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**ECONOMIC COMMISSION FOR EUROPE**

**MEETING OF THE PARTIES TO THE CONVENTION ON  
THE PROTECTION AND USE OF TRANSBOUNDARY  
WATERCOURSES AND INTERNATIONAL LAKES**

Fourth meeting  
Bonn (Germany), 20–22 November 2006  
Item 7 (b) of the provisional agenda

**INVENTORY OF TECHNICAL GUIDANCE FOR MONITORING AND ASSESSMENT  
OF TRANSBOUNDARY WATERS**

Submitted by the International Water Assessment Center (IWAC)

1. At their third meeting, Parties agreed to include in their workplan 2004-2006 activities related to both strategic and technical guidance on monitoring and assessment of transboundary waters. For what concern technical aspects, Parties decided to draw up an inventory of existing technical guidance, tools and examples of monitoring and assessment practices, developed within other frameworks (e.g. United Nations organizations, EU Water Framework Directive), including a short description of the contents and scope, as well as an expert judgement, if possible, to be published on the International Water Assessment Center (IWAC) web site (see programme element 3.1 in ECE/MP.WAT/15/Add.2).<sup>1</sup>
2. Following this decision, IWAC analyzed and selected a number of technical guidelines developed by other United Nations Organizations, universities and other institutions to be included in the inventory. Information was organized in records that include a short description and, when possible, an expert judgment for each technical guidance.
3. The draft inventory of technical guidance for monitoring and assessment was revised and endorsed by the Working Group on Monitoring and Assessment at its seventh meeting (Geneva, 3-5 May, 2006).

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<sup>1</sup> For the strategic guidance, see document ECE/MP.WAT/2006/12.

4. The annex to this document contains the background and the guiding principles followed to compile the inventory. Moreover, information for each selected monitoring and assessment guidance is presented in an easy format. This information will be further organized in a navigable user-friendly format and made available on the Internet.

5. The Meeting of the Parties may wish to:

(a) Examine the inventory of technical guidance for monitoring and assessment of transboundary waters (see annex) and recommend amendments to its structure and contents;

(b) Entrust IWAC with the task of keeping the inventory up to date (see document ECE/MP.WAT/2006/3) including guidelines developed in Russian language;

(c) Invite Parties, non-Parties, international organizations and other partners to inform IWAC on additional existing guidelines to be included in the inventory;

(d) Commend IWAC for the work achieved.

Annex**DRAFT INVENTORY OF TECHNICAL GUIDANCE FOR MONITORING AND ASSESSMENT OF TRANSBOUNDARY WATERS**

This document provides an overview of existing technical guidelines that support implementation of (transboundary) monitoring and assessment programmes. The information is currently in the form of a document but is intended to be transformed into a website that provides easy access to these documents and guidelines.

The inventory will be supplemented with additional information. First priority should be to include documents in the Russian language.

Each record describes a monitoring guidance and it is catalogued with keywords that are clustered in two categories: discipline, that refers to the scope of application of the guidance, and information cycle, that describes what type of information the guidance supports. The keywords will provide both quick links to the monitoring tools and search options in on line queries. Below are listed the keywords for both categories:

**Discipline:**

- Hydrology
- Ecology
- Indicators
- Groundwater monitoring
- Monitoring and modelling
- Municipal wastewater
- Monitoring and agriculture
- Water Framework Directive

**Information cycle:**

- General monitoring
- Information needs
- Information strategy
- Monitoring/Data collection
  - Monitoring programmes
  - Data collection and handling
  - Laboratory analysis
- Data management and assessment
  - Data analysis methods
  - Assessment
- Reporting and Information use

**International hydrological glossary**

(<http://www.cig.ensmp.fr/~hubert/glu/aglo.htm>)

UNESCO – WMO searchable glossary of hydrological terms in many languages.

Keywords: Hydrology

**WMO - Guide to hydrological practices**

(<http://www.wmo.ch/index-en.html>)

Provides detailed guidance for the day-to-day activities of Hydrological Services. The fifth edition (1994) has been completely revised since last published in 1981. It consists of 59 chapters covering the entire field of operational hydrology, as it is currently perceived, with its applications to water management. It includes many of the scientific and technological advances, which have taken place since the 1970s: radar-measurement of rainfall; loggers using solid-state memories; and the application of personal computers and geographic information systems. It discusses a wide range of hydrological models including distributed models and contains information on how to select one for a specific purpose. The guide also deals with urban water-resources management, sustainable water development, irrigation and drainage and similar topics relevant to water management. (ISBN: 92-63-15168-7)

Keywords: Hydrology

**Guidelines for computerized data processing in operational hydrology and land and water management**

(<http://www.wmo.ch/index-en.html>)

This publication provides an introduction to the concepts, terminology and application of computerized data processing for land and water experts; Part I covers the common principles and practices of data processing; Part II deals specifically with computer applications for hydrological data. (ISBN: 92-63-10634-7)

Keywords: Hydrology; Data processing

**Presentations of Three Training Seminars about Quality Assurance (QA), Biological Methods of Water Framework Directive and Waste Water Sampling Techniques**

(<http://www.ymparisto.fi/default.asp?contentid=150662&lan=en>)

Ain Lääne and Pertti Heinonen (eds.) 2005 Suomen ympäristökeskuksen moniste 328; 127p., URN:ISBN:9521120541, ISBN 952-11-2054-1 (PDF).

The presentations of three training seminars about Quality Assurance in sampling and biological methods of the EU Water Framework Directive, and about waste water sampling techniques that were organized in Estonia during 2002 and 2004.

Keywords: Ecology, Hydrology, Water Framework Directive, Laboratory analysis, Municipal waste water

### **Methods for Assessing the Ecological Health of the Environment**

(<http://publications.environment-agency.gov.uk/pdf/SE1-052-PR-e-p.pdf>)

The proceedings of a seminar on the monitoring of ecosystem health are presented. The seminar was organised by the Environment Agency and was held at Reading in July 1998. The seminar covered ecological health assessment methodology, health sustainability, exposure modelling and the biomarker approach.

Keywords: Ecology

### **Using Macrophytes for the Environmental Assessment of Rivers: The Role of Sediment Nutrients**

(<http://publications.environment-agency.gov.uk/pdf/SE1-S01-TR-e-p.pdf>)

The results of a study into the role of sediments in determining macrophyte community composition are presented. The report explores the utilisation of sediment-macrophyte relationships in order to facilitate the use of macrophytes as a biological assessment tool for pollution.

Keywords: Ecology

### **A Framework for the Design of Ecological Monitoring Programs as a Tool for Environmental and Nature Management**

([http://springerlink.metapress.com/\(bqkvfb55lbji5snzktphlibf\)/app/home/contribution.asp?referrer=parent&backto=issue,1,7;journal,106,269;linkingpublicationresults,1:102878,1](http://springerlink.metapress.com/(bqkvfb55lbji5snzktphlibf)/app/home/contribution.asp?referrer=parent&backto=issue,1,7;journal,106,269;linkingpublicationresults,1:102878,1))

P. Vos, E. Meelis and W.J. Ter Keurs, 2000. *Environmental Monitoring and Assessment* 61 (3): 317-344.

Environmental and nature management cannot operate effectively without reliable information on changes in the environment and on the causes of those changes. Ecological monitoring can represent an important source of information. However, many operational monitoring programs are not very effective, i.e., not very useful for decision-making. We present a conceptual framework for the development and maintenance of effective ecological monitoring programs. In the decision-making process, two main functions for monitoring can be recognized: an early warning and an early control function. Both these functions require a high diagnostic

power. This is used as a guideline for the design process. The design consists of choices concerning monitoring objectives, objects and variables to be monitored, sampling strategy and design, data collection, data handling, maintenance and organization. Arguments commonly put forward in literature and in practice to support the various choices are subjected to a critical analysis. The framework will be helpful in the design of effective monitoring systems as it avoids important components to be overlooked, clarifies the relation between the different components, maximizes the exploitation of existing possibilities and opportunities and identifies shortcomings in advance. This will result in monitoring programs that should be able to live up to their expectations.

Keywords: Ecology

### **How to Assess and Monitor Ecological Quality in Freshwaters**

(<http://www.ymparisto.fi/default.asp?contentid=165583&lan=en>)

Marja Ruoppa, Pertti Heinonen, Ansa Pilke, Seppo Rekolainen, Heikki Toivonen and Heidi Vuoristo (eds.), Nordic Council of Ministers, Copenhagen 2003, TemaNord 2003:547

This publication includes the oral and poster presentations held in the fourth symposium of the project 'Monitoring and assessment of ecological quality of aquatic environments' in Helsinki, Finland on 23 - 25 October, 2003. Scientists from different European countries presented recent experiences and approaches concerning classification of ecological status and also views on how to assess and integrate biological elements for the implementation of the WFD. Also examples of new monitoring schemes were presented.

Keywords: Ecology

### **The utility of multivariate techniques for the analysis of fish community structures and the design of monitoring programmes**

(<http://www.mtm-conference.nl/mtm3/docs/NagelkerkeandVanDensen2001.pdf>)

L.A.J. Nagelkerke and W.L.T. van Densen, 2001. Pages 323 – 332 in Timmerman, J.G., W.P. Cofino, R.E. Enderlein, W. Jülich, P.L. Literathy, J.M. Martin, Ph. Ross, N. Thyssen, R.K. Turner and R.C. Ward (Eds.) Proceedings of the international workshop Monitoring Tailor-Made III, Nunspeet, The Netherlands.

The instalment of informative and cost-effective fish monitoring programmes depends on an effective classification of fish communities and on the identification of key variables, i.e. variables that govern most of the diversity within and between fish communities. Classification of the 'overall' structure of fish communities can only be achieved by using the proper multivariate techniques, which also allow for the effective identification of key variables of the fish community. Once these key variables are identified, and explicit questions on possible changes in the fish community are asked, statistical optimisation of the monitoring programme can be achieved. Power analysis is an indispensable tool for this optimisation. In this paper the

selection of key variables, using data of the fish communities of a number of Dutch lakes, is illustrated. The statistical optimisation by power analysis of one of these key variables, is shown for the development in the bream biomass in Veluwemeer (1971-1987).

Keywords: Ecology; Data management and assessment

### **Monitoring and Evaluation Indicators for GEF International Waters Projects**

([http://europeandcis.undp.org/WaterWiki/images/5/52/GEF\\_IW\\_M%26E\\_Indicators.pdf](http://europeandcis.undp.org/WaterWiki/images/5/52/GEF_IW_M%26E_Indicators.pdf))

Effective monitoring and evaluation (M&E) is increasingly recognized as an indispensable tool in project and programme management. If done well, an M&E plan and the indicators developed as part of it serve both as a corrective function during the project cycle, enabling timely adjustments, and as a guide to structuring future projects more effectively. All GEF projects must include M&E provisions. The intent of this paper is to describe the role of M&E relative to GEF's international waters focal area and to more specifically identify an indicator framework for countries to employ as part of the M&E process related to international waters.

Keywords: Indicators; Reporting and Information use

### **Guide to the European Environment Agency (EEA) core set of indicators**

([http://reports.eea.eu.int/technical\\_report\\_2005\\_1/en/CSI-tech1\\_2005\\_FINAL-web.pdf](http://reports.eea.eu.int/technical_report_2005_1/en/CSI-tech1_2005_FINAL-web.pdf))

This guide provides information on the quality of the 37 indicators in the EEA core set. Its primary role is to support improved implementation of the core set in the EEA, European topic centres and the European environment information and observation network (Eionet). In parallel, it is aimed at helping users outside the EEA/Eionet system make best use of the indicators in their own work. It is hoped that the guide will promote cooperation on improving indicator methodologies and data quality as part of the wider process to streamline and improve environmental reporting in the European Union and beyond.

Keywords: Indicators

### **Groundwater Quality Monitoring**

(<http://www.ecampus.com/book/0419258809>)

S.S.D. Foster, P.J. Chilton and R. Helmer, 2002.

This book provides a comprehensive description of strategies to be adopted for the monitoring and assessment of groundwater quality, developed over many years as a result of the GEMS/WATER programme. As many professional staff involved in establishing monitoring programmes for groundwater are not specialists in this area, Groundwater Quality Monitoring contains a brief summary of the main characteristics of groundwater, which need to be

understood for monitoring design. The main body of the book concentrates on strategic issues of sampling methods, providing numerous case studies to illustrate good monitoring design in practice.

Keywords: Groundwater monitoring; General monitoring

### **Environmental Monitoring and Characterization**

([http://www.elsevier.com/wps/find/bookdescription.cws\\_home/701265/description](http://www.elsevier.com/wps/find/bookdescription.cws_home/701265/description))

J. Artiola, I. Pepper and M. Brusseau, 2004.

Environmental monitoring and characterization is an integrated, hands-on resource for monitoring all aspects of the environment. Sample collection methods and relevant physical, chemical and biological processes necessary to characterize the environment are brought together in twenty chapters which cover: sample collection methods, monitoring terrestrial, aquatic and air environments, and relevant chemical, physical and biological processes and contaminants.

Keywords: General monitoring; Groundwater monitoring; Monitoring/Data collection; Data management and assessment

### **Monitoring and modelling catchment water quality and quantity.**

(<http://unesdoc.unesco.org/images/0013/001303/130303e.pdf>)

Proceedings of the 8th Conference of the European Network of Experimental and Representative Basins (ERB), Verhoest, N., J. Hudson, R. Hoeben and F. De Troch (eds.), 2003. Ghent, Belgium, 27-2

A very important aspect of hydrological science is the modelling of hydrological fluxes aiming at a better understanding of the physics behind it and also to use these models in a prediction mode for anticipating extreme events. Yet, models cannot be developed or improved without the availability of data. Therefore, monitoring programs and analysis of data form the profound basis for developing models. The conference created the possibility to join both aspects of the hydrological science.

Keywords: Monitoring and modelling

### **UNEP/WHO/UN-HABITAT/WSSCC Guidelines on Municipal Wastewater Management**

([http://www.gpa.unep.org/training/documents/Guidelines\\_Municipal\\_Wastewater\\_Mgnt\\_version3.pdf](http://www.gpa.unep.org/training/documents/Guidelines_Municipal_Wastewater_Mgnt_version3.pdf))

A practical guide for decision-makers and professionals on how to plan, design, and finance appropriate and environmentally sound municipal wastewater discharge systems.



Keywords: Municipal waste water

**Specifying information needs: improving the working methodology**

(<http://www.mtm-conference.nl/mtm3/docs/TimmermanandSchobben2001.pdf>)

J.G. Timmerman, J. de Boer, M. Hisschemöller, and W.H. Mulder, 2001. Regional Environmental Change 2: 77-84.

Acceptation of the fourth national policy document on water management by the Dutch parliament was the starting point for inventorying the information needs to evaluate this new policy. The project was carried out along the lines of the five-step method for specification of information needs, and was restricted to the information needs of the Dutch Directorate General of Public Works and Water Management. Apart from an overview of information needs on a high level of abstraction, some conclusions were drawn on the future changes in monitoring. The conclusions were: 1) 'policy-monitoring' is needed to enable to evaluate progress in policy measures; 2) spatial planning should be based on hydrological conditions; 3) expansion of transboundary cooperation in water management is inevitable; 4) a limited number of indicators for water policy evaluation should be developed; and 5) monitoring networks should be made more flexible. These future developments are subject to study in the next few years.

Keywords: Information needs

**Handbooks on Biodiversity Information Management**

([http://www.unep-wcmc.org/information\\_services/publications/handbooks.htm](http://www.unep-wcmc.org/information_services/publications/handbooks.htm))

Edited by J.H. Reynolds. UNEP World Conservation Monitoring Centre.

This eight volume series, developed for use by decision-makers, mid-career professionals, and interested parties, reviews the issues and processes involved in the management of biodiversity information to support the conservation and sustainable use of living resources. They also provide a framework for the development of national plans and strategies and for meeting reporting obligations of international programmes and conventions. The handbooks may be used as a training resource or, more generally, to support institutions and networks involved in building capacity in information management.

Keywords: Information needs; Information strategy; Monitoring/Data collection; Data management and assessment; Reporting and Information use

**National Field Manual for the Collection of Water-Quality Data**

(<http://water.usgs.gov/owq/FieldManual/>)

The National Field Manual is targeted specifically toward field personnel in order to:

- Establish and communicate scientifically sound methods and procedures.

- Provide methods that minimize data bias and, when properly applied, result in data that are reproducible within acceptable limits of variability.
- Encourage consistent use of field methods for the purpose of producing nationally comparable data.
- Provide citable documentation for USGS water-quality data-collection protocols.

Keywords: Data collection and handling

### **Sampling for Natural Resource Monitoring**

([http://www.springer.com/sgw/cda/frontpage/0,11855,5-0-22-52077682-0,00.html?referer=http://www.springer.com/sgw/cda/redirect/alertlink\\$mid=153261160\\$aid=153264167](http://www.springer.com/sgw/cda/frontpage/0,11855,5-0-22-52077682-0,00.html?referer=http://www.springer.com/sgw/cda/redirect/alertlink$mid=153261160$aid=153264167))

De Gruijter, J., D. Brus, M.F.P. Bierkens, and M. Knotters, 2006.

The book presents the statistical knowledge and methodology of sampling and data analysis useful for spatial inventory and monitoring of natural resources. The authors omitted all theory not essential for applications or for basic understanding. This presentation is broader than standard statistical texts, as the authors pay much attention to how statistical methodology can be employed and embedded in real-life spatial inventory and monitoring projects. Thus they discuss in detail how efficient sampling schemes and monitoring systems can be designed in view of the aims and constraints of the project.

Keywords: Data collection and handling; Data analysis methods

### **Towards a Definition of Performance-Based Laboratory Methods**

([http://acwi.gov/monitoring/network/design/appendix/append4-1PBMSFINAL\\_Aug15\\_2001.pdf](http://acwi.gov/monitoring/network/design/appendix/append4-1PBMSFINAL_Aug15_2001.pdf))

J. Diamond, A. Eaton, C. Annis, H. Brass, L. Keith, A. Strong, D. McChesney, and M. Shockey, 2001.

This paper presents the National Methods and Data Comparability Board (MDCB) position concerning the need for, and the issues regarding, the implementation of a performance-based system for water quality monitoring methods. Specifically, this paper:

- Presents MDCB's definition of a performance-based system (PBMS) and demonstrates that this definition embraces the conceptual ideas expressed by most organizations and agencies.
- Identifies advantages, disadvantages, and current issues in implementing a PBMS in compliance and ambient monitoring.
- Provides a framework for validation of PBMS measurements.
- Justifies the feasibility of extending a PBMS approach to method-dependent parameters and field methods.
- Lists future activities intended to help address some of the issues and concerns raised regarding the implementation of a PBMS.

Keywords: Laboratory analysis

**QUASIMEME, Quality Assurance of Information for Marine Environmental Monitoring in Europe**

(<http://www.quasimeme.org/index.htm>)

Between 1993 and 1995 the European Union (EU) supported the Quasimeme project which had the aim to develop a holistic quality assurance program for marine environmental monitoring information in Europe. As a result of this pioneering project a marine network and laboratory performance studies have been established for most of the determinants measured in the marine environmental programs for both monitoring and research purposes. The EU funded Quasimeme project demonstrated that laboratories which followed on a regular basis the learning programmes and the laboratory testing schemes improved the quality of their data. The information exchange encouraged by this scheme and the opportunity to verify the laboratory performance was clearly of significant value to those who participated. The advantage of this initial project was that the studies were centrally financed. However, this approach only enabled a limited number of institutes to benefit from this support. After the end of the EU funding in 1995, the Quasimeme scheme continued on subscription basis. Now it is thus possible for any laboratory to participate.

Keywords: Laboratory analysis

**Data Analysis Considerations in Producing 'Comparable' Information for Water Quality Management Purposes**

(<http://water.usgs.gov/wicp/acwi/monitoring/pubs/tr/nwqmc0101.pdf>)

L.M. Griffith, R.C. Ward, G.B. McBride, and J.C. Loftis, 2001.

Water quality monitoring is being used in local, regional, and national scales to measure how water quality variables behave in the natural environment. A common problem, which arises from monitoring, is how to relate information contained in data to the information needed by water resource management for decision-making. This is generally attempted through statistical analysis of the monitoring data. However, how the selection of methods with which to routinely analyze the data affects the quality and comparability of information produced is not as well understood as may first appear. To help understand the connectivity between the selection of methods for routine data analysis and the information produced to support management, the following three tasks were performed. An examination of the methods that are currently being used to analyze water quality monitoring data, including published criticisms of them. An exploration of how the selection of methods to analyze water quality data can impact the comparability of information used for water quality management purposes. Development of options by which data analysis methods employed in water quality management can be made more transparent and auditable.

Keywords: Data management and assessment

**Taking into Account Environmental Water Requirements in Global-scale Water Resources Assessments**

(<http://www.iwmi.cgiar.org/Assessment/files/pdf/publications/ResearchReports/CARR2.pdf>)

V. Smakhtin, C. Revenga and P. Döll, 2004

The Comprehensive Assessment of Water Management in Agriculture takes stock of the costs, benefits, and impacts of the past 50 years of water development for agriculture, the water management challenges communities are facing today, and solutions people have developed. The results of the Assessment will enable farming communities, governments, and donors to make better-quality investment and management decisions to meet food and environmental security objectives in the near future and over the next 25 years.

Keywords: Data management and assessment; Reporting and Information use

**Impact of environmental information on decision making processes and the environment**

(<http://www.grida.no/impact/papers/fullimpact.pdf>)

N. Denisov, and L. Christoffersen, 2001. UNEP/GRID-Arendal, Occasional paper 01. Arendal, Norway.

This paper, prepared by GRID-Arendal, Norway, explores some aspects of these questions and seeks to identify issues important in determining the kind of information that is most effective in bringing about informed and knowledge based decisions. The basic idea behind the establishment of UNEP's global GRID-system in the 1980s was to build bridges between those who produce scientific knowledge and those who can use it in decision-making processes in the local, national and international levels.

Keywords: Reporting and information use

**Telling good stories; we have the message but how to communicate it using the right messengers. A collection of practices and lessons**

(<http://www.grida.no/impact/documents/IMPACTII.pdf>)

N. Denisov, K. Folgen, I. Rucevska and O. Simonett, 2005. GRID-Arendal occasional paper 01 Arendal, Norway.

Engaging the public is far from being a simple task. It actually involves a multitude of complex activities. We must reach beyond environmental textbooks for the especially interested. We must question and explore the efficiency of various approaches and choose environmental information tools having the greatest influence on decision-making, impacting the environment. In the early years of GRID-Arendal, there was a tremendous need just "to get it out", i.e. making information accessible electronically, -"put it on the web". While this need still exists today, the work is far from being "done". Today's need is intelligent and credible content reporting

environmental issues and trends from the global to the local scale presented in a digestible format.

Keywords: Reporting and information use

**A toolbox of existing and emerging methods for water monitoring under the WFD**

([http://www.swift-wfd.com/Local/swift/dir/doc/WP1\\_OM mai 2005 version public.pdf](http://www.swift-wfd.com/Local/swift/dir/doc/WP1_OM_mai_2005_version_public.pdf))

The aim of this document is to present a toolbox of existing and more importantly emerging methods that may respond to the needs of one or more mode of monitoring (surveillance, operational, or investigative monitoring) embedded in the European Water Framework Directive. The objective is to obtain, in a cost-effective manner, consistent and reliable data that can be used for water quality management (at the river basin level) and can be used to make comparisons across national boundaries. The objective is to provide those in charge of water quality monitoring under the WFD with lists of tools and techniques that may be used for the assessment of physico-chemical, biological and chemical quality elements and parameters (not including hydromorphological elements). We are aware that the lists are not exhaustive and we are sure that we will have missed important examples of various technologies. We aim to update this first document as we receive suggestions from readers.

Keywords: Water Framework Directive; General monitoring

**The Benchmark Models for the Water Framework Directive Toolbox (BMW Toolbox)**

(<http://www.rbm-toolbox.net/bmw/index.php>)

This toolbox provides information of models and other tools needed in the implementation of the Water Framework Directive (WFD) and will help model users to select appropriate tools for their specific needs and management tasks. One can screen existing models in the model catalogue, enter new models into it, and evaluate models against the benchmark criteria.

Keywords: Water Framework Directive; Monitoring and modeling

**Environmental and Resource Costs in the Water Framework Directive: the Case of Germany**

(<http://www.ecologic.de/modules.php?name=News&file=article&sid=1236>)

This study describes how environmental and resource costs are currently dealt with in Germany, and examines how the results of the DG Eco 2 can be put to use in the German context. A further point is how to link the assessment of environmental and resource costs to the process of selecting cost-effective combinations of measures. Two options are discussed here: first, addressing the question whether and how information obtained through the selection of measures can be used to assess environmental and resources costs; and secondly, discussing how

the selected measures themselves can help to achieve cost recovery for environmental and resource costs.

Keywords: Water Framework Directive

## **List of Common Implementation Strategy (CIS) documents for the Water Framework Directive. Guidance Documents and technical reports**

**1. Economics and the environment** - the implementation challenge of the Water Framework Directive outlines the economic elements of the WFD to provide an understanding of the role of economics in water policy making. It critically reviews the references to economics and economic requirements in the WFD and integrates them into the decision making process aimed at developing river basin management plans. The document goes on to lay out the key steps that should be considered when carrying out the economic analysis and presents the analysis that the Directive requires to be completed by the end of 2004. Key issues that are related to developing the economic analysis and the need to ensure coherency and integration with the process of preparing River Basin Management Plans are identified.

([http://forum.europa.eu.int/irc/Download/kqesA5JSmjGCc6K-H260JyCxBIKZOH3t3p5Lbtgi3eG-H6BgGm3qO4qSi-ff5\\_k2ygAOHSGRHsUrTV8I0QwMgq/Guidance No 1 - Economics - WATECO %28WG 2.6%29.pdf](http://forum.europa.eu.int/irc/Download/kqesA5JSmjGCc6K-H260JyCxBIKZOH3t3p5Lbtgi3eG-H6BgGm3qO4qSi-ff5_k2ygAOHSGRHsUrTV8I0QwMgq/Guidance No 1 - Economics - WATECO %28WG 2.6%29.pdf))

### **Policy summary:**

([http://forum.europa.eu.int/irc/Download/kheeATJEmjG-c4021qqCPqRjRb7Tp5cGvcJUiAFVXmUpoo2uLyojQ10RIUruFGf8pg2SFUCQSu\\_dDxOCmURgZ/GD 01 - WATECO - Policy Summary.pdf](http://forum.europa.eu.int/irc/Download/kheeATJEmjG-c4021qqCPqRjRb7Tp5cGvcJUiAFVXmUpoo2uLyojQ10RIUruFGf8pg2SFUCQSu_dDxOCmURgZ/GD 01 - WATECO - Policy Summary.pdf))

**2. Identification of water bodies** - develops a common understanding of the definition of water bodies and gives specific practical suggestions for the identification of water bodies under the WFD. General considerations applicable to both surface and groundwater are described. The identification of surface water bodies and bodies of groundwater are then described in more detail.

(<http://forum.europa.eu.int/irc/Download/kgeyAQJEmoG-yy6eLCPR-YCjGu32v4g9wgc8aMtYT1FE60TISfSt2HjRcGYF8e3RH4gEF3EpPvB4UZLOfAmDpp/Guidance No 2 - Identification of water bodies.pdf>)

**3. Analysis of Pressures and Impacts** - presents a common understanding of pressures and impacts in relation to the implementation of the WFD. This includes the role of pressure and impact analysis and its contribution to the characterisation of water bodies and the development of monitoring programmes, river basin management plans and programmes of measures. The document discusses the general approach to the analysis of pressures and impacts, in particular, the key steps that must be taken and methodologies for surface waters and groundwaters. A toolbox is provided detailing specific tools (e.g. data, classification systems and models)

available to aid the analysis and sources of data and information are described. Finally, the document provides examples of good practice.

([http://forum.europa.eu.int/irc/Download/kyeFAFJDmpGtvmANFA-1LpBf2tNHjBgtde1Bu9sj72DUD6BYRxoZ94cGpGjcUGZxckP-1ED1BcS4GRcD2r6RjY/Guidance No 3 - pressures and impacts - IMPRESS %28WG 2.1%29.pdf](http://forum.europa.eu.int/irc/Download/kyeFAFJDmpGtvmANFA-1LpBf2tNHjBgtde1Bu9sj72DUD6BYRxoZ94cGpGjcUGZxckP-1ED1BcS4GRcD2r6RjY/Guidance%20No%203%20-%20pressures%20and%20impacts%20-%20IMPRESS%20-%20WG2.1%20-%20.pdf))

**Policy summary:**

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**4. Identification and designation of heavily modified and artificial water bodies -**

provides explanations of the importance and consequences of artificial water body (AWB) and heavily modifies water body (HMWB) designation in the implementation of the WFD. The document describes the overall HMWB and AWB designation process in both outline and detail and describes the function of provisional identification in the first cycle of the River Basin Management, presenting some important issues of the designation process. The requirement to establish reference conditions and environmental objectives on which status classification is based is described, and the steps leading to the establishment of appropriate values for the quality elements of maximum ecological potential (MEP) and good ecological potential (GEP) presented. Important issues regarding measures and related cost considerations throughout the process are summarised.

([http://forum.europa.eu.int/irc/Download/kreZAgJ-mIGWp6hfUS6DagDgos6CnSuCmV8BmDuhJ30SoORyBY6vPDC2i2ruURZtwz22R3RUTYGxlfS0bBc7vc/Guidance No 4 - heavily modified water bodies - HMWB %28WG 2.2%29.pdf](http://forum.europa.eu.int/irc/Download/kreZAgJ-mIGWp6hfUS6DagDgos6CnSuCmV8BmDuhJ30SoORyBY6vPDC2i2ruURZtwz22R3RUTYGxlfS0bBc7vc/Guidance%20No%204%20-%20heavily%20modified%20water%20bodies%20-%20HMWB%20-%20WG2.2%20-%20.pdf))

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**5. Transitional and Coastal Waters -**

Typology, reference conditions and classification systems develops a framework for the identification of reference conditions for transitional and coastal waters. It defines coastal and transitional waters and suggests methods for the assignment of coastal water bodies to river basin districts. The document also discusses issues related to the implementation of the WFD in respect of marine lagoons and wetlands associated with coastal and transitional waters. It provides guidance on how the typology (or initial physical characterisation) of coastal and transitional water bodies should be carried out and explains the concept of biological reference conditions and how they can be used in practice. Finally the document introduces the principles underlying classification and the requirements of classification tools and schemes for the purposes of the WFD.

([http://forum.europa.eu.int/irc/Download/k4ewALJAmpGUYh6EI2REJuLwBIRGjTV9huJLc0Lx46R-HSUuHfoqznZp5sVuUTR4vgh0CG5UPZHpGuTRfUzMyu/Guidance No 5 - characterisation of coastal waters - COAST %28WG 2.4%29.pdf](http://forum.europa.eu.int/irc/Download/k4ewALJAmpGUYh6EI2REJuLwBIRGjTV9huJLc0Lx46R-HSUuHfoqznZp5sVuUTR4vgh0CG5UPZHpGuTRfUzMyu/Guidance%20No%205-characterisation%20of%20coastal%20waters-COAST%20WG%202.4%20.pdf))

**6. Towards a guidance on establishment of the intercalibration network and the process on the intercalibration exercise** - presents and discusses a common understanding and implications of the parts of the WFD relating to intercalibration (Article 21 and Annex V). The document also presents a synthesis of the intercalibration process and identifies the key steps on the critical path and the possible bottlenecks that may be encountered. The implications of a limited intercalibration and possible short and long-term solutions are provided. Practical guidance is given on the site selection process and criteria for the selection of types and sites for the intercalibration network. The document also presents a preliminary description of the process of the intercalibration exercise to take place in 2005/2006, which requires further elaboration in 2003.

([http://forum.europa.eu.int/irc/Download/k4ewALJAmpGUYh6EI2REJuLwBIRGjTV9huJLc0Lx46R-HSUuHfoqznZp5sVuUTR4vgh0CG5UPZHpGuTRfUzMyu/Guidance No 5 - characterisation of coastal waters - COAST %28WG 2.4%29.pdf](http://forum.europa.eu.int/irc/Download/k4ewALJAmpGUYh6EI2REJuLwBIRGjTV9huJLc0Lx46R-HSUuHfoqznZp5sVuUTR4vgh0CG5UPZHpGuTRfUzMyu/Guidance%20No%205-characterisation%20of%20coastal%20waters-COAST%20WG%202.4%20.pdf))

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**7. Monitoring under the Water Framework Directive** - provides clarification of key concepts and terms in the WFD including the terms "supporting" and "water body"; the concepts of risk, precision and confidence; monitoring of wetlands; surveillance, operational and investigative monitoring of surface waters; surveillance, operation and quantitative monitoring of groundwaters; surface water monitoring for protected areas; and other monitoring considerations such as intercalibration exercises and monitoring of heavily modified water bodies. Guidance is provided on the selection of quality elements for surface waters and groundwater parameters in addition to guidance on the design and implementation of monitoring programmes. Finally, an overview of current monitoring programmes in Member States is presented.

([http://forum.europa.eu.int/irc/Download/k4eGA8JEmjG1Ft52uR2IJuO12YK1j-gGwyMERKef3B8UTFEZCz5t2Htre2ft9LoIcqOHmE50KyR12x260H8WVH/Guidance No 7 - Monitoring %28WG 2.7%29.pdf](http://forum.europa.eu.int/irc/Download/k4eGA8JEmjG1Ft52uR2IJuO12YK1j-gGwyMERKef3B8UTFEZCz5t2Htre2ft9LoIcqOHmE50KyR12x260H8WVH/Guidance%20No%207-Monitoring%20WG%202.7%20.pdf))

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([http://forum.europa.eu.int/irc/Download/k4ewA4JSmSGlcrOOJD-17Y8x0b04d8ytVUo-TtGV600r7TEFDmHWPMP-qRgyQEo-yy6eLCPR-YCjGu32v4g9wc/GD 07 - Monitoring - Policy Summary.pdf](http://forum.europa.eu.int/irc/Download/k4ewA4JSmSGlcrOOJD-17Y8x0b04d8ytVUo-TtGV600r7TEFDmHWPMP-qRgyQEo-yy6eLCPR-YCjGu32v4g9wc/GD%2007-Monitoring-Policy%20Summary.pdf))

**8. Public participation in relation to the Water Framework Directive** - sets out a common understanding of public participation in the context of the WFD and gives specific help



on how to implement public participation in the different steps of the management process. The general planning steps to be undertaken for public participation are indicated and elaborated including active involvement, consultation and access to information and background documents. Indicators for reporting and evaluation are considered and finally requirements for capacity building and investment in order to build relations and understanding between different stakeholders are discussed.

([http://forum.europa.eu.int/irc/Download/kkeeAAJmmGGckASuHvh2H\\_3Gt2F0AhF4vQ2iIglPPUTP1BsRfEtk6vOjUqs5-pCszU-8DBp9eAgHVN0t3m0Bc/Guidance No 8 - Public participation %28WG 2.9%29.pdf](http://forum.europa.eu.int/irc/Download/kkeeAAJmmGGckASuHvh2H_3Gt2F0AhF4vQ2iIglPPUTP1BsRfEtk6vOjUqs5-pCszU-8DBp9eAgHVN0t3m0Bc/Guidance%20No%208%20-%20Public%20participation%20WG%202.9%20.pdf))

**9. Implementing the Geographic Information System (GIS)** - elements of the Water Framework Directive presents the common understanding on terms and on the role of GIS in the WFD. It also specifies the maps that must be reported to the European Commission and when, the different GIS layers that make up these maps, the level of detail and spatial accuracy expected from the data and the reference system to use for reporting the data. The document goes on to discuss the validation procedures that should be employed in the validation step and the standards that should be followed when validating data. Guidance is given on the documentation of GIS layers including the metadata fields that should be delivered with each GIS layer and the standards to be followed when preparing the metadata. The format for transferring layers to the Commission in the short-term is defined and the way forward for the development of a distributed reporting system in the long-term discussed. The Guidance document also discusses the harmonisation of data at borders and methods for co-ordinating the reporting process. Finally the introduction of a European feature coding system is outlined.

([http://forum.europa.eu.int/irc/Download/k0eHAOJ\\_mtGq7VjevHT5SFOiSIQRb4g4IbR-pMbj4IJBTP9eAgHVN0ZTmGzX5L\\_0FdM3IG6SBcLlBO76jEy4dc/Guidance No 9 - GIS %28WG 3.1%29.pdf](http://forum.europa.eu.int/irc/Download/k0eHAOJ_mtGq7VjevHT5SFOiSIQRb4g4IbR-pMbj4IJBTP9eAgHVN0ZTmGzX5L_0FdM3IG6SBcLlBO76jEy4dc/Guidance%20No%209%20-%20GIS%20WG%203.1%20.pdf))

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([http://forum.europa.eu.int/irc/Download/koeyA3JQmZG0erUBC8oFd7-6oHK0mB54itgDfUXjGTC6GR7bEhCxA00QwMgqUCqRtl4F7S6BTF8gBHulhOy0kZ/GD 09 - GIS - Policy Summary.pdf](http://forum.europa.eu.int/irc/Download/koeyA3JQmZG0erUBC8oFd7-6oHK0mB54itgDfUXjGTC6GR7bEhCxA00QwMgqUCqRtl4F7S6BTF8gBHulhOy0kZ/GD09-%20GIS-%20Policy%20Summary.pdf))

**10. Rivers and Lakes - Typology, reference conditions and classification systems** - focuses on the implementation of Annexes II and V of the Water Framework Directive with special emphasis on inland waters. It examines methods and principles for the establishment of reference conditions and class boundaries between high, good and moderate ecological status. Specific tools for establishing reference conditions and ecological status are described, together with suggestions for their future development, and examples of good practice of the suggested approach are provided.

([http://forum.europa.eu.int/irc/Download/koeyA3JQmZG0erUBC8oFd7-6oHK0mB54itgDfUXjGTC6GR7bEhCxA00QwMgqUCqRtl4F7S6BTF8gBHulhOy0kZ/GD 09 - GIS - Policy Summary.pdf](http://forum.europa.eu.int/irc/Download/koeyA3JQmZG0erUBC8oFd7-6oHK0mB54itgDfUXjGTC6GR7bEhCxA00QwMgqUCqRtl4F7S6BTF8gBHulhOy0kZ/GD09-%20GIS-%20Policy%20Summary.pdf))

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**11. Planning Processes** - explains the requirements of the Water Framework Directive in respect of river basin management planning and examines the concept of water planning. It identifies good practice and identifies the main tasks that should be undertaken in the preparation of a river basin management plan and when they should be completed.

([http://forum.europa.eu.int/irc/Download/kjegANJHmgGRtfP-HDPDBF8zPuLNdSYFlsLMq9dxh5-OSIKsEx6b7d2En7YYUAjKc47\\_XHqpbpEqEIB-crhDyX/Guidance No 11 - Planning Process %28WG 2.9%29.pdf](http://forum.europa.eu.int/irc/Download/kjegANJHmgGRtfP-HDPDBF8zPuLNdSYFlsLMq9dxh5-OSIKsEx6b7d2En7YYUAjKc47_XHqpbpEqEIB-crhDyX/Guidance No 11 - Planning Process %28WG 2.9%29.pdf))

**12. The role of wetlands in the Water Framework Directive** - the protection and enhancement of surface water and groundwater will be achieved through the application of the WFD's environmental objectives, and where appropriate through the use of wetland protection and restoration to help fulfil these objectives in a cost effective and sustainable manner. These aspects of implementation are outlined in the main body of the paper.

(<http://forum.europa.eu.int/irc/Download/kgeyAQJEmoG-yy6eLCPR-YCjGu32v4g9wcg8aMtYT1FH7Uuw2qSfkDDjYv4G8Ej1Ft52uR2IJuOI2YK/Guidance No 12 - Wetlands %28WG B%29.pdf>)

**13. Overall approach to the classification of ecological status and ecological potential** - the purpose of this document is to provide general guidance on the assessment of ecological status and potential leading to the overall ecological classification of water bodies for the purposes of the Water Framework Directive (WFD). The document also provides specific guidance on the role of the general physico-chemical quality elements in ecological classification.

([http://forum.europa.eu.int/irc/Download/kqedAJJ\\_moG7qxK3GORIUyGqGtNuk2eMhqg-IWp6hfUS6DagDgos6CnSuCmV8BmDuhJ30SoORyBY6vPDc2i2ru/Guidance No 13 - Classification of Ecological Status %28WG A%29.pdf](http://forum.europa.eu.int/irc/Download/kqedAJJ_moG7qxK3GORIUyGqGtNuk2eMhqg-IWp6hfUS6DagDgos6CnSuCmV8BmDuhJ30SoORyBY6vPDc2i2ru/Guidance No 13 - Classification of Ecological Status %28WG A%29.pdf))

**14. Guidance on the intercalibration process 2004 – 2006.**- the purpose of the present document is to provide further guidance for the intercalibration process, which started in 2004 and will continue up to the end of 2006, The document is based on the Intercalibration Guidance, taking into account the results of the metadata analysis, ongoing discussions in Working Group A Ecological Status (WG A), and the recommendations of the expert networks on lakes, rivers, and coastal and transitional waters.

([http://forum.europa.eu.int/irc/Download/ktevA4J\\_mrGDqr6LD-3FEyHjReTFfre2ft9LoIpgO1-4T5Uc\\_f6ePRdGrMXb9RmCY47\\_XHqpbpEqEI/Guidance No 14 - Intercalibration process.pdf](http://forum.europa.eu.int/irc/Download/ktevA4J_mrGDqr6LD-3FEyHjReTFfre2ft9LoIpgO1-4T5Uc_f6ePRdGrMXb9RmCY47_XHqpbpEqEI/Guidance No 14 - Intercalibration process.pdf))

**Technical Report 1. The EU Water Framework Directive: Statistical aspects of the identification of groundwater pollution trends and aggregation of monitoring results.** The main goal of the project was to establish methods for the calculation of representative mean concentrations, for data aggregation and trend (reversal) assessment at the groundwater body level respectively for groups of groundwater bodies. The methods had to be suitable for Europe-wide application and implementation based on the provisions of the Water Framework Directive. ([http://forum.europa.eu.int/irc/Download/kmeqATJEmVGCbp72J-TSUYtJoz94cGpGjp4Go2XjTI1rCUDxLfRp0IqSnCmdJLc0Hx0LuHvh2H\\_3Gt2F0AhF4v/Technical Report No 1 - GW trends %28WG 2.8%29.pdf](http://forum.europa.eu.int/irc/Download/kmeqATJEmVGCbp72J-TSUYtJoz94cGpGjp4Go2XjTI1rCUDxLfRp0IqSnCmdJLc0Hx0LuHvh2H_3Gt2F0AhF4v/Technical%20Report%20No%201%20-%20GW%20trends%20-%20WG%202.8%20-%20.pdf))

All of the guidance documents and many other relevant public documents are also accessible directly from the circa WFD library website. (<http://forum.europa.eu.int/Public/irc/env/wfd/library>)

Keywords: Water Framework Directive