European Topic Centre on Inland Waters

SURF'ACE WATER QUALITY MONITORING

by

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Preface

This report aims at elaborating an overview of the existing surface water quality monitoring activities in the countries in the European Environment Agency area (the 15 European Union Member States and Iceland and Norway). The study includes all surface waters, ie. rivers, lakes and reservoirs, coastal and open marine waters. The study is limited to the description of monitoring activities containing information of interest at European, Euro-regional, national or large regional level.

The report has been prepared by the National Environmental Research Institute (NERI) of the Danish Ministry of Environment and Energy based on a cost-shared project between the Commission of the European Community (CEC) and NERI. A draft report of this project was prepared in November 1994. As part of the activities of the European Topic Centre on Inland Waters (ETC/IW) this report has been updated during the spring 1995. With assistance of the ETC/IW partners, NERI has been responsible for the collating, evaluating and reporting of the information.

Opinions and views expressed in the present report are the responsibilty of NERI and they do not necessarily reflect those of the European Commission or the European Environment Agency .

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1. Introduction, data and information sources

The European continent has several million kilometers of flowing water, more than a million lakes, and a long coastline, each having their own characteristics and, perhaps, environmental problems. An assessment of the general environmental state of European surface waters will be a compilation and aggregation of a huge amount of information. Such an assessment may be used to identify areas with severe environmental problems, to provide a basis for identification and assessment of environmental threats at regional and global levels, to provide information necessary to ensure that society develops in an environmentally sustainable way, and to enable general actions to be taken to improve the environmental state of the waterbodies.

Reliable high quality information about the environmental state of surface waters is essential for water management and implementation of optimal measures to improve environmental quality. Greater knowledge of water quality at the regional and European level is needed if European management of surface waters is to be improved. The reports "Europe's Environment - the Dobris assessment" (EEA 1995) and "European rivers and lakes - assessment of their environmental state" (EEA 1994) provided the first attempts to assess the environmental state of European surface waters. These reports included only a small part of the considerable quantities of environmental information currently produced. Moreover, the findings were based on heterogeneous information and not always directly comparable data as a consequence of, for instance, differences in the design of monitoring networks, variables selected, and analytical methods used. It is stated in the reports that the assessment could be significantly improved if more information could be included and measures were implemented to ensure consistency and comparability.

Considerable environmental information on European surface waters is currently collected and reported by various regional and national authorities. However, an overview of valuable information, does not exist. In Europe local and regional authorities have traditionally been responsible for managing and monitoring the quality of surface waters. The activities were initiated in the 1960s and 1970s and were improved by the implementation of more and more monitoring activities and an increasing number of sampling sites during the 1980s. As the public demand for a cleaner environment and awareness of water quality issues increased during the late 1970s and 1980s the need for national and regional information on the environmental state of surface waters also increased. This situation led to the need for implementation of national surface water monitoring programmes. Many countries organized and established national aquatic monitoring programmes in the late 1980s and early 1990s. Nearly all countries in the EEA area have now, for instance, a national monitoring programme with the purpose of assessing the chemical and physical conditions of rivers. Various marine monitoring activities have also been coordinated, standardized and harmonized to be included in national marine monitoring programmes.

The results from these national and large regional surface water monitoring programmes may form the basis of a surface water quality information system in the EEA area. The first step is to work out an overview of the existing data sources on the environmental state of European surface waters. This report is a part of this process and aims at elaborating an overview of the existing surface water monitoring activities in the countries in the EEA area (the current 15

EU Member States plus Iceland and Norway). The study includes all surface waters, ie. rivers, lakes and reservoirs, coastal and open marine waters. The study is limited to the description of data sources containing information of interest at European, Euro-regional, national or large regional level (Länder, water boards, etc.). The report includes a description of the national and large regional surface monitoring programmes in each country. Similar monitoring programmes have been put together and similarities and differences according to network set-up, sampling frequency and variables measured have been analyzed.

On the basis of the report and additional analyses, a European surface water information system may be elaborated, including criteria for incorporating national monitoring sites into the international network, proposals for harmonization and standardization of sampling and variables to be analyzed, and ideas for information processing from the national level to EEA level. Such a system should be established in close cooperation with the participating countries.

The report has been prepared by the National Environmental Research Institute (NERI) of the Danish Ministry of Environment and Energy based on a cost-shared project between the Commission of the European Community (CEC) and NERI. In December 1993 the CEC, DGXI.B1 and EEA-TF, respectively, entered into a contract with NERI. A draft report of this project was prepared in November 1994. As part of the activities of the European Topic Centre on Inland Waters (ETC/IW) this report has during the spring 1995 been updated. NERI has with assistance of ETC/IW partners been responsible for collating, evaluating and reporting the information.

1.1 Sources of data and information

The data and information in this report are based on:

- nationally prepared descriptions of major surface waters and the administrative organization of surface water quality monitoring (involved organizations, responsibilities, coordination, reporting, data storage, etc.),
- national descriptions of major national and large regional surface water monitoring programmes,
- various national and regional state of the environment and technical reports, and
- scientific literature on monitoring of surface waters.

The National Environmental Research Institute (NERI), Denmark, started working on the project in January 1994. During the spring NERI produced a list of elements to be studied by each Member State and also worked on case studies of monitoring activities in Ireland and Denmark. A draft report describing the Irish monitoring activities was distributed to the Member States as a proposed outline of the descriptions to be prepared by each Member State. On June 22 a meeting was held by the EEA-TF in Brussels with representatives from 11 countries. The outline was discussed and it was decided that NERI should prepare a revised outline and send it to the national focal points and that each country should prepare a description of national monitoring activities and forward the descriptions to NERI by August 15. During the autumn of 1994 NERI received descriptions of monitoring activities from several countries. NERI analyzed the description and prepared in November 1994 a draft report. The draft report

5. Conclusion

The current report gives an overview of national surface water quality monitoring activities in the countries in the European Environment Agency (EEA) area. The results from these national and large regional monitoring programmes could make the basis for the evaluation of the. state and trends in water quality at the EEA level. On the basis of the current report and additional analyses, a European surface water information system could be elaborated, including criteria for incorporating national monitoring sites into the EEA network, proposals for harmonization and sampling procedures and variables to be measured, and ideas for information processing from national level to the EEA level.

The report presents summary descriptions of the monitoring activities in each country based on the supplied national descriptions. Generally, the countries have several national monitoring programmes focused on assessment of the environmental state of surface waters. Some countries have a long tradition for national coordination of their monitoring programmes, however, in most of the countries the monitoring of surface waters has traditionally been performed by regional or local organisations. During the 1980s and 1990s the growing need for national information on the environmental state of surface waters made it necessary to work out national coordinated monitoring programmes. In most cases these national programmes are based on the information collected by regional organisations.

Nearly all countries in the EEA area have a national monitoring programme with the purpose of assessing the chemical water quality of rivers. The networks consist generally of more than 100 sampling sites located in all major river systems and rivers in each country. In most of the programmes basic variables (eg. water flow, temperature, pH, conductivity), organic pollution indicators (eg. BOD5, dissolved oxygen, ammonium), nutrients (nitrogen and phosphorus), specific ions (eg. chloride, sulphate, potassium, calcium) are measured. At a reduced number of sampling sites heavy metals and organic micropollutants are generally measured. The sampling and measuring frequency are generally monthly or even more frequent. Most of the countries also have monitoring programmes with the purpose of estimating the riverine loading into coastal areas, or the loading by transboundary rivers. In the Nordic countries programmes have been established with the purpose of monitoring water quality and loading from small catchments. These monitoring programmes generally consist of up to 20 relatively small stream catchments with detailed integrated studies of both river water quality and of the catchment (eg. land use and soil type), the main purpose being to follow reference areas, loading from agricultural land or impact of acid precipitation.

Most European countries have a long tradition for local assessment of the river quality based on studies of macroinvertebrates. In some countries these activities have developed into national surveys/classifications of the biological quality of the main rivers. These national surveys are generally based on the results collected by the local organisations and made possible through national harmonisation and standardisation. In some countries (eg. Austria, Germany, Ireland, Luxembourg, and the United Kingdom), the national classification has been performed since the 1970s and the countries are generally assessing the river quality at two to five years intervals. Some of southem European countries and the Nordic countries have no national programme for the assessment of biological river quality.

Only a minor part of the countries in the EEA area has national monitoring programmes for the assessment of water quality of lakes; some countries have, however, local monitoring of lakes. The Nordic countries with their many natural lakes generally have one or several lake monitoring programmes. Generally, a "survey-type" monitoring programme including a large number of lakes, which are sampled with inter-vals of several years (5-10 years), is supplemented with more intensive programmes with a sampling frequency of several times a year and typically covering a small number of lakes. The lake monitoring programmes generally include measurement of basic variables (eg. temperature, pH, conductivity, dissolved oxygen), nutrients (nitrogen and phosphorus), specific ions (eg. chloride, sulphate, potassium, calcium). In addition, assessment of biological variables, especially phytoplankton is also included in many of the lake nionitoring programmes.

Norway, Sweden and Finland each have nation-wide surveys in order to assess the extent of acidification. The surveys include national sampling of 200 to more than 1000 water bodies, primarily lakes, and are generally performed with intervals of five to ten years. The Nordic countries and the United Kingdom and Ireland have monitoring programmes involving detailed studies of few catchments with the purpose of understanding the process of acidification and to analyze trends.

Information about marine monitoring programmes has been received from ten out of the seventeen countries. Most countries have one general marine monitoring programme, which may be divided into sub-programmes eg. one programme concentrating on coastal waters and one programme focused at the open marine waters. Most of the marine monitoring programmes include measurement of chemical and physical variables in the water column (basic variables (eg. temperature and salinity), oxygen condition, and nutrients) and many of the programmes include studies of the biota (phytoplankton, zooplankton, zoobenthos etc.).- The sampling networks consist generally of a number of intensive sampling sites, typically- less than 20 sites, with frequent sampling (> 12/yr) of the water column supplemented with extensive network including several sampling sites and low frequent sampling (1-4/yr).

Reliable high quality information on the environmental quality of surface waters is essenti for water management and the implementation of optimal measures that will improve. environmental quality. Greater knowledge of water quality at the regional and European is essential if the management of surface waters at the European level is to be improved. considerable information on the state of surface waters collected and reported by various regional and national authorities may be a valuable input to a European Surface Water Information System. Consistency and comparability of the information processed by the information system would require some harmonization and standardization of the regional national monitoring programmes. A successful European Surface Water Information Sys would have to include the following elements:

A representative monitoring network,
A harmonized sampling and analyzing programme,
National and regional reporting of the enviromnental state of surface waters.