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IN-DEPTH STUDY OF THE MONITORING SITUATION IN INLAND SURFACE WATERS

Proposal by the European Environment Agency
(European Topic Centre on Water – United Kingdom)[1]

Introduction

1. ECE countries in transition to a market economy are today facing numerous difficulties in maintaining and improving their systems of environmental information particularly regarding human health impacts. A number of important weaknesses remain as a result. This handicaps the development of appropriate remedies, whether policy or legislative. Furthermore, ongoing monitoring systems cannot be easily integrated in international (global or regional) programmes.

2. The Working Group will undertake an in-depth analysis of a significant area (inland surface waters) of environmental monitoring to identify major gaps and obstacles to a comprehensive assessment. At the same time, a broad cross-sectoral analysis will be made to identify possible synergies of common data use. The Working Group will, thereafter, identify good practices to overcome the most pervasive obstacles and develop recommendations. Attention will be given to the link between monitoring and reporting obligations under relevant intergovernmental processes and agreements.

[1] Prepared in coordination with the International Water Assessment Centre - IWAC (Lelystad, Netherlands) under the ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes.

PROPOSAL

A. Why are we monitoring inland waters in Europe?

3. Poor water quality has effects not only on aquatic ecosystems but also on the suitability and treatability of water for drinking. In particular, pollution of water by organic material (e.g. sewage effluent), toxic and persistent substances (such as heavy metals and pesticides), and pathogens (viruses and bacteria) have been addressed through European Union directives. The enrichment of water by nutrients such as nitrogen and phosphorus can also lead to eutrophication, which again can have significant environmental effects. Effective control and reduction in pollutants requires information on and an assessment of their concentrations, effects, loads and sources. This information is obtained by monitoring.

4. Environmental monitoring is at the very beginning of the environmental information chain. It is the basis of environmental data collection, environmental reporting and environmental research, and the basis of understanding of environmental problems and trends. Environmental monitoring is therefore a powerful tool for supporting decision-making, enforcing policy decisions, and for assessing compliance with policy regulations and objectives.

5. Countries monitor water resources according to their national priorities and requirements (e.g. legal and operational) and international obligations (e.g. European Commission directives and international agreements). There will also be budgetary and resource considerations in all countries that may limit the extent of monitoring in terms of water types, numbers and types of stations and determinants measured. Environmental monitoring is thus often very limited in those countries that have other national budgetary priorities and therefore cannot afford it. This is particularly so in countries in transition to a market economy.

B. How do we get information on inland waters in Europe?

6. Up until now there has been no way of obtaining 'timely, targeted, relevant and reliable information' on all of Europe's water resources. This gap is being filled with the creation and implementation of **EUROWATERNET** (the EEA information and monitoring network for inland waters) throughout Europe. This includes the European Union (EU), countries in accession to the EU, other PHARE countries and eventually the newly independent States - a total of about 44 countries.

7. EUROWATERNET is designed to give a representative assessment of all sizes and types of rivers, lakes and groundwater bodies, and of the human pressures that affect the quality and quantity of water (such as agricultural activities) within a country, and also across the EEA area. It will soon be extended to cover transitional, coastal and marine waters. EUROWATERNET provides information on:

(a) The status of Europe's inland water resources, quality and quantity (state and trends assessments); and

(b) How that relates and responds to pressures on the environment (cause-effect relationships).

8. The key concepts of EUROWATERNET include:

(a) It samples existing national monitoring and information databases;

(b) It compares like-with-like;

(c) It has a statistically stratified design ‘tailor-made’ for specific issues and questions; and

(d) It has a known power and precision.

9. EUROWATERNET will provide data and information that will be used in the formulation of policy-relevant indicators. EEA and its Topic Centres are currently developing a core set of indicators for water. These will be used in the coming products of the EEA including the Kiev assessment report that will be produced for the “Environment for Europe” Conference in 2003, and will have a pan-European coverage and thus include the NIS. The basis of EEA reporting is the DPSIR framework and therefore information and indicators are required on the **D**riving forces resulting in **P**ressures on the environment that affect its **S**tate and potentially causing an **I**mpact (degradation). **R**esponses would include measures and policies to reduce the pressures and hence improve the state and reduce the impact.

10. There are three steps in the development and progressive implementation of EUROWATERNET. Countries are asked to implement: initially a "basic network" based on a number of river and lake stations in relation to a country's surface area; an "impact, policy related network" where specific river and lake stations are selected to answer specific policy-related questions; and ultimately "a fully representative network”.

11. There is close collaboration between EEA (through its Topic Centre on Water) and the UN ECE Working Group on Monitoring and Assessment to ensure that the data requirements of EEA are in harmony with those required under the UN/ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992) and its 1999 Protocol on Water and Health. This Working Group has been particularly active in producing inventories of transboundary rivers, lakes and groundwaters in the ECE region, reviews of current practices in monitoring and assessment, strategic guidelines on monitoring and assessment of transboundary rivers and groundwaters (both now published) and lakes (under preparation). Guidance has also been given on quality assurance procedures for monitoring and assessment (www.unece.org/env/water). These documents are available on the web site of IWAC hosted by the Netherlands' Institute for Inland Water Management and Waste Water Treatment (RIZA) (http://www.iwac-riza.org).

12. The approaches of the UN/ECE Working Group on Monitoring and Assessment and EEA (EUROWATERNET) have been identical in stressing the integrated approach to monitoring and assessment (through the DPSIR framework) and the absolute necessity of having clearly defined information needs before designing and carrying out a monitoring programme.

13. Discussions have also started with the OSPAR Commission on how EUROWATERNET can be linked with the OSPAR "Comprehensive Study on Riverine Inputs and Direct Discharges" (RID). The proposal is that OSPAR signatory countries would use EUROWATERNET to report RID data, and that the data would be stored, disseminated and visualized through WATERBASE. WATERBASE is the database in which EEA would hold data and information arising from EUROWATERNET.

14. The key policy driver over the coming decades in the EU, and eventually the accession countries, will be the newly adopted Water Framework Directive. There are many aspects that countries will have to consider, develop and implement in the coming years. Countries and the European Commission are keen to make this process as efficient and harmonized as possible. To that end there are initiatives under way for EEA and its Topic Centres to facilitate and streamline parts of this process.

C. EUROWATERNET could be used in UN/ECE countries not covered by EEA

15. EUROWATERNET is designed to be a flexible monitoring and information collection system. It can thus be easily applied to different water types (e.g. transitional and coastal waters), different geographic regions and in countries with different levels of monitoring activities and networks. As described in section B, one of its key concepts is that it samples existing national monitoring and information databases. It can also be implemented step by step, starting with what may be a limited network, and progressively adding to it, as technical capacity and available monitoring resources improve and increase in a country. It can thus be seen as a 'least-cost' solution to improve data and information flows at a pan-European level serving different international monitoring and reporting requirements.

16. EUROWATERNET is now being increasingly seen and accepted as the main reporting mechanism for countries and the European Commission by which the effectiveness of European water policies can be assessed and new ones formulated if needed. For example, it can provide relevant and reliable information enabling EU structural funds to be effectively targeted.

D. What is needed to implement EUROWATERNET in UN/ECE countries not covered by EEA?

17. Several steps are required to get a clear picture of the needs concerning the implementation of EUROWATERNET in countries not yet covered. These steps have been divided into three phases indicating linkages of tasks and to facilitate the allocation of resources. The first phase could be regarded as the inventory and gap assessment phase. This is then followed by an implementation phase during which the gaps are filled and the national databases are constructed and populated. Full compatibility and interchangeability with the EEA-

ETC/Water pan-European database (known as WATERBASE) would be ensured. Finally, a consolidation phase is envisaged in which the institution of regular electronic data flows from NIS to EEA-ETC/Water into WATERBASE and vice versa would be achieved. Specific elements will be as follows:

(a) Phase I: inventory and assessment:

- Inventory of current surface water monitoring networks for national and international purposes;
- Inventory of existing databases and description of data flows;
- Inventory of available pressure or proxy pressure data;
- Comparison with the EUROWATERNET station selection criteria – identification of gaps in monitoring and information;
- Selection of EUROWATERNET – basic stations.

(b) Phase II: implementation:

Actions taken to fill gaps in systems identified in phase I and support to the creation of national databases on the state of and pressures on surface waters. The national databases would be constructed in a way to ensure that electronic data transfers from them to the EEA-ETC/Water pan-European database (WATERBASE) can be implemented simply and routinely;

(c) Phase III: consolidation:

- Recommendations for improving cooperation and data exchange between countries, the EEA and other international organizations;
- Institution of regular data flows to ensure full participation in the reporting schedules of EEA.

These steps are now described in more detail.

Phase I: inventory and assessment

(a) Inventory of current surface water monitoring networks for national and international purposes

18. A number of reviews of current surface water monitoring networks, i.e. rivers, canals, lakes and reservoirs, have been carried out in NIS in the recent past, e.g. by the European Topic

Centre on Inland Waters, for the UN/ECE Environmental Performance Reviews, by IWAC for transboundary waters and by consultants working under contract to TACIS. These reviews need to be compiled, converted to an inventory, checked by an appropriate expert in each country and, where necessary corrected and updated. It is important that the inventory is a complete record of what is actually being done in each country rather than what ***should be done***.

19. Information required in the inventory:

(a) Water body type (river, canal, lake, reservoir);

(b) Number of monitoring stations in the network;

(c) Purpose of the monitoring network;

(d) Identification of each station (reference number, name);

(e) Geographic position of each station (universal latitude and longitude);

(f) Determinants monitored in the following categories:

(i) Basic (e.g. depth, water temperature, flow or discharge, pH, conductivity, dissolved oxygen);

(ii) Suspended particulate matter (e.g. suspended solids, turbidity);

(iii) Organic pollution (e.g. Biological Oxygen Demand, Chemical Oxygen Demand, Total Organic Carbon, ammonium);

(iv) Nutrients, eutrophication and biological, e.g. N, P (in various forms), chlorophyll, Secchi disc (in lakes), phytoplankton, zoobenthos ;

(v) Acidification indicators, e.g. alkalinity, sulphate, aluminium, diatom species;

(vi) Major ions, e.g. Ca, Na, K, Mg, chloride;

(vii) Metals;

(viii) Organic micropollutants e.g. pesticides, polychlorinated ciphenyls, polycyclic alomatic hydrocarbon, hexachlorohexane;

(ix) Radioactivity;

(x) Microbiological indicators, e.g. total coliforms, faecal coliforms, faecal streptococci;

(xi) Biological indicators, e.g. phytoplankton, zooplankton, zoobenthos, fish, macrophytes;

(g) Frequency of sampling;

(h) Sampling window (e.g. annual, summer, winter);

(i) Matrices sampled (water, sediment, biota);

(j) Data storage system;

(k) Data analysis process.

(b) Inventory of existing databases and description of data flows

20. Following subsection (a), it is necessary to know details of any existing databases or records (e.g. paper-based archives or yearbooks) that may be held, managed and maintained at national and international levels along with a description of the system or process of data flows used to create the database or record. Information required on national and international sources of data is:

(a) Name of database;

(b) Organization(s) responsible for data collection, aggregation and management;

(c) Platform on which the data are collected and held (e.g. computer system, diskettes, Internet, paper reports);

(d) Availability of data (e.g. freely, confidential, purchasable);

(e) Countries or regions covered by database;

(f) Number of years of data held and the start year (identify any gaps in the record);

(g) Number of sites where sampling has been done and data are available sorted according to water type (river, canal, lake, reservoir, groundwater, estuary, coastal and marine);

(h) List the determinants in the database by:

(i) Its name (e.g. nitrate nitrogen);

(ii) The statistic held (weekly, monthly, summer minimum, winter maximum, annual average);

(iii) The unit of the determinant (e.g. mg/litre as N);

(i) Any other metadata that are relevant to the database or record;

(j) Description of the process whereby the data are transferred from the lowest (local) level to the highest aggregated level.

(c) Inventory of available pressure or proxy pressure data

21. For each selected river and lake station additional physical characteristics and pressure information is required for EUROWATERNET. These are summarized in the following table:

	Rivers	**Lakes**
Physical characteristics		
Depth (mean)		
Surface area		
Catchment area upstream of station/lake		
Station/lake altitude		
Longitude/ latitude		
Upstream river length to source		
Soil type/geology of catchment		
Pressure information		
Population density in (upstream) catchment		
Upstream catchments land use such as		
- % agricultural land		
- % arable		
- % pasture land		
- % forest		
- % urbanization		
Point source loads entering upstream		
Fertilizer use in catchment upstream		

(d) Comparison with the EUROWATERNET station selection criteria – identification of gaps in monitoring and information

22. The inventories generated in subsections (a) and (b) need to be compared with the requirements for Eurowaternet stations as described in EUROWATERNET – Technical Guidelines for Implementation, Technical Report No. 7. European Environment Agency, 1998.

23. This comparison will provide information on the representativity of national monitoring networks and their usefulness or otherwise in providing representative and comparable information on the state of the water environment. The gaps and shortcomings will be identified and recommendations made on how they can be improved

(e) Selection of EUROWATERNET – Basic stations

24. With the support of a local expert (equivalent to a national reference centre representative using the terminology of EEA), the appropriate EUROWATERNET – Basic Network stations will be identified.

2. Phase II: Implementation

Guidelines and support to the creation of national database on state of and pressures on surface waters

25. With the support of a local expert, specifications for the design of a database to hold the national EUROWATERNET will be provided. Assistance and advice will be available on populating, quality checking and validating the data in the national database. Specifications for the transfer of data from the national database to the European database (WATERBASE), managed by ETC/Water for EEA, will also be provided.

3. Phase III: Consolidation

(a) Recommendations for improving cooperation and data exchange between the countries, EEA and other international organizations

26. Experience gained from designing, testing and supporting the implementation of EUROWATERNET in the 30 or so European countries that are members of EEA will be used. The construction and management of an electronic database holding data that can be used for multiple reporting purposes and the ability to generate data flows electronically are important factors in making cooperation more effective and in reducing the national reporting burden.

(b) Institution of regular data flows to ensure full participation in the reporting schedules of EEA

27. This task flows naturally from the preceding ones and is the proof of their effectiveness. The goal will be to build the national capacities to the extent that annual data flows to ETC/Water (and for other organizations) are assured and are being carried out in the most efficient and cost-effective way. This task will involve the technical manager and the data manager in ensuring that all data submitted are entered into WATERBASE after quality control processing.

E. Method of working

28. The organization of the project will be kept as simple as possible. It is proposed that the manager of the ETC/Water should be the project director responsible to the ECE Working Group on Environmental Monitoring and the funding organization(s) for all contractual matters. He will be supported technically by the core team of ETC/Water, which consists of a technical manager and a data manager. Coordination with and participation of the ECE secretariat and IWAC will be ensured.

29. Working Group members from NIS will designate national institutions as focal points (national experts) for the project. The Working Group may wish to recommend a recognized institution on water monitoring in a NIS as coordinating body (project manager) for the project. This institution will report to the project director.

Phase I: inventory and assessment

30. The project manager will work with national experts in each NIS and make all necessary arrangements to complete and check the validity of the inventories (paras. 18-21) and send them to the core team.

31. The core team will make the comparison with the EUROWATERNET criteria (paras. 21-23) and select the EUROWATERNET stations (para. 24) in collaboration with the project manager. The comparisons and selection are to be validated by the national experts.

Phase II: Implementation

32. The core tetam will give support for the creation of national databases to the national experts in the form of guidelines. Helpdesk facilities will be provided. It is likely (based on experience in EEA countries) that the gathering of pressure information will be difficult and time-consuming and provision is made in the project for additional support from the core team to the project manager and national experts jointly to determine how to overcome these problems.

Phase III: Consolidation

33. The consolidation of previous phases will enable the national experts to institute regular data flows to ensure full participation in the regular reporting schedules of EEA (para. 27). Reporting needs for other international organizations will also be taken into account in this phase.

F. Output

34. The outcome of the project in the form of a report and draft recommendations to NIS Governments will be submitted to the Working Group at its fourth session in January 2003 for consideration.