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Contaminants assessment at the national Bulgarian level

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Overview of the existing contaminants monitoring

According to improved monitoring program D8

Coastal (0-30)

- 37 stations WFD 2000/60/EC;
- Vromos Bay –

to investigate the impact form past radionuclides pollution;

- Mussel farms (additional information from own monitoring is required).

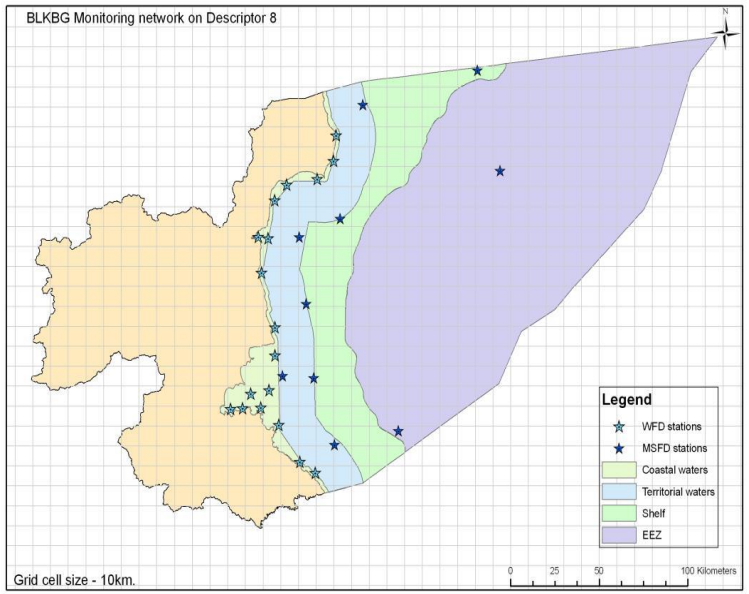
Shelf (30-200m)

- 5 stations at 12 miles zone
- Sites for dredging depose (in front of Varna Bay and cape Galata and Burgas Bay)

Open Sea (>200m)

- At transects Krapets, Galata and Ahtopol

Assessment areas,
monitoring stations network



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Overview of the existing contaminants monitoring

Monitoring program for D9

Coastal (0-30) in front of 6 "hot spots"

- Varna Bay
- Burgas Bay
- Krapets (to investigate potential transboundary influence from Danube) river
- Kamchia river
- Vromos Bay
- Mussel farms

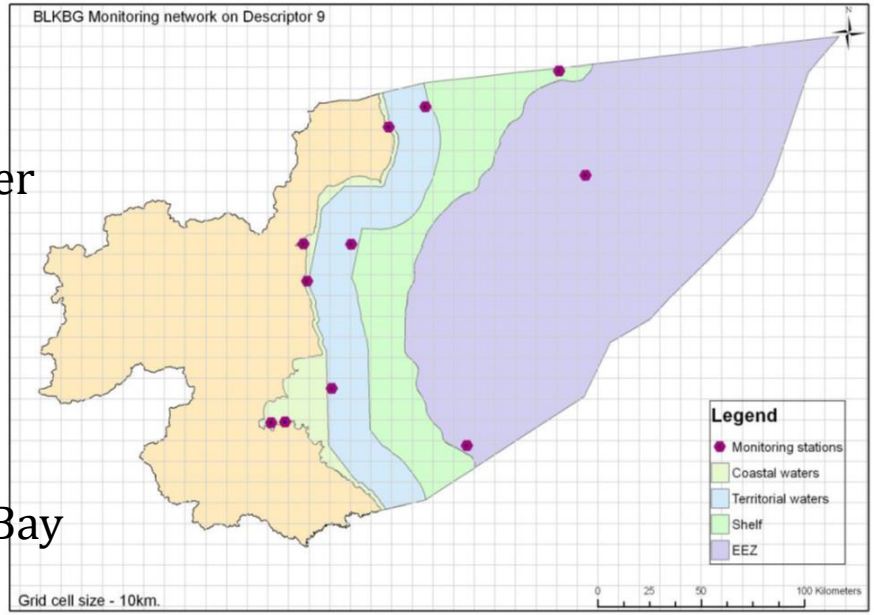
Shelf (30-200m)

- in front of Krapets at 12 miles zone
- Sites for dredging depot (in front of Varna Bay and cape Galata and Burgas Bay)

Open Sea (>200m)

- At transects Krapets, Galata and Ahtopol

Assessment areas, monitoring stations network



Overview of the existing contaminants monitoring

Assessment species

FISH

- *Sprattus sprattus sulinus*
- *Engraulis encrasicholus ponticus*
- *Trachurus mediterraneus ponticus*
- *Sarda sarda*
- *Belone belone*
- *Scophthalmus maeoticus*
- *Merlangius merlangus euxinus*
- *Squalus acanthias*
- *Neogobius melanostomus*

Other seafood

- *Rapana venosa*
- *Mytilus galloprovincialis*

Overview of the existing contaminants monitoring

Parameters and Frequency

- priority substances in waters: monthly (12 times per year), annually throughout the six-year cycle of implementation of Art. 11;
- priority substances in sediment: at least once per year;
- priority substances in biota: at least once per year;

- specific pollutants in waters: every three months (4 times per year);
- specific pollutants in sediment: once per year;
- specific pollutants in biota: once per year

If the priority substances are in very low concentrations (under Environmental Quality Standard (EQS) values), respectively, the concentration trend is decreasing and stable, and there is no obvious risk to increase, monitoring can be reduced within the six-year cycle. If these conditions are not met, monitoring should be carried out annually

Overview of the existing contaminants monitoring

- Existing data and information; data sets and time-series;

The information about sea water and sediment pollution along the Bulgarian coast is scarce.
Until 2015 a chemical monitoring (for priority and specific substances) has not carried out. Some data was collected in the frame of scientific projects. Most of published data in the literature are for heavy metals.

- Financing:

WFD (2015-2016) - Ministry of environment and waters;
MSFD - scientific projects (MISIS-2013, IMAMO - Improved Marine Waters Monitoring , 2015-2016)

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Overview of the existing contaminants monitoring

- In 2015-2016 - 12 expeditions were carried out from IO-BAS at 18 stations (13 water bodies)
- The analyses were elaborated by a consortium of accredited laboratories abroad.
- The Chemical Status Assessment Approach under Directive 2008/105 / EC and 2013/39 / EC is based on the National Methodology for Assessment of the Surface Water Chemical Conditions.

Water body	Code monitoring station	Name of station	Latitude	Longitude	Depth, m
BG2BS000C001	BG2BS00000MS001	Krapets	43°35.18'N	28°35.49'E	14.7
BG2BS000C002	BG2BS00000MS102	Shabla	43°32.06'N	28°36.71'E	16.1
BG2BS000C1003	BG2BS00000MS002	Rusalka	43°24.53'N	28°31.19'E	15.5
	BG2BS00000MS003	Kaliakra	43°22.26'N	28°28.62'E	14.8
BG2BS000C1013	BG2BS00000MS104	Balchik	43°23.25'N	28°10.58'E	14.7
	BG2BS00000MS105	Albena	43°19.25'N	28°04.61'E	14.8
	BG2BS00000MS004	Galata	43°10.00'N	28°00.00'E	23.3
BG2BS000C005	BG2BS00000MS006	Varna Bay - South	43°10.67'N	27°56.48'E	15.1
BG2BS000C1006	BG2BS00000MS007	Kamchia	43°00.50'N	27°54.01'E	15.3
BG2BS000C1007	BG2BS00000MS008	Dvoinitca	42°49.20'N	27°53.95'E	18.6
BG2BS000C1008	BG2BS00000MS109	Koketrais	42°38.79'N	27°53.21'E	16.7
BG2BS000C1208	BG2BS00000MS010	Pomorie	42°31.60'N	27°35.73'E	14.1
BG2BS000C1308	BG2BS00000MS011	Rosenets	42°27.81'N	27°31.01'E	14.5
BG2BS000C1010	BG2BS00000MS012	Burgas Bay	42°30.52'N	27°45.17'E	35.1
	BG2BS00000MS110	Maslen nos	42°19.15'N	27°47.64'E	31.3
BG2BS000C1011	BG2BS00000MS111	Sozopol	42°25.30'N	27°39.54'E	13.0
BG2BS000C1012	BG2BS00000MS112	Varvara	42°06.98'N	27°55.35'E	15.0
	BG2BS00000MS013	Veleka	42°04.08'N	27°58.92'E	14.6

No	Substances	Number of samples	Frequency	Total samples/Σ
2	Anthracene	11	12	132
28	PAHs: Benzo(a)pyrene Benzo(b) fluoranthene Benzo(k) fluoranthene Benzo(ghi)perylene Indeno[1,2,3-cd]pyrene	11	12	132
15	Fluoranthene	11	12	132
22	Naphtalene	11	12	132
3	Atrazine	3	12	36
12	Di(2-ethylhexyl)phthalate (DEHP)	11	12	132
16	Hexachlorobenzene	11	12	132
26	Pentachlorobenzene	11	12	132
17	Hexachlorobutadiene	3	12	36
	Total DDT	11	12	132
	p,p-DDT	11	12	132
20	Pb	11	12	132
21	Hg	11	12	132
23	Ni	11	12	132
23	Ni	2	6	12
6	Cd	11	12	132
6	Cd	7	6	42
25	Octylphenols	11	12	132
30	Tributyltin compaunds	5	12	60
23	Terbutryn	7	6	42

Water samples for pollutants were collected from the surface layer from the 5 l Niskin bottles of the Rosette System. The sampling was carried out by qualified specialists of IO-BAS in accordance with the instructions of the licensed laboratories.

Overview of the existing contaminants monitoring

- Assessment criteria, indicators and methods; thresholds values for GES ;

The upper 95% confidence interval of twelve monthly data for each investigated substances was calculated and compared to the Mean Annual Concentration.

Results below the detection limit are replaced by ½ LOQ (limit of quantification).

Accidental exceeds were checked - 95 percentile was calculated and the obtained value was compared to the maximum allowable concentration (MAC).

Contaminant	Number of samples
Anthracene	7
PAHs: Benzo(a)pyrene Benzo(b) fluoranthene Benzo(k) fluoranthene Benzo(ghi)perylene Indeno[1,2,3-cd]pyrene	7
Fluoranthene	7
Brominated diphenyle	7
C10-13-chloroalkanes	7
Di(2-ethylhexyl)phthalate (DEHP)	7
Hexachlorobenzene	7
Pentachlorobenzene	7
Hexachlorobutadiene	7
Total DDT	7
p,p-DDT	7
Lindan	7
Tributyltin compaunds	7
PCBs	7
Hg, Cd, Pb, Cu, Al, Li, Ni	7

Sediment samples for pollutants were taken using a Van Veen sampler grab, from the bottom surface undisturbed layer.

The analysis was performed on a total dry weight sample and normalization to a fraction <0.63µm, based on the detailed grain size analyses in IO-BAS.

Pollutants	Number of samples
Brominated diphenyle ethers	4
Fluoranthene	4
Hexachlorobenzene	4
Hexachlorobutadiene	4
Hg	4
Benzo(a)pyrene	4
Benzo(b)fluoranthene + Benzo(k)fluoranthene	4
Benzo(ghi)perylene + Indeno[1,2,3-cd]pyrene	4
Dicofol	4
PFOS	4
Dioxins and dioxin-like compounds	4
HBCDD	4
Heptachlor and Heptachlor epoxide	4

The biota status assessment is based on the National methodology for assessment of chemical status of surface waters and approach for assessment of trends in the variation of pollutant concentrations in sediment and biota Guidance Document No. 32 on Biota Monitoring, 2013

Station	Species	Latitute	Longitude	Depth, m
Kamchia	*Sprattus sprattus sulinus*	43°00.30'	28°08.03'	30
Galata	Red mullet-*Mullus barbatus pontius*	43°06.50'	28°10.23'	29
Sozopol	*Trachurus mediterraneus ponticus*	42°26.00'	27°42.50'	16
Shkorpilovci	*Trachurus mediterraneus ponticus*	42°57.00'	28°06.00'	30-35

Assessment of Black Sea contamination status

- Annual monitoring reports;
- Initial assessment of Bulgarian Black Sea waters, MSFD art. 8,9,10; 2006 – 2011 period;
- Re-evaluation of IA, art. 17, 2012 – 2017 period –

Knowledge gaps and research needs

- Lack of data and regular monitoring for pollution in the marine environment and biota
- To develop and test indicators.
- Integration approach: need for an integrative assessment tool for contamination

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