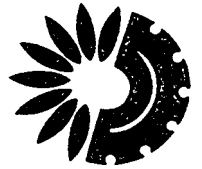




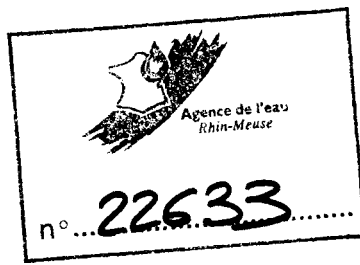
EUROPEAN TOPIC CENTRE ON INLAND WATERS



UNDER CONTRACT
TO THE EUROPEAN
ENVIRONMENT
AGENCY

INTERNATIONAL REQUIREMENTS FOR MONITORING SURFACE AND GROUND WATERS

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EXECUTIVE SUMMARY

The European Topic Centre on Inland Waters was **formed** in December 1994 to **undertake** an identified programme of work for the **European Environment Agency**. This report is on **one** of the **projects** (**MW1: Water Resources** - quality and quantity, general approach to assessment) to be undertaken **during** 1995, and has the overall objective of suggesting possible **approaches** to co-ordinate and improve monitoring in the **EEA area**. This entailed the establishment of the detailed monitoring requirements of existing and proposed **European Union** legislation, **policy** and international agreements. At the time of submitting this report, information on monitoring requirements had not been validated by Iceland and the Walloon and **Brussels** regions of Belgium.

Within the **EEA area**, **many** requirements for monitoring arise from the **European Commission**. However, there are also **many** other international commitments which make monitoring requirements. Four types of directive have been employed by the EU to control the pollution of water: use-related directives; **industry** sector directives; substance directives; and, **product** directives. With the exception of the **products** directives, most of these directives require the implementation of monitoring, either routine programmes or preliminary investigations. The extent to which monitoring requirements associated with directives overlaps **depends** on commonalities between the national implementation of directive requirements, and the monitoring undertaken for this **purpose will** therefore **vary** from country to country.

The requirements made in the directives have been designed largely independently from each other. The Commission has, however, taken some initiatives to harmonise monitoring requirements and reporting of results in the **Exchange of Information Decision** (77/795/EEC as amended by **Decision 86/574/EEC**) and in the reporting of implementation of certain directives as specified in the **Reporting Decision** (92/446/EEC). In total four directives and **one** proposed directive make requirements for groundwater monitoring (the requirements made in the **Dangerous Substances Directive** (76/464/EEC) have been superseded by the **Groundwater Directive** (80/68/EEC)) and there is no overlap in the **current** monitoring requirements. In EU legislation, all monitoring requirements which apply to **rivers**, also apply to lakes and reservoirs. Most directives which apply to freshwaters also apply to salt waters. The **Shellfish Directive** (79/923/EEC) is the only directive which applies to estuaries and coastal waters but not freshwaters.

Of the 15 directives that require monitoring of fresh surface waters, all include water column monitoring. The **Dangerous Substances Directives** and the **Titanium Dioxide Directive** (82/883/EEC) also require monitoring of sediment and biota. The **Exchange of Information Decisions** make the only requirements for flow measurements. There are eight international agreements which also require monitoring of water quantity - flows and levels.

Barriers to the harmonisation of monitoring can be introduced at the sampling, analysis, and reporting stages, and can arise either because requirements differ (i.e. conflicts) or because requirements are not clearly specified (i.e. weaknesses). The most specific requirements in terms of named water bodies and measuring stations are in the Exchange of Information Decisions. These rivers are nationally significant rivers and lakes and as such are quite likely to be sampled for other national and international obligations (e.g. Rhine and Elbe Conventions). The scope for overlap of sampling locations between directives, therefore, appears to be limited to areas where use and designation overlap, which is probably a limited circumstance in many states. Many of the directives allow the competent authority of each Member State to make decisions on such aspects as the exact sampling point, the distance from this point to the nearest point where pollutants are discharged and the depth at which the samples are to be taken but the same sites and depths should be used in all surveys, in relation to physical and temporal conditions.

For some directives, once the fate and behaviour of an effluent is known and the effects have been established, and as long as there is no deterioration, then there is also scope for the Member States to use a lower sampling frequency than specified in the directive. Sampling period is not usually specified or if it is the interpretation of its definition can give rise to differences between countries (for example bathing season). These imprecise requirements can give rise to different interpretation.

As the choice of sampling location is for some directives related to areas designated by the Member States rather than by the European Commission, it is unlikely that, for some directives, a comparison of quality across Europe of these designated waters will give a complete picture of quality because the degree of comparability will depend on the interpretation of the designation rules and national differences of how these are implemented. Therefore, the degree of coverage that water quality data encompasses within each country will be determined by national designations and the prevalence of the industries that are required to be regulated.

It is not apparent from most of the published directives whether there have been any, or if so, what, statistical considerations when defining the required sampling frequencies or numbers. These aspects have a significant effect on the statistical precision and confidence of the monitoring data produced. The required frequency should be derived with reference to the quantified risks that some waters will be misclassified (against compliance criteria). Furthermore for fairness of comparison the frequency of sampling should be uniform throughout Europe.

Sources of error in the overall assessment of a determinand in a water body would include sampling error and analytical error. The analytical requirements made in the directives are generally very basic and defined in terms of performance criteria (i.e. limits of detection, precision and accuracy) and/or by the method. The degree of definition, however, varies greatly from directive to directive. Many directives make very broad requirements to use 'appropriate methods' for pre-treatment and

analysis. The performance criteria are the key requirements with regard to analysis. Despite this several directives, the Titanium Dioxide Directive and all the use-related directives (**except** the Surface Water through the Sampling Analysis Directive) **fail** to establish performance requirements for analysis. In addition the laboratories **concerned** with applying the directives should be free to use '*appropriate methods*' providing they satisfy performance criteria. Probably the most significant omission in requirements for analytical technologies is a requirement for analytical quality control (AQC). Increasingly AQC is being recognised as essential for data from monitoring programmes to be reliable and comparable. Microbiological methods should be standardised for efficiency of recovery and performance (accuracy, specificity, **precision**) and, for securing harmonisation of **results** between Member States, single **reference procedures** must be agreed for **each** determinand.

Another important aspect of directives, particularly when a **comparison** of quality **across European** states is expressed as a **comparison** of compliance against limits and standard values (e.g. as in the Bathing Waters Directive), is how the compliance requirements in the directives are expressed, calculated and interpreted. **Differences** in interpretation of these requirements is another significant barrier to harmonisation of monitoring and implementation of directives **across** Europe.

For international agreements sample location **will** generally be related to the **purpose** of the agreement often being at designated or fixed sites. Other agreements are **less specific about** sampling location perhaps being determined by the needs of the signatories or monitoring programme. The sampling frequency specified in international agreements is **very** variable within agreements and between agreements and the analytical requirements are **also** generally **very** basic and apparently hardly ever defined in terms of performance criteria.

As **well** as the aspects described above, another significant barrier to obtaining valid and quantitative temporal and spatial **comparisons** of water quality **across** Europe is the **differences** on how directives are implemented and interpreted at the Member State level. This issue has not been addressed in this **project**, but it is recommended that such an assessment is undertaken.

There are European policy initiatives and proposed new directives that will potentially change **and/or** increase the need for national and Europe-wide monitoring. In particular the groundwater action and water management programme will focus on the monitoring of groundwater **resources**, and the proposed **ecological** directive will place more emphasis on biological monitoring in all surface waters.

The outputs from Project MW1 and MW2 (inventories of current monitoring networks) **will** be used in the next phase of the Topic Centre's work programme for this year - the design of an inland water monitoring network to meet the needs of the European Environment Agency.