

The European Water Framework Directive— an example for water management in national and international river basins

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Abstract Waters in the European Community are under increasing pressure from the continuous growth in demand for sufficient quantities of good quality water for all purposes. It is therefore necessary to develop an integrated Community policy on water. The success of this policy relies on close cooperation and coherent action at Community, Member States and local level as well as on information, consultation and involvement of the public, including users. The objective of achieving good water status needs to be pursued for the whole river basin, so that measures in the same ecological, hydrological and hydrogeological system are coordinated. International river basins like the Rhine basin serve as a positive example for this approach to water management, with their cooperation and joint settings of objectives across Member State borders and even beyond Member States of the European Union (EU).

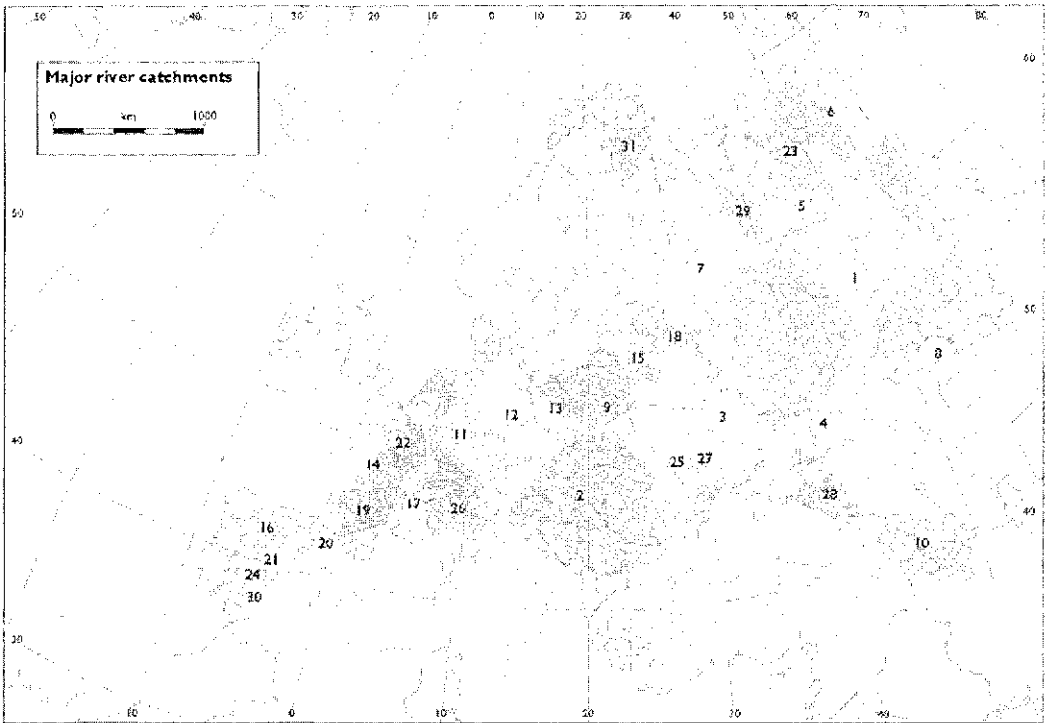
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INTRODUCTION

Recently the European Environment Agency (1998) has reported the results of the state of the environment in Europe. Two of the main findings related to water are:

- (a) despite the introduction of water quality targets in the EU there has been no overall improvement of river quality since 1989/90, and
- (b) groundwater quality is affected by increasing concentrations of nitrates.

Although tackling pollution is a national task, the basins of most of the large rivers in Europe are international (Fig. 1). The European Union (EU) has implemented legislation since 1975 concerning standards for rivers and lakes used for drinking water abstraction. It has also included legislation on the quality of fishery waters (Directive 78/659/EEC), shellfish waters (Directive 79/923/EEC), bathing waters (Directive 76/160/EEC) and groundwater (Directive 80/68/EEC). This so-called “patchwork legislation” came under pressure, however, because of a fundamental rethink of Community water policy. It needed to consider a more global approach and to address the increasing awareness of citizens and other involved parties for their water. At the same time water policy and water management need to address problems in a coherent way. The European Union (EU) has therefore recently reconstructed its water policy. A new legislation for the waters of all European Member States—the EU Water Framework Directive—(WFD) came into force in December 2000 (Directive 2000/60/EC



River	Country	Catchment area (10 ³ km ²)	Mean discharge (km ³ year ⁻¹)	Length (km)	
1	Volga	RU	1360	230	3530
2	Danube	DE, AT, SK, HU, HR, SB, RO, BG, UA, CH*, PL*, IT*, CZ*, SI*, BA*, AL*, MD*	817	205	2850
3	Dnepr	RU, BY, UA	558	53	2270
4	Don	RU, UA*	422	38	1870
5	Severnaya Dvina	RU	358	148	740
6	Pechora	RU	322	129	1810
7	Neva	RU, FI*, BY*	281	79	75
8	Ural	RU, Kazakhstan	270	-	2540
9	Wisla	PL, SK*, UA*, BY*	194	31	1050
10	Kura	GE, TK, AZ, AR*, Iran*	188	18	1360
11	Rhine	CH, AT, DE, FR, NL IT*, LU*, BE*	185	69	2200
12	Elbe	CZ, DE, AT*, PL*	148	24	1140
13	Oder	CZ, PL, DE	119	16	850
14	Loire	FR	118	32	1010
15	Neman	BY, LT, RU, PL*	98	22	960
16	Douro	ES, PT	98	20	790
17	Rhône	CH, FR	96	54	810

* The country includes part of the catchment area but the main river does not run through it.

AL	Albania	BY	Byelo-Russia	GE	Georgia	NL	Netherlands	SK	Slovak Republic
AR	Armenia	CH	Switzerland	HR	Croatia	PL	Poland	TK	Turkey
AT	Austria	CZ	Czech Republic	HU	Hungary	PT	Portugal	UA	Ukraine
AZ	Azerbaijani	DE	Germany	IT	Italy	RO	Rumania		
BA	Boznia Herzegovina	ES	Spain	LT	Lithuania	RU	Russia		
BE	Belgium	FI	Finland	LU	Luxembourg	SB	Serbia		
BG	Bulgaria	FR	France	MD	Macedonia	SI	Slovenia		

Fig. 1 Major river catchments in Europe.

of 23 October 2000). Those countries sharing river basins with Members of the EU, which themselves are not or not yet Members of the EU, are also integrated into the planning process.

MAIN OBJECTIVES OF THE WATER FRAMEWORK DIRECTIVE

The legislation of the WFD has the following main objectives (European Commission, 2001):

- (a) expanding the scope of water protection to all waters, surface water and groundwater;
- (b) achieving “good status” for all waters by a certain deadline;
- (c) “combined approach” of emission limit values and quality standards;
- (d) water quantity addressed;
- (e) getting the citizens involved more closely;
- (f) improved data and information management; and
- (g) water management based on river basins.

These objectives are further elaborated hereafter.

Expanding the scope of water protection

All of Europe’s waters will be subject to protection under the WFD, surface waters and groundwater. Unlike previous water legislation, the framework directive covers surface waters and groundwater together, as well as estuaries and marine waters. Its purpose is:

- (a) to prevent further deterioration, and to protect and enhance the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems;
- (b) to promote sustainable water consumption based on the long-term protection of available water resources;
- (c) to contribute to the provision of a supply of water in the qualities and quantities needed for its sustainable use; and
- (d) to aim at enhanced protection and improvement of the aquatic environment, *inter alia*, through specific measures for the progressive reduction of discharges, emissions and losses of priority substances.

“Good status” for all waters by a certain deadline

Member States of the EU will have to ensure that “good ” ecological status is achieved or kept in all waters at the end of the year 2015. A good ecological status for surface waters is defined as follows: the values of the biological quality elements for the surface water body type show low levels of distortion resulting from human activity, but deviate only slightly from those normally associated with the surface water body type under undisturbed conditions (Directive2000/60/EC, Annex V, no. 1.2). Ecological quality and chemical quality are the criteria. For groundwater, good status is measured in terms of both quantity and chemical purity. Member States will need to

establish programmes for systematically monitoring the quality and quantity of their groundwater and surface waters. The monitoring network shall be designed so as to provide a coherent and compressive overview of ecological and chemical status within each river basin and shall permit classification of water bodies into five classes for surface waters. Where water bodies are identified being at risk or failing to meet their environmental objectives, additional networks for operational and investigative monitoring need to be established. In order to ensure comparability of such monitoring systems, the results of the systems operated by each Member State shall be expressed as an ecological quality ratio (Directive 2000/60/EC, Annex V, no. 1.4).

The tasks from the WFD are core activities of the Management Plan and can be divided into four core areas to be dealt with step by step over the first nine years:

- (a) reviewing the situation of waters within the river basin district (ecology, economy, water management);
- (b) monitoring the status of waters;
- (c) elaborating the objectives to be achieved with regard to the status of the waters; and
- (d) establishing measures or programmes of measures needed to achieve these objectives.

The starting point for the programmes of measures is the full implementation of any relevant national or local legislation as well as a range of Community legislation on water and related issues. This might include stricter controls on polluting emissions from industry or agriculture as well as from urban wastewater sources.

“Combined approach” of emission limit values and quality standards

The WFD’s combined approach to pollution control comprises:

- (a) limiting pollution at the source by setting emission limit values; and
- (b) establishing water quality objectives for water bodies.

In each case, the more stringent approach will apply. Thus Member States will have to set down in their programmes of measures both limit values to control emissions from individual point sources and environmental quality standards to limit the cumulative impact of such emissions as well as of diffuse sources of pollution. Water used for drinking water abstraction is subject to particular protection. Member States are required to set environmental quality standards for each significant body of water that is used for abstraction or may be used in the future. The quality standards must be designed to ensure that under the expected water treatment regime the abstracted water will meet the requirements of the Drinking Water Directive (79/869/ECC).

Water quantity addressed

The WFD is the first piece of Community water legislation to address the issue of water quantity. Although no special actions are foreseen its purpose (under Article 1) mentions that this directive shall contribute to mitigating the effects of floods and droughts. It mainly stipulates that the programme of measures established for each

river basin must aim to ensure a balance between the abstraction and recharge of groundwater. Moreover, all abstractions of surface water or groundwater will require prior authorization except in areas where it can be demonstrated that this will have no significant impact on the status of the water. These provisions, together with full cost-recovery pricing, will contribute towards protecting water as a resource.

Getting the citizen involved

Caring for waters will everywhere require more involvement of citizens, interested parties, national and international nongovernmental organizations. To that aim the WFD will require information and consultation when river basin management plans are established. It is intended to establish a network for the exchange of information and experience between water professionals throughout the Community. A strategy for raising awareness will be developed by one of the working groups with participants from all Member States, Candidate Countries, stakeholders and nongovernmental organizations. Within the coming years an information strategy will be developed and a series of national and international workshops will be organized. Additionally an Internet web page for an easy exchange of documents between expert groups and information of the public will be established.

Improved data and information management

The WFD follows modern approaches to data and information collection and reporting. Data and information are collected with a view to identifying trends and dynamics. The WFD will also contribute to modernized data and information management with certain requirements for using spatially referenced data within a geographical information system (GIS). In order to prepare the ground for the more streamlined reporting process as required under the WFD, a number of preparatory analyses and reports are of importance. Of particular interest are the analyses, which must be finalized and reported to the Commission four years after the WFD comes into force, i.e. by the end of 2004. These analyses present information on river basin (natural) characteristics, economics of water use and human impact and pressures and to a certain extent also status. Such information needs to be presented in the geographical context and can best be handled in the framework of a GIS. Data and information on water is also reported to the European Environment Agency through the EuroWaternet information system, which is extensively based on voluntary cooperation and provision of information from all involved parties. Also this system needs a GIS for geographically referencing the incoming information and for analysing spatial relationships.

There is a common interest in exploring possibilities for developing the structure and basic layers of a European GIS, primarily adapted to and based on the information requirements of the WFD. This European GIS will include layers on the river network, river basins and sub-basins of different hierarchy with an associated coding system. It should also include some basic characteristics of the basins. The data model proposed needs to be defined in such a way that it can accommodate the information resulting

from the national obligations of the WFD or that it can be linked to national systems via the coding system. A final European GIS will most probably be based on a combination of compatible national systems and the proposed European system, which may be shared between Member States, the Commission and the European Environment Agency. This system should allow for a multi-scale approach, being able to provide more generalized (aggregated) information at the European level and detailed information at the level of the Member States, river basins and sub-basins. Most probably this implies individual systems, which have compatible data structures. As such the overall system should allow the retrieval and accumulation of information on the physical, hydrological, ecological, socio-economic and administrative characteristics of rivers and lakes and their basins. The definition of the database structure should allow various descriptors to be accommodated, e.g. information on basin type and size, terrain and relief characteristics, runoff regimes, climatology, geology, soils, land cover, population densities, and industrial activities. Later, additional of information on anthropogenic pressures and environmental indicators should be anticipated.

Water management based on river basins

One of the Framework Directive's innovations is that rivers and lakes will need to be managed by river basin—the natural geographical unit—instead of only according to administrative or political boundaries. The objective of achieving good water status should be pursued for each river basin, so that measures in respect of surface waters and groundwaters belonging to the same ecological, hydrological and hydrogeological system are coordinated. Also for the purpose of environmental protection there is a need for greater integration of qualitative and quantitative aspects of both surface waters and groundwaters, taking into account the natural flow conditions of water within the hydrological cycle. Groundwater and coastal waters will be assigned to the nearest or most appropriate river basin district.

Several EU Member States have already taken a river basin approach but this was not the case everywhere. For each river basin district, some of which transcend national frontiers, a “river basin management plan” needs to be established and updated every six years. This plan will have to include an analysis of the river basin's characteristics, a view of the impact of human activity on the status of waters in the basin, and an economic analysis of water use in the basin district.

Within a river basin where use of water may have transboundary effects, the requirements for the achievement of environmental objectives should be coordinated for the whole of the river basin district. International river basins like the Rhine basin serve as a positive example for this approach to water management, with their cooperation and joint settings of objectives across Member State borders and even beyond EU Member States.

The Rhine water protection measures, which were stepped up in the 1970s and internationally coordinated, were initiated, organized and carried through by a number of government offices and other institutions (Irmer & Vogt, 2001). With regard to governmental management of the environment the International Commission for the Protection of the Rhine (CIPR) was founded in 1950.

In Germany the government institutions (generally the ministries of the environment as the highest water authorities) and below them special offices of the federal government and of the five federal states of the Rhine basin are concerned with planning and carrying out the specific measures.

Probably the most important outcome for Europe, which impressed all Member nations, is the fact that the extensive cooperation in all matters concerning the Rhine has become a powerful tool with which all organizational, technical and political problems posed by this in many ways intensely used river can be solved lastingly and with increasing efficiency.

Today there is a trust and understanding which stems from the insight that everyone along the river is in the eyes of neighbours, both upstream and downstream, and there is no alternative to cooperation.

By jointly working out the necessary international recommendations, the best available technology has been introduced in the entire Rhine basin. For the first time both wastewater standards and target values have been applied successfully in an international river basin.

The successes in preventing the discharge of harmful wastewater, which improved the water quality of the Rhine as well as of other rivers, has led to a significant shift in emphasis in water management.

The Rhine, however, still lacks diverse habitats. Due to the human impact on the development, the course of the Rhine has lost some diversity—banked-up water forms barriers to salmon, which the fish cannot overcome and surrounding natural habitats were lost by being cut off from the river. These shortcomings need to be reduced in the long run to combine the biotopes along the Rhine as much as possible.

CONCLUSIONS

Historically, water policy has been driven by agendas set by competing sectoral interests. As a result much water policy developed with insufficient regard for an integrated approach. The WFD addresses the problems of water policy and water management in a coherent way. The successful execution requires interdisciplinary thinking and actions ranging from local to international level. In the course of time the international activities for the protection of the Rhine have been merged so that a uniform and integral approach to water protection is now pursued which is essential for the lasting protection of the environment.

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