

Monitoring Specifications

Date: 2010-01-25

Hydrology





ARGE BLMP - Working Group for the North Sea and Baltic Sea Monitoring Programme

At the 34th North German Environmental Ministerial Meeting held on 17 April 1997, the competent departments of the German Federal Government and of the federal states of Hamburg, Mecklenburg-Vorpommern, Lower Saxony and Schleswig-Holstein agreed to establish a joint working group co-ordinating the monitoring of the marine environment of the North and Baltic Seas (ARGE BLMP Nord- und Ostsee).

Members of ARGE BLMP are:

- Federal Ministry of Food, Agriculture and Consumer Protection
- Federal Ministry of Transport, Building and Urban Development
- Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
- Federal Ministry of Education and Research
- Authority for Urban Development and Environment of the Free and Hanseatic City of Hamburg
- Mecklenburg-Vorpommern Ministry for Agriculture, the Environment and Consumer Protection
- Lower Saxony Ministry for the Environment and Climate Protection
- Schleswig-Holstein Ministry for Agriculture, the Environment and Rural Areas

The Monitoring Manual describes the current measuring programme implemented under BLMP. The monitoring requirements of the different EC Directives (Marine Strategy Framework Directive, Water Framework Directive, FFH, Birds Directive), marine protection conventions (OSPAR, HELCOM, Trilateral Monitoring and Assessment Program) and other bodies of regulations have been taken into account in the Manual. The Monitoring Manual is available free of charge on the BLMP website at www.blmp-online.de/Seiten/Monitoringhandbuch.htm

Editorial information

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1 General

1.1 Subject area

Physical Monitoring - Hydrology

1.2 Definition

Description of hydrological conditions using the following parameters:

Water level, tidal range, current, sea state and wave exposure, as well as the structure and condition of the intertidal zone, freshwater flow regime and exchange times.

1.3 Competent authority/ies

| | |
|-------------------------|---|
| Federal Government: | WSV , BSH , BfG |
| Mecklenburg-Vorpommern: | LUNG , STAUN |
| Lower Saxony: | NLWKN |
| Schleswig-Holstein: | LLUR , LKN-SH |

1.4 Working group

Ad Hoc Working Group on Hydrography, Hydrology and Morphology

2 Monitoring requirements

2.1 Necessity

[MSFD \[1\]](#)

Article 11, Annexes III and V

Comments

Monitoring programmes that survey the following hydrological parameters must be drawn up under the Marine Strategy Framework Directive:

- current velocity,
- wave exposure and
- residence time.

Article 8(1) [2]

Comments

The results of hydrological monitoring are required for the initial assessment of marine waters. The hydrological parameters mentioned in Article 11 must be surveyed for this purpose.

[WFD \[3\]](#)

Article 8(1); Annex V, 1.13, 1.14

Comments

Under the WFD, the hydrological conditions in transitional and coastal waters must be investigated. These include:

- volume of water and water level,
- freshwater flow regime (transitional waters),
- direction of dominant currents (coastal waters) and
- wave exposure.

[HELCOM](#)

PLC-Water [4]

[OSPAR](#)

JAMP RID Monitoring Programme [5]

Comments

Joint Monitoring and Assessment Programme - investigation of riverine inputs and direct discharges.

[TMAP \[6\]](#)

Wadden Sea Plan (Stade Declaration, 1997)

Comments

Fluctuations and trends in the following hydrological parameters are to be monitored:

- Water level
- Flooding of salt meadows and sea state

Technical necessity

Water level measurements are required for the assessment of the tidal regime.

Overview of monitoring frequencies and cycles:

| | WFD | HD | OSPAR | HELCOM | TMAP | MSFD |
|------------------|------|----|-------|--------|------|----------|
| Frequency | N.a. | - | ? | ? | - | Coherent |
| Monitoring cycle | N.a. | - | ? | ? | - | Coherent |

2.2 Environmental targets

MSFD

Article 9

"On the basis of the initial assessment made pursuant to Article 8(1), Member States shall, in respect of each marine region or subregion, establish a comprehensive set of environmental targets and associated indicators for their marine waters [...], taking into account the indicative lists of pressures and impacts set out in [...] Annex III."

HD

See the assessment schemes for habitat types (in preparation).

WFD

Annex V, 1.2.3 and 1.2.4:

Hydrology (transitional and coastal waters)

The freshwater flow regime in transitional waters, the direction and velocity of dominant currents in coastal waters and wave exposure correspond totally or nearly totally to conditions consistent with the achievement of the values specified for the biological quality elements.

TMAP

Information is to be obtained in order to ascertain whether changes in the hydrological situation have been caused by anthropogenic activities.

Target: A natural dynamic situation in the tidal area.

2.3 Threats

Climate change

2.4 Spatial allocation

| | EEZ | 12- nm zone | Coastal waters 1) | Transitional waters |
|--------|-----|-------------|-------------------|---------------------|
| MSFD | x | x | x | - |
| HD | x | x | x | x |
| WFD | - | x | x | x |
| HELCOM | - | - | - | - |
| OSPAR | - | - | - | x |
| TMAP | - | - | - | - |

1) Under the WFD: baseline plus one nautical mile

3 Monitoring concept

3.1 Description of monitoring network

There are limited numbers of monitoring stations and area-wide models for the following parameters: surface runoff, sea state, current and water level. Marine monitoring will be able to build on these components in future, but at present does not yet cover all water bodies subject to the WFD.

Appropriate investigations are to be carried out or available results have to be taken into account for the determination of exchange times and residence times.

3.2 Monitoring activities

North Sea and Baltic Sea

Hydrology

Methods:

The determination of the freshwater flow regime in transitional waters is based on measurements of surface runoff in the lower reaches or estuary of the watercourse in question. For this purpose, it has traditionally been necessary to calculate the flow rate from the runoff rate and runoff velocity, integrated over the cross-section of the water. To an increasing extent, autonomous ultrasonic devices that record water current velocities (ADCPs) are being installed in many places.

The direction and velocity of the currents in coastal waters vary dramatically over small distances depending on a small scale correspondent to the local morphological structures, in particular close to the coast and in the Wadden Sea, which means it is difficult to measure them across wide areas. As a rule, the currents in the coastal waters of the North Sea are dominated by the influence of the tides, which results in clearly alternating current directions in the channels and sharply varying currents on the intertidal mudflats. A dominant current cannot meaningfully be given for areas of tidal flats. Apart from measurements of local currents, the results of operational hydraulic-numerical models (BSH, DHI, BAW, ...) are used for the monitoring of this parameter in the Baltic Sea and the coastal zone of the North Sea. These circulation models are three-dimensional and take account of the meteorological conditions forecast over the North Sea and Baltic Sea. With grid spacings of one nautical mile, they satisfy the requirements for WFD monitoring. The resolution of these operational models is inadequate for the more finely structured morphology of the Wadden Sea area. However, there are high-resolution models for parts of the Wadden Sea. Although they are not applied operationally, they may be deployed in operative monitoring or monitoring for surveillance purposes, depending on the issue that is being addressed.

Wave exposure in coastal waters is surveyed primarily using anchored wave measurement buoys. Apart from this, ultrasonic gauges, ADCPs and pressure cells, sometimes coupled with current probes, as well as special wave radar devices also come to be deployed in shallower waters. The results of the measurements are represented using one- and two-dimensional spectra. In addition to this, time series for characteristic sea state parameters such as significant wave height, wave period and, where available, mean wave direction are stored.

Mathematical sea state models are deployed for the area-wide determination of sea state. There are also high-resolution models for parts of the Wadden Sea in this field, although they are not actually applied in operation (see information on currents).

WFD Reporting Summary Sampling Method (2000 Characters):

Specially anchored wave-tracking buoys and water level monitoring devices are deployed to determine wave exposure.

The freshwater flow regime in transitional waters is surveyed at selected points in adjacent flowing waters.

WFD Reporting Summary Analysis Method (2000 Characters):

Changes in wave exposure and current conditions are determined using mathematical models.

Operative monitoring:

WFD Reporting Summary Frequency Method (2000 Characters):

At present, it is not necessary to monitor hydrological quality elements operatively.

WFD Reporting Summary Cycle Description (2000 Characters):

At present, it is not necessary to monitor hydrological quality elements operatively.

Surveillance monitoring:

WFD Reporting Summary Frequency Method (2000 Characters):

At present, the surveillance monitoring of hydrological conditions does not deviate from the general frequencies.

WFD Reporting Summary Cycle Description (2000 Characters):

At present, the surveillance monitoring of hydrological conditions does not deviate from the general frequencies.

3.3 Additional parameters

4 Assessment

4.1 Assessment procedures

North Sea

Title

Tidal Regime Assessment under the WFD

Authors

Ad Hoc Working Group on the Hydrography, Hydrology and Morphology of Coastal Waters

Guideline:

Various directives

Comments:

Hydrological conditions and the tidal regime are assessed using the assessment matrix put forward by the Ad Hoc Working Group on Hydrography, Hydrology and Morphology.

5 Quality assurance

- Quality Assurance Panel (Working Group on Quality Assurance under the auspices/guidance of the Quality Assurance Panel at the UBA)

Comments

5.1 Monitoring institutions

5.2 Guidance documents

5.3 Standards

- WFD Reporting Summary Standards (2000 Characters): The hydrological measurements and calculations of hydrological conditions comply with the state of the art and are carried out using comparable methods.
- WFD Reporting Summary Confidence (2000 Characters): *Has not yet been completed - but would be desirable in future!*

5.4 Current status

6 Literature

7 Activities required to implement the concept

7.1 Changes to the current monitoring programme

Parameters

There are networks in place for the monitoring of the following parameters: water level, current, sea state and freshwater flow regime. The spatial and temporal resolution of these networks does not satisfy all the requirements imposed by the above-mentioned directives. The monitoring activities required are already being carried out for some subfields, and the results are available to the specialist institutions as required.

Appropriate studies are still to be carried out to determine exchange times.

7.2 Working steps required

Priorities

- Completion and implementation of the monitoring concept for the WFD.
- Determination of exchange times.

Footnotes

(1) Marine Strategy Framework Directive; Directive 2008/56/EC of 17 June 2008. This also applies to transitional waters and coastal waters covered by Directive 2000/60/EC, where pertinent aspects of the protection of the marine environment not dealt with in Directive 2000/60/EC are at issue.

(2) Version: proposal of the General-Secretariat of 13 November 2006.

This also applies to transitional waters and coastal waters covered by Directive 2000/60/EC, where pertinent aspects of the protection of the marine environment not dealt with in Directive 2000/60/EC are at issue.

(3) EC Water Framework Directive; Directive 2000/60/EC. The coastal waters subject to ecological assessment under the WFD extend 1 nautical mile beyond the baseline.

(4) On the basis of HELCOM Recommendation 26/2, Compilation of Waterborne Pollution Load (PLC Water), HELCOM 26 decided that waterborne inputs should be surveyed in two phases:

- 1. Total direct loads of nutrients and hazardous substances were to be reported to HELCOM annually.
- 2. As of 2006, the Contracting Parties were to draw up a comprehensive summary of all inputs into inland waters located within the catchment area of the Baltic Sea every six years.

(5) Annual surveying of surface runoff and riverine inputs of selected substances into the marine environment. See also the information on nutrients and pollutants. The parameters to be monitored under OSPAR are listed in the documents cited.

(6) The monitoring requirements under TMAP were specified in the Wadden Sea Plan ([Sylt, 2010](#)) (see also [TMAP Manual, section 2](#)).