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Institutional and Economic Instruments for Sustainable Water Management in the Mediterranean Region

Coordination Action

DELIVERABLE NO 1
WFD HARMONISATION PROCEDURES REVIEW
THE WFD IMPLEMENTATION IN ARID AND SEMI-ARID COUNTRIES: INSTITUTIONAL AND ECONOMIC ISSUES

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Preface

The present document is the Deliverable 1, "WFD harmonisation procedures review" of the INECO project (Contract no: INCO-CT-2006-517673). The Deliverable was prepared by Istituto di economia e politica dell'energia e dell'ambiente (IEFE), of the Luigi Bocconi University, and presents the work undertaken in the framework of Task 1 of Work Package 2 of the INECO project.

The overall objectives of Work Package 2 *"Exchange and dissemination of best available practices for institutional and economic instruments in constructively engaged IWRM"* are to:

- Exchange information and disseminate previous research efforts of the consortium regarding the application of institutional and economic instruments for meeting the goals of Integrated Water Resources Management.
- Disseminate the review of experiences gathered from the harmonisation procedures adopted in the European Mediterranean Countries for the adaptation of institutional frameworks to the WFD requirements.
- Present institutional and economic instruments adopted in arid and semi-arid developed countries

In the framework of WP 2, Task 2.1 *"Review of the WFD harmonisation procedures"* deals with institutional and economic issues relevant to the implementation of the Water Framework Directive in arid and semi-arid countries and aims at:

- Analysing the patterns of implementation of the WFD in Mediterranean EU Member States (Spain, Italy, Greece, Portugal) characterized by quantitative water stress (arid and semi-arid countries), and
- Identifying of a set of critical issues that characterize water management in these countries and develop a set of case studies aimed at enlightening good- and bad-practices.

The deliverable is organised as follows:

- Chapter 1 analyses briefly the challenges related to the implementation of the Water Framework Directive in arid and semi-arid regions;
- Chapter 2 describes water availability and use patterns in Mediterranean Countries, with the aim to highlight the physical constraints that impact heavily on water management issues;
- Chapters 3 and 4 consider in more depth the WFD implementation in the European arid and semi-arid countries, namely Portugal, Spain, Italy and Greece, following the INECO conceptual scheme, i.e. the Governing, Sharing and Valuing water management challenges.
- Finally, Chapter 5 on the basis of the comparative analysis at country level highlights critical institutional and economic issues. These issues are typical of arid and semi-arid countries and in this regard, their analysis can be useful to understand how to tackle such situations in such cases.

1. Introduction

1.1 The challenge of the WFD implementation in arid and semi-arid countries

Water scarcity is receiving more and more attention at EU (Environment Council, 2006) and global level. In economic terms, water scarcity refers to situations where the level of water demand exceeds the supply capacity of the natural system. This imbalance can be temporary, e.g. for the occurrence of a drought, or permanent, due to excessive pressure on water resource and/or low rainfall rates. The latter characterises Mediterranean regions, where long term low precipitation rates, together with high evaporation rates, due to high temperatures, entails aridity. This situation can be exacerbated by extreme events, such as temporary decreases of the average water availability. Droughts can be experienced in both northern and southern European countries, even though their effects are more severe in the latter.

In this report we are dealing with the arid and semi-arid countries, characterised by long term imbalance of available water resources and demand. These countries continue experiencing temporary crisis as well, such as the droughts in summer time.

Looking at the theoretical water availability, one notes that in general Mediterranean Countries show similar figures to Northern countries (see next paragraph). However, these areas present a higher vulnerability to extreme events and frequent water shortages due to variability of the resource across regions and during the year. For these reasons, water management guidelines are frequently defined at national level (with the river basin management being secondary in importance) and water policy, as a result, is centralised, in order to transfer water across regions and cross-subsidy water works through general taxation.

Beyond the WFD requirements in terms of water quality objectives, the challenge in these countries is represented by the ability to cope with water scarcity. Historically these countries have reacted to water shortages by increasing water storage capacity (through large water investments financed through general taxation). As a consequence, there has been little scope for private sector involvement. The central role of the state in WSS provision and water resource management was justified on the ground that water was considered as a social right which should be assured, independently from cost consideration, since it was considered as a social right.

The limitedness of financial resources together with civil society's opposition to large water transfers have challenged this management approach, boosting water demand management into policy discourse. The WFD implementation is thus constrained by this policy context: in this countries the challenge is not limited to the good status objectives attainment, but it is severely conditioned by water availability patterns.

Generally speaking, the policy responses to temporary or permanent shortages are twofold. On the one hand, water can be managed in a sustainable way by changing the institutional settings defining property rights and water allocation among different uses.

On the other hand, economic instruments can be applied in order to give "scarcity" signals to users and in order to internalize negative externalities arising from water use. Box 1 summarises the categories of economic instruments considered in this report. They all deal with quality

issues. In order to cope with water scarcity, however, other policy tools will be considered, namely user fees and water markets.

The distinction between institutional arrangement and economic instruments is only analytical, since in practice they are linked, as we will see from the analysis of case studies. For instance, the introduction of water markets is strictly related with the definition of transferable water rights. In this example, the economic instrument introduction (the creation of a market) is dependent upon the change of institutional aspects.

Box 1: Economic Instruments

Emission charges: Direct payments based on the measurement or estimation of the quantity and quality of a pollutant.

User charges: payments for the cost of collective services. They are primarily used to guarantee the cash flow necessary to finance services such as collection and treatment of solid waste and wastewater. In the case of natural resource management, they are labelled as user fees, i.e. they represent payment for the use of the natural resource.

Product charges: payments applied to products that create pollution, such as fertilisers and pesticides.

Taxes: payments for the use of natural resources

Marketable (tradable or transferable) permits, rights or quotas (emission trading) and **water markets.**

Source: OECD (1999)

1.2 An overview of the WFD

The WFD (2000/60/CE) can be considered one of the milestones of EU water and, more in general, environmental policy. It builds on the previous EU water legislation, by grouping the whole set of the EU legislation and by introducing a new approach to water policy.

Its main purpose is the attainment of a good ecological status for all waters inside the EU. In order to reach this goal, it fixes general principles of water resource management that should be followed by Member States.

In particular, it establishes the principle of integrated management at the river basin scale, where "integrated" here refers to consideration of the whole "water" as a resource in its entirety and the coordination of all activities and policies regarding water resource management at a given scale, i.e. river basin (Aubin and Varone, 2002) . The choice of river basin as the unit of management is justified on the ground that all impacts of human activities should be taken into account. In our view, the term "integration" refers also to the need to consider not only environmental aspects, but also economic consequences of water protection and management, together with issues such as equity (e.g. affordability of water tariffs) and access to the resource. In order to water management to be sustainable, all sustainability dimensions should be taken into account: environmental standards can be guaranteed by a set of policy measures which have a cost opportunity for society and can have distributive impacts for citizens. Integration can also be intended as coordination of policies and approaches within sectors. The need for policy integration derives from the externalities existing among water uses, i.e. the fact that decision about how to use water by one user impact on the availability of the resource for another one.

In order to manage water at the river basin scale, Competent Authorities should be established at river basin level, in order to develop management plans, which should contain:

- A general description of characteristics of water in the district;

- An analysis of the pressure and impact of human activities on the status of water;
- A description of the monitoring network;
- A list of environmental objectives for each water body;
- A summary of the economic analysis and of the programme of measures.

The main instrument for reaching the goal of water quality status is the programme of measures, formed by the compulsory measures, i.e. the ones necessary to implement previous water legislation (e.g. discharge standards). If these measures are not sufficient to meet the WFD objective, then supplementary measures should be put in place. In order to make water users responsible for the pollution they entailed, the polluter–pays principle should be applied. In order to do so, the tariff paid for water use and for discharge of waste water should consider the whole cost of water use (i.e. full-cost recovery principle). The WFD clarify that the full cost should be intended as the costs of water service provision, environmental and resource use.

Finally, the role of public participation in water management is recognized by the art. 14, which states that the directive's success is guaranteed by citizens' participation and involvement. As a consequence, the active involvement of all stakeholders in the development and upgrading of the water management plans is encouraged. In particular, all information concerning water is public. Moreover, public can react to the provisions of the proposed plan and its remarks should be taken into account. The aim of the WFD is to reach an open and democratic decision-making.

The WFD does not consider the issue of private sector involvement and liberalization in water and waste water service management. This topic is considered by other EU regulations, namely the White Book of "services of general (economic) interest", where the aim to enlarge competition in service provision is emphasised, with the objective to enlarge the single market. Water is generally considered as a Service of General Interest, for which competition rules do not find application (Massarutto, 2004).

2. Water availability and use in arid and semi-arid countries

2.1 Water quantity

Europe shows a great disparity in availability in water resources. Southern countries present a higher availability of water resource per capita (Table 1) compared to Northern European Countries[1]. They also show higher abstraction volumes, both at aggregate and per capita terms (Table 4), with the agricultural sector having the major share in water abstraction (Table 2).

Even though theoretical availability is sufficient to satisfy water needs, nonetheless these regions experiences water shortages problems, since water availability presents a great variability across regions and over the year. On one side, rainy days are concentrated in few months, leaving the water provision for the remaining period dependent on storing capacity. On the other side, there is a mismatch water availability and demand. As a result, only 8% of water is available at any time, compared with the 40% of European average.

Table 1: Water availability and withdrawals in EU arid and semi-arid countries

Countries	France	Spain	Italy	Portugal	Greece	Cyprus
Availability of water resource (million m³)	189,048	111,133	175,000	73,593	72,000	370
Precipitation	488,427	346,527	296,000	82,164	115,000	2,670
Evapotranspiration	310,379	346,527	129,000	43,571	55,000	2,300
Withdrawals (m³/capita)	558.8	908.6	737.7	1,097.0	809.3	299.9
Water stress[2]	Medium-high	Medium-high	Medium-high	Moderate	Moderate	n.a.

Source: Eurostat website

Considering water uses, Table 2 emphasizes the predominance of agricultural uses which account for the majority of withdrawals in all the countries considered, except France. Regarding water sources, whilst Spain relies heavily on surface water, the other Mediterranean countries use mainly groundwater sources (Table 4).

Table 2: Water consumption by use

Countries	France	Spain	Italy	Portugal	Greece	Cyprus
Drinking water withdrawals (%)	18.25	14.74	18.00	7.86	9.91	22.71
Agriculture (%)	9.84	81.90	48	74.80	88.55	77.29
Industry (%)	11.50	2.85	19	4.40	1.26	-
Cooling (%)	60.32	-	14	14.10	1.42	-

Source: Eurostat website

[1] For instance, England and Wales have 2,694 m³/capita/year

[2] Water stress is defined as the gross freshwater abstraction as % of total resources. It is low, if this ratio is below 10%; moderate if it is between 10 and 20%; medium-high if it is between 20 and 40% and high if it is above 40% (OECD, 2003).

Table 3: Sources of water withdrawals

Countries	France	Spain	Italy	Portugal	Greece	Cyprus
Surface water (million m^3)	26,922.5	32,210.3	n.a.	4,800	4,602.5	71.5
Ground water (million m^3)	6,240	5,010.4	n.a.	6,290.0	3,118.8	143.0

Source: Eurostat website

Table 4: Drinking water consumption (and source) in EU arid and semi-arid countries

Countries	France	Spain	Italy	Portugal	Greece	Cyprus
Consumption per capita (l/day)	165	174	236	184		
Total Consumption	6,275.9	5,299.0	2,100	750	861.4	48.7

Source: Eurostat website

Looking at the perspective situation, in the long run several regions in Southern Europe will experience low rainfall rates (see Table 1). This situation, together with high evapotranspiration rates, could worsen deficit situation. In the driest regions, up to 90% of rainfall can be lost. Evaporation losses mean that relatively minor rainfall deficiencies can translate into large deficiencies (Figure 1).

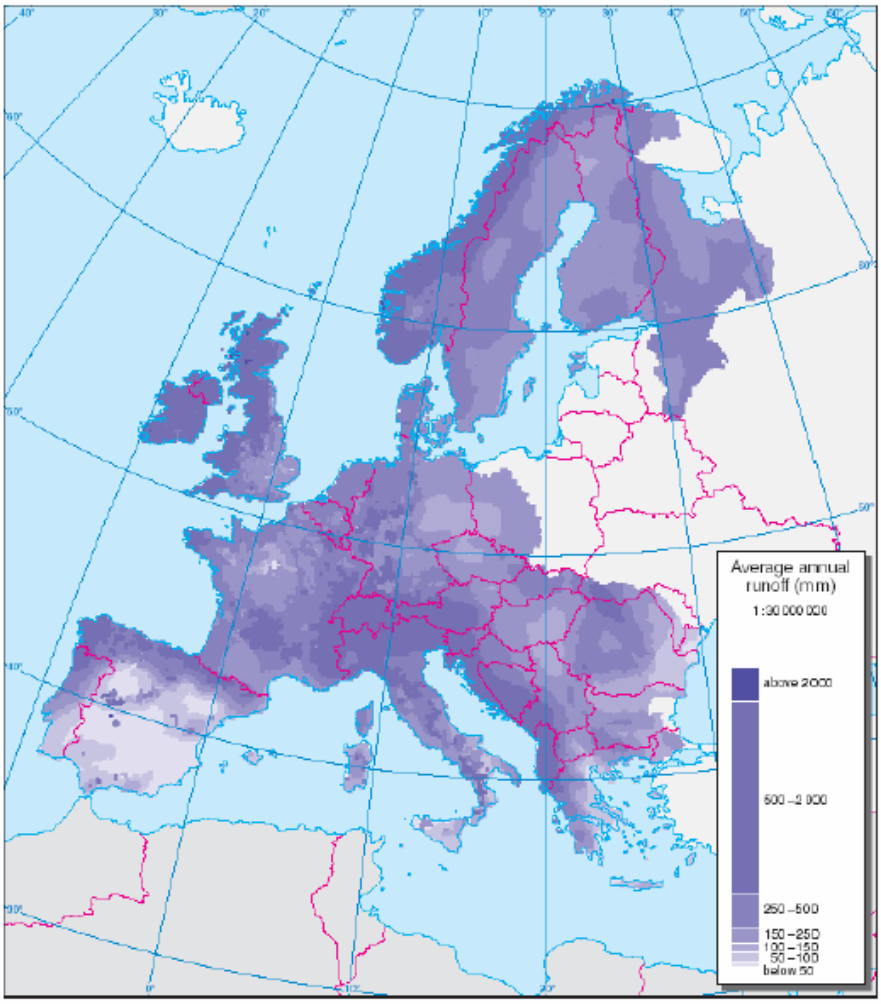

Figure 1: Long term average run off in the European Union. Source: EEA (1998)

In the Mediterranean Countries rains are concentrated in few days per year. As a consequence, rivers present a great variability. This pattern strongly influences water management in these countries.

The need to cope with water variability boosts the development of water transfer infrastructure. In all Mediterranean Countries considered, water is stored, through construction of reservoirs, and transported even through long distances with adduction pipes. In this area, the water withdrawals from different uses are strongly interconnected, since they normally share the same infrastructure. Reservoirs are normally used to store water devoted to irrigation and potable consumption. Consequently, it is difficult to separate agricultural from household uses and the of water management is de facto integrated.

New challenges are put into the scene by climate change, which will exacerbate extreme events, such as droughts and floods. Table 5 summarizes the main consequences of climate change on water availability. In particular, the increased variability in river flows and lower groundwater recharge rates will influence water management in semi-arid regions. Given the fact that these events cannot be forecasted precisely, due to the high uncertainty that surrounds these dynamics, it is essential to improve the adaptation capacity of existing water systems. To this respect, the WFD requirements are even more challenging in these countries, since the water

quantity management add to the quality management, increasing the complexity of water management issues.

Even if the objective of this report is not to analyse climate change implications on water management, the future challenges will be considered in analysing the current situation.

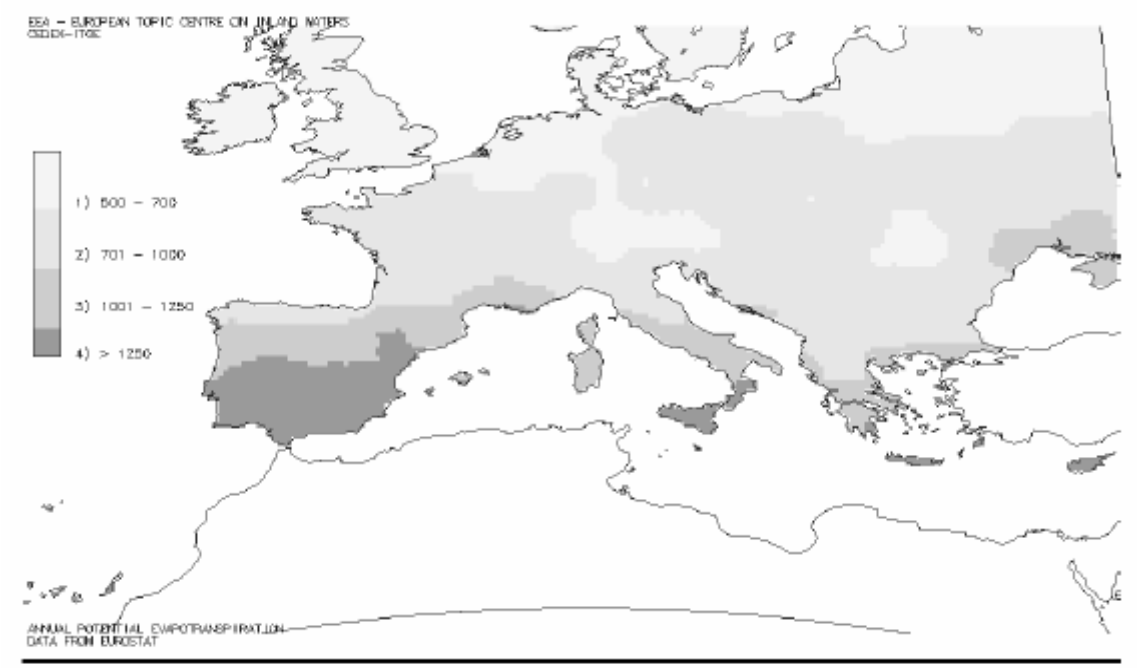

Figure 2: Annual potential evapotranspiration map for Europe. Source: EEA (1996)

Table 5: Impacts of climate change on water availability

Aspect	Representative impacts
More variability and extreme weather events: – More frequent and intense storms – Increased number of days of heavy rainfall events and torrential downpours – More frequent and longer lasting droughts spells – Greater seasonal and year-to-year variation in precipitation, especially in semi-arid areas in the southern and eastern portions of the region	– Higher surface runoff with less chance for infiltration – Increased variability in river flows through the year – More frequent and higher floods, especially over northern parts of the Mediterranean basin – Increased erosion from intense storms and sediment in runoff (in conjunction with effects of drought making soils erosion-prone – Lower groundwater recharge rates associated with drought

Aspect	Representative impacts
Wetter winters and dryer summers: – More precipitation in winter, less in summer over the Mediterranean region as a whole, with variability in basins – Earlier snowmelt (e.g. shifting to Jan, Feb, Mar) – More winter precipitation falling as rain (in mountainous and colder climate regions)	– Shift in normal season of peak flows in rivers from spring to winter, especially in basins with mountains in the upper catchments – Runoff in a particular basin may increase or decrease on average, but the seasonal distribution will change – Lower groundwater recharge rates where infiltration is less, and in dry summers – Less efficient rainwater infiltration feeding inland and coastal water tables and fragmentation of fresh water aquifers
Hotter summers and heat waves: – Warming trend greater in summer than in winter – Hotter and longer summers – Heat waves becoming the norm.	– Increased soil evaporation, pant evapotranspiration – Dryer and more erosion-prone soils – Acceleration of desertification effects – Multiple impacts, such as increased water needs in human, agriculture and natural systems

2.2 Water quality

River water quality across Europe is generally improving, thanks to advances in wastewater collection and treatment. In North-west countries, up to 90% of population is connected to the sewer and treatment systems. This figure is lower (from 50% to 80%) in Southern countries. The implementation of the Dir. 271/91/CE made possible to cut considerably point sources of pollution. Water pollution control proved costly for many countries, reaching around 0.8% of GDP (see Table 6).

Apart from point source pollution, an increasing proportion of emissions to rivers is represented by diffuse pollution, whose main source is agriculture, with particular focus on nitrates and phosphates.

Table 6: Investment and current expenditure on waste water pollutuion abatement and control in selected countries, late 1990s

	Total[a]			Public sector[b]				Business Sector		
	Year	Per capita	‰ GDP	Year	Per capita	‰ GDP	Investment ‰ GDP	Year	Per capita	‰ GDP
Mexico *	..	..	..	2000	1.8	0.2	0.1	..	..	..
US	1994	161.8	6.0	1994	105.0	3.9	1.8	1999	23.4	0.7
Japan	..	...	..	1999	84.1	3.3	..	..	..	..
Korea	2000	116.3	6.6	2000	80.8	4.6	3.6	2000	35.5	2.0
Australia	..	..	..	2000	36.7	1.4	0.6	..	..	..
Austria *	2000	202.8	7.5	2000	117.2	4.3	1.9	2000	47.2	1.4
Belgium	2000	111.4	4.3	2000	74.3	2.8	1.9	2000	29.6	1.1
Denmark	..	..	..	2000	123.0	4.	1.9	2000	29.6	1.1
Finland	1999	81.8	3.6	2000	58.4	2.4	1.1	1999	30.6	1.3
France	2000	177.9	7.5	2000	100.7	4.2	2.3	2000	23.3	1.0
Germany *	1999	195.4	8.3	1999	168.7	7.2	3.6		28.0	1.1
Greece	..	..	..	1999	14.3	1.0	0.9	..	..	..
Iceland	..	..	..	2000	17.2	0.6	0.5	..	..	..
Ireland	1998	73.6	3.1	1998	58.7	2.5	1.7	1998	14.9	0.6
Italy *	..	..	..	1996	3.2	0.2	0.0	1997	6.3	0.3
Luxembourg	..	..	..	1997	96.8	2.7	1.6	..	..	..
Netherlands	1998	144.3	5.9	198	113.5	4.7	2.0	1998	26.6	1.1
Norway *	..	..	..	2000	81.2	2.8	1.3	..	..	..
Poland *	2000	62.7	6.8	2000	42.0	4.5	3.7	2000	20.3	2.2
Portugal	1998	58.5	3.7	2000	40.0	2.3	1.7	2000	14.9	0.9
Slovak Rep.	..	..	..	1994	38.3	4.9	3.6	..	..	..
Spain	..	..	..	1999	46.4	2.5	2.0	..	..	..
Sweden *	..	..	..	..	..	..	..	..	..	..
Switzerland*	..	..	..	1999	131.6	4.8	2.6	..	..	..
Turkey	1997	10.5	1.7	1997	8.7	1.4	1.2	1997	1.8	0.3
UK	2000	17.7	0.7	2000	4.7	0.2	0.0	2000	13.0	0.5

a) Public and business sectors and specialized producers of environmental services (not households)

b) Including public specialized producers of environmental services

* See technical notes for country notes and comments - Per capita: in USD per person at current purchasing power parities – ‰ GDP: per 1000 units of GDP.

Source: OECD (2003)

3. Implementation of WFD at country level

3.1 The transposition process

Following art. 3 of the WFD, by June 2004 MS had to report on identification of individual river basins lying in national territories and international river basin. Moreover, by December 2003 MS had to identify competent authorities and bring into force the laws, regulations and administrative provisions necessary to comply with the directive. As of November 2006, all Member States have completed the transposition process.

Table 7 summarises the piece of legislation that, for each MS, made possible to transpose the directive in national laws.

Table 7: The transposition process of the WFD in selected Member States

Country	Relevant Legislation
England and Wales	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 The Water Environment (Water Framework Directive) (Northumbria River Basin District) Regulations 2003
Scotland	Leading legislation is the Water Environment and Water Services (Scotland) Act 2003 : WEWS Act
Northern Ireland	The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003
Germany	Federal Law Gazette 2002 I, p. 3245.
Greece	Law 3199/2003
France	Law n° 2004-338
Spain	Law 62/2003
Italy	Decree Law 192/2006
Ireland	Regulation 2003 (SI No. 722)
Portugal	Decree-Law 112/2002

To sum up, in **Germany**, the legislation on the protection of water bodies is manly the Federal State Responsibility. The Federal Water Act of 2002 implements the European requirements, especially the WFD. The law reflects the principle informing EU legislation, namely: the integral river basin related approach within the management of water bodies; the water resources objectives, with the aim of achieving good ecological water status by the end of 2015; principles for the identification and evaluation of water quality; and preparing river basin.

In **Portugal**, the WFD has been transposed through the Decree Law 112/2002. The Portuguese territory has been divided into 10 River Basins (*Bacias Hydrograficas*). This Law has introduced basin authorities that should have the power to establish the polluter-pays principle and the recovery principle.

In **Spain** the law 62/2003 completes the transposition process. This piece of legislation introduces the water quality objectives in Spanish legislation and strengthen the water planning mechanisms by introducing a Water Council (Consejo del Agua), in charge of coordinating the policies taken at river basin level.

In **Ireland** on the 22 December 2003, the Minister for the Environment, Heritage and Local Government made Regulations, which transpose the Water Framework Directive (2000/60/EC)

in to national law[3]. The regulations assign responsibilities to the EPA, local authorities and other public authorities for implementation of the Water Framework Directive and lay down deadlines for the delivery of the main tasks of required by the Directive.

In **Italy** the recent Decree Law 152/06 completed the transposition process, even if the WFD requirements were still considered by previous pieces of legislation (see below).

3.2 Identification of Competent Authorities

MS had the duty to provide a list of their competent authorities. The WFD states that Competent Authorities should be identified in order to manage water resource at river basin level. By analysing the report submitted to the European Commission following the art. 3, one can note that in several case the Competent Authorities are identified at a level not coincident with the river basin, namely the National one (eg. Cyprus, Latvia, Slovakia, Malta), regional one (Belgium) or local one (Denmark and Ireland).

Table 8: Map of the Competent Authorities in Selected Member States

Member State	Competent Authorities
Belgium	The regional governments (Wallonie, Flanders and Brussels) are identified as CA
Cyprus	Minister of Agriculture, Natural Resource and Environment (MANRE)
Denmark	16 Competent Authorities have been identified and are coincident with the county level
Finland	Seven river basin districts are established for reporting and planning (they can be formed by more river basins)
France	The 13 Prefect Coordinator are identified as competent authorities for police duties, whilst the Basin Committees are responsible for the other duties.
Ireland	The 6 county councils are responsible for water river basin plans whilst the Environmental Agency is responsible for reporting to EU.
Latvia	The competent authorities identified are the State Geological Survey of Latvia, the Ministry of Environment and the Latvian Environment Agency. In particular, the first CA will be responsible for the Production of river basin management plans and reporting to the EU.
Malta	Two CA have been identified: the Resources Authority (for inland water) and Environment and Planning Authority (coastal waters).

[3] These Regulations provide for:

- the protection of the status of all waters (i.e. no deterioration to be allowed) and the achievement of at least "good status" by 22 December 2015 for all waters
- the establishment of "river basin districts" (RBDs) as the administrative areas for implementation of the Directive (including international RBDs in relation to cross-border river basins)
- the co-ordination of actions by all relevant public authorities for water quality management in an RBD including cross-border RBDs
- the characterisation of each RBD
- the establishment of environmental objectives for each RBD
- the development of a programme of measures to achieve those objectives and subsequently its review / updating every six years
- the development and adoption in each RBD of a river basin management plan (RBMP) and subsequently its review / updating every six years.

Member State	Competent Authorities
Portugal	CA are identified in the Commission of Regional Development Coordination (CCDR), responsible for the drafting of national river basin plans, the INAG for drafting of the plans related to international basins.
Slovak Republic	The Ministry of the Environment and 5 Regional Environment Authority are the CA. The Ministry has to write the river basin management plans and the Water Plan of Slovakia and to coordinate them within the international cooperation in the Danube River Basin and Vistula River Basin.
UK	The Secretary of State for Environment, Food and Rural Affairs known as DEFRA has ultimate responsibility for implementation of the WFD; the Welsh Assembly Government has the relevant powers to transpose the Directive in Wales by means of secondary legislation; the Scottish Executive is responsible for leading transposition process; the Department of the Environment in Northern Ireland is responsible for leading the implementation of WFD.

Source: WFD library

3.3 Implementation of UWWT directive

The starting point for the implementation of the WFD is the implementation of previous directives, namely the Waste Water Treatment dir. 271/91/CE (WWT). Table 9 shows that the majority of MS is not able to comply with WWT Directive. Percentages of non compliance superior to 75% of the load in sensitive areas are observed in Spain, Ireland, Luxembourg, Portugal and Finland. This percentage is lower in agglomerations superior to 15,000 p.e.: the average non compliance figure is 31%, with a percentage superior to 50% in Greece, Ireland and Portugal. Thus the level of WSS provision is still insufficient in several member states and further investments are needed. The main reason for delays in implementing the UWWT directive is the costs involved.

Table 9: Waste water treatment in agglomerations affected by sensitive areas and organic loads (2002)

Member State	Articles applied[1]	Agglomerations concerned		Complying treatment level			Non complying treatment level		
		Number	Load [p.e.]	Number	Load [p.e.]	%[2]	Number	Load [p.e.]	%[2]
Belgium		186	8 952 516	72	2 566 050	29	114	6 386 466	71
Denmark	5(8)	127	6 698 384	122	6 429 418	96	5	268 966	4
Germany[3]	5(4)	3 859	124 876 488	-	-	P-reduction 90% N-reduction 74%	-	-	-
Greece		17	609 400	8	241 400	40	9	368 000	60
Spain		113	5 740 260	34	1 407 984	25	79	4 332 276	75
France		348	16 728 379	143	6 086 935	36	205	10 641 444	64
Ireland		28	3 362 856	12	269 478	8	16	3 093 678	92
Italy		49	3 024 094	28	2 165 493	72	16	661 748	22
Luxembourg	5(8), 5(4)[4]	11	804 500	3	108 500	14	8	696 000	86
Netherlands[3]	5(8), 5(4)	394	15 906 991	-	-	P-reduction 79% N-reduction 66%	-	-	-
Austria[5]	5(8)	25	1 851 885	25	1 851 855	100	0	0	0
Portugal		27	1 372 700	5	148 500	11	22	1 224 200	90
Finland	5(8)	87	6 377 300	7	429 600	7	80	5 947 700	93
Sweden		134	7 672 670	74	5 629 760	73	60	2 042 910	27
United Kingdom		90	6 221 177	26	1 782 241	29	64	4 438 936	71
Total		**5 495**	**210 199 600**	-	-	-	-	-	-
MS not applying Article 5(4)		**1 242**	**69 416 121**	**559**	**29 117 244**	**42**	**678**	**40 102 024**	**58**

Source: COM(2004) 248 final

[1] According to Article 5(8), a Member State does not have to identify sensitive areas for the purpose of the Directive if it implements the treatment established under paragraphs 2, 3 and 4 of the Directive over all its territory. The option of Article 5(4) of the Directive exempts a Member State from the provisions for individual treatment plants with more than 10 000 p.e. according to Article 5(2) and 5(3), but it has to show that a minimum percentage of reduction in the overall load entering a treatment plant in that area is at least 75% for total phosphorus and 75% for total nitrogen.

[2] Percentage in relation to the total organic load affected in the Member State.

[3] Germany did not include the waste water load of their entire territory, but only the load of agglomerations above 2 000 p.e. In Germany the load of agglomerations below 2 000 p.e. represents about 2% of the entire waste water load produced.

[4] .Luxembourg applies Article 5(4) but wishes to be evaluated according to Articles 5(2) and 5(3) until it achieves full compliance with Article 5(4).

[5] As Austria applies Article 5(8) from the end of 2002 onwards. The current evaluation includes only agglomerations discharging into the catchment areas of sensitive areas identified by other Member States

Table 10: Waste water treatment in agglomerations affected by normal areas (> 15 000 p.e.) and organic loads (2000)

Member State	Total		Complying secondary treatment			Non complying treatment		
	Number	Load [p.e.]	Number	Load [p.e.]	Load [%][1]	Number	Load [p.e.]	Load [%][1]
Belgium[2]	-	-	-	-	-	-	-	-
Denmark[2]	-	-	-	-	-	-	-	-
Germany	126	8 264 830	126	8 264 830	100	0	0	0
Greece[3]	90	9 081 100	55	4 307 100	47	35	4 774 000	53
Greece[4]	77	8 317 800	52	4 040 300	49	25	4 277 500	51
Spain	458	53 862 365	245	33 307 446	62	126	50 554 919	38
France	486	42 548 060	307	29 042 277	68	179	13 505 783	32
Ireland	28	3 901 479	13	706 032	18	15	3 195 447	82
Italy	630	55 412 105	312	28 764 701	52	318	26 377 404	48
Luxembourg[2]	-	-	-	-	-	-	-	-
Netherlands[2]	-	-	-	-	-	-	-	-
Austria	181	15 189 287	181	15 189 287	100	0	0	0
Portugal	94	8 455 900	45	3 149 200	37	49	5 306 700	63
Finland[2]	-	-	-	-	-	-	-	-
Sweden[2]	-	-	-	-	-	-	-	-
United Kingdom	618	65 980 345	551	58 819 918	89	67	7 163 427	11
Total	**2 698**	**261 662 171**	**1 832**	**181 280 991**	**69**	**866**	**80 381 180**	**31**

Source: COM(2004) 248 final

[1] Percentage in relation to the total organic load affected in the Member State.
[2] The Member States were not affected by "normal areas" as they had either identified their entire territory as sensitive area or applied Article 5(8).
[3] First version, not taken into account for the total calculation.
[4] Second version, after Greece's revision, taken into account for the total calculation.

4. Analysis of WFD implementation in Mediterranean EU Member States

The Mediterranean countries show some peculiarities regarding their water management system that derive from water availability patterns described above.

Generally speaking, apart from meeting EU water quality standards, the main problem in managing water resources is dealing with water scarcity: as underlined above, in the last decade these countries have been facing extreme events like drought.

Concerning integrated management at the river basin scale, the presence of large inter-basin transfers (built in order to meet regional demand) expands the unit of water management. To this respect, the concept of "river basin" become less significant for planning purposes, since this scale cannot capture all the relevant dynamics in water use patterns and fully account for external effects. There is the risk that competent authorities designed at river basin level are weakened as a consequence of centralized water policy. The national interest is strengthened by the weak role of lower administrative layers (e.g. municipalities) and tends to support "large users" (irrigation, power generation) which are able to lobby to have the water they need guaranteed.

In Mediterranean countries, the interest to guarantee safe water supply has been used as a justification for massive financial support (through public finance) to large public works like dams and reservoirs. As a result, the full cost recovery principle is not applied and subsidies tend to finance a great percentage of the cost of service provision.

It can be said that water scarcity produces two opposing effects: on the one side it contributes to create a culture of "water as a social right"; on the other, the need to guarantee water for all at cheap price produces a neglect for environmental issues and the polluter-pays principle is not considered.

The characteristics of water infrastructure condition private sector involvement patterns. We register a prevalence of public undertakings; weak tradition of delegation and regulation.

Regarding, public participation there is a tradition of participatory institutions in a "neo-corporative" model, since stakeholders participate directly to decision-making (even if they do not contribute proportionally to finance the sector).

These characteristics make the implementation of the WFD and, generally speaking, water management at river basin scale, even more demanding, in terms of governance and effectiveness of the instruments applied. These issues are analysed more in depth in the country reports below.

4.1 Portugal

Governing water

River basin management has been introduced by Decree Law n. 70/90. The same creates 5 river basin agencies. However, in 1993 five Regional Directorates of the Ministry of Environment took responsibility for drafting the river basin plans. De facto, river basin management is not implemented, since the directorate boundaries correspond to those of administrative regions.

Water plans are prepared at national regional and sub-regional level. The five Regional Directorates of the Ministry of Environment are responsible for the remaining plans. INAG is responsible for the drafting of the national plan and the five international river basin plans. 15 basin plans have to be prepared in accordance with the National Plan presented in 2001.

Following the Decree Law 112/2002, Portugal has been divided into ten Hydrografic Regions[13] (*Regiões Hidrográficas*, see Figure 3), which correspond to one or more River Basins. The 15 river basin councils have been established.

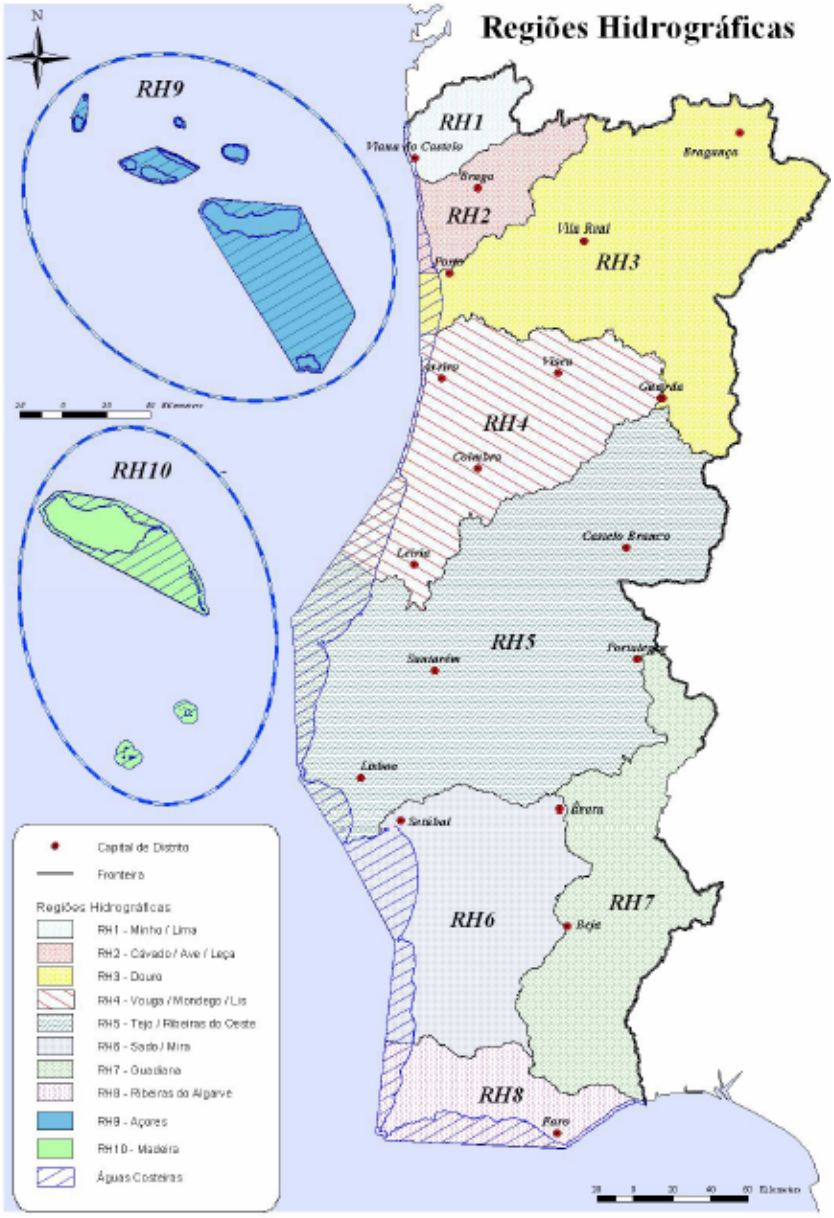

Figure 3: Portuguese River Basins as defined by the Decree Law 112/2002. Source: INAG website

A proposal was recently made to create ten river basin authorities in which various stakeholders would form voluntary user associations to manage water resources and control water pollution.

[13] RH1 = Minho e Lima; RH2 = Cavado, Ave and Leça; RH3 = Douro; RH4 = Vouga, Montego and Lis; RH5 = Tejo and West Coast; RH6 = Sado and Mira; RH7 = Guadiana; RH8 = Algarve Coast; RH9 = Açores; RH10 = Madeira.

Following the 1966 Civil Code, water is classified as public or private. Surface water is largely public, whilst groundwater is private, but subject to public regulation: the withdrawal is subjected to licences. The five regional directorates for the Environment are responsible for delivering licences for water withdrawals and discharges.

Portugal is characterized by the low development of water and sanitation sector: in 2002 connection rates are respectively 92% and 42% (see Table 11), despite the fact that huge investments have been carried out in the last decades, in order to extend the rate of service coverage. In doing so, Portugal has been able to successfully use the European Cohesion Funds. In 1990, as a matter of fact, only 80% of the population was supplied in drinking water, 55% of the population was supplied with a sewerage service and 21% with wastewater treatment (OECD, 2001). It is estimated that 3,500m euros will be necessary to comply with EU directives until 2006. Of these, 2,200 will be provided through tariffs whilst the remaining part through European Subsidies for WSS Services (Table 12).

Table 11: Population served in percentages (2004)

Indicator	% of population served
Drinking water sector	92
Sewerage (urban population only)	70
Treatment	50
Primary treatment only	19
Primary and secondary treatment only	18
Primary, secondary and tertiary treatment	15

Source: EWA (2005)

Table 12: Allocation of European Funds

	II European Support Framework (1994-2000)	III European Support Framework (2001-2006)
Total European Subsidies (Cohesion Fund)	1,300	1,700
European Subsidies for WSS Services	490	1,300
Total Investments by ADP in multi-municipal systems	980	3,500

Source: DREE (2003)

In order to increase the efficiency and effectiveness of WSS provision, a major reform was introduced in 1993. This piece of legislation divided the WSS services in three layers:

- Local level is mainly related with retail supply and sewerage ("baixa" activities);
- Regional level concerns bulk supply and sanitation ("alta" activities);
- National level is represented by Aguas de Portugal (AdP), created in 1993 as the major shareholder of the multi-municipal companies and to channels European Funds.

This division conditions also the management forms. In particular, municipalities are responsible for retail distribution and can delegate this function to private sector. For what concerns the municipal systems, they can be managed by municipalities (direct public management), by private-public company (delegated public management), or by private companies (delegated private management, for example under a contract of concession). Private

participation reaches around 15% of the supplied population for water services. It exists different forms of municipal ofanisations, namely:

- Municipal services, in case of no separation between the municipality and the service provider;
- "Municipalised" services, when separate structure under the commune control are created in order to provide the service;
- Municipal enterprise, when a new corporate structure (private in legal terms but municipally owned)

Bulk activities, at the contrary, can be managed only by multi-municipal companies. Two Decrees (372/93 and 379/93) define a new institutional framework for the management of water and wastewater services. According to Decree 372/93 the private sector can participate in these services, namely in bidding processes for municipal systems' delegated management contracts, and in participating with a minority stake in the capital of multi-municipal systems' concessionaires. Decree 379/93 regulates WSS management, making a distinction between municipal systems and multi-municipal systems[14].

Following the Decree law 314/94, multi-municipal companies have a concession contract for 25-30 years with the State (see Table 13). Their major shareholder is AdP (which owns at least 51% of their shares). The remaining part is owned by municipalities and private operators. To sum up, the Portuguese market remains relatively close to PSP.

With respect to the regulatory framework, a national authority (IRAR) has been created in 1997 to regulate the water sector, but it has only information duties. IRAR controls only the multi-municipal and municipal concessions for WSS. The local administration bodies that provide the service directly, are not subject to IRAR's action. In practice, IRAR duties can be summarised as follows[15]:

1. Structural regulation of the sector, i.e. control on horizontal or vertical integrations of the operators. The IRAR's power is only of influence, since it has not the power to block such operations;
2. Regulation of the operators' behaviour. This can be done through the use of benchmarking regulation (through a set of ad hoc defined indicators) and public divulgation of the comparison results.

In fact, IRAR has a weak capacity of intervention.

[14] These are defined as "water systems related to at least two municipalities". Their development is considered of national interest and investments are determined by the State.
[15] http://www.irar.pt/irar.pdf

Table 13: Water and Wastewater Service Concession in Portugal (2000)

Municipal System	Municipality	Population	Object of concession	Year	Duration	Concessionaire
Mafra	Mafra	44.000	Water services	1995	25	CGE- Portugal (100%)
Fafe	Fafe	48.000	Water services	1996	25	Indágua Fafe Indágua (60%) Hidrocontrto (40%)
Ourém	Ourém	40.000	Water services	1996	25	CGE- Portugal (100%)
Carvoeiro	Association of municipalities of Carvoeiro	250.000	Water services (bulk supply)	1996	20	Aguas de Vouga Luságua (80%) Aquagest (20%)
Batalha	Batalha	13.000	Water services	1997	15	Aguas do Lena Luságua (75%) Aquagest (25%)
Trancoso	Trancoso	11.000	Water and wastewater services	1997	25	Aguas do Teja Luságua (75%) Aquagest (25%)
Planalto Beirao	Association of municipalities of Planalto Beirao	86.000	Water services	1997	25	Aguas do Planalto Luságua (50%) Aquagest (25%) Edifer (25%)
Setúbal	Setúbal	100.000	Water and wastewater services	1997	25	Aguas do Sado Luságua (60%) AGS (40%)
Vale do Alve	Association of municipalities of Vale do Alve	375.000	Wastewater services	1998	25	Tratave Luságua (60%) AGS (40%)
Santo Tirso	Santo Tirso	100.000	Water services	1998	25	Indágua Santo Tirso Indágua (60%) Hidrocontrto (40%)
Figueira da Foz	Figueira da Foz	62.000	Water and wastewater services	1999	25	Aguas de Figueira AGS (40%) Aquapor (40%) Efacec (20%)
Feira	Santa Maria de Feira	120.000	Water and wastewater services	1999	35	Indágua Feira Indágua (60%) Hidrocontrto (40%)

Source: PEAASAR 2000-2006 (www.inag.pt)

Regarding water abstraction charges, following the Decree Law 46/94, all licenses uses are subject to the payment of a tax for withdrawal and discharge. But it seems that these taxes are not been collected yet. It is directly proportional to the amount of water that is used and to the economic value of the water for each specific sector, and inversely proportional to water availability. The income of the tax is devoted to river basin management and implementation of river basin plans. The polluter pays principle is applied through emission charges and revenues reinvested in water management.

Water price in principle, should be set to reflect true costs of provision. Water tariffs are different among localities, due to the investments costs necessary to provide the service. In particular, in the case of concession to multi-municipal companies, water tariffs are calculated so as to guarantee the recovery of asset depreciation costs. In the case of municipal services, water tariffs should not be inferior to the costs of provisions (following art. 20 of the Local Finance Law). In practice, however, FCR is not applied. Household and agricultural uses are highly subsidised. The report written up following the art. 5 requirements highlight the level of cost recovery summarised in Table 14. Industry not served by centralised WSS is supposed to cover all provision costs since there are no subsidies available for this use.

Table 14: Level of FCR for uses connected to WSS in Portugal (2002)

Hydrografic Region	Water	Sewerage and Sanitation	Total
RH1	88	52	78
RH2	96	46	76
RH3	85	22	61
RH4	98	26	65
RH5	107	79	86
RH6	100	52	81
RH7	87	23	64
RH8	79	56	72
Average	99	54	82

Source: Art. 5 Report – Portugal

Table 15: Level of FCR for agricultural uses in Portugal (2002)

Hydrografic Region	Total costs
RH1	n.a.
RH2	n.a.
RH3	9
RH4	10
RH5	28
RH6	27
RH7	35
RH8	13
Average	23

Source: Art. 5 Report – Portugal

In particular, environmental and resource costs are not considered in the art. 5 report, due to lack of data. The financial costs have been considered as sum of operation and maintenance costs and annual investment costs (considering a depreciation schedule of 30 years).

Table 16: Rate of connection (%) to the centralised WSS (2002)

Hydrografic Region	Water	Sewerage and Sanitation
RH1	77	14
RH2	78	36
RH3	83	28
RH4	89	48
RH5	98	45
RH6	93	55
RH7	84	68
RH8	82	72
Average	92	42

Source: Art. 5 Report – Portugal

Sharing water

After evaluating the degree of full cost recovery, the art. 5 report emphasises the socio-economic importance of different water uses. For potable uses, the annual water bill is considered (see Table 17).

Table 17: Average WSS Bill (€/year) considering a consumption of 144 m³

Hydrografic Region	Water		Sewerage and Sanitation	
	Average	Range	Average	Range
RH1	78	13-138	26	0-51
RH2	119	32-147	31	0-67
RH3	151	16-168	18	0-68
RH4	105	0-168	24	0-79
RH5	115	0-172	30	0-67
RH6	83	0.171	22	0.63
RH7	77	35-136	11	0-63
RH8	84	35-356	31	0-84
Average	109	0-356	26	0-84

Source: Art. 5 Report – Portugal

For each use, the value added is considered as an indicator of the importance of water resource use (Table 18).

Table 18: Socio-economic importance of different water uses – Portugal

Hydrografic Region	Industry	%	Agriculture	%	Hotels and Restaurants	%	Total
RH1	446	83,05%	47	8,75%	44	8,19%	537
RH2	3,975	90,96%	176	4,03%	219	5,01%	4,370
RH3	3,222	78,55%	638	15,55%	242	5,90%	4,102
RH4	3,521	87,33%	297	7,37%	214	5,31%	4,032
RH5	7,074	73,28%	1,042	10,79%	1,537	15,92%	9,653
RH6	507	66,36%	181	23,69%	76	9,95%	764
RH7	210	34,15%	223	36,26%	182	29,59%	615
RH8	120	18,24%	157	23,86%	381	57,90%	658
Total	19,075	66,49%	2,761	16,29%	2,895	17,22%	24,731

Source: Art. 5 Report – Portugal

4.2 Spain

Governing water

Water basin planning is not a novelty in Spain, since the water basin (*Cuenca*) is considered as the unit for water management. It has been established in 1926, through a Royal Decree Law. The Water Basin Authorities (*Confederationes Hidrográficas*, CH), however, were even older. They were set up by the 1879 Water Law, which established the public control over water provision to guarantee development purposes, mainly for irrigation. To this extent, the CHs are responsible for granting use licences and for developing water infrastructures. The 29/1985 Water Act partially modifies the pre-existing water use and property rights regime. It establishes that all water resources are public. The 46/1999 Water Act introduces two types of disposition rights

- It admits the contracts for the cession of use rights (water can be sold to other concession holders)
- Introduces the figure of banks of use rights exchange, by which the hydraulic administration purchases water and sells it at the price it decides

The planning system is organised in two levels:

- The national one: when the river basin cross several Autonomous Communities. The national planning is informed by the "national water balance system"
- The river basin one, when the river basin is included into a single Autonomous Community. In this case, regional water planning has to conform to national guidelines.

The 14 River Basin Organisations are responsible for water development, bulk allocation, pricing, monitoring and enforcement. They are classified into:

- 9 inter-regional entities (*Confederationes Hidrográficas*)[16]
- 5 intra-regional entities (Administratiónes Hidrográficas)[17]

Each water basin authority is responsible for the drafting of its Hydrologic Plan (Plan Hidrológico de Cuenca). These plans form the basis for the elaboration of the Plan Hidrológico National, PHN), which aims at coordinating the different Basin Hydrological Plans, the forecasting and conditions for the transfer of resources among basins, the modifications to the current planning system which insist on the current provision levels. In particular, the CHs are responsible for the drafting and implementation of the National Hydrologic Plan, for the control of the withdrawals, for building and management of water infrastructures.

Water systems are divided into bulk and retail supply: the Water Basin Authorities are in charge of managing the bulk systems, whilst the Municipalities are responsible for retail distribution

The 8050 municipalities are responsible for the provision of WSS services. WSS provision is still not complete (see Table 19).

[16] Northe, Duero, Ebro, Guadalquivir, Guadiana, Júcar, Norte, Segura, Tajo.
17 Cuencas internas de Catalana, Islas Baleares, Islas Canarias, Galicia Costa, Cuencas Internas de País Vasco.

Table 19: Population served in percentage (2004)

Indicator	% of population served
Drinking water sector	97
Sewerage	86
Treatment	83
Primary treatment only	25
Primary and secondary treatment only	70
Primary, secondary and tertiary treatment	4

Source: EWA (2005)

Municipalities can manage WSS:

1. Directly, through municipal or inter-municipal companies, whose capital is entirely public;
2. Through shared private-public companies (with municipalities owning the majority stake);
3. Through delegation to private operators.

The first one is dominant for small municipalities and sewerage systems, but the other two are growing, especially in the highly populated areas. Private participation reaches around 50% of the supplied population for water services.

Among the public operators, the most important ones are Canal de Isabel II[18] (Madrid) and EMASESA[19] (Sevilla). EMIVASA[20] (Valencia), CLABSA[21] (Barcelona) and EMALSA[22] (Las Palmas) are examples of shared public-private companies.

The following private operators cover 80% of the concession contracts in WSS: Aigües de Barcelona[23] is owned by the AGBAR group[24] and it serves almost 3 million inhabitants. Aqualia[25] is owned by the FCC group and it operates in several cities (e.g. Salamanca, Ibiza, Palma de Maiorca, Cadiz, Alicante, Malaga and Cordoba, to quote but a few).

Valuing and sharing water

Regarding quantitative management aspects, each user, in order to withdraw water, must have a licence and pay the correspondent user fee. It is different for agricultural (close to zero), industrial and potable uses and it is collected by the River Basin Authority. Water abstraction charges have been introduced to compensate the State for investment, exploitation and maintenance costs: it is not intended as a scarcity signal.

Waste water charges (Cánones de Vertido) are collected by the River Basin Authority. They are set up for unit of pollution with the aim of improving the environment conditions.

18 http://www.cyii.es/www/publico/index_esp.html
19 http://www.aguasdesevilla.com/
20 http://www.emivasa.es/home_fr.htm: Water services only
21 http://www.clabsa.es/: Clabsa is formed by AGBAR, FCC and the Barcelona Municipality and it is responsible for the sewerage service only.
22 http://www.emalsa.es/1/1_1.php
23 http://www.aiguesdebarcelona.es/home.asp
24 http://www.agbar.es/esp/welcome.htm. This group owned several water companies, whose activities are located mainly in Spain and Latin America. AGBAR Agua is the first Spanish WSS operator.
25 http://www.aqualia.es/es/principal/index.asp

Water prices are proposed by the WSS operator and approved by municipalities. It exists several tariff systems. First, the flat tariff (independent on the quantity consumed) is applied only in small municipalities. Second, the volumetric charges are present in municipalities and town. Third, a fixed charge is combined with a volumetric one. Finally, a fixed charge could also be applied together with a block tariff. Apart from the system applied, water bills could include other fixed costs such as the water meter rent. Regarding volumetric charges, they are calculated by considering the cost of WSS provision (including depreciation and bulk water supply costs) and dividing it by the mc provided. In case of fixed charge, it is calculated as percentage of total costs and then divided by the number of users. The remaining part enters the calculus of volumetric or block tariffs (Sáenz de Miera, 2000).

Regarding the degree of cost recovery principle, in 1996 it was applied by 84% of the municipalities. The remaining 16% was constituted by small municipalities. For instance, about 69.5% is actually paid by current water users, the remaining 15% being devoted to flood mitigation and the other 15% charged to future uses. Since 1996 the degree of subsidies increases over time.

Water assets in Spain are divided among different uses. For this reason, in order to divide the total cost of WSS provision a coefficient of equivalence is calculated. It reflects the actual benefits deriving from water uses (greater the benefits, greater the cost). For instance, in the past years the coefficient among rural uses and household uses in the Jucar river basin have been fixed 1 to 4, i.e. for each mc delivered, the agricultural uses pays 25% of the total costs of provision.

In particular, for the Jucar river basin the provision costs of water and wastewater services to household are respectively 1.05 and 0.72 euros. The degree of cost recovery is about 90%. The subsidies have been granted mainly by regional government, and since 1996 by the EU through the cohesion fund. In the same basin, the cost of water provision for agricultural uses ranges from 430 to 1.360 €/year. The degree of cost recovery varies from 72% to 85%.

Differently from other Member States, the Spanish WFD documents indicates also an estimation of scarcity and environmental costs. The former is calculated as opportunity cost of water consumption, i.e. as the cost to bear if water availability decreases of one unit. The maximum scarcity cost has been estimated in 0.6€/mc (in drought periods). This information is deemed useful, since it can be used to increase the water price in dry months over the year.

Externality costs are calculated as the costs incurred to implement the water directives (98/83/CEE, 76/464/CEE and 91/271/CEE), namely 997m, 142m and 775m euros respectively in the Jucar river basin only.

In Spain there are several examples of water markets. These were introduced by the 1999 Water Law that specifies the institutional framework necessary to implement such a system. In particular, the state determines the areas and the temporal periods under which water rights can be traded, stating the following conditions:

- Water cannot be sold to uses which are secondary to that for which the permit was granted;
- Public institutions have preference in purchasing;
- Public authorities can prohibit contracts if they are contrary to the public interest.

Under conditions of drought or severe water stress, the water authorities will facilitate "water banking" (similar to Californian water banks). The water bank experience will constituted a case study analysis.

4.3 Greece

Governing water

According to the 1987 Water Resource Management Act, all water resources are owned exclusively by the State and priority is given to drinking water provision. The law established 14 water districts and related Regional Water Committees. Up to 2000 regional water resource management plans have been proposed in ten water districts, to develop long term water resource management strategies. The plans have been submitted for consultation to all social and economic actors (OECD, 2000).

Figure 4: Greek water districts. Source: Central Water Agency (2006)

Responsibility over water resources are split at national level between the Ministry of Environment, for what concerns environmental aspects, and the Ministry of Development, regarding water administration. Moreover, the ministry of Agriculture deals with irrigation.

WSS management is influenced by a new local administrative structure defined by Law 2539/97, which makes the merger between communities compulsory in order to form large municipalities. The precedent fragmentation hampers the effective delivery of public services, water and sanitation services included. Some municipalities have established inter-municipal agencies to tackle with water and waste water issues (Tsagarakis *et al.*, 2001). After the reform, there are 900 municipalities and 133 communities in Greece.

Except from Athens and Thessaloniki, municipalities are responsible for WSS provision. Larger cities are able to establish municipal owned public utility corporation. In fact, they divide construction of infrastructure from operation: the municipal enterprises for water supply and sewerage (DEYA) being responsible for the first task, whilst the communal enterprises for water supply and sewage (KEYA) dealing with the latter. In alternative, especially for small municipalities in rural areas (20% of the population), direct provision is prevalent.

In Athens and Thessaloniki, large state owned companies are responsible for WSS provision. EYDAP SA serves Athens metropolitan area. It was privatised in 2000 through selling the minority stake in Athens Stock Exchange. It has the exclusive rights to provide the service in this area for 20 years. The population supplied is around 3.8m persons, equal to 40% of the Greek population. The other state owned company, EYATH SA operates in Thessaloniki, having 1m customers, equal to 12% of population.

Historically investments have been financed through State grants and EU grants (see Table 20). Following the listing in the Athens Stock Exchange, more private capital may fund future investments.

Table 20: Public Investment Expenditure on water resource management (1994-99)

Activity	**Billions of GRD**
Operational Environmental Programme	29.3
Regional Operational Programme	224.8
EU Cohesion Fund	432.3
Total	686.4

Source: OECD (2000)

Valuing water

Water use permits are granted for ten years through Presidential Decrees. Licences for agricultural uses are free of charge. Regarding discharges control, industries must obtain a discharge permits.

Water prices are set by municipalities, but they must receive the approval of the Prefect. Athens prices must be approved by the Ministry of Environment. They increased considerably after the 1992-93 droughts. Water supply charges are usually based on volumetric rates. In Athens, the water supply tariff include a fixed charge. Water volumetric charges for industry are higher than for household. Farmers are not charged for irrigation water.

4.4 Italy

Governing water

River Basin Management has been introduced by the Law n. 183/89, which identified the basin as the unit for water management. All the Italian territory has been divided into river basins, having different territorial relevance, namely those having national, inter-regional and regional relevance.

Seven national river basin Authorities (*Autorità di Bacino*) were set up[26], in order to carry out management and planning duties in the river basins having national relevance. For the remaining river basins, the regions are responsible for these duties.

Following the Decree 152/99, transposing the Dir. 271/91/CEE, each region has to define a water management plan (*Piano di Tutela delle Acque*) defined at regional level. This plan, after a description of the state of the water environment in the region considered, has to identify a set of measures necessary to attain the good status for all surface and ground waters. It has to include also an economic analysis of the measures, in order to identify the most cost-effective.

The role of the River Basin Authorities has been weakened by the attribution of planning competences to the regions.

Regarding the water rights definition, the Decree 1775/1933 distinguished among public and private waters, the former being defined as all the surface and lake waters; while the remaining was private. In practice, public ownership of the resource had to be declared by the public authority on a case-by-case basis. It is only with the Gall Law (36/1994) that all waters became public and needed a licence in order to be extracted. This definition has been set up to guarantee the national interest. However, implementation of this law has been very slow, and it remains thousands of private wells to be identified (OECD, 2002).

Regarding WSS management, following the Galli law, this should be organised in ATOs (Optimal Management Units). The 91 ATOs were defined by the Regions through regional legislation. Even if the law states that their boundaries should reflect hydrographic features and homogeneity among areas, the Regions defined them more or less coincident with the district level.

Moreover, even if the law imposes one operator for each management unit, de facto the implementation process is showing that WSS operators, in several cases, are more than one. This choice has been justified on the need to safeguard the existing incumbents. Nevertheless, a process of aggregation at supra-municipal scale is occurring, with municipal management being abandoned in favour of bigger territorial scales.

Regarding the operators' organisational structure, several alternatives are possible. Following art. 14 of the law n. 326/2003, three management *de jure* possibilities are envisaged, since water and waste services can be delegated to: (i) identified through competitive bidding procedures; (ii) shared (private-public) companies, where the private partner has to be chosen through competitive bidding procedures; (iii) companies completely owned by public entities, provided that the company is controlled by the public body and its main activities are carried out under

26 Autorità di bacino nazionale del fiume Adige, Autorità di bacino nazionale dei fiumi dell'Alto Adriatico, Autorità di bacino nazionale del fiume Arno, Autorità di bacino nazionale dei fiumi Liri-Garigliano e Volturno, Autorità di bacino nazionale del fiume Po, Autorità di bacino nazionale del fiume Po, Autorità di bacino pilota del fiume Serchio

the supervision of these bodied (in house). The choice of the WSS operator is made after a Business Plan (called Piano d'Ambito) is drawn by the ATO Assembly (formed by the ATO municipalities and district government), containing a description of the state of the infrastructure, the investments to be carried out and the tariff level necessary to guarantee the application of the Full Cost Recovery principle). The municipalities remain the owner of the infrastructure, which is temporarily transferred to the operator. This is responsible for the investments indicated in the Piano d'Ambito, intended to maintain the network and to increase the level of the services (e.g. increase connection to sewerage network and to sanitation plants). At the end of the concession level, the operator has to transfer the new assets to the municipalities.

De facto, WSS are managed through:

- Multiutility companies (especially in the central and Northern part of the country);
- In-house provision;
- Shared (private-public) company with the public majority stake; the private share is either sold through competitive bidding or through the stock exchange.

The reform, after 12 years, is still in progress[27]. In 2005, 80 Piani d'Ambito have been completed; 43 ATOs have defined the ATO operator (COVIRI, 2006):

- Through competitive bidding procedures (4 cases);
- As shared (private-public) companies, where the private partner has to be chosen through competitive bidding procedures (5 cases);
- As in house provision (14 cases).

The remaining 20 cases refer to management possibilities existing before the 2003 law, regarding the identification of the WSS operator without bidding procedures.

One weakness emerging in the last years is the lack of an effective regulatory system. Regulation is introduced mainly as ex ante regulation: the Piano d'Ambito provides detailed information of the investments required to the operator. There is inadequate ex post control on the management activities carried out of the operator, and lack of flexible mechanisms to deal with uncertainty. The national regulator (Comitato di Vigilanza sull'Uso delle Risorse Idriche) has only advice functions, without power in terms of tariff regulation or quality of the service delivered control.

Finally, there are problem of coordination between the investments defined at ATO and at river basin level. The plans are drawn by different bodies. The Piano d'Ambito is prepared by the ATO Assembly, whilst the Piano di Tutela is written up by the Regions. The risk is that the Piano di Tutela mainly confirms the investments identifies by the municipalities, without been able to impose additional measures necessary to attain the good status objective.

Valuing and sharing water

As stated in the introduction, the analysis of economic instruments considers tools aiming at coping with water quantity and water quality issues. Regarding the former aspects, abstraction charges (*canone di derivazione*) were introduced by the Galli law. Following this piece of legislation, each user, in order to withdraw water, must have a licence and pay the

27 A detailed description of the State of Art of the reform is provided yearly by the Comitato di Vigilanza sull'Uso delle Risorse Idriche.

correspondent user fee: this is set up according the the licensed level rather than on the actual abstraction.

Abstraction charges are collected by the Regions and were supposed to form a Water Fund. They are different for agricultural, industrial and potable uses. For these reasons this economic instrument does not have any allocative functions.

Regarding qualitative aspects, waste water charges, even if introduced by the Merli Law (319/76), were set up only in 1995. At that time, basic rates were € 0.08 for sewerage and € 0.25 for waste water treatment. In 2001 waste water charge industry rate were aligned with those of household. They were not set up in order to reflect the external costs.

Table 21: Water Abstraction Charges in Italy (2001)

Use	Rate (€/module[28])
Agriculture	3629
Household	1,550
Industry	11,36230
Hydroelectric	

Source: OECD (2002)

Finally, concerning WSS management, according to the Galli Law, water tariffs should reflect the full cost of service provision. Until late '90s they made possible the recovery of operational costs only. With the 1994 reform, water tariff should be set up in order to consider the full cost of WSS provision, namely operation and maintenance, depreciation and remuneration of the capital invested. Price increases can occur only within a range determined by applying the so called Metodo Normalizzato, which determines the full cost of reference. Operation costs are to be determined through a parametric formula. It has been highly criticized since it does not reflect true costs. In practice, tariffs have been set equal to the maximum allowable by the Metodo Normalizzato, level which is deemed insufficient to cover all the costs necessary to cover investments needed to implement EU water directives. The Table 22 shows the water tariff dynamics, as stated by the Piano d'Ambito approved until 2003.

Table 22: Water Pricing Dynamics for WSS provision (€/mc)

Area	Average tariff 2003	Year 1	Year 5	Year 10	Year 15	Year 20
North	0.85	0.87	0.98	1.07	1.22	1.31
Centre	0.84	0.91	1.03	1.18	1.25	1.23
South	0.93	0.96	1.09	1.29	1.38	1.39
Islands	0.99	1.02	1.17	1.33	1.43	1.44
ITALY	0.90	0.94	1.06	1.22	1.31	1.32

Source: COVIRI (2004)

It specifies the average tariff in 2003, at the tariffs to be applied at the 1st, 5th, 10th, 15th and 20th year of the concession period. With this respect, in order to become "Sustainable", tariff should increase (ranging from + 16% to + 169%). Historically infrastructure has been financed through public financial sources.

28 One module is equivalent to 100 litres per second.
29 The rate for irrigation for water delivered through canal is 0.33€/ha.
30 Charged are halved for processes entailing water re-use or recycling or water discharge without alteration.

5. Critical issues

The Country analysis carried out in the previous paragraphs makes possible to underline some critical issues regarding the WFD transposition process and integrated river basin management. These issues are typical of arid and semi-arid countries and to this extent their analysis can be useful to understand how to tackle such situations in such cases.

In particular, regarding institutional aspects, in analysing the establishment of integrated management at the basin scale we will discuss how institutions are built in practice at the river-basin scale. We will provide some examples of IRBM. We will deal also with public participation and stakeholders' involvement.

With respect to the use of economic instruments and evaluation, we will focus on two aspects. On the one side, by considering the economic valuation of water policies, we will emphasise to what extent economic analysis is used to assess water scarcity (e.g. by estimating water demand) and, increasing the information available, to introduce demand-side management policies. Economic analysis is also considered by the WFD, since it allows to choose the most cost-effective measures.

Even if the use of economic instruments is not explicitly addressed by the Directive, we will give insights on how the application of cost-recovery principle is influenced by the choice of policy instruments. Moreover, we will describe the diffusion of economic incentives and market instruments.

Finally, in dealing with private sector involvement, we will discuss different alternatives that are currently in place, to give some useful insights for Mediterranean countries.

5.1 Building institutions at the river basin scale

All the countries considered have known important administrative reforms in the past decades, all emphasising a tendency towards *regionalisation* against centralisation of public policies. In particular, in Italy at the beginning of the '70s the 21 regions have been created. In Spain and Portugal, at the end of the respective dictatorships there has been a shift from a centralised state to regional autonomy. In Greece the merger between communities became compulsory in 1997, in order to form large municipalities.

With respect to water basin management, responsibilities are split among the State, the Regions and the Water Basin Authorities depending on the characteristics of the River Basin. Generally speaking, one can observe a mismatch between the administrative (regional or national) boundaries and the river basin boundaries (see above). In particular, The Duero river is classified as an International river basin, due to its flowing in Spain and Portugal. Moreover, in Spain and Portugal the State has the last word regarding water basin planning. In the two cases, in fact, river basin management plans have to be consistent with the guidelines set up at national level. For instance, in Spain, the State has exclusive competence for legislation and concession of water resources for the basins covering more Autonomous Communities, on the basis of the fact that the *national interest* is predominant over the regional autonomy. In Portugal, main river basin planning is carried out by the five Regional Directorates of the Ministry of Environment. In Italy, water Basin Authorities have a coordination role among different administrative bodies for the river basin considered of national importance. Otherwise river basin planning is a regions' responsibility.

In all the cases considered, river Basin institutions are already in place but there are institutional mechanisms that make possible for other government layers to intervene with river basin planning. In particular, in the Iberian Peninsula the variability of water availability together with spatial mismatches between supply and demand of water made the planning at the river basin scale not adequate to tackle the governance issues, namely the water scarcity. This hydrological pattern boosts inter-basin transfers and entails several conflicts among basins. In Spain hydraulic works have developed over the last 100 years in order to transfer water for long distances ("*hydraulic paradigm*").

This example emphasises how water governance is influenced by the shift from centralisation towards subsidiarity (with regional governments gaining even more voice on water issues). Considering the Spanish case, the 1993 Spanish National Water Plan (see Box 2) included more than 100 new reservoirs and increase of water transfers among basins. In this case, the State based its action on two guiding principle, namely:

- the *solidarity principle*, which states that those basins having more water (i.e. "surplus water") must share it with those in need;
- the *cohesion principle*: those basins receiving the water have to compensate for the economic, social and environmental impacts caused by the transfers.

Against this position, the National Water Council considers inter-basin transfers as the last resort. Moreover, Regions are gaining political power and are against inter-basin transfer, for cultural and political reasons: they deemed that water resources should boost local development and not be transferred to richer Regions. In fact, water transfers were planned from stagnant regions to wealthy ones.

Here the crucial problem is to guarantee that Basin Authorities have effective power to deal with water management. The critical issues with regards to current water management practices are determined by the legal status of basin organisations and their relationships with other government layers, i.e. the hierarchical place of decisions taken at basin level. In particular, effective power is guaranteed by the fact that their decision are binding with respect to policy takers. Moreover, Finally, they must be put in a position to actively influenced the policy process, e.g. by influencing the financial resources available for investment in water infrastructure.

Generally speaking, one of the main challenges of the next years will be to put in place a "true" public participation with representation of all interest parties and their active involvement. This outcome can be obtained in two manners: first, their consultation in water management policy definition; second, their contribution in water management implementation by giving them responsibilities over the process.

This evolution will entail a great change in the roles and functions of basin institutions, which will become water policy enablers instead of planners. In other words, the shift from top-down to bottom-up policy definition will result in an increase of cooperative relationships between the river authorities and the other stakeholders instead of the tradition command-and-control approach.

Box 2: The National Hydrological Plan (NHP)

The NHP unleashed the greatest citizen mobilisation after the political transition to democracy. It implements the 1985 Spanish Water Law, which requires water planning to be defined at two levels: the river basin and the national one. The NHP was elaborated by the Ministry of Environment and includes a list of "investments" (i.e. the proposed water infrastructure and other works) and a series of annexes containing different supporting documents. It was adopted in 2001.

The main NHP purpose is the regulation of water resources by transfer from catchments. In particular, the Plan establishes the creation of a new water transfer of 1,050 cubic hectometres per year from the Ebro river to the following regions: Catalonia (190 hm^3), Comunidad Valenciana (315 hm^3), Murcia (450 hm^3) and Almería (95 hm^3). Except for the 190 hm^3 to be used for supplying fresh water to the urban area of Barcelona, the remaining transferred volumes are reserved for the agricultural areas that have "irrigation rights". From an economical point of view, the plan includes a major expenditure of 4,207 million Euro for the Ebro water transfer - to be executed in 8-10 years time - and other investments amounting to 8,869 million Euro for a number of hydraulic works (dam construction and improvement of irrigation infrastructures). Other sums are being reserved for desalination, water treatment and supply (5,420 million Euro), water quality control (1,260 million Euro), flood prevention and reforestation (3,294 million Euro). The Government foresees that one third of the global cost (23,050 million Euro) of the NHP will be paid by the European Union.

The Plan has been highly debated. Environmental associations, in particular, contest the environmental effects, namely biodiversity loss due to water transfer (especially for the deterioration of the unique ecosystem of the Ebro Delta) and claim that the project breaks several EU directives, namely the WFD and the Habitats and Birds Directives. They propose as viable policy alternatives full cost recovery, desalinisation, water saving via modernisation of irrigation systems, water re-use, intermediary markets or water banks, territorial and urban planning and the integrated management of surface and groundwater. The opposition to the project encompasses also numerous academics, scientists, unions and political parties. Some scholars (among others, Arrojo, 2003) claim that the project is not justified on economic grounds (since it shows a negative Net Present Value), it overstates consumption estimates and do no take into account current water management policies (such as the introduction of water banking). Even the Autonomous Communities of the basin donors (Catalonia and Aragón) oppose it.

They are mainly trying to block the funding from the European Union, which is supposed to cover 40% of the investments needed. Whilst initially (2003) the European Commission's Environment Directorate approved a big water transfer scheme under the Spanish NHP (Jucar-Vinalopó project), in the following year, the European Commission's Environment Directorate has recommended provisionally withholding €1.26bn funding requested by Spain for NHP implementation.

Source: http://www.rivernet.org/

Box 3: Agences de l'Eau and Basin Parliaments

The six Water Agencies (Agences de l'Eau, AdE) were created by the1964 Water Law as the executive arm of the "Water Parliaments" (Comités de Bassin, CdB) created by the same law. In the CdB the main water users and local institutions are represented (20% of seats is devoted to the States, 20% the Region of reference and the remaining 40% local users.

In fact, the AdE are technical bodies responsible for financing water policies. The financial resources are raised by a system of ear-marked taxes and levies that co-finance water investment of local authorities. The CdB decides on the level of levies and financial plans allocating collected funds to water projects and has also a role in the validation of Water Master Plans. In particular, there are two layers of basin planning:

– SDAGE: strategic and long-run vision, for the whole basin
– SAGE: management (sub-basin level)

The role of AdE in river basin management is crucial. In Fact, they represent an important fraction (15% on average) of total investment funds. This financial mechanism makes possible to undertaking investments while maintaining the cost of capital low

Finally, user are responsible for water planning implementation, since they are obliged to co-finance the interventions needed to achieve priorities set up by the agency

Box 4: Confederationes Hidrograficas

The nine Spanish river basin authorities (Confederationes Hidrograficas) were created in 1926 with the duty to carry out all water management functions at the basin level, i.e. planning and resource allocation (e.g. plan drafting, withdrawal concessions) and management (building and maintenance). They have a complex structure with different bodies responsible for decision-making, management, consultation and cooperation.

They were initially set up as an autonomous bodies, but they were progressively driven within the direct control of the state, although maintaining stakeholders' participation in the boards.

Like in the French case, there is a strong emphasis on representation of water users (at least 1/3 of members) and different layers of central and local government. Water users are represented in the managing bodies (especially important for technical allocation of water made available by big water works). More recently there has been an attempt to enlarge the participatory base by including NGOs and "non users"

Even though they were initially conceived as self-financing institutions; during time progressively dominated by state transfers (for big water works). In fact, levies and charge cover approx. only operational expenditure

To sum up, the decision making process could not develop only at the river basin scale, due to the existing institutional settings (different government layers) or to the fact that in arid and semi-arid countries the river basin cannot make possible to take into account water variability patterns and regional disparities.

Box 5: River Basin Management in Italy

As underlined in Italy Report above, River Basin Authorities (RBA) were introduced by the law n. 183/89, with the aim of creating authorities responsible for "basin planning" and coordination of different administration layers dealing with water.

River Basin Authorities were defined in different manner, according to the dimension of the river basin. In particular, rivers were classified into three types and the competent authorities were identified. This decision increased the institutional complexity

- Regional rivers: Regions are directly responsible as RBA
- Inter-regional rivers: Neighbouring Regions constitute the RBA
- Basins of national interest (6, eg Po, Tevere):
  - "Comitato istituzionale" (Institutional Committee): decision board, composed by Regional governors and 4 Ministries from the national government; can decide on a majority basis (but praxis is unanimity).
  - "Comitato tecnico" (Technical Committee): has function of discussion and validation of proposals
  - "Segreteria generale" (General Secretariat): provides the bulk of the work, often in collaboration with Regional and Ministerial officers and executives

Another weakness of the system is the fact that River Basin Authorities have no administrative nor enforcement powers and they merely allocate money budgeted by the different competent administrations. As a result they are forced to try to cooperate with other administrative layers.

They were originally intended as responsible for planning (intended with a top-down approach), but during time this role has been performed mostly through directives, specific prescriptions, sector plans and soft regulation (e.g. information).

Some RBAs foresee consultation and participatory procedures, but only on a voluntary basis. In these months a proposal has been carried out, aiming at changing this structure with the creation of "River districts" and clarifying the planning activity hierarchy (with the river basin plan intended as strategic and regional plans devoted to management functions).

5.2 From "water scarcity" to "demand management"

In the last decade, the awareness that water scarcity is socially built and as such has not to be tackled only with infrastructural solutions increases.

In the past, in Mediterranean countries water scarcity has been overcome through infrastructure development. Water was considered as an essential element for development purposes, so it was crucial for national planners that "cheap water was available for all". Given this strategic aim, the State covered the infrastructure development costs. This supply side approach was present even in recent times: water is considered as a resource that has to be guaranteed to final users. Planning documents (e.g. the 1993 Spanish National Plan) consider water scarcity as an exogenous fact and public policies should put in place consequently. In particular, demand forecasts do not consider changes in production patterns (e.g. impacts of the PAC reform on the irrigated land). Moreover, it seems that demand management possibilities (water saving and reuse) have been neglected until recently.

The debate around the Spanish National Plan (see above) has highlighted, on the contrary, that water scarcity cannot be considered as something given, but is created by economic and social behaviour patterns. In particular, the definition of "surplus" and "deficit" water was highly debated, since it seemed that deficit situations were entailed by extravagant demand (mostly irrigation) instead of real shortages. On the other hand, surplus regions argue that water availability was present because of the lack of industrial development. In both cases,

environmental concerns entered the political debate only in late ’90s and became a strong argument against water transfers (see the Rhones case).

This case exemplifies the need for economic valuation in defining water policies. The WFD approach emphasize that economic analysis aims at understanding the value of water for society, by underlining the consequences (i.e. economic and social impacts) of the measures to be taken to attain the good ecological status. It is evident that the introduction of economic analysis cannot be consider simply a technical issue, like administrative requirements, but entails a great change in developing water policies towards strategic planning and the definition of prevention measures. This could become a significant breakthrough with respect to the “emergency management” that characterizes water management in the last decades. In particular, by assessing cost and benefits of water policies and distributional impacts among users the economic analysis provides useful information that can be used in the planning process in two ways:

- On the one side, assuming the policy definition process to be deliberative, it allows all the stakeholders to have the relevant information to be used in the negotiations;
- On the other side, it can be used by planning authorities to understand to what extent water shortages depend on wrong management practices or institutional settings.

With respect to the second point institutional arrangements can be seen as alternative demand management solutions. Shortages can be solved by introducing innovative management practices like agreements between agriculture and urban water management; reuse of treated effluents; temporary tradability of water rights for meeting peak demand and managing emergencies. Again, the cost of service provision can be lowered by new practices like the joint operation of water services for urban areas and industry.

Box 6: Water transfer between Rhone river and Barcelona

The water transfer between the Rhone river and Barcelona was proposed to solve the water scarcity problem in the Barcelona metropolitan area. It has been promoted by the French Company BRL (Société mixte d'aménagement du Bas-Rhône et du Languedoc), which owns the withdrawal rights in the river Rhone. The works consist of the construction of a pipe 330 km long, which makes possible to transfer 15 m³/sec (see Figure 5) .

Notwithstanding the technical feasibility, the project has been questioned for several reasons: on the one hand, the forecasted urban population increase is deemed excessive. On the other hand, leakages are estimated in 25%: as a consequence, there is room for water services management improvement. Eventually, even the urban development model was debated, since there were a clear perception that water needs were not linked with primary use but with dissipative ones (like golf grounds).

As a result, alternative measures were taken into account, namely the increase in water storage capacity and the water transfer from a closer river, the Cardener. This second option has the advantages of being less costly and more flexible (since water transfers would be put in place only in case of scarcity situations).

The discussion around this contested project emphasise the potential of institutional innovations instead of mere engineering intervention logic.

Source: http://www.rivernet.org/rhonebarcelone/welcome_f.htm#donnees

Figure 5: The Rhone-Barcelone water transfer
Source: http://www.rivernet.org/rhonebarcelone/welcome_f.htm#donnees

In conclusion, water scarcity is frequently socially created, and, as such, new styles of interventions are needed, beyond the supply side management approach which characterises the past decades. The role of demand management policies can be fully understood by considering the impracticability of supply side alternatives, due to shortage of financial resources.

5.3 Use of economic instruments

In the Mediterranean Countries the use of economic instruments has been conditioned by the supply side approach described above. In particular, since until recently water was considered as a resource that should be guaranteed at cheap price for social and economic reasons, water tariffs were insufficient to cover the provision costs. As a consequence, FCR was not applied.

Mechanisms of cost sharing are present. The first one can be identified in the cross-subsidiation among tax-payers and water users. In the past, a high involvement of the State, through financing of the main infrastructure, can be registered. Heavy subsidies were available for large water transfers and irrigation infrastructure. The second one is the Cross-subsidisation among uses. In these countries it is not infrequent that different uses share the same infrastructure (e.g. reservoirs for agricultural and household uses). In all such situations, the uses that contribute more to the recovery of cost provision implicitly subsidised the other uses. In particular, in several cases the potable uses pays more than agricultural ones.

Figure 6 sketches the financial flows incurring at different stages of water management. These financial flows are captured by a variety of forms of economic instruments, from water tariffs to subsidies. Other kind of economic instruments such as the water abstraction charges or the wastewater charges are present, even if they are not set at a level which makes possible to take into account the environmental external costs entailed in the different uses.

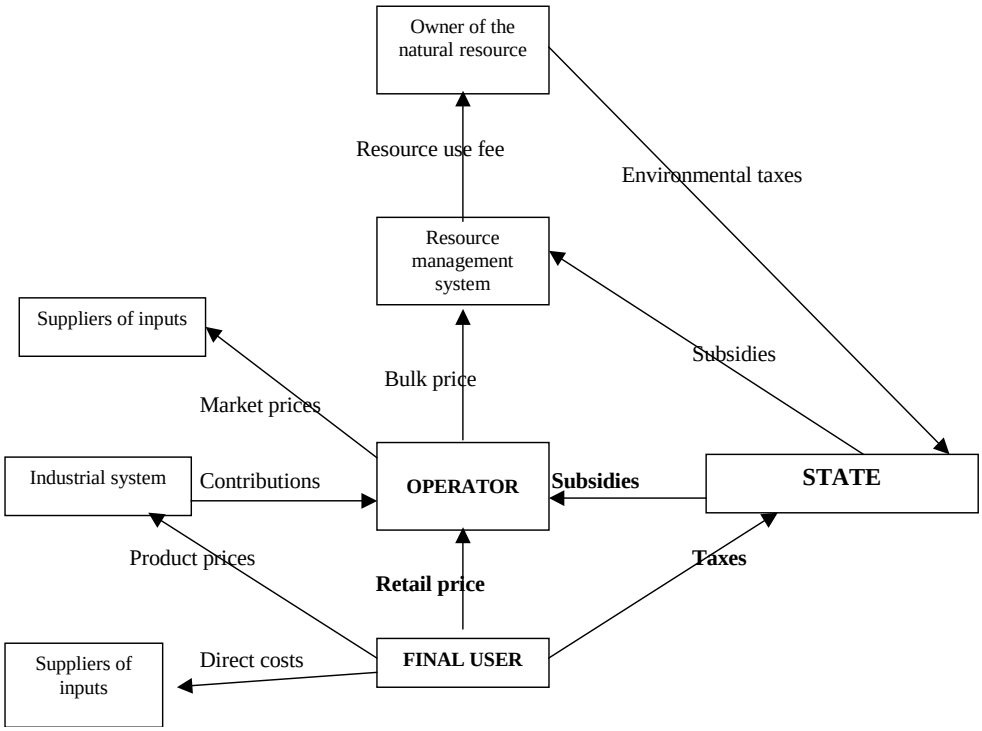

Figure 6: Financial flows in water sector

Full cost recovery principle, in theory, is always guaranteed: total costs could be covered by a continuum of instruments whose extremes are, on the one side, tariffs and on the others general taxation (see Table 23). In the former case the user will bear the burden of financing the service provision (together with environmental costs). At the opposite, these costs are split among all the taxpayers. From an economic point of view, the full cost is guaranteed. What is different is the distribution of these costs.

Sources of financing present different levels of endogeneity (i.e. the fact that costs are covered from revenues raised within the water users). Table 23 highlights that different sets of solution exist. Generally speaking, the theoretical optimum calls for State financing (or in generally general taxation) for public-goods components and marginal cost pricing for private-good components. Moreover, external costs should be internalised.

The choice among endogenous vs. exogenous source of finance is determined by some constraints. First, the fact that public finance is scarcer and scarcer. Central and regional governments have limited possibilities to increase public expenditure on public services like water and wastewater services. Moreover, there are transaction costs associated with the shift to financing only with tariffs. Here the problem is that metering is costly and, if this system have to put in place from scratch (like in the UK case), total costs increases. Second, it could be impossible to rely only on financing through tariffs for the distributional impacts. For certain uses, the increase in tariffs subsequent to the decrease in public finance availability could make water services unaffordable. There are several solutions: one could be to introduce cross subsidies among users; another option consists in water demand management policies, in order to decrease water consumption and, consequently, water bills.

Table 23: Sources of WSS financing

ENDOGENOUS ↕ **EXOGENOUS**	**From water users** – On individual base (marginal cost) – Compensating among customers according to the charging criteria adopted – On a collective base (territorial cross-subsidies) – Through ear-marked taxes **Cross-subsidies** – From the collectivity – Cross-subsidies among services operated by the same authority; – Cross-subsidies among users of the same water resource **General taxation:** – Direct subsidies (grants for new investment; coverage of operational deficits) – Indirect subsidies (e.g. low-interest loans; under-pricing of commodities and services supplied by the public sector) **Transferred elsewhere as an external cost:** – To other water users (inter-generational externalities: e.g. pollution of a river used for bathing / fishing) – To following generations (inter-generational externalities: e.g. bad maintenance of assets, public debt for covering operational expenditure, permanent contamination of a water table)

With this premise, it is clear that FCR is not the main issue in the application of economic instruments. The problem here is to define what can be considered "full" cost.

With regard to cost of provision, it seems that accounting for capital costs impacts on the tariff level. The WATECO (2002) guidance document highlights that different accounting methods exist, from traditional public accounting conventions based on cash expenditure (which do not depreciate investment) with recording practices based on historical cost, (revaluated) historical cost or reconstruction value. The cost of capital is also influenced from the rate of return guaranteed to investors, which in turn depends on the role (and risk) carried by private investors. Finally, there is the problem of evaluating scarcity costs and external costs, from which there is not an agreed standard methodology on how to define external costs.

In fact, once all these aspects are fixed, there is not guaranteed that current costs are coincident with efficient costs.

Price level is rising everywhere to cover investments needed for EU requirements. This trend can be explained by the substitution of public finance with tariff revenues.

European experiences of full-cost recovery show different tariffs structures:

- Individual full cost with flat prices applied in very large territorial units (UK)
- Individual full cost with average cost pricing and ear-marked taxes system for helping start-up investment (France)
- Individual full cost with average cost pricing, inter service cross-subsidies and local finance (Germany and Italy)
- Public money for large bulk transfer schemes, cost recovery for distribution (Spain, Italy, Portugal and Greece)

A part from the tariff structure, in all cases quoted above, serious doubts exist on the capacity of charges to recover the "true" cost of capital. That means that in the long run there is the risk that massive financing should be found to sustain the infrastructure system. For instance, historically, in UK when the Government decided to fully divest on water service, WSS debt was cancelled out and it was established that water companies were responsible for new investment only. In France the Agences de l'Eau provide a "compulsory saving bank" lending money at no interest, which decrease the risk dread above. Finally, in Germany capital costs are valuated at reinstatement value. As a consequence, infrastructure never loses value during time provided cash flow is reinvested in water sector.

Box 7: The Welsh debt-financed asset management company

In May 2001 Glas Cymru, a new company, was created with the purpose of purchasing the asset of Dwr Cymru (Welsh Water). Glas activities were restricted to water asset ownership. This company had no share capital and was owned and controlled by its members. This is completely debt financed, through investment bonds. Glas was initially managed by the same team that had run the Welsh Water as a part of the Hyder Group, prior to restructuring. The Board of Glas was independent, with all the non-executive directors having no present or past interest in the Hyder Plc. The members of the Glas Cymru do not receive dividends and have no financial interests in the company. All financial surpluses were to be used for the benefits of Welsh water, its customers and the environment. Customers would not own Welsh Water nor would be required to meet liabilities. The management risk was minimise by prohibition of diversification in other activities.

The day-to-day business was to be contracted out in two parts (Thomas, 2001): one comprising O&M and the other covering customer services (e.g. customer contracts, billing operations and revenue collecting activities). Both contracts were assigned through a competitive bidding on a four year basis.

The company governance structure is formed by a boards of directors which as an identical composition of that of the Welsh Water, this to minimise the conflict of interests between the two bodies. The board set the policy and targets for the executive management and is accountable for performance. Glas is controlled by its members, who behave as shareholders (even if they do not receive dividends and have not financial interests in the company). The appointments of the members are made by the board on the basis of the nomination of and independent panel. Members control the running of the company, monitor the performance, decide the salaries and approve the conduct of the board. They have the power to dismiss and select directors if they fail to reach the targets. Members' appointment reflects a broad array of stakeholders.

Source: Massarutto and Paccagnan (2006)

Generally speaking, the main problems are twofold: on the one side, to ensure that money is obtained from the market but at the cheapest cost. To this extent, the experience of the Agences de l'Eau described above can be considered as a best practice. Another alternative could be to separate asset management and service management, and assign the former to either local asset ownership companies, which can devote water tariff to infrastructure maintenance and have access to financing at low rate (like in Northern Italy), or new created debt-financed companies, like in the Welsh case. This solution makes possible is to finance WSS completely through debt, instead of equity, thus lowering the cost of capital (see Box 7).

From a social point of view, the claim that WSS should be financed through tariffs raise the problem of protecting poor families and ensuring affordability and accessibility of WSS. To this extent, several solutions exist: one can modify the water bill structure (fixed vs. variable), avoid disconnections while maintaining the right to claim the bill (e.g. from the LA).

Apart from price signals, other institutional devices have been put in place to manage water efficiently. Water markets have been introduced in Spain. This experience is summarised in Box 8 below.

Box 8: Spanish "water banking"

Water markets are not a novelty in WSS management in Spain. Trade between rural communities and cities can be found from the beginning of the XX century.

In the case of Camp de Tarragona is a good example of how this institutional device could enhance with existing management practice. In this example, in 1904 the concession for water use was granted by regional water authorities for the Siuriana-Riudecanyes system, under the condition that two-thirds of the total water would be utilised for irrigation and one-third for urban supply. The part for agricultural uses was allocated through 3,750 titles.

In 1911 an Association of water users (small landowners and urban middle-class) has been set up to bring private capital to the construction of large public works (i.e. dam and canals). Water titles have always been tradable among members of the Association, i.e. municipalities and farmers. The additional water availability created by this infrastructure was recognised through the issue of new water rights (corresponding to 6,250 additional titles). As a result, a transfer of "extra" water developed between agricultural and urban uses. In particular, urban uses pay to landowners (i.e. the water right holder) a negotiated price. The fact that water companies negotiated for the urban users and the association negotiates for the farmers made decreases considerably the transaction costs.

In practice, a lively water market developed in the region since the beginning of the century, with permanent and temporal water rights transfers among farmers and urban user (through the intermediation of municipal water supply companies). The market has proved to be effective in allocating water in a context of changing urban water demand and irrigated land. The activity of the market seems to be conditioned on the economic situation: in years with stagnant situation, there was an increase of lease (temporary) transactions, whilst in years characterised by the expansion of agricultural activities long-term transfers were predominant.

The administration of the system has evolved over time. Initially, trading was made possible through informal transactions. In 1982, an official exchange administered by the Association was set up with the purpose to improve the operation of the market.

This system persists in a legislative vacuum. In fact, until 1999 there was not a piece of legislation addressing temporary water transfers.

Source: Mariño and Kemper (1999)

To sum up, water demand management through tariff or other economic instrument is frequently limited by the facts that water prices do not reflect the full cost of WSS provision. In any case, the effectiveness of such instruments should be evaluated case by case, since technological solutions appear more promising in several cases. The sustainability of water tariffs is another factor to analyse, once private sector is involved in financing.

5.4 Private sector involvement

Private sector involvement can be introduced at different stages of WSS management. This choice has important implications regarding WSS organisation and regulation. Regarding management of WSS, the O&M of water systems together with asset management can be delegated to public or private operators through competitive bidding. Since water and wastewater services are natural monopolies, tariff regulation has to be introduced. Several forms exist, ranging from incentive regulation to benchmarking. Private sector involvement can also be guaranteed in the provision of inputs to water industry. It can be the case that WSS operators cannot produce by themselves all the services and products they need. As a result, they could

outsource part of their activities. In case of public entities, the respect of procurement rules must be guaranteed.

All the arid and semi-arid regions considered are characterised by segmentation between bulk and retail water supply: public bodies are responsible for bulk distribution, either by financing the construction or by managing it directly, whilst Municipalities (or group of municipalities) are in charge for the retail distributions.

For what concerns bulk activities, financing has been assured first by transfer from the central budget and later on by the EU, (through the EU Cohesion Funds). Even management activities are responsibility of public bodies, namely the *Confederationes Hidrográficas* in Spain and the multi-municipal enterprises (AdP subsidiaries) in Portugal.

Regarding retail activities, delegation to the private sector is one of the available options, together with in-house provision and private companies with the majority stake in public hand. Sewerage and sanitation have been heavily subsidized through the EU Cohesion Funds. Nevertheless, given the insufficient service coverage, massive investment are needed for sewerage and sanitation development but availability of European Funds.

Here the main problem regards the capacity of: being attractive for professional water operators and market investors. To this extent, in cases where tariffs finance the full cost of the service, like in the British case, it is crucial that economic regulation is committed to guarantee both consumers' welfare and viability of business. For instance, these two principles are clearly followed by OFWAT. In this case, all the economic risk is borne by private operators.

There exist however systems where some forms of risk sharing exist and public bodies continue to be responsible (partially) for asset financing. Another possibility could be to decrease the cost of infrastructure maintenance by managing in an integrated way local infrastructure, like in Germany and Italy.

To sum up, different solution for private sector involvement exists: their choice should be induced by social acceptability and the analysis of different organisational models have on water tariffs.

References

Arriaza, Manuel, Gomez-Limon, José Antonio and Upton, Martin, (2002) "Local Water Markets for Irrigation in Southern Spain: A Multicriteria Approach". *The Australian Journal of Agricultural and Resource Economics*, Vol. 46, No. 1, pp. 21-43. Available at SSRN: http://ssrn.com/abstract=312059

Bakker K. (2002), "From State to Market? Water *Mercatilización* in Spain", *Environment and Planning A*. Vol. 34: 767-790.

Breuil L., Canneva G., and Garcia S., 2003, "Charter 7. Country Report Portugal" in Available at www.mir.epfl.ch/euromarket.

Central Water Agency (2006), "Report on the pressures and qualitative characteristics of water bodies in the water districts of Greece and a methodological approach for further analysis", June 2006.

Comitato di Vigilanza sull'Uso delle Risorse Idriche (COVIRI), 2006, *Relazione annuale al Parlamento sullo stato dei servizi idrici. Anno 2005*. Roma.

EC (2004), Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions. Implementation of Council Directive 91/271/EEC of 21 May 1991. Brussels, 23.4.2004. COM(2004) 248 final.

Environment Council (2006): *European Action on Water Scarcity & Droughts*. First Analysis of Water Scarcity and Drought Issues. Information Note, 27 June 2006.

European Water Association (2005), *EWA Yearbook 2005*. Available at http://www.ewaonline.de/downloads/Yearbook_2005.pdf

Mariño, M. Kemper M. E. (1999), "Institutional Frameworks in Successful Water Markets. Brazil, Spain and Colorado, USA", *World Bank Technical Paper no. 427*. Washington, D.C.

del Moral L., Saurì D. (1999), "Changin corse: water policy in Spain", *Environment*. July-August.

Kallis and Coccossis, 2003, Managing Water for Athens: From Hydraulic to the Rational Growth Paradigm. European Planning Studies, vol. II n. 3: 245-261.

Nunes Correia F., Beja neves E., Alzira Santos M. and Evaristo da Silva J., 1998, "Portugal", in Nunes Correia F. (ed.), *Institutions for Water Resource Management in Europe*. Balkema.

OECD (2006), Infrastructure to 2030: Telecom, Land Transport, Water and Electricity. Paris. Available at: http://europa.eu.int/comm/environment/water/water-framework/implementation.html.

OECD (2004), *Environmental Performance Reviews. Spain*. Organisation for Economic Co-operation and Development, Paris.

OECD (2003), *Environmental Performance Reviews. Water.* Organisation for Economic Co-operation and Development, Paris.

OECD (2002), *Environmental Performance Reviews. Italy*. Organisation for Economic Co-operation and Development, Paris.

OECD (2001), *Environmental Performance Reviews. Portugal*. Organisation for Economic Co-operation and Development, Paris.

OECD (2000), *Environmental Performance Reviews. Greece*. Organisation for Economic Co-operation and Development, Paris.

OECD (1999), *Economic Instruments for Pollution Control and Natural Resource Management in OECD Countries: A Survey*. ENV/EPOC/GEEEI(98)35/REV1/FINAL. Available at www.oecd.org

Sáenz de Miera, G. (2000), "El sistema tarifario como elemento de gestión de los servicios urbanos del agua". Paper presented at the CENEAM Conference, Valsaín (Segovia), 17-19 April 2000. Available at: http://hispagua.cedex.es/documentacion/documentos/gestionecosis.html#1

Saurì D., del Moral L. (2001) "Recent development in Spanish water policy. Alternatives and conflicts at the end of hydraulic age", *Geoforum*. 32: 351-362.

Tsagarakis K.P., Mara D.D., Horan N.J., Angelakis A.N. (2001), "Institutional Status and structure of wastewater quality management in Greece", *Water Policy*, 3: 81-89.

Web sites

http://servicios.lasprovincias.es/comun/phn/phn/libroblanco.pdf: Libro Blanco de l'Agua

http://hispagua.cedex.es

EU – Funded projects

Advisor - http://ecoman.dcea.fct.unl.pt/projects/advisor/

Aquadapt - http://www.aquadapt.net/

Aqualibrium - http://www.aqualibrium.de/en/main.htm

Euromarket - http://www2.epfl.ch/mir/page18246.html

Euwareness - http://www.euwareness.nl/

Firma - http://firma.cfpm.org/

HarmoniCOP - http://www.harmonicop.info/index.php

Intermediaries - http://www.irs-net.de/intermediaries/

MantraEast - http://www.mantraeast.org/

Merit - http://merit-eu.net/

Mulino - http://siti.feem.it/mulino/

Prinwass - http://users.ox.ac.uk/~prinwass/index.shtml

RiverDialogue - http://www.riverdialogue.org/

Slim - http://slim.open.ac.uk/page.cfm

WaterStrategyMan - http://environ.chemeng.ntua.gr/wsm/

MEDIS - http://www.uni-muenster.de/Umweltforschung/medis/

AquaStress - http://environ.chemeng.ntua.gr/aquastress/

Harmoni-ca- http://www.harmoni-ca.info/index.php