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# Contaminants assessment at the national level - Romania -

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ANEMONE Workshop  
19 - 20 June 2019, Istanbul, Turkey

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## Overview of the existing contaminants monitoring

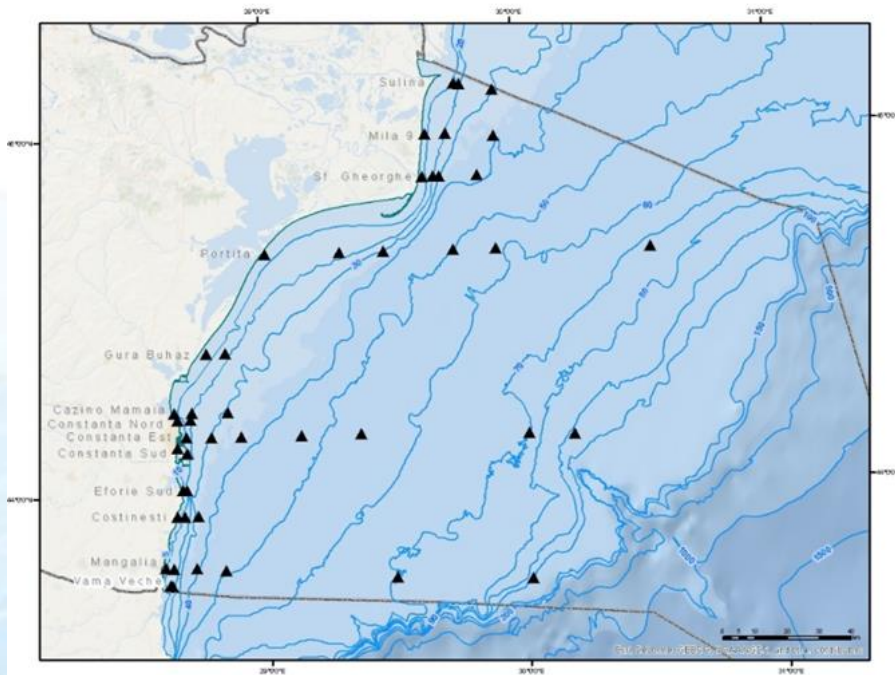


Fig. Integrated Marine Monitoring Network

### Monitoring stations network:

The national marine monitoring network covers the national transitional, coastal and marine waters, and is represented by 45 permanent stations, which reach down to 100 m depth and approx. 65 nm from the base line, positioned on 13 transects arranged along the Romanian coastline.

### Assessment areas:

- **BLK\_RO\_RG\_TT03\_ Waters with variable salinity** – waters with variable salinity located in the north, under the direct influence of the Danube, from the mouth of the river in the Black Sea, south to the Portița, at depths of up to 30m. The waters are delimited by the average seasonal salinity up to 8.0 PSU and an annual average up to 14.5 psu;
- **BLK\_RO\_RG\_CT\_Coastal waters** - are the coastal water from the central to the south (from Portița to Vama Veche), from the base line to the isobath of 30m. The waters are delimited by the average seasonal salinity 8-16 PSU and an annual average up to 16.0 PSU;
- **BLK\_RO\_RG\_MT01\_Marine Waters** – the marine waters area from the 30 m isobath to 200m; The waters inside and outside the continental platform, delimited by the average seasonal and annual salinity in the range 16 – 17, 5PSU;

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## Overview of the existing contaminants monitoring

Parameters included in the national marine monitoring programme, D8, D9

- Monitoring cruises are conducted 1-2 times/year;

Monitoring ecosystem components	Monitoring parameters	Relevance to MSFD Monitoring programme
<b>Matrix: WATER COLUMN</b>		
<b>Synthetic and non-synthetic contaminants</b>	Levels (concentrations); Trends; EQS compliance Heavy metals (copper, cadmium, lead, nickel, chromium, etc.); Persistent organic pollutants (organochlorinated pesticides, polychlorinated biphenyls, total petroleum hydrocarbons, polycyclic aromatic hydrocarbons)	BLKRO-D8
<b>Bacterial indicators</b>	Levels (concentrations); Trends; EQS compliance Pathogenic microbial organisms: total coliforms germ; Fecal coliforms germ; Fecal streptococci	BLKRO-D8
<b>Matrix: SEDIMENT</b>		
<b>Synthetic and non-synthetic contaminants</b>	Levels (concentrations); Trends; SQC compliance Heavy metals (copper, cadmium, lead, nickel, chromium, etc.); Persistent organic pollutants (organochlorinated pesticides, polychlorinated biphenyls, total petroleum hydrocarbons, polycyclic aromatic hydrocarbons); Total organic carbon (TOC), granulometry;	BLKRO-D8
<b>Matrix: BIOTA (mollusks, fish)</b>		
<b>Synthetic and non-synthetic contaminants</b>	Levels (concentrations); Trends; MAC compliance The degree of contamination with hazardous chemicals: heavy metals (copper, cadmium, lead, nickel, chromium, mercury, s.a.), persistent organic pollutants (total petroleum hydrocarbons, polynuclear aromatic hydrocarbons, organo-chlorinated pesticides, Polychlorinated biphenyl); Microbial pathogenic organisms;	BLKRO-D9



## Overview of the existing contaminants monitoring



- Scientific cruises with the R/V Sea Star 1 are generally organized 2 times/year;
- Water samples (surface horizon), sediments (surface layer) and marine mollusks are collected with specific devices (Nansen bathometers, bodengreifer Van Veen, and beam trawl, respectively);
- The samples are processed and analysed in the specialized laboratories of INCDM, using reference methods for marine pollution studies (UNEP, IAEA-MEL, s.a);

- Procedures for quality assurance and control of data are applied, including participation in European programs for intercomparison of analytical data, such as: QUASIMEME and IAEA-MEL, and also using certified reference materials and internal standards;

## Overview of the existing contaminants monitoring

**Heavy metals** are determined in unfiltered marine water samples, acidified up to pH = 2 with HNO<sub>3</sub> Ultrapur, and in sediments and biota after acid digestion (HNO<sub>3</sub> Ultrapur), using Graphite Furnace Atomic Absorption Spectrometry (GF-AAS).

**TPH** – Total content in petroleum hydrocarbons – Fluorescence method;

**Polynuclear aromatic hydrocarbons (PAH)** - for calibration, a standard containing a mixture of 16 PAHs is used: naphthalene, acenaftilene, acenaften, fluorene, phenantren, anthracene, fluoranten, piren, benzo [a] anthracene, crisen, benzo [b] fluoranten, benzo [K] fluoranten, benzo [a] piren, benzo (g, h, i) perilen, dibenzo (a, h) anthracene, indeno (1, 2, 3-c, d) piren and 9.10 dihydroanthracene as an internal standard. The PAHs determination is carried out in the following stages: extraction, purification, concentration and gas chromatographic with mass spectrometer (detector) analysis (GC-MS);

### **Organic pesticides and polychlorinated biphenyls**

The analyzed compounds are HCB, lindan, heptaclor, aldrin, dieldrin, endrin, p, p '-DDE, p, p '-DDD, p, p '-DDT and polychlorinated biphenyls: PCB 28, PCB 52, PCB 101, PCB 118, PCB 138, PCB 153, PCB 180. The analytical determination is made by the gas chromatography with electron capture detector method (GC-ECD).

## Overview of the existing contaminants monitoring

- Contaminants monitoring is included in the national monitoring programme , adapted to MSFD and BSIMAP requirements, financing being assured by Ministry of Water and Forestry, and also through contribution of various scientific projects;
- Existing data sets allow trends assessment for the last 10-20 years.

Results are included in:

- ✓ National monitoring reports, Ministry of Water and Forestry (MWF);
- ✓ Scientific projects reports;
- ✓ Contributions to the National Report on the State of Environment in Romania, National Agency for Environmental Protection;
- ✓ Reports to Black Sea Commission, Pollution Monitoring and Assessment (PMA) Advisory Group;
- ✓ Report on the Initial assessment (IA) of Black Sea waters, MSFD art. 8,9,10; **2006 – 2011** period, MWF;
- ✓ Report on the Re-evaluation of IA, MSFD art. 17, **2012 – 2017** period, MWF;



## Descriptor 8: indicators, GES assessment and targets

Proposed Indicator	GES	Proposed target	Environmental objectives	
Heavy metals concentration in superficial marine sediments.	Concentrations of the relevant contaminants measured in appropriate matrices (water, sediment or biota) are lower than concentrations at which negative effects may occur or demonstrate a downward tendency. – Coastal waters (up to 12 nautical miles): the concentrations of relevant contaminants, measured in appropriate matrices (water, sediment or biota) complies with environmental quality standards used in the WFD in 12 nm zone (for priority substances) or 1 nm area (for all other substances). – Waters of the wide area (from 1 or 12 nautical miles, respectively): the concentrations of relevant contaminants in the appropriate matrices (water, sediment or biota) comply with environmental quality standards or demonstrate a downward tendency.	The '75 <sup>th</sup> percentile of heavy metals concentrations measured in sediment is less than the levels from which adverse effects are expected ( <b>ERL/US EPA; EAC/OSPAR; SQC/Ord. 161/2006</b> )	<p style="background-color: #0056b3; color: white; padding: 2px;"><b>Status Objective:</b></p> The concentrations of contaminates in water, sediment and biota do not present increasing tendencies.	
Heavy Metals concentration in marine waters		The '75 <sup>th</sup> percentile of heavy metals concentrations measured in marine waters is less than the levels from which adverse effects are expected ( <b>WFD-EQS/Directive 2013/39/EU;/Ord.161/2006</b> )		
Concentration of synthetic contaminants in superficial marine sediments.		The '75 <sup>th</sup> percentile of the concentrations of synthetic contaminants measured in sediment is less than the levels from which adverse effects are expected ( <b>ERL/US EPA; EAC/OSPAR</b> )		<p style="background-color: #0056b3; color: white; padding: 2px;"><b>Pressure Objective:</b></p> The intake of contaminants in the marine environment is reduced.
Concentration of synthetic contaminants in bivalve molluscs.		The '75 <sup>th</sup> percentile of the concentrations of synthetic contaminants measured in <i>Mytilus galloprovincialis</i> is less than the levels from which adverse effects are expected ( <b>EAC/OSPAR</b> )		
Concentration of synthetic contaminants in marine waters		The '75 <sup>th</sup> percentile of the concentrations of synthetic contaminants measured in marine waters is less than the levels from which adverse effects are expected ( <b>WFD-EQS/Directive 2013/39/EU</b> )		<p style="background-color: #0056b3; color: white; padding: 2px;"><b>Impact Objective:</b></p> The percentage of samples of water, sediment and biotin that exceed the values proposed as a limit for good ecological status for contaminants is reduced (< 25%).
Concentration of polynuclear aromatic hydrocarbons in superficial marine sediments.		The '75 <sup>th</sup> percentile of polynuclear aromatic hydrocarbons concentrations measured in sediment is less than the levels from which adverse effects are expected ( <b>ERL/US EPA; EAC/OSPAR</b> )		
Concentration of polynuclear aromatic hydrocarbons in marine waters		The '75 <sup>th</sup> percentile of polynuclear aromatic hydrocarbons concentrations measured in marine waters is less than the levels from which adverse effects are expected ( <b>WFD-EQS/Directive 2013/39/EU</b> )		

## Descriptor 9: indicators, GES assessment and targets

Proposed Indicator	GES	Proposed Target	Environmental objective					
Contaminants levels (Heavy metals – Cu, Cd, Pb, Ni, CR) in fish and molluscs	Contaminants concentration do not exceed the levels regulated by European legislation: Regulation (EC) No 1881/2006 laying down the maximum levels for certain contaminants (metals – Cd, Pb, Hg) in food (including molluscs and fish), amended by: Regulation (EC) No 1126/2007; Regulation (EC) No. 565/2008; Regulation (EC) No 629/2008; Regulation (EU) No 105/2010; Regulation (EU) No 165/2010	The 75 <sup>th</sup> percentile of the concentrations of heavy metals measured in fish and molluscs is less than the levels regulated by the European legislation	<p><b>Food</b></p> <p><b>Lead</b></p> <p>Fish fillet 0.30 Bivalve molluscs 1.5</p> <p><b>Cadmium</b></p> <p>Fish fillet (depending on the Species) 0.050; 0.10; 0.20; 0.30 Bivalve molluscs 1.0</p> <p><b>Mercury</b></p> <p>Fishery products and fish fillet 0.50 Other fish species 1.0</p>	Maximum levels (mg/kg weight wet)				
Contaminants levels (sum of polychlorinated biphenyls – PCB28, PCB52, PCB101, PCB138, PCB153 and PCB 180) in fish and molluscs	Contaminants Concentration do not exceed the levels regulated by European legislation: Regulation (EC) No 1881/2006 completed by Regulation (EC) No 1259/2011 on the maximum levels for dioxins, dioxins like PCBs and PCBs in different food products.	The 75 <sup>th</sup> percentile of the concentrations of polychlorinated biphenyls measured in fish and molluscs is less than the levels regulated by the European legislation	<p>Sum of PCB28, PCB52, PCB101, PCB138, PCB153 and PCB 180</p> <table border="1"> <thead> <tr> <th>Food</th> <th>Maximum levels (ng/g wet weight)</th> </tr> </thead> <tbody> <tr> <td>Fishery products and fish fillet</td> <td>75</td> </tr> </tbody> </table>		Food	Maximum levels (ng/g wet weight)	Fishery products and fish fillet	75
Food	Maximum levels (ng/g wet weight)							
Fishery products and fish fillet	75							





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## Descriptor 9: indicators, GES assessment and targets

Proposed Indicator	GES	Proposed Target	Environmental objective		
Contaminants levels <b>(Organochlorinated pesticides</b> – HCB, lindane, aldrin, endrin, dieldrin, p,p' DDE, p,p' DDD, p,p' DDT) in fish and molluscs	Contaminants concentration do not exceed the levels regulated by National legislation: Order 147/2004 on the approval of sanitary and food safety rules for pesticide residues in products of animal and non-animal origin and residues of veterinary medicines in products of animal origin.	The 75th percentile of the concentrations of organochlorinated pesticides measured in fish and molluscs is less than the levels regulated by national legislation	Compound	Maximum level (mg/kg Wet weight for organisms with ≤ 10% g fat contained in meat – fish and molluscs)	Maximum level (mg/kg of fat contained in the meat – fish and molluscs)
			Aldrin	0.02	0.2
Contaminants levels <b>(Polycyclic aromatic hydrocarbons – benzo(a)pyrene)</b> in fish and molluscs	Contaminants concentration do not exceed the levels regulated by the European Union legislation: Regulation (EC) No 1881/2006 laying down the maximum levels for certain contaminants (Polycyclic aromatic hydrocarbons – benzo(a)pyrene in food (including molluscs and fish).	The 75 <sup>th</sup> percentile of the concentrations of benzo(a)pyrene measured in fish and molluscs is less than the levels regulated by the European legislation	Food	Maximum levels (µg/kg wet weight)	
			Fish fillet other than smoked fish	2.0	
			Bivalve molluscs	10.0	

# Assessment of Black Sea contamination status

## Report on the Re-evaluation of IA, MSFD art. 17

### DESCRIPTOR 8

- Evaluation was based on the criterion D8C1 (2017/848/EU) (concentration of contaminants): in coastal and territorial waters, contaminants ' concentrations do not exceed the threshold values
- Available data on contaminants concentration in relevant matrices, water and sediment, for 2012 – 2017 period, were processed, statistically analyzed and evaluated against the proposed target values which define Good ecological status
- Assessment areas: waters with variable salinity (BLK\_RO\_RG\_TT03), coastal waters (BLK\_RO\_RG\_CT) and marine waters (BLK\_RO\_RG\_MT01).



***Assessment of the ecological status by assessment areas for D8C1 (Contaminants Concentration), 2012 – 2017 , OA-AO principle***

Assessment area	Matrices	Group of compounds	Ecological status for each group of compounds	Ecological status for the assessment area	
Marine	Water	Organochlorinated Pesticides	BAD	BAD	
		Polycyclic Aromatic Hydrocarbons	BAD		
		Heavy Metals	GOOD		
	Sediment	Organochlorinated Pesticides	GOOD		BAD
		Polychlorinated Biphenyls	BAD		
		Polycyclic Aromatic Hydrocarbons	BAD		
		Heavy Metals	BAD		
Coastal	Water	Organochlorinated Pesticides	BAD	BAD	
		Polycyclic Aromatic Hydrocarbons	BAD		
		Heavy Metals	GOOD		
	Sediment	Organochlorinated Pesticides	BAD		BAD
		Polychlorinated Biphenyls	BAD		
		Polycyclic Aromatic Hydrocarbons	BAD		
		Heavy Metals	BAD		
With variable salinity	Water	Organochlorinated Pesticides	BAD	BAD	
		Polycyclic Aromatic Hydrocarbons	BAD		
		Heavy Metals	BAD		
	Sediment	Organochlorinated Pesticides	GOOD		BAD
		Polychlorinated Biphenyls	BAD		
		Polycyclic Aromatic Hydrocarbons	BAD		
		Heavy Metals	BAD		

## Report on the Re-evaluation of IA, MSFD art. 17

### DESCRIPTOR 9

- Evaluation was based on the criterion D9C1 (2017/848/EU): the level of contaminants in edible tissues (muscle, liver, or other soft parts, as appropriate) of seafood (including fish, crustacea, molluscs, seaweed and other marine plants), caught or harvested from the natural environment (excluding fish from mariculture) does not exceed the maximum admissible levels;
- Available data on the concentration of contaminants in the species of commercial molluscs (*Rapana venosa* and *Mytilus galloprovincialis*) harvested from the marine area, for 2012 – 2017 period, were processed, statistically analyzed and evaluated in relation to the proposed target values for defining good environmental status.
- Assessment areas: marine waters (BLK\_RO\_RG\_MT01).



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*Assessment of the ecological status by assessment areas for D9C1  
(Contaminants in fish and other seafood for human consumption), 2012 – 2017*

Assessment area	Compound	Ecological status for each group of compounds	Ecological status for the assessment area
Marine	Organochlorinated Pesticides	GOOD	GOOD
	Polychlorinated Biphenyls	GOOD	
	Polycyclic Aromatic Hydrocarbons	GOOD	
	Heavy Metals	GOOD	

## Knowledge gaps and research needs

MSFD CRITERIA	GAPS AND RECOMMENDATIONS
<p><b>D8C1 — Primary:</b> Within coastal and territorial waters, the concentrations of contaminants do not exceed the following threshold values:</p> <p>(a) for contaminants set out under point 1(a) of criteria elements, the values set in accordance with Directive 2000/60/EC;</p> <p>(b) when contaminants under point (a) are measured in a matrix for which no value is set under Directive 2000/60/EC, the concentration of those contaminants in that matrix established by Member States through regional or subregional cooperation;</p> <p>(c) for additional contaminants selected under point 1(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects. Member States shall establish these concentrations through regional or subregional cooperation, considering their application within and beyond coastal and territorial waters.</p>	<p>The programme is fully adequate for data/information collection to assess the distance to GES, as it is defined at present.</p> <ul style="list-style-type: none"> <li>-More research dedicated to interaction of substances (hazardous substances, especially synthetic chemicals, that occur in the environment as mixtures); development of tools/methods for their combined effect on organisms and the ecosystem);</li> <li>-To develop monitoring and research on “novel” compounds such as hormones, veterinary medicines and pharmaceuticals, s.a.;</li> <li>-To develop radionuclides monitoring; more research related to pressures and impacts of radionuclides;</li> <li>-New biota matrices (highly mobile species-fish, mammals, birds) have to be included in the programme for a better understanding of the effects at the higher levels of the food-web (link with the Descriptor 4).</li> <li>-Development of new sampling and observation techniques (passive sampling, in situ voltammetry, satellite images, etc.);</li> <li>-New modeling techniques (e.g. biogeochemical modeling, bioaccumulation modeling, etc.) to be developed;</li> <li>-Tools for the integrative assessment of contaminants status need to be implemented.</li> <li>-Improving QA/QC;</li> <li>-Improving data management.</li> </ul>



Fully adequate
Partially adequate
Not covered



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MSFD CRITERIA	GAPS AND RECOMMENDATIONS
<p><b>D8C2 — Secondary:</b></p> <p>The health of species and the condition of habitats (such as their species composition and relative abundance at locations of chronic pollution) are not adversely affected due to contaminants including cumulative and synergetic effects.</p> <p>Member States shall establish those adverse effects and their threshold values through regional or subregional cooperation.</p>	<p>Programme is partially covered. Early stages of research and development for implementing methods. Some biological effect techniques like oxidative enzymes, metallothionein's, lysosomal stability, etc. were tested, but not included yet in contaminants program.</p> <ul style="list-style-type: none"> <li>-More research focusing on the assessment of biological effects of pollution based on biomarkers analyses needed;</li> <li>-To develop ecotoxicology monitoring (will offer more information/knowledge for a better understanding of contaminants effects on biological components);</li> <li>-New sampling technique and methods have to be developed (financial support and trainings are needed.)</li> <li>-Chemical and biological effects monitoring data should be assessed and interpreted in an integrated manner, thus new tools and methods have to be developed (e.g. models, biomarkers, etc.).</li> </ul>



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MSFD CRITERIA	GAPS AND RECOMMENDATIONS
<p><b>D8C3 — Primary:</b></p> <p>The spatial extent and duration of significant acute pollution events are minimized.</p>	<p><b>Not covered</b></p> <p>For covering this criterion, a subprogramme referring to incident-specific monitoring has to be developed (with the support of other authorities/organizations – e.g. ROSA, Port Authorities, offshore companies, etc.) and also more knowledge are needed for assessing the impact of acute pollution events on the ecosystem.</p> <p>New tools and methods for assessing the origin, occurrence and extent of acute oil pollution (e.g. aerial and satellite images) need to be developed. The data/information coming from will be used for defining new pressure and impact-based targets, as well as operational targets.</p>





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Criteria	Gaps and recommendations
<p><b>D9C1 — Primary:</b></p> <p>The level of contaminants in edible tissues (muscle, liver, roe, flesh or other soft parts, as appropriate) of seafood (including fish, crustaceans, molluscs, echinoderms, seaweed and other marine plants) caught or harvested in the wild (excluding fin-fish from mariculture) does not exceed:</p> <p>(a) for contaminants listed in Regulation (EC) No 1881/2006, the maximum levels laid down in that Regulation, which are the threshold values for the purposes of this Decision;</p> <p>(b) for additional contaminants, not listed in Regulation (EC) No 1881/2006, threshold values, which Member States shall establish through regional or subregional cooperation.</p>	<p>The programme is adequate in terms of providing data and information needed to assess GES.</p> <p>Presently, the programme provides quite enough data for assessing GES, but some improvements have to be made so that the programme could be considered fully adequate for giving a more robust GES assessment.</p> <p>More data/information is needed either in terms of additional determinants (As, Hg, dioxins, radionuclides, etc. – to be included) or matrix (more commercial fish species– to be selected more species target).</p> <p>Also, the programme has to be improved in terms of data collection. The concentrations below the regulatory levels are not necessarily indicators of good environmental status, since environmental effects might be present at lower concentrations. In this respect, the MSFD – Task Group 9 recommends aggregation between descriptors 8 and 9 for more robust GES definition.</p> <p>The programme has to developed for more data/information acquisition (data regarding the number of contaminants for which exceeding levels have been detected in parallel, origin of the contamination, etc.) or increased knowledge (e.g. possible relations between contaminants in water/sediment and biota, new analytical procedures, improved QA/QC, etc.).</p> <p>-Tools for the integrative assessment of contaminants status need to be implemented.</p>



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