



# INTERNATIONAL WATER DATABASES

By

S. J. France, C. Marcuello, S. J. Ashley, S. C. Nixon and T. Lack

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# EXECUTIVE SUMMARY

This report catalogues and summarises the data contained within databases associated with international monitoring programmes which are relevant to the EEA's **needs**. Information is provided on **each** of the data sources together with the type of data included, countries and water bodies covered and the determinands measured. This report is only able to **portray** the information within the metadatabase using a **few** relatively simple examples. The main output from this project is a searchable electronic **database** of the identified international databases that allows rapid identification of geographical **areas**, determinands measured and temporal coverage of the data.

The monitoring programmes recorded in the metadatabase **fall** into three broad categories:

- those produced from monitoring schemes derived to support EC legislation;
- those related to international conventions based in Europe; and
- those derived from international conventions based outside Europe **such** as the **UNEP/WHO/UNESCO/WMO** project on global water quality **monitoring** (**GEMS/WATER**).

Four different sources of information have been used to compile the metadatabase:

- data relating to international conventions agreed between the EEA countries, obtained from the **database** developed in the project **MWI** (Requirements for Water Monitoring);
- published reports and other literature relating to different monitoring programmes, including Paris and Oslo Commission reports, Helsinki Commission reports, the Dobris Assessment, UNEP publications, etc.; and
- information available on the Internet.

Data obtained from these sources were augmented by distribution of a questionnaire to key organisations.

It is intended that the report and the **database will** be a source of information to be used alongside other reports and inventories produced by the **Inland** Waters Topic Centre. These **include** a review of the international monitoring requirements for **monitoring** surface and groundwaters, and inventories of EEA Member States **monitoring** networks; surface water quality and quantity networks, and groundwater quality and quantity monitoring networks. The information contained in these reports **will** be used when implementing the freshwater **monitoring** network designed for the EEA **area**. Contacts for **each** of the databases recorded and summarised in this report **will** be available through the EEA's Catalogue of Data Sources (CDS). The CDS is available to **all** National Focal Points and forms part of the EIONET. The CDS is **also** scheduled to be

# 1. INTRODUCTION

This report catalogues and summarises the data contained within databases associated with international monitoring programmes which **are relevant** to the EEA's needs. The main output from this project is a searchable electronic metadatabase of these databases that allows rapid identification of geographical **areas**, parameters measured and temporal coverage of the data. It is intended that the report and the **database will** be a source of information to be used alongside other reports and inventories produced by the **Inland Waters Topic Centre**. These **include** a review of the international monitoring requirements for monitoring surface and groundwaters (Nixon *et al.*, (1996); inventories of EEA Member States **monitoring** networks, surface quality (Kristensen 1995) and surface quantity (Rees *et al.*, 1996) networks, and groundwater quality and quantity monitoring networks (Koreimann *et al.*, 1996). The information contained in these reports **will** be used when implementing the freshwater **monitoring** network designed for the EEA **area** (Nixon *et al.*, 1996), and **will** be recorded in the EEA's Catalogue of Data Sources.

The monitoring programmes recorded in the metadatabase **fall** into three broad categories:

- those produced from **monitoring** schemes derived to support EC legislation;
- those related to international conventions based in Europe; and
- those derived from international conventions based outside Europe **such** as the UNEP/WHO/UNESCO/WMO project on global water quality monitoring (GEMS/WATER).

Four different sources of information have been used to compile the metadatabase:

- data relating to international Conventions agreed between the EEA countries, obtained from the **database** developed in the project MW1;
- published reports and other literature relating to different monitoring programmes, including Paris and Oslo Commission (PARCOM) reports, Helsinki Commission reports, the **Dobris Assessment**, UNEP publications, etc.; and
- information available on the Internet.

Data obtained from these sources were augmented by distribution of a questionnaire to key organisations.

This report summarises the main aspects of the metadatabase, it **provides** information on **each** of the data sources together with the type of data included, countries and water bodies covered and the parameters measured. This report is only able to **portray** the information within the metadatabase using a few relatively simple examples. However, the electronic version is able to exploit the full flexibility of this media and allows limitless combinations of reporting the data, in **line** with the users requirements.

Sections 2-6 **describe** the different sections of the metadata database covering geographical and temporal coverage, the water bodies included, the parameters reported and the format of data storage.

**It should be noted that the report and database are compiled from the best available information as described. The review process (with National Focal Points and National Reference Centres) revealed additional information and/or errors. Appropriate amendments and additions have been made in this final agreed version of the report.**

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## 5. SUMMARY OF INFORMATION ON DETERMINANDS

### 5.1 Determinands assessed by monitoring programme

In order to allow information in the metadatabase to be references in terms of determinand, the parameters included have been grouped by means of a look-up table. The types of determinands included and some examples of the standardised determinands grouped into each type are as follows:

Aesthetic determinands: Colour, floating materials, surfactants.

Biological determinands: Benthic fauna, planktonic flora, species list, ecotox test, primary production, tar ball collections, fish disease.

Chemicals: Acidity, calcium, chlorides, cyanides, fluorides etc.

Metals: Aluminium, arsenic, boron, zinc etc.

Microbiological determinands: Coliform, salmonella, total bacteria etc.

Nutrients: Ammonia, nitrogen etc.

Organic pollution: BOD, COD, organic carbon, dissolved oxygen etc.

Physical and physicochemical determinands: Flow, level, pH, temperature, dissolved solids etc.

Radioactive elements: Alpha emissions, caesium, strontium etc.

Synthetic organics: PCB, DDT, BHC, HCH etc.

Table C.1 in Appendix C shows a complete list of the determinands, classified by matrix, for each monitoring programme.

The matrices considered in the metadatabase are biota, water and sediment.

- **Biota** Determinands assessed in biota are grouped under the following headings:
  - biological determinands;
  - metals;
  - microbiological determinands;
  - synthetic organics; and
  - radioactive elements.

Table D.3 in Appendix D shows, where available, the determinands measured in biota for each monitoring programme, the number of sites where they have been assessed, and the year the programme began.

- **Water** The determinands measured in suspended matter have been classified in this matrix, although the each determinand has been annotated with the phrase



“measured in suspended **matter**”. Similarly, where determinands have been measured in groundwater they are annotated with the term “measured in groundwater”. Determinands assessed in water have been grouped under the following headings: aesthetic, biological, chemical, microbiological and physical determinands, radioactive elements and synthetic organics.

Table D.1 in Appendix D shows the determinands measured in water for **each** monitoring programme, the number of sites where they have been assessed, and the year the programme began. Table D.2 in Appendix D shows the **same** information for **sea** waters, whilst Table D.4 in Appendix D displays the list of determinands monitored in groundwater. **All** the determinands held in the tables in Appendix D are standardised. Further information on **each** determinand **can** be found in Table C.1 in Appendix C.

- **Sediments** The determinands monitored in sediments are listed in Table C.1 in Appendix C.

## 5.2 Statistics used

The determinands are mainly reported by **each** monitoring programme as their **annual** average values although in some cases, the annual average is also complemented with the annual maximum and the annual minimum. Other statistics used **include** the **annual** averages of the maxima and minima, the **mean** monthly averages and total annual values. Flow is recorded in terms of maxima, minima and averages.

## 5.3 Units

The unit in which a measurement is expressed is dependent on the determinand concerned.

Chemicals (e.g. Ca, Cl, F, Hg) and metals are usually measured as mg (or  $\mu\text{g}$ ) of **each** particular element per litre. Other units **include**  $\mu\text{mol}/\text{dm}^3$ , kg/s and tonnes. When metals are assessed in suspended **matter** or **biota**, they are measured as g/kg.

Coliforms, **faecal** coliforms and **faecal** streptococci have been recorded in terms of the number per 100 ml ( $\text{N}^\circ/100\text{ml}$ ). Phytoplankton is counted either in  $\text{N}^\circ/\text{l}$  (or  $\text{N}^\circ/\text{ml}$ ) or the number of species. Chlorophyll is measured in  $\text{mg}/\text{m}^3$  or  $\mu\text{g}/\text{dm}^3$ . Other biological indicators have different **units**, the **carbon** dark fixation and the inorganic assimilated **carbon** are both measured in  $\text{mg C m}^3/\text{day}$ , the **specimen** density in rivers and lakes is measured in  $\text{indiv}/\text{m}^2$  and respiration is measured in  $\text{mg O}_2 \text{m}^3/\text{day}$ .

Nutrients have been recorded in mg (or  $\mu\text{g}$ ) per litre. **Nitrogen** compounds are expressed in **all** cases as mg **N/l** whilst phosphorous compounds are measured either as mg **P/l** or mg **PO<sub>4</sub>/l**. **Silica** is measured in mg **Si/l** or kg Si/s. **One** programme also uses  $\mu\text{mol}/\text{dm}^3$ .

BOD and COD have both been measured in terms of mg **O<sub>2</sub>/l**. Dissolved oxygen has been measured as mg **O<sub>2</sub>/l** and %**O<sub>2</sub>**. Organic **carbon** has been measured as mg **C/l** and kg/s.

**Flow** has mainly been measured as  $\text{m}^3/\text{s}$ , although the stream runoff is reported in  $\text{l}/(\text{s}\cdot\text{km}^2)$  and groundwater level has been measured in cm from the surface.

Alkalinity has been reported as  $\text{mg}/\text{l}$  and as  $\text{mmol H ions}/\text{l}$ . **Conductivity** is always measured as  $\mu\text{S}/\text{cm}$  and temperature is always reported in  $^\circ\text{C}$ . Suspended and dissolved solids have both been measured in  $\text{mg}/\text{l}$ . The colour in water has been measured in  $\text{cm}^{-1}$ , and **also expressed** by the colour number (Pt  $\text{mg}/\text{l}$ )

**Radioactivity** in water is measured in  $\text{Bq}/\text{l}$  (or  $\text{mBq}/\text{l}$ ). The synthetic organics assessed in water are expressed in  $\mu\text{g}/\text{l}$  or reported as tonnes discharged in effluent. Those assessed in suspended **matter** and **biota** are measured in  $\mu\text{g}/\text{kg}$  (or  $\text{mg}/\text{kg}$ ).

## 6, PLATFORMS

In general there is a lack of information about the format in which data is contained within the different databases. The software used to store data includes:

- ORACLE relational database management system (RDMS). Some databases using this system are compatible with the ARC/INFO GIS system. or have an interface with RAISON, (Regional Analysis by Intelligent systems on a microcomputer), a system which is able to provide regional statistics based on maps;
- Ingres;
- DOS;
- Microsoft Access; and
- INFORMIX under UNIX

In addition, some data are reported only as hard copy. No information was available relating to the systems used for holding the data.