## Draft indicator factsheet D5-open waters

**SUMMARY INFORMATION**

**Indicator name**: D5-open waters incorporating assessments for D5C1 Nutrient concentrations, D5C2 - Chlorophyll a in the water column and D5C5- Dissolved oxygen in the bottom of the water column

* **Indicator summary:** The indicator fact sheet presents results from the cruise done in the frame of the MISIS project in the Western Black Sea on a sampling network consisted of three transects: Romania, Bulgaria, Turkey and one intercalibration station, covering shelf, and open waters. Based on the data collected in the cruise, on the reference values and acceptable deviations of these parameters (specific for each country) it was tested the integrative tool for eutrophication assessment proposed by the Black Sea Commission through the Baltic2Black project, BEAST (Black Sea Eutrophication ASsessment Tool). Based on the BEAST results the eutrophication status of the Western Black Sea in summer 2013 was High-Good for open waters and Poor – High for shelf waters. The only one “poor” status responsible for not achieving the Good Ecological Status was the shelf station from Romanian transect where the phosphate and silicate concentrations were highest. Due to no correlation of BEAST with salinity (interpreted as no influence of the river discharge) and in absence of any other quantified anthropogenic influences it is to note that the poor eutrophication status was mainly influenced by the currents and winds regime and the water mixing phaenomena (Lazar, et al, 2015).
* **Background/relevance:** Eutrophication is caused by excessive inputs of nutrients (nitrogen and phosphorus) resulting from various human activities. High concentrations of nutrients and their ratios form the preconditions for huge algal blooms, reduced water clarity and increased oxygen consumption. Long term nutrient data are key parameters for quantifying the effects of human activities and evaluating the success of measures undertaken.
* **Relevant criterion/a**: D5C1, D5C2, D5C5

**MAIN ASSESSMENT**

* **Status and trends:** A core set indicators was chosen for the eutrophication assessment of the western Black Sea in respect with the descriptor’s 5 criteria, the intercalibration exercise and BEAST requirements –nutrients levels – concentrations of phosphate and nitrogen oxidised forms; chlorophyll a concentrations and bottom dissolved oxygen saturation only for the stations with depths up to 65m (Winkler method, onboard). The samples were analysed in each country laboratory (Bulgaria – IO-BAS, Romania - NIMRD and Turkey – TUBITAK) and despite some differences in terms of methodological aspects, the results of the intercalibration exercise between the cruise participants showed generally satisfactory agreements for nutrients and chlorophyll a

Measurements.

Based on the data achieved for surface concentrations, on the reference values and acceptable deviations of the parameters (specific for each country) the BEAST tool was applied. BEAST categories are divided into three criteria: C1 - causes of eutrophication, C2 - direct effects and C3 - indirect effects indicating the main cause-effect relationships in the eutrophication process12. Each criterion could have a set of indicators (based on availability and expert choice). The result of each indicator status is done by EUT\_Ratio and it is included, according to its own weight (chose by expert), into a qualitative response: high, good, moderate, poor and bad. Within the categories, BEAST is averaging the parameters or taking a weighted mean (according to the significance of the parameter or the data quality) while, between the categories, the One-Out-All-Out-principle (OOAO) is applied (the worst assessment of a quality element determines the overall assessment result). The result is another qualitative response, the “Final eutrophication status”: high, good, moderate, poor and bad. For shelf and open water only one water body out of ten is in poor status. All others are either good or high. The final results are shown in the table below:

* **Map**:



Map of network stations – MISIS Joint Survey, July 2013

* **Figures**:
* **Tables:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Transect** | **Station** | **Type** | **BEAST** | **Assigned****value** | **GES** |
| Romania | MO2 | Shelf | Good | 2 | GES |
| MO3 | Shelf | Good | 2 | GES |
| MO4 | Shelf | Poor | 4 | Non-GES |
| MO5 | Shelf | Good | 2 | GES |
| MO6 | Open | Good | 2 | GES |
| MO7 | Open | High | 1 | GES |
| Bulgaria | MO11 | Shelf | Good | 2 | GES |
| MO10 | Shelf | High | 1 | GES |
| MO9 | Shelf | High | 1 | GES |
| MO8 | Open | High | 1 | GES |

Qualitative results of BEAST tool for eutrophication assessment for Romania and Bulgaria, July 2013

* **Confidence assessment:**

Bulgaria: Low/Medium/High (explanation)

Romania: Low/Medium/High (explanation)

Due to no correlation of BEAST with salinity (interpreted as no influence of the river discharge on the eutrophication status) and in absence of any other quantified anthropogenic influences it is to note that the poor eutrophication status could be influenced by the phosphate resuspension from the bottom hypoxic water-sediment interface, a process strongly influenced by the physical parameters and indirect by the hydrographic conditions.

* **Knowledge gaps:**

Bulgaria:

Romania:

Text description of uncertainties and data/knowledge gaps in the assessment (i.e. reasons why confidence is "medium" or "low")

**SUPPORTING INFORMATION/FURTHER DETAIL/METADATA**

* **Geographical coverage**: BG, RO
* **Date of data used for assessment**

Bulgaria: July 2013

Romania: July 2013

* **Data products**: (insert link)
* **Contact and ownership**

Bulgaria: Black Sea Basin Directorate/Varna/BG

Romania: National Institute for marine research and development "Grigore Antipa"/Constanta/Romania

* **Method for assessment (optional)**: See: Lazar Luminita, Boicenco Laura, Beken Colpan, Dzhurova Boryana, Moncheva Snejana, Shtereva Galina, Vasiliu Dan (2015): Western Black Sea eutrophication status according to Black Sea eutrophication asessment tool, BEAST– MISIS cruise results, available at http://mcc.jrc.ec.europa.eu/documents/201606235238.pdf

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