



## **INDICATORS**

### **For annual reporting to Black Sea Commission**

The tables below reflect the indicators for annual reporting to the Black Sea Commission, **elaborated and agreed by the members of the all six Advisory Groups of the Black Sea Commission during their regular meetings in 2015.**

The data is based on existing AG annual reporting formats, and also takes into account the new environmental challenges and legislation, as well as approaches introduced by relevant global and regional organizations (i.e. provisions of EU MSFD; GFCM; ACCOBAMS etc.).

## PMA Regional Reporting Indicators

Agreed Indicators	Explanation	Comments
<b>Trix</b>	$TRIX = [\log (Chl \times D\%O_2 \times N_{min} \times P_{tot.}) + k] / m *$	The E-TRIX formula is the same as original one TRIX (Vollenweider et al., 1998), so let's keep it TRIX. It would be easier to use in meetings with other RSCs. K=1.5 and m=1.2 are constant use particularly for Northern Adriatic. For Black Sea could be necessary to calculate another.
<b>Oxygen Saturation in Bottom waters</b>	Saturation of oxygen  in bottom layer in late summer times	The indicator is saturation sensitive so, it couldn't be used for marine areas where hypoxia/anoxia are natural features.
<b>Inorganic N, P, Si in the surface layer in late winter time</b>		Proposed Maximum bottom depth by which the parameter is eligible is 1 m Proposed time – end of February
$N_{inorganic} / P_{inorganic}$	<b>Inorganic N per Inorganic P</b>  in upper layer (1 m from surface)	
$N_{inorganic} / Si$	<b>Inorganic N per Si</b>  in upper layer (1 m from surface)	
<b>BEAST</b>	<b>Core set indicators grouped as causes - inorganic nitrogen, inorganic phosphorus (phosphates), direct effects - chlorophyll a , indirect effects - bottom oxygen (where available), Secchi.</b>	To be defined by each country according to its reference values – within B2B each country had an expert who worked for BSC

### LBS Regional Reporting Indicators

- Amount of Total discharge (point sources)
- Amount of Untreated discharge (point sources)
- Amount of treated discharge (point sources)
- Number and amount(volume) of Accidents that impacted Black Sea (if any)
- Rivers

Parameters/Status, BS State	BG	GE	RO	RU	TR	UA
Tonnes/year						
Annual Flow						
TP						
TN						
Inorganic N (will be calculated)						
Inorganic P(will be calculated)						
Trace Metal (common ones will be selected*)						
TSS						
TPH						
BOD5						

### CBD Regional Reporting indicators

Parameters/Status, BS State	BG	GE	RO	RU	TR	UA
Phytoplankton biomass (seasonal trends for the last 3 years)						
Phytoplankton abundance (seasonal trends for the last 3 years)						
Max concentration of blooming species						
Diatoms/Dinoflagelates biomass ratio (only for spring)						
H-Shannon 95 (biomass)						
Chl a (seasonal trends for the last 3 years)						
Mesozooplankton biomass (for 3 years)						
Biomass of <i>Noctiluca</i> (%)						
Mesozooplankton H-Shannon (biomass, abundance)						
Jellatinous macrozooplankton biomass and abundance						
Macrophytobenthos (EEIc *)						
Macrozoobenthos (M-AMBI*)						
Number of new introduced non-indigenous species (for each 6 years)						
Marine protected areas (in number and in % every 5 years)						

### FOMLR Regional Reporting indicators

Parameter/BS State	BG	GE	RO	RU	TR	UA
Total catch and landing						
Fishing effort						
Stock biomass, incl. spawning biomass						
Fishing mortality						
By-catch of vulnerable and non-target species, including cetaceans						
Landings per unit of effort						
Aquaculture production						
Number of fishing free zones						
Name and number of stocks below biological safety limits						
Specimens of Black Sea bottlenose dolphins in captivity						
Biomass index						
Large fish indicator						
Optimal length						
Mean trophic level						
*In addition to these agreed indicators, the candidate indicators for which further work shall be done						

### ICZM Regional Reporting indicators

<b>1. ICZM Legislation</b>	
<b>2. ICZM Competent authorities</b>	
<b>3. ICZM mechanism</b>	
<b>4. Description of coastal zone</b>	

	Parameter/BS State	BG	GE	RO	RU	TR	UA
<b>1.</b>	<b>Population and geography</b>						
1.1.	Administrative organization of coastal zone, no.						
1.1.1.	<i>a) total no. of cities</i>						
1.1.2.	<i>b) no. of cities over 100 000 inhabitants</i>						
1.1.3.	<i>c) no. of cities over 1000 000 inhabitants</i>						
1.1.4.	<i>d) total no. of rural settlements</i>						
1.2.	Total inland area of reported territory, km <sup>2</sup>						
1.3.	Number of population, thousands person						
1.4.	Population density in coastal regions, inhabitant/km <sup>2</sup>						
1.5.	Urbanization ratio, %						
1.6.	Total land use, ha						
1.6.1.	<i>a) agriculture areas</i>						

1.6.2.	<i>b) forest and other forest vegetation lands</i>						
1.6.3.	<i>c) waters and ponds</i>						
1.6.4.	<i>d) wetlands</i>						
1.6.5.	<i>e) urban area</i>						
<b>2.</b>	<b>Energy</b>						
2.1.	Energy production, MW						
2.2.	Energy consumption, MW						
2.3.	Number, capacity and type of Power Stations						
<b>3.</b>	<b>Water and waste water</b>						
3.1.	Population connected to public sewage network system (PSNS), %						
3.2.	Discharge of sewage waters (incl. untreated), (from LBS AG reporting)						
<b>4.</b>	<b>Biodiversity</b>						
4.1.	Number and square of protected areas (land and aquatic parts)						
<b>5.</b>	<b>Coastal erosion</b>						
5.1.	Stretch of coast of vulnerable areas subject to erosion, %						

<b>6.</b>	<b>Economy</b>						
6.1.	Regional Gross Domestic Product (GDP), thousand Euro						
6.2.	Sectoral distribution of production, %						
6.2.1.	<i>a) Agriculture</i>						
6.2.2.	<i>b) Industry</i>						
6.2.3.	<i>c) Transport</i>						
6.2.4.	<i>d) Tourism</i>						
6.2.5.	<i>e) Commerce etc.</i>						
<b>7.</b>	<b>Tourism</b>						
7.1.	Touristic accommodation capacities, places						
7.2.	Number of tourist arrivals						
<b>8.</b>	<b>Solid Waste Management</b>						
8.1.	Industrial waste produced, tones/year						
8.2.	Industrial waste stored, tones/year						
8.3.	Municipal wastes produced, tones/year						
8.4.	Municipal wastes stored, tones/year						
8.5.	Number of landfills and amount of waste, mln tones						



<b>9.</b>	<b>Agriculture</b>						
9.1.	Total area of agricultural lands, thousand ha						
9.2.	Area of irrigated lands / drainage, thousand ha						
<b>10.</b>	<b>Industry</b>						
10.1	Number of enterprises (please specify types)						
10.2	Total production of enterprises, Euro						
<b>11.</b>	<b>Transport</b>						
11.1.	Density of public road network, km2						
11.2	Number of airports						
11.3	Length of rail ways, km						
11.4	Number of ports (from ESAS AG reporting)						
11.5	Port traffic capacity (from ESAS AG reporting)						
11.6	Number of oil terminals (from ESAS AG reporting)						
11.7	Actual capacity of oil terminals (from ESAS AG reporting)						
<b>12.</b>	<b>Climate</b>						
12.1.	Precipitations, mm per year (min-max)						
12.2.	Sea level rise*, mm						

12.3.	Number of floods						
12.4	Average temperature (to be further elaborated)						

### ESAS Regional Reporting indicators

Parameter/BS State	BG	GE	RO	RU	TR	UA
<b>Ship calls, <i>inter alia</i>:</b>						
Tankers						
Chemicals						
Gas (LNG)						
Others						
<b>Cargo turnover, mln tons, <i>inter alia</i>:</b>						
General Cargo						
Oil, th tons (?)						
Chemical goods, (?)						
Gas, th tons (?)						
Others						
<b>Number of ports</b>						
<b>Capacity of terminals, <i>inter alia</i>:</b>						
Oil terminals, th tons per year						

Gas terminals, th tons per year						
<b>Port reception facilities (PRF), actual load</b>						
For oily waters, cub. M						
For garbage, cub. M						
For sewage, cub. M						
Number, volume, location and causes of accidental pollution/spills						
Number, volume and location of illegal pollution/spills						
<b>Pollution fines (in USD)</b>						
<b>Dumping of dredged materials, volume</b>						