/L
Coastal waters – 2.05µg/L
Marine waters – 2.00µg/L</td><td>Marine Waters – 3.08 µg/L</td><td>µg/L</td><td>4 times/year</td></tr>
<tr><td></td><td>Phytoplankton Biomass</td><td>Transitional waters – 427.08 mg/m3
Coastal waters – 191.16 mg/m3
Marine waters – 551.89 mg/m3</td><td>Marine Waters – 828 mg/m3</td><td>mg/m3</td><td>4 times/year</td></tr>
<tr><td>Comments regarding background and upper limits</td><td colspan="5">Please state whether there are areas where the background level is higher or lower than that stated above</td></tr>
<tr><td></td><td colspan="5">The reference values are calculated based on summer season values. Compared with spring season characterized by high phytoplankton development in general, the background values could be lower.</td></tr>
<tr><td>Indicative</td><td colspan="5">For each of the above parameters please give indicative values, as measured by your</td></tr>
</table>

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values	country's monitoring plan	
	Parameter	**Indicative value (for summer 2013)**
	Chlorophyll a	0.20 - 17.97 µg/L (average 2.81 µg/L, median 2.33 µg/L, stdev. 3.36 µg/L) **Average summer 2013 for marine waters: 0.99 µg/L**
	Phytoplankton biomass	139.37 - 11669.44 mg/m3 (average 783.17 mg/m3, median 344.67 mg/m3, stdev. 2034.78 mg/m3) **Average summer 2013 for marine waters: 288.42 mg/m3**
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	Chlorophyll a	SCOR-UNESCO, 1966. Determinations of photosynthetic pigments in seawater. Monographs on Oceanographic Methodology 1: 11-18.
	Phytoplankton biomass	Moncheva S., B. Parr. 2010. Manual for Phytoplankton Sampling and Analysis in the Black Sea. Black Sea Commission.
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	
	GES based on chlorophyll a concentration: 90th percentile of summer chlorophyll a concentrations decreasing trend based on routine monitoring.	

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FACTSHEET 3: Eutrophication - Other

<table>
<tr><td>Descriptor</td><td colspan="5">D5 Eutrophication</td></tr>
<tr><td>Indicator</td><td colspan="5">Other</td></tr>
<tr><td rowspan="4">Parameters</td><td colspan="5">The parameters for nutrients include secchi depth and dissolved oxygen concentration. In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).</td></tr>
<tr><td>Parameter</td><td>Background Level Reference conditions</td><td>Upper Limit</td><td>Unit</td><td>Monitoring Frequency</td></tr>
<tr><td>Transparency (Secchi depth)</td><td>Transitional waters – 3.0m
Coastal waters – 7.5m
Marine waters – 9m</td><td>Marine waters – 6.8m</td><td>m</td><td>4 times/year</td></tr>
<tr><td>Oxygen saturation</td><td>80%</td><td>60%</td><td>%</td><td>4 times/year</td></tr>
<tr><td rowspan="2">Comments regarding background and upper limits</td><td colspan="5">Please state whether there are areas where the background level is higher or lower than that stated above</td></tr>
<tr><td colspan="5">As stated in the table, marine areas have higher transparencies than coastal and transitional bodies.</td></tr>
<tr><td rowspan="4">Indicative values</td><td colspan="5">For each of the above parameters please give indicative values, as measured by your country’s monitoring plan</td></tr>
<tr><td>Parameter</td><td colspan="4">Indicative value (for year 2013)</td></tr>
<tr><td>Transparency (Secchi depth)</td><td colspan="4">0,8 – 12,5m (average 3.3m, median 2.8m, stdev. 2.1m).
Average summer 2013: 6.9m</td></tr>
<tr><td>Oxygen saturation</td><td colspan="4">45.7-141.3% (average 105.3%, median 107.4%, stdev. 21.2%, percentile 95th 130.6%).</td></tr>
<tr><td rowspan="4">Method</td><td colspan="5">Please state the method used for measuring for each parameter and determining the above values</td></tr>
<tr><td>Parameter</td><td colspan="4">Method used</td></tr>
<tr><td>Transparency (Secchi depth)</td><td colspan="4">Secchi disc</td></tr>
<tr><td>Oxygen saturation</td><td colspan="4">Winkle method and calculation according IOCtables.</td></tr>
</table>

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Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.
	GES is assessed based on target values (reference values - Acceptable deviation 25%) in each water body: 95th percentile of transparency values should be more than the target values; 95th percentile of bottom oxygen saturation (up to 50m due to the anoxic natural features of the Black Sea) values should be more than the target values.

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FACTSHEET 4: Contaminants – In Water

Descriptor	**D8/D9 Contaminants**				
Indicator	**PAHs in water**				
Parameters	The parameters for contaminants include synthetic substances (e.g**. PAHs**, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).				
	Parameter	**Background Level**	**Upper Limit**	**Unit**	**Monitoring Frequency**
	Polyaromatic hydrocarbons (Σ_{16} PAH):	-	-		twice per year
	1.Naphtalene	-	130	µg/L	twice per year
	2.Acenaphthylene	-	-	µg/L	twice per year
	3.Acenaphthene	-	-	µg/L	twice per year
	4.Fluorene	-	-	µg/L	twice per year
	5.Phenanthrene	-	-	µg/L	twice per year
	6.Anthracene	-	0,100	µg/L	twice per year
	7.Fluoranthene	-	0,120	µg/L	twice per year
	8.Pyrene	-	-	µg/L	twice per year
	9.Benzo[a]anthracene	-	-	µg/L	twice per year
	10.Crysene	-	-	µg/L	twice per year
	11.Benzo[b]fluoranthene	-	0,017	µg/L	twice per year
	12.Benzo[k]fluoranthene	-	0,017	µg/L	twice per year
	13.Benzo[a]pyrene	-	0,027	µg/L	twice per

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					year
	14.Benzo (g,h,i)perylene	-	$8,2 \times 10^{-4}$	µg/L	twice per year
	15.Dibenzo(a,h)anthracene	-	-	µg/L	twice per year
	16.Indeno(1,2,3-c,d)pyrene	-	-	µg/L	twice per year
	Total petroleum hydrocarbons (TPH)	50	200	µg/L	twice per year

Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above	
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan	
	Parameter	**Indicative value**
	Naphtalene	Range: DL- 10.153 (µg/L); Average: 0.7218 (µg/L)
	Anthracene	Range: DL-15.075 (µg/L); Average: 0.8852 (µg/L)
	Fluoranthene	Range: DL- 6.885 (µg/L); Average: 0.0914(µg/L)
	Benzo[b]fluoranthene	Range: DL- 0.1956 (µg/L); Average: 0.0161(µg/L)
	Benzo[k]fluoranthene	Range: DL- 0.1489 (µg/L); Average: 0.0207(µg/L)
	Benzo[a]pyrene	Range: DL- 0.3588 (µg/L); Average: 0.0280(µg/L)
	Benzo (g,h,i)perylene	Range: DL- 0.2050 (µg/L); Average: 0.0164(µg/L)
	Total petroleum hydrocarbons (TPH	**Range: DL- 998.0 (µg/L); Average: 215.9(µg/L)**
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	Naphtalene	gas chromatography-mass spectrometry (GC-MS)
	Acenaphthylene	gas chromatography-mass spectrometry (GC-MS)
	Acenaphthene	gas chromatography-mass spectrometry (GC-MS)
	Fluorene	gas chromatography-mass spectrometry (GC-MS)
	Phenanthrene	gas chromatography-mass spectrometry (GC-MS)
	Anthracene	gas chromatography-mass spectrometry (GC-MS)
	Fluoranthene	gas chromatography-mass spectrometry (GC-MS)
	Pyrene	gas chromatography-mass spectrometry (GC-MS)
	Benzo[a]anthracene	gas chromatography-mass spectrometry (GC-MS)
	Crysene	gas chromatography-mass spectrometry (GC-MS)

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	Benzo[b]fluoranthene	gas chromatography-mass spectrometry (GC-MS)
	Benzo[k]fluoranthene	gas chromatography-mass spectrometry (GC-MS)
	Benzo[a]pyrene	gas chromatography-mass spectrometry (GC-MS)
	Benzo (g,h,i)perylene	gas chromatography-mass spectrometry (GC-MS)
	Dibenzo(a,h)anthracene	gas chromatography-mass spectrometry (GC-MS)
	Indeno(1,2,3-c,d)pyrene	gas chromatography-mass spectrometry (GC-MS)
	Total petroleum hydrocarbons (TPH)	Fluorescent method
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	

Descriptor	**D8/D9 Contaminants**				
Indicator	**PCBs in water**				
Parameters	The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).				
	Parameter	**Background Level**	**Upper Limit**	**Unit**	**Monitoring Frequency**
	Lindane (gamma HCH)	zero	0.020 (refers to HCH, not only to gamma HCH)	µg/L	twice per year
	HCB	zero	0.050	µg/L	twice per year
	p,p' DDE	zero	0.025 (refers to Sum DDT, DDE, DDD)	µg/L	twice per year
	p,p' DDD	zero		µg/L	twice per year
	p,p' DDT	zero	0.01	µg/L	twice per year
	Aldrine	zero	0.005 (refers to Sum Cyclodiene	µg/L	twice per year
	Dieldrin	zero		µg/L	twice per year
	Endrin	zero		µg/L	twice per year
	Heptachlor	zero	0.00003 (refers	µg/L	twice per year

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			to heptachlor and heptachlor epoxide)		
	PCB 52	zero	-	µg/L	twice per year
	PCB 138	zero	-	µg/L	twice per year
	PCB 28	zero	-	µg/L	twice per year
	PCB101	zero	-	µg/L	twice per year
	PCB 118	zero	-	µg/L	twice per year
	PCB 153	zero	-	µg/L	twice per year
	PCB180	zero	-	µg/L	twice per year
Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above				
	Compared to" Upper Limit" (Directive 2013_39_EU) there are frequently exceedances for lindane, the amount of cyclodienes (aldrin, dieldrin, endrin) and the amount of DDT (DDT and metabolites) in all areas and HCB in the southern area Constanta - Vama Veche				
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan				
	Parameter	**Indicative value**			
	Lindane (gamma HCH)	DL - 0.51			
	HCB	DL - 0.33			
	p,p' DDE	DL - 0.16			
	p,p' DDT	DL - 0.16			
	Aldrine	DL - 0.11			
	Dieldrin	DL - 0.09			
	Heptachlor	DL - 0.06			
	p,p' DDD	DL - 0.04			
	Endrin	DL - 0.03			
	PCB 52	DL – 0.4			
	PCB 153	DL – 0.003			
	PCB 118	DL – 0.003			
	PCB 101	DL – 0.0004			
	PCB138	DL – 0.0008			
	PCB 28	DL			
	PCB180	DL			

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Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	Lindane (gamma HCH)	GC-ECD
	HCB	GC-ECD
	p,p' DDE	GC-ECD
	p,p' DDT	GC-ECD
	Aldrine	GC-ECD
	Dieldrin	GC-ECD
	Heptachlor	GC-ECD
	p,p' DDD	GC-ECD
	Endrin	GC-ECD
	PCB 52	GC-ECD
	PCB 153	GC-ECD
	PCB 118	GC-ECD
	PCB 101	GC-ECD
	PCB138	GC-ECD
	PCB 28	GC-ECD
	PCB180	GC-ECD
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	

Descriptor	**D8/D9 Contaminants**
Indicator	**Heavy Metals in water**
Parameters	The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).

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	Parameter	**Background Level**	**Upper Limit**	**Unit**	**Monitoring Frequency**
	Cu			µg/L	twice per year
	Cd		1,50	µg/L	twice per year
	Pb		14,00	µg/L	twice per year
	Ni		34,00	µg/L	twice per year
	Cr			µg/L	twice per year
Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above				
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan				
	Parameter	**Indicative value**			
	Cu	0,18-8,36			
	Cd	0,40-9,12			
	Pb	1,13-8,61			
	Ni	0,81-22,78			
	Cr	0,28-5,10			
Method	Please state the method used for measuring for each parameter and determining the above values				
	Parameter	**Method used**			
	Cu	GF-AAS			
	Cd	GF-AAS			
	Pb	GF-AAS			
	Ni	GF-AAS			
	Cr	GF-AAS			
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.				

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FACTSHEET 4: Contaminants – In Sediments

<table>
<tr><td>Descriptor</td><td colspan="5">D8/D9 Contaminants</td></tr>
<tr><td>Indicator</td><td colspan="5">PAHs in sediment</td></tr>
<tr><td>Parameters</td><td colspan="5">The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides.
In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).
<table>
<tr><th>Parameter</th><th>Background Level</th><th>Upper Limit</th><th>Unit</th><th>Monitoring Frequency</th></tr>
<tr><td>Polyaromatic hydrocarbons (Σ_{16} PAH):</td><td>116.5</td><td>1000.0</td><td>µg/kg*</td><td>twice per year</td></tr>
<tr><td>1.Naphtalene</td><td>4,9</td><td>160</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>2.Acenaphthylene</td><td>2,0</td><td>44</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>3.Acenaphthene</td><td>3,1</td><td>16</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>4.Fluorene</td><td>4,2</td><td>19</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>5.Phenanthrene</td><td>29,5</td><td>240</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>6.Anthracene</td><td>8,1</td><td>85</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>7.Fluoranthene</td><td>5,0</td><td>600</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>8.Pyrene</td><td>11,3</td><td>665</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>9.Benzo[a]anthracene</td><td>0,5</td><td>261</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>10.Crysene</td><td>1,8</td><td>384</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>11.Benzo[b]fluoranthene</td><td>4,1</td><td>-</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>12.Benzo[k]fluoranthene</td><td>2,7</td><td>-</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>13.Benzo[a]pyrene</td><td>2,1</td><td>430</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>14.Benzo (g,h,i)perylene</td><td>1,9</td><td>85</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>15.Dibenzo(a,h)anthracene</td><td>1,7</td><td>63</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>16.Indeno(1,2,3-c,d)pyrene</td><td>0,9</td><td>240</td><td>µg/kg</td><td>twice per year</td></tr>
<tr><td>Total petroleum hydrocarbons (TPH)</td><td>-</td><td></td><td></td><td>twice per year</td></tr>
</table>
</td></tr>
</table>

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			100	**µg/g**	
				* dry weight	

Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above	
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan	
	Parameter	**Indicative value**
	Polyaromatic hydrocarbons (Σ_{16} PAH):	**Range: DL- 4 962 (µg/kg); Average: 853.4 (µg/kg)**
	1.Naphtalene	Range: DL- 3 976 (µg/kg); Average: 294.2 (µg/kg)
	2.Acenaphthylene	Range: DL- 94.0 (µg/kg); Average: 8.9 (µg/kg)
	3.Acenaphthene	Range: DL- 292.2 (µg/kg); Average: 10.2 (µg/kg)
	4.Fluorene	Range: DL- 976.0 (µg/kg); Average: 41.6 (µg/kg)
	5.Phenanthrene	Range: DL- 1919.5 (µg/kg); Average: 120.6 (µg/kg)
	6.Anthracene	Range: DL- 1 572.0 (µg/kg); Average: 147.1 (µg/kg)
	7.Fluoranthene	Range: DL- 2 294.4 (µg/kg); Average: 112.4 (µg/kg)
	8.Pyrene	Range: DL- 2 286.0 (µg/kg); Average: 91.6 (µg/kg)
	9.Benzo[a]anthracene	Range: DL- 387.7 (µg/kg); Average: 26.8 (µg/kg)
	10.Crysene	Range: DL- 890.0 (µg/kg); Average: 23.8 (µg/kg)
	11.Benzo[b]fluoranthene	Range: DL- 255.1 (µg/kg); Average: 17.9 (µg/kg)
	12.Benzo[k]fluoranthene	Range: DL- 96.1 (µg/kg); Average: 10.0 (µg/kg)
	13.Benzo[a]pyrene	Range: DL- 560.0 (µg/kg); Average: 42.8 (µg/kg)
	14.Benzo (g,h,i)perylene	Range: DL- 340.1 (µg/kg); Average: 16.9 (µg/kg)
	15.Dibenzo(a,h)anthracene	Range: DL- 269.8 (µg/kg); Average: 8.9 (µg/kg)
	16.Indeno(1,2,3-c,d)pyrene	Range: DL- 706.1 (µg/kg); Average: 26.4 (µg/kg)
	Total petroleum hydrocarbons (TPH)	**Range: DL- 728.9 (µg/g); Average: 127.8 (µg/g)**
Method	Please state the method used for measuring for each parameter and determining the above values	

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	Parameter	Method used
	1.Naphtalene	gas chromatography-mass spectrometry (GC-MS)
	2.Acenaphthylene	gas chromatography-mass spectrometry (GC-MS)
	3.Acenaphthene	gas chromatography-mass spectrometry (GC-MS)
	4.Fluorene	gas chromatography-mass spectrometry (GC-MS)
	5.Phenanthrene	gas chromatography-mass spectrometry (GC-MS)
	6.Anthracene	gas chromatography-mass spectrometry (GC-MS)
	7.Fluoranthene	gas chromatography-mass spectrometry (GC-MS)
	8.Pyrene	gas chromatography-mass spectrometry (GC-MS)
	9.Benzo[a]anthracene	gas chromatography-mass spectrometry (GC-MS)
	10.Crysene	gas chromatography-mass spectrometry (GC-MS)
	11.Benzo[b]fluoranthene	gas chromatography-mass spectrometry (GC-MS)
	12.Benzo[k]fluoranthene	gas chromatography-mass spectrometry (GC-MS)
	13.Benzo[a]pyrene	gas chromatography-mass spectrometry (GC-MS)
	14.Benzo (g,h,i)perylene	gas chromatography-mass spectrometry (GC-MS)
	15.Dibenzo(a,h)anthracene	gas chromatography-mass spectrometry (GC-MS)
	16.Indeno(1,2,3-c,d)pyrene	gas chromatography-mass spectrometry (GC-MS)
	Total petroleum hydrocarbons (TPH	Fluorescent method
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	

Descriptor	**D8/D9 Contaminants**				
Indicator	**PCBs in sediment**				
Parameters	The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).				
	Parameter	**Background**	**Upper**	**Unit**	**Monitoring**

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		Level	Limit		Frequency
	p,p' DDD	zero	-	µg/kg dry weight	twice per year
	p,p' DDT	zero	-	µg/kg dry weight	twice per year
	p,p' DDE	zero	2.2	µg/kg dry weight	twice per year
	Aldrine	zero	-	µg/kg dry weight	twice per year
	Heptachlor	zero	-	µg/kg dry weight	twice per year
	Lindane (gamma HCH)	zero	3.0	µg/kg dry weight	twice per year
	Dieldrin	zero	2.0	µg/kg dry weight	twice per year
	Endrin	zero	-	µg/kg dry weight	twice per year
	HCB	zero	20.0	µg/kg dry weight	twice per year
	PCB 28	zero	1.7	µg/kg dry weight	twice per year
	PCB 52	zero	2.7	µg/kg dry weight	twice per year
	PCB 153	zero	40	µg/kg dry weight	twice per year
	PCB 138	zero	7.9	µg/kg dry weight	twice per year
	PCB 101	zero	3.0	µg/kg dry weight	twice per year
	PCB 118	zero	0.6	µg/kg dry weight	twice per year
	PCB 180	zero	12	µg/kg dry weight	twice per year
Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above				
	Compared to" Upper Limit" there are frequently exceedances for Lindane, and occasionally for p,p' DDE , Dieldrin, PCB 28, PCB 52, PCB 101, PCB 118, PCB 138. There are no "Upper Limit set for Heptachlor, Aldrin, Endrin, p,p' DDD and p,p' DDT in sediments.				
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan				
	Parameter	**Indicative value**			
	p,p' DDD	DL - 87			
	p,p' DDT	DL - 56			
	p,p' DDE	DL - 39			
	Aldrine	DL - 90			
	Heptachlor	DL - 60			
	Lindane (gamma HCH)	DL - 38			
	Dieldrin	DL – 13			
	Endrin	DL - 13			
	HCB	DL - 5			
	PCB 28	DL – 80			

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	PCB 52	DL – 48
	PCB 153	DL – 30
	PCB 138	DL – 30
	PCB 101	DL – 20
	PCB 118	DL -10
	PCB180	DL -6
Method	**Parameter**	**Method used**
	p,p' DDD	GC-ECD
	p,p' DDT	GC-ECD
	p,p' DDE	GC-ECD
	Aldrine	GC-ECD
	Heptachlor	GC-ECD
	Lindane (gamma HCH)	GC-ECD
	Dieldrin	GC-ECD
	Endrin	GC-ECD
	HCB	GC-ECD
	PCB 28	GC-ECD
	PCB 52	GC-ECD
	PCB 153	GC-ECD
	PCB 138	GC-ECD
	PCB 101	GC-ECD
	PCB 118	GC-ECD
	PCB180	GC-ECD
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	

Descriptor	**D8/D9 Contaminants**
Indicator	**Heavy metals in sediment**
Parameters	The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average

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<table>
<tr><td></td><td>naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).
<table>
<tr><th>Parameter</th><th>Background Level</th><th>Upper Limit</th><th>Unit</th><th>Monitoring Frequency</th></tr>
<tr><td>Cu</td><td></td><td>40</td><td>µg/g dw</td><td>twice per year</td></tr>
<tr><td>Cd</td><td></td><td>1.2</td><td>µg/g dw</td><td>twice per year</td></tr>
<tr><td>Pb</td><td></td><td>47</td><td>µg/g dw</td><td>twice per year</td></tr>
<tr><td>Ni</td><td></td><td>35</td><td>µg/g dw</td><td>twice per year</td></tr>
<tr><td>Cr</td><td></td><td>81</td><td>µg/g dw</td><td>twice per year</td></tr>
</table></td></tr>
<tr><td>Comments regarding background and upper limits</td><td>Please state whether there are areas where the background level is higher or lower than that stated above</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Indicative values</td><td>For each of the above parameters please give indicative values, as measured by your country’s monitoring plan
<table>
<tr><th>Parameter</th><th>Indicative value (2013 average values)</th></tr>
<tr><td>Cu</td><td>26.85</td></tr>
<tr><td>Cd</td><td>0.69</td></tr>
<tr><td>Pb</td><td>14.75</td></tr>
<tr><td>Ni</td><td>38.75</td></tr>
<tr><td>Cr</td><td>34.22</td></tr>
</table></td></tr>
<tr><td>Method</td><td>Please state the method used for measuring for each parameter and determining the above values
<table>
<tr><th>Parameter</th><th>Method used</th></tr>
<tr><td>Cu</td><td>GF-AAS</td></tr>
<tr><td>Cd</td><td>GF-AAS</td></tr>
<tr><td>Pb</td><td>GF-AAS</td></tr>
<tr><td>Ni</td><td>GF-AAS</td></tr>
<tr><td>Cr</td><td>GF-AAS</td></tr>
</table></td></tr>
<tr><td>Scales to assess GES</td><td>For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.</td></tr>
<tr><td></td><td></td></tr>
</table>

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FACTSHEET 5: Contaminants – In Biota

Descriptor	**D8/D9 Contaminants**				
Indicator	**PAHs in biota**				
Parameters	The parameters for contaminants include synthetic substances (e.g. **PAHs,** PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).				
	Parameter	**Background Level**	**Upper Limit Fish-Bivalve molluscs**	**Unit**	**Monitoring Frequency**
	Polyaromatic hydrocarbons (Σ_{16} PAH):	-	-		
	1.Naphtalene	-	-		
	2.Acenaphthylene	-	-		
	3.Acenaphthene	-	-		
	4.Fluorene	-	-		
	5.Phenanthrene	-	-		
	6.Anthracene	-	-		
	7.Fluoranthene	-	-		
	8.Pyrene	-	-		
	9.Benzo[a]anthracene	-	-		
	10.Crysene	-	-		
	11.Benzo[b]fluoranthene	-	-		
	12.Benzo[k]fluoranthene	-	-		

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	13.Benzo[a]pyrene		Fish: 2 Bivalve molluscs: 10	µg/kg*	
	14.Benzo (g,h,i)perylene	-	-		
	15.Dibenzo(a,h)anthracene	-	-		
	16.Indeno(1,2,3-c,d)pyrene	-	-		
				*wet weight	

Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above	
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan	
	Parameter	**Indicative value**
	Benzo[a]pyrene	Range: DL- 6.0 (µg/kg); Average: 1.8 (µg/kg)
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	Benzo[a]pyrene	gas chromatography-mass spectrometry (GC-MS)
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	

Descriptor	**D8 Contaminants**				
Indicator	**PCBs in biota (both fish and bivalve molluscs)**				
Parameters	The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).				
	Parameter	**Background Level**	**Upper Limit**	**Unit**	**Monitoring Frequency**
	p,p' DDE	Zero	-	µg/kg dry weight	once per year

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	p,p' DDD	zero	-	µg/kg dry weight	once per year
	Dieldrin	zero	-	µg/kg dry weight	once per year
	Aldrine	zero	-	µg/kg dry weight	once per year
	Heptachlor	zero	-	µg/kg dry weight	once per year
	Lindane	zero	-	µg/kg dry weight	once per year
	p,p' DDT	zero	-	µg/kg dry weight	once per year
	Endrin	zero	-	µg/kg dry weight	once per year
	HCB	zero	-	µg/kg dry weight	once per year
	PCB 52	zero	5.4	µg/kg dry weight	once per year
	PCB 118	zero	1.2	µg/kg dry weight	once per year
	PCB 101	zero	6.0	µg/kg dry weight	once per year
	PCB 138	zero	15.8	µg/kg dry weight	once per year
	PCB 153	zero	80	µg/kg dry weight	once per year
	PCB 28	zero	3.2	µg/kg dry weight	once per year
	PCB 180	zero	24	µg/kg dry weight	once per year
Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above				
	Compared to" Upper Limit" there are frequently exceedances for PCB 52 and occasionally for PCB 28, PCB 101, PCB 118, PCB 138. There are no "Upper Limit set for HCB, Lindane, Heptachlor, Aldrin, Endrin, Endrin, p,p' DDD, p,p' DDE and p,p' DDT in biota.				
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan				

Parameter	**Indicative value**
p,p' DDE	DL - 600
p,p' DDD	DL - 800
Dieldrin	DL - 167
Aldrine	DL - 147
Heptachlor	DL - 145
Lindane	DL – 128
p,p' DDT	DL - 106
Endrin	DL - 70
HCB	DL - 35
PCB 52	DL - 283
PCB 118	DL - 144
PCB 101	DL - 133

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	PCB 138	DL - 80
	PCB 153	DL - 36
	PCB 28	DL - 16
	PCB 180	DL - 16
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	p,p' DDE	GC-ECD
	p,p' DDD	GC-ECD
	Dieldrin	GC-ECD
	Aldrine	GC-ECD
	Heptachlor	GC-ECD
	Lindane	GC-ECD
	p,p' DDT	GC-ECD
	Endrin	GC-ECD
	HCB	GC-ECD
	PCB 52	GC-ECD
	PCB 118	GC-ECD
	PCB 101	GC-ECD
	PCB 138	GC-ECD
	PCB 153	GC-ECD
	PCB 28	GC-ECD
	PCB 180	GC-ECD
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	

Descriptor	**D8/D9 Contaminants**
Indicator	**Heavy metals in biota**
Parameters	The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average

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<table>
<tr><td></td><td>naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).
<table>
<tr><th>Parameter</th><th>Background Level</th><th>Upper Limit</th><th>Unit</th><th>Monitoring Frequency</th></tr>
<tr><td>Cu</td><td></td><td></td><td>µg/g dw</td><td>1-2 times/year</td></tr>
<tr><td>Cd</td><td></td><td>5,00 (mussels); 1,20 (fish)</td><td>µg/g dw</td><td>1-2 times/year</td></tr>
<tr><td>Pb</td><td></td><td>7,50 (mussels); 1,20 (fish)</td><td>µg/g dw</td><td>1-2 times/year</td></tr>
<tr><td>Ni</td><td></td><td></td><td>µg/g dw</td><td>1-2 times/year</td></tr>
<tr><td>Cr</td><td></td><td></td><td>µg/g dw</td><td>1-2 times/year</td></tr>
</table></td></tr>
<tr><td>Comments regarding background and upper limits</td><td>Please state whether there are areas where the background level is higher or lower than that stated above</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Indicative values</td><td>For each of the above parameters please give indicative values, as measured by your country’s monitoring plan
<table>
<tr><th>Parameter</th><th>Indicative value (mussels 2013 average data)</th></tr>
<tr><td>Cu</td><td>20.95</td></tr>
<tr><td>Cd</td><td>2.57</td></tr>
<tr><td>Pb</td><td>1.28</td></tr>
<tr><td>Ni</td><td>8.20</td></tr>
<tr><td>Cr</td><td>3.44</td></tr>
</table></td></tr>
<tr><td>Method</td><td>Please state the method used for measuring for each parameter and determining the above values
<table>
<tr><th>Parameter</th><th>Method used</th></tr>
<tr><td>Cu</td><td>GF-AAS</td></tr>
<tr><td>Cd</td><td>GF-AAS</td></tr>
<tr><td>Pb</td><td>GF-AAS</td></tr>
<tr><td>Ni</td><td>GF-AAS</td></tr>
<tr><td>Cr</td><td>GF-AAS</td></tr>
</table></td></tr>
<tr><td>Scales to assess GES</td><td>For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.</td></tr>
<tr><td></td><td></td></tr>
</table>

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ACTIVITY 3: SELF-ASSESSMENT TOOL FOR ASSESSING GES FOR EUTROPHICATION AND CONTAMINANTS

Country	Turkey
Region	Black Sea
Neighboring Regions	Marmara Sea
Partner	TUBITAK

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FACTSHEET 1: Eutrophication - Nutrients

<table>
<tr><td>Descriptor</td><td colspan="5">D5 Eutrophication</td></tr>
<tr><td>Indicator</td><td colspan="5">Nutrients</td></tr>
<tr><td>Parameters</td><td colspan="5">The parameters for nutrients include nitrogen and phosphorus compounds, ammonia and sediment organic matter.
In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).</td></tr>
<tr><td></td><td>Parameter</td><td>Background Level</td><td>Upper Limit</td><td>Unit</td><td>Monitoring Frequency</td></tr>
<tr><td></td><td>PO4_P</td><td>0,04</td><td>-</td><td>µM</td><td>Twice / year</td></tr>
<tr><td></td><td>NO3+NO2_N</td><td>0,90</td><td>-</td><td>µM</td><td>Twice / year</td></tr>
<tr><td></td><td>NH4_N</td><td>-</td><td>-</td><td>µM</td><td>Twice / year</td></tr>
<tr><td></td><td>SiO2</td><td>4,81</td><td>-</td><td>µM</td><td>Twice / year</td></tr>
<tr><td></td><td>TP</td><td>0,26</td><td>0,32*</td><td>µM</td><td>Twice / year</td></tr>
<tr><td>Comments regarding background and upper limits</td><td colspan="5">Please state whether there are areas where the background level is higher or lower than that stated above</td></tr>
<tr><td></td><td colspan="5">Background values were obtained as average for open waters (>1 nm) of the western black sea, 0-10 m depths for winter period of 2008-2011.
These values also change for western and eastern black sea and seasonally.

Upper values are not defined for the above parameters for marine waters.
*National legislation(2009): Oligotrophic conditions for the Black Sea . This legislation sets criteria for other trophic levels and also for Chl, TN and SDD.</td></tr>
<tr><td>Indicative values</td><td colspan="5">For each of the above parameters please give indicative values, as measured by your country’s monitoring plan</td></tr>
<tr><td></td><td>Parameter</td><td colspan="4">Indicative value</td></tr>
<tr><td></td><td>PO4_P</td><td colspan="4">0.01-0.17 (min-max values for the above period and area)</td></tr>
<tr><td></td><td>NO3+NO2_N</td><td colspan="4">0.04-4.94 (min-max values for the above period and area)</td></tr>
<tr><td></td><td>NH4_N</td><td colspan="4">-</td></tr>
</table>

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	SiO2	0.04-29.5 (min-max values for the above period and area)
	TP	0.08-0.78 (min-max values for the above period and area)
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	PO4_P	Colorimetric : Grasshoff et al. 1983, S.M. 4500-P : 2005 G
	NO3+NO2_N	Colorimetric : Grasshoff et al. 1983, S.M. 4500-P : 2005 G
	SiO2	SM 4500-SiO2 C 21. 2005
	TP	Persulfate oxidation- colorimetric : Grasshoff et al. 1983, S.M. 4500-P : 2005 G
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	
	Initially 10percentil of data is excepted as reference value and the ref+50% deviation is the target value for GES.	

Ref to the Project:

TUBITAK-MRC and MoEU-GDEM (2014). Marine and Coastal Waters Quality Determination and Classification Project (DeKoS). ÇTÜE 5118703, Report No. ÇTÜE.13.155 (Final Report), February 2014, Gebze-Kocaeli, Turkey.

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FACTSHEET 2: Eutrophication - Phytoplankton

<table>
<tr><td>Descriptor</td><td colspan="5">D5 Eutrophication</td></tr>
<tr><td>Indicator</td><td colspan="5">Phytoplankton</td></tr>
<tr><td rowspan="4">Parameters</td><td colspan="5">The parameters for nutrients include chlorophyll a, primary production, microalgae and phytoplankton.
In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).</td></tr>
<tr><td>Parameter</td><td>Background Level</td><td>Upper Limit</td><td>Unit</td><td>Monitoring Frequncy</td></tr>
<tr><td>Chl-a</td><td>0,95</td><td>1,00</td><td>µg/L</td><td>Twice/year</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">Comments regarding background and upper limits</td><td colspan="5">Please state whether there are areas where the background level is higher or lower than that stated above</td></tr>
<tr><td colspan="5">Background values were obtained as average for open waters (>1 nm) of the western black sea, 0-10 m depths for winter period of 2008-2011.
These values also change for western and eastern black sea and seasonally.

*National legislation(2009): Oligotrophic conditions for the Black Sea . This legislation sets criteria for other trophic levels and also for TP, TN and SDD.</td></tr>
<tr><td rowspan="4">Indicative values</td><td colspan="5">For each of the above parameters please give indicative values, as measured by your country’s monitoring plan</td></tr>
<tr><td colspan="2">Parameter</td><td colspan="3">Indicative value</td></tr>
<tr><td colspan="2">Chl-a</td><td colspan="3">0.05-3.2 (min-max values for the above period and area)
10% percentile(reference value): 0,45</td></tr>
<tr><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td rowspan="3">Method</td><td colspan="5">Please state the method used for measuring for each parameter and determining the above values</td></tr>
<tr><td colspan="2">Parameter</td><td colspan="3">Method used</td></tr>
<tr><td colspan="2"></td><td colspan="3"></td></tr>
</table>

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Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.

FACTSHEET 3: Eutrophication - Other

Descriptor	**D5 Eutrophication**				
Indicator	**Other**				
Parameters	The parameters for nutrients include secchi depth and dissolved oxygen concentration. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).				
	Parameter	**Background Level**	**Upper Limit**	**Unit**	**Monitoring Frequency**
	SDD	10	>6	m	Twice/year
	DO				
Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above				
	Background values were obtained as average for open waters (>1 nm) of the western black sea in winter period of 2008-2011. These values also change for western and eastern black sea and seasonally. *National legislation(2009): Oligotrophic conditions for the Black Sea . This legislation sets criteria for other trophic levels and also for TP, TN and Chl-a.				
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan				
	Parameter	**Indicative value**			
	SDD	6.6-16.4 m (min-max values for the above period and area)			
	DO				
Method	Please state the method used for measuring for each parameter and determining the above values				
	Parameter	**Method used**			

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	SDD	Secchi disk
	DO	Winkler method
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	
	10 Percentil of data proposed as reference : 5.3 m Target as set by expert judgement: >5 m For bottom DO: Instead of bottom DO values, sigma-t 14.3-14.4 and 15.4 values might be considered for the western black sea. GES target values for these density layers were proposed respectively as >% 85 for 14.3 and >40-50 uM for 15.4.	

Ref to the Project:

TUBITAK-MRC and MoEU-GDEM (2014). Marine and Coastal Waters Quality Determination and Classification Project (DeKoS). ÇTÜE 5118703, Report No. ÇTÜE.13.155 (Final Report), February 2014, Gebze-Kocaeli, Turkey.

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FACTSHEET 4: Contaminants – In Water

WE DO NOT MONITOR CONTAMINANTS IN WATER

<table>
<tr><td>Descriptor</td><td colspan="5">D8/D9 Contaminants</td></tr>
<tr><td>Indicator</td><td colspan="5">In water</td></tr>
<tr><td rowspan="3">Parameters</td><td colspan="5">The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides.
In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).</td></tr>
<tr><td>Parameter</td><td>Background Level</td><td>Upper Limit</td><td>Unit</td><td>Monitoring Frequency</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">Comments regarding background and upper limits</td><td colspan="5">Please state whether there are areas where the background level is higher or lower than that stated above</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td rowspan="3">Indicative values</td><td colspan="5">For each of the above parameters please give indicative values, as measured by your country’s monitoring plan</td></tr>
<tr><td>Parameter</td><td colspan="4">Indicative value</td></tr>
<tr><td></td><td colspan="4"></td></tr>
<tr><td rowspan="3">Method</td><td colspan="5">Please state the method used for measuring for each parameter and determining the above values</td></tr>
<tr><td>Parameter</td><td colspan="4">Method used</td></tr>
<tr><td></td><td colspan="4"></td></tr>
<tr><td rowspan="2">Scales to assess GES</td><td colspan="5">For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.</td></tr>
<tr><td colspan="5"></td></tr>
</table>

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FACTSHEET 5: Contaminants – In Sediment

DATA ON ORGANIC CONTAMINANTS IS SCARCE.

<table>
<tr><td>Descriptor</td><td colspan="5">D8/D9 Contaminants</td></tr>
<tr><td>Indicator</td><td colspan="5">In sediment</td></tr>
<tr><td rowspan="10">Parameters</td><td colspan="5">The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides.
In the table below, please add all the parameters that are being monitored <u>AND</u> for which there are available monitoring data. Add the most characteristic parameters for our region first.
For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).</td></tr>
<tr><td>Parameter</td><td>Background Level</td><td>Upper Limit</td><td>Unit</td><td>Monitoring Frequency</td></tr>
<tr><td>Hg (dry weight)</td><td>52</td><td></td><td>mg/kg</td><td>1 /yr (planned)</td></tr>
<tr><td>Cd (dry weight)</td><td>0,38</td><td></td><td>mg/kg</td><td>“</td></tr>
<tr><td>Pb (dry weight)</td><td>28</td><td></td><td>mg/kg</td><td>“</td></tr>
<tr><td>Zn (dry weight)</td><td>119</td><td></td><td>mg/kg</td><td>“</td></tr>
<tr><td>Cu (dry weight)</td><td>58</td><td></td><td>mg/kg</td><td>“</td></tr>
<tr><td>Cr (dry weight)</td><td>84</td><td></td><td>mg/kg</td><td>“</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Comments regarding background and upper limits</td><td colspan="5">Please state whether there are areas where the background level is higher or lower than that stated above</td></tr>
<tr><td colspan="5">Average of 2004, 2009 and 2010 measurements.

Upper limits not defined for sediment.

ERL and enrichment factors are used for assessment.</td></tr>
<tr><td rowspan="2">Indicative values</td><td colspan="5">For each of the above parameters please give indicative values, as measured by your country’s monitoring plan</td></tr>
<tr><td>Parameter</td><td colspan="4">Indicative value</td></tr>
</table>

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	Hg	0,04-286 (min-max of measured values)
	Cd	0,03-1,04 (min-max of measured values)
	Pb	2,5-79,8 (min-max of measured values)
	Zn	41-200 (min-max of measured values)
	Cu	2,9-408 (min-max of measured values)
	Cr	14-316 (min-max of measured values)
Method	Please state the method used for measuring for each parameter and determining the above values	
	Parameter	**Method used**
	Hg	AAS – Cold Vapour
	Other metals	ICP-OES, EPA Method 3051 a
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.	
	Sediment quality criteria has to be developed for GES and non-GES.. Not done yet. So, we used in DeKoS (our national Project) ERL and Enrichment Factor assessments.	

Ref to the Project:

TUBITAK-MRC and MoEU-GDEM (2014). Marine and Coastal Waters Quality Determination and Classification Project (DeKoS). ÇTÜE 5118703, Report No. ÇTÜE.13.155 (Final Report), February 2014, Gebze-Kocaeli, Turkey.

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FACTSHEET 5: Contaminants – In Biota

DATA IS SCARCE.

Descriptor	**D8/D9 Contaminants**				
Indicator	**In biota**				
Parameters	The parameters for contaminants include synthetic substances (e.g. PAHs, PCBs, pesticides etc), non-synthetic substances (e.g. metals such as Cu, Cd, Hg etc), petroleum hydrocarbons and radionuclides. In the table below, please add all the parameters that are being monitored **AND** for which there are available monitoring data. Add the most characteristic parameters for our region first. For each of these parameters, please give the background level (the yearly average naturally occurring concentration) the upper limit (as set by national or European legislation), as well as the units that these are measured in, and the monitoring frequency (per year).				
	Parameter	**Background Level**	**Upper Limit**	**Unit**	**Monitoring Frequency**
Comments regarding background and upper limits	Please state whether there are areas where the background level is higher or lower than that stated above				
Indicative values	For each of the above parameters please give indicative values, as measured by your country's monitoring plan				
	Parameter	**Indicative value**			
Method	Please state the method used for measuring for each parameter and determining the above values				
	Parameter	**Method used**			
Scales to assess GES	For each parameter, please state the predefined scale that is used to assess progress towards GES, if any.				

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Appendix C – The DeCyDe-4-IRIS Participatory self assessment method towards GES and MSFD integrated monitoring.

C.1. Introduction – concept

In order to serve the needs for GES of MSFD, and have a strategic role in the decision making process, the DeCyDe-4 method has been adapted to IRIS-SES needs and the DeCyDe-4-IRIS method and toolbox has been developed. The aim is threefold:

- To develop a strategic decision support method and framework that supports the decision makers and the stakeholders to understand and justify the main issues that are involved in the process of decision-making and the trade-offs between different decision alternatives.
- To enhance experts and key actors involvement and create an engagement toolbox and
- To develop a self- assessment tool for GES and integrated monitoring efforts, supporting IRIS's aim for *sustainability of achievements*. The tool will remain in operation and be part of the monitoring process, after the end of the project.
- To develop a set of guidelines on implementable abatement measures that can be considered in countries' strategic roadmap/ action plan, in their policies for implementing MFSD, towards GES.

The DeCyDe-4-IRIS method was developed for two descriptors (5 and 8/9), and will be implemented at the regional level during the two IRIS regional stakeholder meetings (one for the Mediterranean and one for the Black Sea) that will be held during the project.

C.2. Implementing DeCyDe-4-IRIS method

The process of the implementation of the DeCyDe-4-IRIS method in IRIS regional workshops consists of the following three successive parts, from A to C. It is important to ensure that the participants in the regional stakeholder meetings are able to provide real site specific input and expertise, and will be committed to incorporate the new methods and suggestions in their work/ processes:

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C.2.1 PART A: Preparatory phase

Partners will be asked to be prepared for the workshop, in order to maximize the impact of the workshop outcomes. Two documents will be sent to the partners at least one month before the workshop: the factsheets for descriptors 5 and 8/9 and the stakeholder mapping, as described below. Partners will complete them and will send the completed, site specific documents to ISOTECH prior to the meeting, in order to set up the score board for each partner country, as described in part B of this document.

1. ***The DeCyDe-4-IRIS factsheets for Descriptors 5 and 8/9***: at least one month before each of the regional stakeholder workshop, the participating partners will receive certain factsheets that they will have to complete, regarding eutrophication and contaminants. Using these factsheets, partners will need to provide information on eutrophication and contaminant parameters that are being measured in specific region(s) in their country. Partners will be required to choose regions that are neighboring to other partner countries. The information that partners will have to report appears in the attached factsheet and includes:
    a. what is being monitored (adding the 5 most important parameters at the top),
    b. How, i.e. the method of monitoring
    c. what is the baseline concentration in the particular region, what is the upper level set by national or European legislation and what are indicative values recorded in that specific region.

It is important to keep in mind, that the information required here should be brief and representative.

2. ***Mapping of key actors and stakeholders***: The list of the DeCyDe-4-IRIS key actor and stakeholder categories that have an important role in MFSD descriptor monitoring and the target of GES, has been prepared and will be sent to the partners that will attend each of the regional stakeholder workshops. The partners should identify people that fall within those specific categories. The stakeholder/ key actors "blend" list will form part of the discussion during Part D of the regional workshops, aiming to identify possible

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problems and needs when trying to involve stakeholders. It is thus important that the partners communicate with the people whom they will identify as national stakeholders/ key actors, in order to have a real idea of their reactions, suggestions, and needs. The stakeholders/ key actors will form the national IRIS stakeholder group, which will play an important role for the implementation and sustainability of IRIS outcomes.

C.2.2 PART B: The DeCyDe-4-IRIS toolbox:

1. ***The DeCyDe-4-IRIS "score board":*** Based on the ***existing situation***, that will be derived from the DeCyDe-4-IRIS factsheets in each region, i.e. the parameters that have been identified as important for each descriptor, and the background and upper levels recorded in the factsheets, Isotech will deduct the "ranges" that will be used in the self-assessment tool, aiming at GES. The DeCyDe-4-IRIS score boards will be developed and set up for each country for the specific region which will be identified by the partners on the factsheets, in order to be ready during the IRIS Regional Workshop to work with this tool. Apart from addressing the GES, the scoreboards will include the frequency of monitoring per country/region, per parameter, per descriptor, in order to provide regional participants with more tools to promote cooperation in descriptors monitoring.

2. **The *Source-pollutant Matrix*** per descriptor
    a. The ***Source-pollutant Matrix***, will be developed for each descriptor. The matrix will address the main sources of pollutants for each of the descriptor parameters. It will be used alongside the self-assessment tool to assist decision-makers and stakeholders to pinpoint possible causes for underperformance.

3. **The list of *Abatement Measures*** per source/industrial sector
    a. Mapping the sources of pollutants and the identification of solutions/measures per source of pollution is a very challenging perspective, which is not part of IRIS tasks. A general list of possible Abatement Measures is developed through DeCyDe-4-IRIS and used here, as a tool. The Abatement Measures list will be used by together with the Source-pollutant Matrix to provide with a framework that supports the decision makers and the stakeholders to understand and justify

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the main issues that are involved in the process of decision-making and the trade-offs between different decision alternatives.

C.2.3 PART C: The DeCyDe-4-IRIS Regional Workshop

Part C of the methodology will be implemented during the IRIS Regional Workshop. Stakeholders and decision makers are expected to participate to IRIS-SES regional workshops.

Each workshop will last about 4 hours. The collective opinions of these partners (key actors and stakeholders) as per the gaps and needs in monitoring and the possible implementation of abatement measures towards GES, will be drafted into a report, to be presented to the Commission as part of IRIS-SES strategic suggestions.

The workshops are structured on group work and will have **three** distinct but interrelated stages, aiming to:

- Guide the partners through the Self Assessment process;
- Identify the gaps, problems and needs of their country/region with regards to eutrophication and contaminants monitoring
- Discuss on possibilities of joint monitoring
- Improve coordination among neighboring countries.
- Discuss possible abatement measures for the improvement of GES

Step 1:

The DeCyDe-4-IRIS self-assessment tool - Scoring through ranges to identify the problems: To start off the workshop, the participants will be asked to form "regional groups", i.e. groups with participants from their neighboring countries/regions. Using the information submitted in the factsheets according to their country and using the DeCyDe-4-IRIS self-assessment tool developed for each region/country and the factsheets, in which indicative concentrations of parameters were recorded, they will score their country/region. The scores of individual countries/regions will be discussed among the regional groups and major differences will be identified and discussed. Where scores are lower than the average, a discussion on the possible

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reasons will help identify the problems in specific regions or countries. Each group will present their outcomes to the plenary.

Step 2:

Gaps in cooperation in MSFD descriptors monitor - proposals on how to improve joint monitoring possibilities: having their self assessment tools filled and discussed the participants will be asked again to go back to their groups for the second DeCyDe-4-IRIS workshop:

a. what are the monitoring/measurement needs in each country and what are the common ones for the region. Each participant will be given 1 post-it on which to write the major need according to their opinion. Then each group will identify the common needs of their group.
b. Following the same procedure as in point (a) above, the participants will be asked to identify possible collaboration opportunities (i.e. whether the monitoring scheme of one country/region could be expanded to include another country/region and fill in a monitoring gap, joint use of infrastructure etc).

The groups will then be asked to report this back to plenary.

The results from activities (a) and (b) will be collected and grouped according to their category (i.e. whether they regard infrastructure, policy etc) and if possible their region and will be reported.

Step 3:

Abatement Measures: This part of the workshop starts with an open discussion on the source-pollutant relationships, using the source pollutant matrix as a tool. Then the participants will again go back to their groups and will be asked to identify 1-2 possible measures, from the Abatement Measures List, that can be implemented per source/ per descriptor, in their region. Each group will report to plenary. This part of the workshop will provide with a useful strategic tool: possible implementable abatement measures will be identified by the decision makers/ stakeholders themselves in cooperation with their counterparts from the neighbouring countries. The result of this innovative and participatory part of the workshops will form a guideline for promoting specific actions towards GES.

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C.3. Scope and expected outcomes of the DeCyDe-4-IRIS Workshop

The DeCyDe-4-IRIS workshop will enable key actors, decision makers and stakeholders to:

1. **Introduce in their activities a self-assessment process:** with the use of the self-assessment tool, partners will be able to "score" their country/region with regards to meeting GES for Descriptors 5 and 8/9, monitor their progress over time and test the effects of any changes in monitoring and management to their overall score. Easily identify which parameters need to be improved in order to increase their overall score.
2. **Record the challenges and opportunities to improve regional cooperation for the implementation of the Marine Strategy Monitoring Schemes**. Provide with the experts opinion on monitoring gaps and needs and ideas on how-to improve joint monitoring actions on MFSD descriptors;
3. **Formulate a strategic guideline, with specific and implementable abatement measures that will support MFSD target of GES**

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Appendix D – Proposed Abatement Measures to Improve the Environmental Status Related to Eutrophication (D5) and Contaminants (D8/D9)

Source 1: Municipal Waste

A. Sewage

1. Absorption pits
2. Sewerage system with primary wastewater treatment and discharge in the sea
3. Sewerage system with secondary wastewater treatment and discharge in the sea
4. Sewerage system with tertiary wastewater treatment and discharge in the sea
5. Sewerage system with primary wastewater treatment and use of treated water for agricultural or other purposes
6. Sewerage system with secondary wastewater treatment and use of treated water for agricultural or other purposes
7. Sewerage system with tertiary wastewater treatment and use of treated water for agricultural or other purposes
8. Sewerage system with tertiary wastewater treatment and additional nutrient minimization techniques
9. Place emergency outfalls for wastewater treatment plans away from the coast
10. Return of treated water to main users
11. In coastal hotels:
    a. Minimize the use of chemical fertilizers on grass and green spaces
    b. Replace chemical fertilizers with low release organic soil conditioners (e.g. compost)
    c. Establish private water desalination plants
    d. Secure the diversion of sewage from the sea by:
        i. Establishing connections with the sewerage system
        ii. Implementing private tertiary treatment stations with controlled use of water on-site
        iii. Storage in watertight tanks and transfer to a central treatment station
12. Other (please specify)

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B. Other Municipal Discharges

1. Avoid the direct discharge of rainwater to rivers and the sea
2. Create artificial reef ponds/ buffer zones or other areas of vegetation
3. Replace materials that release pollutants e.g. PAHs, heavy metals (from e.g. asphalt, petrol) with other less harmful alternatives
4. Other (please specify)

Source 2: Industrial Waste

1. Separate waste streams to ensure the proper management of each stream
2. According to the waste stream, the following methods can be applied:
    a. Reuse in other operations
    b. Material recovery
3. Pre-treatment of wastewater and transfer to a central municipal wastewater treatment plant
4. Central industrial wastewater treatment plant in industrial zones
5. Private wastewater treatment plants
6. Watertight evaporation ponds, or watertight tanks that will hold the wastewater until it is ready to be transported to a wastewater treatment plant
7. Limit emissions through stricter legislation and practical measures e.g. new equipment that minimizes PAH emissions from diesel central heating engines
8. Other (please specify)

Source 3: Farming including aquaculture

1. Apply automatic control and feeding systems-codes-technologies in farming – aquaculture
2. Periodically or permanently transfer aquaculture cages to a significant distance from the coast
3. Reduction of hatcheries wastewater polluting load through managerial, or/and technological interventions

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4. Construct watertight evaporation tanks for the diversion of liquid-solid farming waste from surface runoff
5. Anaerobic digestion at the central and private level
6. Other waste treatments (e.g. soil conditioners etc.)
7. Rainwater control on farming units
8. Use appropriate material and carry out due studies for watertight evaporation tanks
9. Other (please specify)

Source 4: Agriculture

1. Promote organic agriculture
2. Apply a good agricultural practice code, complemented by a certification process
3. Training-Awareness Raising campaigns on proper agricultural care for the reduction of chemical/synthetic fertilizers and/or the gradual use of slow release organic soil conditioners (e.g. compost)
4. Prohibit the use of chemical fertilizers to end nitrification (protected EU areas)
5. Use alternative crops with limited fertilisation requirements
6. Promote crop rotation with appropriate crops/species
7. Other (please specify)

Source 5: Shipping – Nautical Tourism and Energy (hydrocarbon exploration and mining)

1. Avoid copper based antifoulants
2. Provide incentives for technical modifications / changes to ship engines to improve combustion and reduce emissions
3. Impose stricter ship emission limits
4. Prohibit the disposal of wastewater from boats, regardless of boat size
5. Implement an indirect fee system
6. Other (please specify)

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Appendix E – List of Participants at the Black Sea DeCyDe-4-IRIS Workshop

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