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River basin management plan for the Spanish part of the Duero basin district

SUMMARY

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River basin management plan for the Spanish part of the Douro basin district: Summary

1. Introduction

This summary is intended to provide a brief document giving an overview of the ample documentation forming the proposed draft River Basin Management Plan, for public consultation, for the Spanish part of the Douro river basin district, consisting of a Brief plus fourteen annexes extending or developing its content with the following titles: 1) Artificial and heavily modified water bodies, 2) Inventory of water resources, 3) Protected areas, 4) Environmental flows, 5) Water demand, 6) Allocation and reservation of resources, 7) Inventory of pressures, 8) Environmental objectives, 9) Cost recovery, 10) Public participation, 11) Information system manual, 12) Programme of measures, 13) Update of the special drought plan and 14) Atlas of maps. The Plan also includes a regulatory document, attached with its draft adopting provision, and an Environmental Sustainability Report resulting from the strategic environmental assessment process to which the new Douro River Basin Management Plan (hereinafter DRBMP) is subject. Moreover the information used is stored in the Mírame alphanumeric and spatial information system, administered by the Douro River Basin Authority.

All the aforesaid documents, along with the Mírame information system, are accessible through the Douro River Basin Authority's web portal, where their contents may be viewed and the relevant files downloaded.

This new DRBMP, intended to replace the current River Basin Management Plan for the Douro basin adopted in 1998, is the key instrument in implementing the Water Framework Directive in the basin. Its preparation is a function expressly assigned to the Douro River Basin Authority, and its adoption by royal decree rests with the Spanish government.

Its general aims may be grouped into three sets:

- Preventing further deterioration of water in the basin and restoring it to good status, i.e. to a state not significantly different from its natural condition.
- Meeting water needs in the Douro basin so as to allow the socioeconomic uses required by society for efficient and effective development.
- Mitigating the undesired effects of floods and droughts.

Accordingly the hydrological planning process is conceived as a strategy involving a six-year cycle of continual improvement: planning, carrying plans out, checking the results and, finally, reviewing plans with a view to a new cycle.

The whole process is subject to a large and complex regulatory framework including European Union provisions, international agreements, national or regional Spanish regulations and local provisions. In this context the six-year planning cycle is organized around four main lines of action (figure 1): the river basin management plan itself, the strategic environmental assessment which it has to undergo, the public consultation and participation that must accompany the whole process, and the programmes of measures to be implemented by the competent authorities so as to achieve the aims set in the Plan.

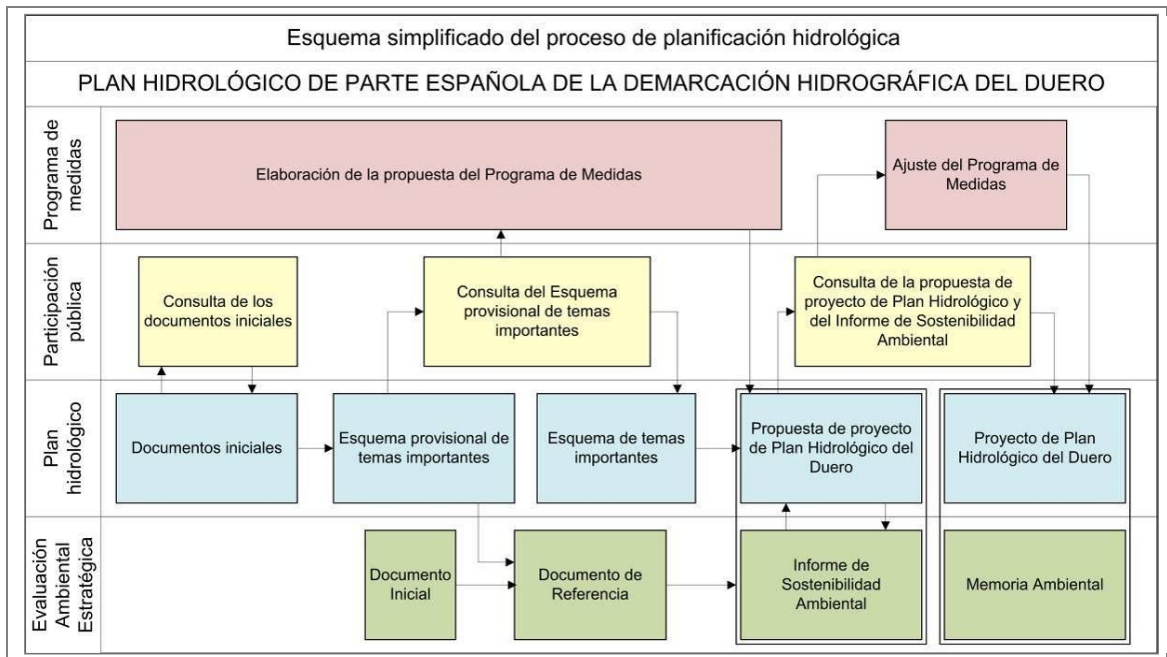


Figure 1. Simplified outline of the river basin planning process

Simplified outline of the river basin planning process					
RIVER BASIN MANAGEMENT PLAN FOR THE SPANISH PART OF THE DOURO BASIN DISTRICT					
Program me of measures	Preparation of the proposed programme of measures			Adjustment of the programme of measures	
Public participat ion	Consultation on initial documents	Consultation on the provisional outline of major issues		Consultation on the proposed draft Basin Management Plan and the Environmental Sustainability Report	
Basin Manage ment Plan	Initial documents	Provisional outline of significant issues	Outline of significant issues	Proposed draft Douro River Basin Management Plan	Draft Douro River Basin Management Plan
Strategic environm ental assessme nt		Initial document	Reference document	Environmental Sustainability Report	Environmental Brief

It should be kept in mind that all this work must provide the expected results, concretely and tangibly for the benefit of all. We must also be aware that Spain has to report on these results to the European Commission, which periodically examines compliance with formal requirements and the achievement of objectives, and may impose penalties if it finds evidence of non-compliance.

The content of river basin management plans is stipulated in the Spanish Water Act, which lists all the issues that must obligatorily be included. There is also a regulation and an instruction on hydrological planning detailing the scope with which the various aspects are to be addressed. The DRBMP Brief has a chapter on all obligatory items of content

stipulated in the Act, which are those set out in the following sections. This summary concludes with a reference to the Environmental Sustainability Report, drawn up in the framework of the strategic environmental assessment process to which the Basin Management Plan is subject.

2. General description of the river basin district

The Douro river basin is the largest river basin in the Iberian Peninsula, with an area of nearly 100,000 km². Administratively it is shared between Spain and Portugal, as indicated in table 1.

	Spanish part		Portuguese part		Total
	Units	%	Units	%	Units
Area (km ²)	78,859	80.4	19,214	19.6	98,073
Population (inhab)	2,210,541	52.9	1,966,483	47.1	4,177,024
Run-off (hm ³ /year)	13,500	62.8	8,000	37.2	21,500
Average rainfall (l/m ²)	618	37.5	1,030	62.5	1,648
Reservoirs (hm ³ /number)	7,874/67	87.9	1,080/39	12.1	8,954/106
Gross demand (hm ³ /year)	4,680	84.8	837	15.2	5,517
Irrigation (ha)	551,197	73.3	200,723	26.7	751,920
Average gross duty (m ³ /ha/year)	7,936		3,700		6,825
Cultivated land (ha)	4,172,681	85.1	729,923	14.9	4,902,604
Natura 2000 network area (ha)	1,723,412	73.9	609,852	26.1	2,333,264
Surface water bodies	710	65.0	383	35.0	1,093
Groundwater bodies	64	95.5	3	4.5	67

Table 1. Basic data on the Douro river basin district

The Spanish Basin Management Plan is in any event confined to the Spanish part of the district. In this part, 774 water bodies have been identified, characterized and assigned to various categories (table 2).

Original category	Natural	Artificial and modified, defined as:		Total number of water bodies
		River	Lake	
River	608	38	42	688
Lake	12		2	14
Artificial		3	5	8
Total surface bodies	620	41	49	710
Groundwater	64			64
Total				774

Table 2. Number of water bodies in each category defined in the Plan

In total 13,530 km of rivers have been defined as water bodies forming the significant network, from the more than 83,000 km of watercourses mapped at 1:25,000 scale. The 14 lakes defined as water bodies represent just a tiny portion of the nearly 2000 areas recorded as wetlands in the Spanish Douro basin.

Groundwater bodies cover the whole district. They are organized in two overlaid horizons: the upper one includes alluvial, foothills and moor areas, and the lower or general one includes the other aquifers identified in the basin.

The total natural resources have been assessed at some 13,000 hm³/year, consisting of scarcely mineralized water with a predominance of calcium bicarbonate facies. The recent assessment of resources shows figures appreciably lower than those provided with the 1998 Management Plan (table 3).

Sub-area name	Current Plan	Previous Plan	% reduction	% reduction
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	Average discharge (hm ³ /year)	Average rainfall (hm ³ /year)	Average discharge (hm ³ /year)	Average rainfall (hm ³ /year)	in discharge	in rainfall
Tera (both sub-areas)	1,769.8	3,943.7	2,121	4,577	16.6	13.8
Órbigo	1,436.4	3,619.0	1,224	3,710	-17.4	2.5
Esla - Valderaduey	2,724.0	6,559.3	3,231	6,883	15.7	4.7
Carrión	614.4	2,578.4	734	2,708	16.3	4.8
Pisuerga	903.6	4,083.3	1,003	4,365	9.9	6.5
Arlanza	844.4	3,471.7	926	3,682	8.8	5.7
Alto Duero	817.9	5,111.8	1,056	5,598	20.5	8.7
Riaza - Duratón	218.7	2,128.0	305	2,290	28.3	7.1
Cega – Eresma - Adaja	612.4	3,895.0	969	4,376	36.8	11.0
Bajo Duero	359.8	3,215.8	572	3,107	37.1	-3.5
Tormes	1,229.4	3,913.4	1,793	4,615	31.4	15.2
Águeda	857.1	3,712.4	1,234	4,960	30.5	25.2
DRBMP area	12,385.1	46,231.8	15,168	50,868	18.3	9.1

Table 3. Summary of the inventory of resources contained in the Plan

3. Description of uses, demands and pressures

The Spanish Douro basin, which covers 15% of Spain, has some 2,200,000 inhabitants (4.7% of the Spanish population), with a slightly downward trend in recent decades, and significant aging and movement of population to cities to the detriment of the rural environment.

The gross value added generated annually in the basin is of the order of 45 billion euros (4.6% of the Spanish total), with services, industry and construction (table 4) as the most notable sectors.

Sector of activity	Six-year growth rate (2001-2007)			Productivity	Make-up
	GVA (%)	Employment (%)	Productivity (%)	€/worker	% of GVA
Crop, livestock and fish farming	12.25	-5.58	18.89	30,127	6.69
Energy	26.27	-5.19	33.18	138,674	3.42
Industry	33.06	6.09	25.42	47,409	15.18
Construction	88.56	15.04	63.91	49,742	12.07
Services	55.25	17.93	31.64	51,157	62.64
TOTAL DOURO	49.64	12.24	33.32	49,162	100.00
TOTAL SPAIN	54.66	21.76	27.02	48,773	

Table 4. Economic trend indicators in the Plan's geographic area

The most quantitatively notable water uses in the basin are hydroelectric generation, especially taking advantage of the drop of altitude between the Castilian plain and the Portuguese lowlands, and irrigation. Water uses for livestock farming and certain industrial applications are also significant. Table 5 shows the gross demand calculated for the current situation.

Water use system	Main water consumption demand (current situation). Annual average values									
	Urban		Farming (*)		Industrial		Recreational		Total	
	hm ³	%	hm ³	%	hm ³	%	hm ³	%	hm ³	%
Tám-Man.	3,03	0,9	13,89	0,3	0,08	0,2	0	0,0	17,00	0,4
Tera	5,72	1,7	136,66	3,1	0,01	0,0	0	0,0	142,39	3,0

Water use system	Main water consumption demand (current situation). Annual average values									
	Urban		Farming (*)		Industrial		Recreational		Total	
	hm ³	%	hm ³	%	hm ³	%	hm ³	%	hm ³	%
Órbigo	21,87	6,6	643,36	14,6	1,92	4,2	0	0,0	667,15	13,9
Esla	32,97	9,9	909,51	20,6	11,38	24,6	0,85	10,7	954,71	19,9
Carrión	58,33	17,5	439,16	9,9	2,62	5,7	0,28	3,5	500,39	10,4
Pisuerga	10,34	3,1	329,11	7,5	11,33	24,5	1,31	16,5	352,09	7,3
Arlanza	34,06	10,2	75,10	1,7	0,21	0,5	1,6	20,2	110,97	2,3
A. Duero	22,23	6,7	206,37	4,7	2,68	5,8	0,82	10,4	232,1	4,8
Riaza-Dur.	38,00	11,4	241,69	5,5	3,96	8,6	0,18	2,3	283,83	5,9
Cega-E-Adaja	45,02	13,5	197,63	4,5	4,65	10,1	1,33	16,8	248,63	5,2
B. Duero	16,23	4,9	561,01	12,7	3,11	6,7	0,17	2,1	580,52	12,1
Tormes	38,88	11,7	619,61	14,0	3,36	7,3	1,39	17,6	663,24	13,8
Águeda	5,71	1,7	40,56	0,9	0,88	1,9	0	0,0	47,15	1,0
TOTAL	332	100,0	4.414	100,0	46	100,0	8	100,0	4.800	100,0

Table 5. Current gross demand (the total may not tally with the sum of parts due to truncation and rounding from three to two decimals)

Demand for irrigation, representing 90% of total demand for consumption, is the most notable item and may be the focus for the most significant improvement actions.

There is a wide range of irrigated crops in the Spanish Douro basin, for the basin is large and varied, but there is a clear predominance of cereals and industrial and pulse crops. Irrigated crop output, with gross unitary duties of some 8000 m³/ha/year, is normally distinctly higher than rain-fed output, with productivity 2.6 times greater. This causes farmers in the Douro basin to be interested in irrigating their land, which is done with a large inflow of public and private funds, especially in the case of irrigation with groundwater.

These water uses put pressure on the natural environment, with both point source pollution (for there are some 2500 discharge authorizations) and diffuse pollution. There is also considerable pressure from water abstractions, both from the river network and from aquifers, due in particular to the hydromorphological alterations that they entail. Some 3600 barriers have been documented with various degrees of permeability for the fish population, along with more than 1100 canalized sections and some 600 bank reinforcement actions.

The impacts arising from these pressures are generally very clear, as shown in the assessment of the current status of water bodies set out below.

4. Priorities for the use and allocation of resources

The DRBMP allocates the available resources to current and likely future water uses in the scenario established for 2015. Firstly this involves identifying the portion of the resource that cannot be used, as it comprises the environmental flows needed to main fish life and riverside vegetation. These environmental flows are set out in the Plan as continuous flow values for each of the twelve months of the year and each water body, and must be respected as long as the natural availability so allows.

Another restriction on water uses in the Spanish part of the basin is the flows that must reach Portugal pursuant to the Albufeira Hispano-Portuguese Agreement and the allocations previously established in the national Water Management Plan for aquifers shared between various basins.

For new allocations a demand scenario for 2015 is considered including a targeted improvement in overall water use efficiency which should be at least 60% in each unit of agricultural demand, and net water needs adjusted by area and crop, taking into account the projections provided by the EU for the next few years.

With all this, using simulation tools allowing us to link the various components of water use systems and a few key indicators of compliance with environmental objectives, a balance sheet of available resources and demand is drawn up, and the volumes and flows allocated to each unit of demand are calculated. The portion of allocations that has not yet been granted is reserved by the Douro River Basin Authority for the purpose specified for such allocations.

As a result of all this the new River Basin Management Plan allocates 4242 hm³/year, i.e. 400 hm³/year less than what was allocated by the 1998 Plan. Of this total volume, 80% goes to irrigation and the remaining 20% to urban and industrial water supply (table 6).

Water use system	Use	Units	Annual demand	Supplied 2015	Allocated 1998 Plan	Allocated new Plan
			hm ³ /year	hm ³ /year	hm ³ /year	hm ³ /year
Támega-Manzanas	Water supply	28.816	2,97	2,97		2,97
	Irrigation	2.545	11,10	11,10		11,10
	Others					
	Total		14,07	14,07	0	14,07
Tera	Water supply	46.390	5,31	5,31		5,31
	Irrigation	12.068	78,88	78,74	125	78,88
	Others		0,00	0,00		0,00
	Total		84,19	84,05	125	84,19
Órbigo	Water supply	130.349	14,33	14,33	16	14,33
	Irrigation	70.303	474,94	460,67	463	461,82
	Others		1,67	1,67		1,67
	Total		490,94	476,67	479	477,82
Esla	Water supply	229.839	25,35	25,35	20	25,35
	Irrigation	101.379	789,24	788,04	1,169	788,99
	Others		32,98	32,98	24	32,98
	Total		847,57	846,37	1,213	847,32
Carrión	Water supply	363.892	46,25	46,25	47	46,25
	Irrigation	55.358	345,32	338,24	326	345,32
	Others		146,60	146,60	10	146,60
	Total		538,17	531,09	383	538,17
Pisuerga	Water supply	60.418	6,92	6,92	8	6,92
	Irrigation	42.343	232,60	227,77	240	228,02
	Others		10,79	10,79		10,79
	Total		250,31	245,48	248	245,73
Arlanza	Water supply	226.867	27,30	27,30	31	27,30
	Irrigation	12.048	61,47	61,31	203	61,31
	Others					
	Total		88,77	88,61	234	88,61
Alto Duero	Water supply	88.280	11,15	11,15	5	11,15
	Irrigation	29.222	153,73	141,71	126	141,91
	Others		2,31	2,31	1	2,31
	Total		167,19	155,17	132	155,37
Riaza-Duratón	Water supply	244.187	30,55	30,55	43	30,55
	Irrigation	26.439	154,27	152,54	233	152,69
	Others		3,72	3,72	6	3,72
	Total		188,54	186,81	282	186,96
Cega-Eresma-Adaja	Water supply	306.659	36,24	36,24	19	36,24
	Irrigation	41.075	209,99	203,35	261	203,58
	Others		2,30	2,30	0	2,30
	Total		248,53	241,89	280	242,12
Bajo Duero	Water supply	144.733	16,42	16,42	10	16,42
	Irrigation	92.549	510,45	510,34	650	510,45
	Others		3,03	3,03	2	3,03
	Total		529,90	529,79	662	529,90
Tormes	Water supply	296.669	34,54	34,54	35	34,54
	Irrigation	51.109	311,61	297,30	317	297,30
	Others		9,56	9,56		9,56
	Total		355,71	341,40	352	341,40

Water use system	Use	Units	Annual demand	Supplied 2015	Allocated 1998 Plan	Allocated new Plan
			hm ³ /year	hm ³ /year	hm ³ /year	hm ³ /year
Águeda	Water supply	40.685	4,70	4,70	4	4,70
	Irrigation	6.876	35,95	34,71	94	34,89
	Others		0,87	0,87		0,87
	Total		41,52	40,28	98	40,46
Total	Water supply	2,207.784	262,03	262,03	238	262,03
	Irrigation	543.314	3.369,55	3.305,82	4207	3.316,26
	Others		213,83	213,83	43	213,83
	Total		3.845,41	3.781,68	4488,00	3.792,12

Table 6. Summary of allocations (the total may not tally with the sum of parts due to truncation and rounding from three decimals)

5. Identification and mapping of protected areas

In the Douro river basin there are various types of protected area, with various purposes and covered by a range of legislation. The DRBMP includes a summary of the “Register of protected areas” in the Spanish part of the Douro basin with the area types indicated in table 7.

Area type	No of areas	Size of length
Surface water abstractions for water supply	361	
Protected river sections for water supply	168	2.015 km
Protected reservoirs for water supply	37	254 km ²
Protected canal sections for water supply	3	222 km
Groundwater abstractions	4.459	
Groundwater abstraction safeguard areas	3.302	503 km ²
Future abstractions for water supply	10	
Protected areas due to new abstractions for water supply	7	79 km
Catalogued fish-farming areas	21	682 km
Areas for recreational use (bathing water)	26	
Vulnerable areas	10	2.330 km ²
Sensitive areas	36	292 km ²
Sites of Community interest (*)	78	12.037 km ²
Special protection areas for birds (*)	53	14.262 km ²
Protective perimeters for mineral and thermal waters	31	165 km ²
Natural river reserves	24	502 km
Special protection areas	45	1.405 km
Wetlands	393	84 km ²
(*) Only those in which water is a significant factor in their conservation.		

Table 7. Types of protected area within the DRBMP's geographic area

The DRBMP incorporates the particular objectives for the protection of these protected areas, established according to the purpose for which each area type is protected.

6. Programmes for the monitoring of water body status

With the aim of assessing the status of water bodies at any one time, ascertaining their evolution over time and, in particular, determining the effects of the implementation of programmes of measures included in the DRBMP, various status monitoring programmes have been established, which, though they were to be fully operational at the end of 2006, have been progressively adjusted and supplemented with the consolidation of the various indicators used, the monitoring rates and the class marks, allowing us to determine status according to the category and type of water body in question.

These programmes may be regarded as forming three overall groups, according to whether they concern surface water bodies, groundwater bodies or protected areas. According to their purpose, three types of programme may in turn be identified: surveillance, operational and investigative.

The main aim of surveillance programmes is to get a comprehensive overview of water body status. They allow future monitoring programmes to be designed effectively and long-term changes in water body status to be assessed – changes resulting from variations in natural conditions or from widespread anthropogenic activity.

The aim of operational monitoring is to determine the effects of operational actions resulting from the adoption of programmes of measures. Accordingly it is implemented on the water bodies that need it because they are in poor condition. So the purpose of operational monitoring programmes is to assess any changes resulting from the application of programmes of measures.

Finally, investigative programmes are established to ascertain the reasons for non-compliance with environmental objectives in situations and events where they are not sufficiently clear. In particular the Douro River Basin Authority has conducted a major investigative programme with the aim of directly assessing the status of nearly all surface water bodies, as reinforcement for the initial assessment made when formulating the DRBMP.

Table 8 shows the number of sampling stations or control points included in each programme type for surface water bodies.

	Rivers	Reservoirs	Lakes
Surveillance	107	43	14
Operational	249/FQ 457/H M	20	2
Investigative	230	1	2

Table 8. Number of control stations in each monitoring programme

In the case of groundwater bodies, a surveillance programme has also been established, currently with 306 stations, and an operational programme with 102 stations for monitoring chemical status. There is also a programme for monitoring qualitative status with 392 piezometers, and 149 pending installation.

Protected areas have various monitoring sub-programmes for determining the degree to which their specific protection objectives are met according to the type of protected area in question (see table 7).

The definition of each sub-programme relating to surface water bodies or of each programme relating to groundwater bodies involves identifying the control stations and the metrics calculated at them so as to assess indicators of biological, hydromorphological or physico-chemical quality elements, according to the type, category and nature of the water body to be studied; each quality element has, or should have, specific class marks allowing the final status to be identified. The DRBMP Brief contains all this information in detail.

7. Environmental objectives for water bodies

The general environmental objectives required by the Water Framework Directive are set out in article 92.bis of the consolidated text of the Water Act, and the periods for achieving them are specified in the Act's eleventh additional provision. Put simply, these objectives may be summarized as that before the end of 2015 all water bodies should have at least good status or equivalent. In certain exceptional situations, duly justified as provided in the

Water Framework Directive and in our legal system, the good status objective may be extended for two planning cycles and less strict objectives may even be set. Such postponement of objectives is not acceptable in protected areas.

Achieving the objectives depends on the nature of the problems in doing so, the characteristics of the environment on which action is to be taken and the degree to which the programme of measures can be implemented, with the basic aim of removing or reducing pressures.

In the Spanish part of the Douro basin the most significant water pollution problems are caused by urban wastewater discharges and diffuse pollution from farming sources. The former issue is to be addressed by strengthening the wastewater treatment system, and the latter by applying best practice codes in the most problematic areas. However, where the problem has clearly affected the groundwater there are physical limitations on the feasibility of correcting it in the required time, given the characteristics of the porous medium and the scale of the basin's aquifers.

Moreover there are other very significant problems linked to the severe hydromorphological deterioration of our river systems. This deterioration involves a manifest loss of habitat and the occupation of rivers by opportunist or invasive species, with a sharp loss of biodiversity. But the impossibility to date of using ecological status indicators such as fish population that are sensitive to these pressures means that the problem is partially concealed, for strictly hydromorphological indicators have little influence in status classification.

Keeping in mind the above, the objectives that could be achieved in 2015 and at future horizons under various pressure reduction hypotheses were simulated. The results obtained in the solution considered most realistic are shown in table 9.

WATER BODY	ENVIRONMENTAL OBJECTIVE				TOTAL
	GOOD STATUS / POTENTIAL 2015	EXTENSION 2021	EXTENSION 2027	LESS STRICT	
Natural rivers	241	5	298	64	608
Heavily modified rivers	9	0	27	2	38
Natural lakes	24	1	0	17	42
Heavily modified lakes	12	0	0	0	12
Artificial body similar to a lake	2	0	0	0	2
Artificial body similar to a river	3	0	0	0	3
Heavily modified rivers similar to lakes (reservoirs)	2	0	3	0	5
Groundwater bodies	47	0	3	14	64
TOTAL	340	6	331	97	774

Table 9. Summary of environmental objectives set out in the River Basin Management Plan

Thus, if the working hypotheses in the DRBMP are correct, in 2015 we will have good status in 707 water bodies, 91% of the total. Extensions to 2021 are made in 10 water bodies categorized as rivers and extensions to 2027 in 7 other water bodies. For 50 water bodies, i.e. for 6.5% of the bodies identified in the Spanish part of the Douro basin, it is not considered possible to achieve good status in 2027, and so less strict objectives are defined.

8. Compliance with environmental objectives

The DRBMP includes a determination of the status of water bodies in 2009, i.e. its theoretical starting year. This status assessment was made with data from the monitoring programmes put in place and, especially for this purpose, the investigative programme specified carried out for the initial assessment. The results obtained are shown in table 10.

Category	No of bodies	% of total
Natural rivers	122	20%
Heavily modified rivers (river)	1	2,6%
Heavily modified rivers (reservoir)	20	48,8%
Natural lakes	10	83,3%
Heavily modified lakes	2	100,0
Artificial body similar to a lake	2	40%
Artificial body similar to a river	2	67%
Total surface water bodies	159	22,3%
Groundwater bodies	48	75%
Total	207	26,7%

Table 10. Situation of current compliance with environmental objectives

Thus, according to the calculations made, in 2009 the environmental objectives are met in 59% of water bodies in the Douro basin. By water body type, we have 56.9% of surface water bodies and 82.8% of groundwater bodies meeting the objectives.

9. Recovery of the cost of water services

One of the DRBMP's requirements is the quantification of the level of recovery of costs invested by public authorities in the provision of water services, so as to determine the contribution by the various beneficiaries to the total amount. This contribution is a means for achieving an efficient use of the resource and adequate participation by users in the underlying cost of services, with the basic aim of protecting the environment and ultimately of contributing to social wellbeing. This approach is in line with the Water Framework Directive, which stipulates that Member States shall by 2010 ensure that water-pricing policies provide adequate incentives for users to use water resources efficiently, and an adequate contribution of the different water uses to the cost of the services that they require and use.

The annual total cost of water services in the Spanish part of the Douro basin was assessed at 937 million euros. The calculation was made on the basis of the budgets and cost estimates of the various public authorities, bodies, companies and individuals that contribute to providing the services, totalling 659 million/year, to which an annual 278 million euros is added as an estimate of non-internalized environmental costs in current expenditure.

The income from water services was put at an annual 355 million euros from end users in the form of water rates and the cost of self-services that users provide themselves, and naturally pay for.

From all this we get a cost recovery level of some 38% of total costs, a value that rises to 54% if non-internalized environmental costs are excluded.

Figure 2 shows the current level of cost recovery according to the calculations made to date, disaggregated by the various significant sectors in the basin.

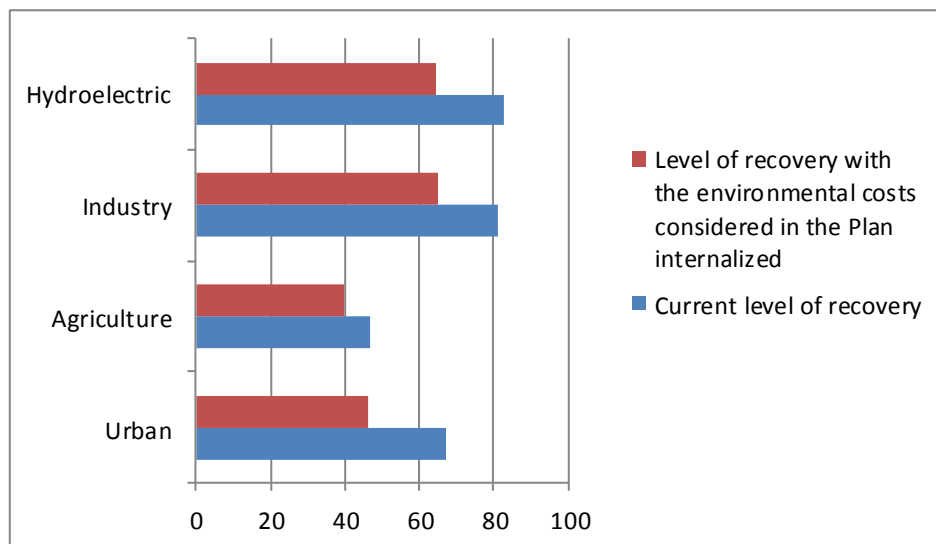


Figure 2. Level of cost recovery by sector

Recovery percentage

- Level of cost recovery with the environmental costs considered in the Plan internalized
- Current level of recovery

Urban, Farming, Industrial, Hydroelectric sectors

10. Related plans and programmes

There are many sectoral plans provided by various public authorities with concurrent competence over the territory of the Spanish part of the basin. Both the River Basin Management Plan and the accompanying Environmental Sustainability Report analyze the relationship between the various plans and programmes with the aim of establishing synergies in the actions programmed so as to help meet the DRBMP's objectives. The most notable plans or programmes linked to the DRBMP are the National Plan for Adaptation to Climate Change, the 2nd National Water Quality Plan: Sanitation and Treatment, the National River Restoration Strategy, the Zero Tolerance of Discharges Action Plan, the Spanish Strategic Plan for the Conservation and Rational Use of Wetlands, the National Strategic Rural Development Plan, the National Strategy for Sustainable Modernization of Irrigation (up to 2015), the Electricity and Gas Sector Plan (2008-2016) and the Alberca and Water Register Programme.

11. Dependent plans: droughts and floods

This section concerns dependent plans relating to the management of short-term drought and flood situations. In the former case there is a special plan for the Spanish part of the Douro basin adopted in March 2007; and in the latter case a flood risk assessment and management plan should be adopted by the end of 2015.

The aim of the Special Plan for Action in Alert and Possible Drought Situations in the Spanish part of the Douro river basin district is to minimize the environmental, economic and social impacts of possible drought situations. The Plan establishes a system of indicators allowing drought events in the sub-areas into which the basin has been divided to be assessed and the severity of droughts to be determined. According to the results shown by the indicators various types of tactical or emergency strategic measures are adopted. The proposed River Basin Management Plan includes a review of the original Special Plan, updating and improving the indicator system and updating the various

measurement types, with particular reference to the new definition of environmental flows and the allocations and water use rules adopted by the DRBMP. In particular there is an analysis of situations in which a temporary deterioration in the status of a water body affected by drought may be admissible.

The Flood Risk Assessment and Management Plan meets the requirements provided in Royal Decree 903/2010, of 9 July, transposing to the Spanish legal system Directive 2007/60/EC, envisaging action in three phases: 1) a preliminary flood risk assessment, to be completed by the end of 2011, 2) preparation of flood hazard maps and flood risk maps, to be completed by the end of 2013, and finally 3) preparation of flood risk management plans, to be completed by the end of 2015. Currently the Douro River Basin Authority is working on a demarcation of flood zones so as to meet the requirements of the first phase. The results are being progressively integrated into the National Flood Zone Mapping System, following preliminary consolidation in the Douro basin information system.

12. Programme of measures

As we have seen, in 2009 the environmental objectives were met by 59% of water bodies in the Spanish part of the Douro river basin district, and more than 91% of water bodies are expected to meet the environmental objectives set in the DRBMP by 2015. In order to move from one scenario to the other the general instruments and specific actions included in the various programmes of measures summarized in the DRBMP must be adopted and carried out by the various competent authorities.

General instruments are regulatory provisions adopted to guide water management towards the achievement of the objectives set. In particular they involve the actions concerning the utilization and protection of the public hydraulic domain adopted with the DRBMP and highlighted in the regulatory document accompanying the current draft royal decree adopting the Plan, as provided in article 81 of the Hydrological Planning Regulations specifying the Plan's formal structure. These instruments also include those intended to achieve the aim of properly meeting the water needs specified in a separate chapter, including the environmental flows established in the Plan, criteria on priority and compatibility of uses and allocation and reservation of resources, i.e. a regulatory chapter determining the distribution of available water.

The programmes of measures also include specific actions, i.e. the basic infrastructure required by the Plan to achieve the objectives set. These measures have been organized in ten groups: 1) sanitation and treatment, 2) water supply, 3.1) modernization of irrigation, 3.2) new irrigation, 4) hydraulic infrastructure, 5) flood management, 6) restoration of rivers and wetlands, 7) energy, 8) regulatory alternatives, 9) planning and control and 10) other measures. To organize and manage the measures a database has been created with 1300 specific actions, of which 1064 should be carried out in the 2010-2027 window.

The cost of the preliminary version of this programme of measures contained in the draft submitted for public discussion is some 2.7 billion euros over 2010-2015. The figure is slightly more than 5.1 billion euros for 2010-2027. A very significant part of this budget – more than 1 billion euros – is required for adapting the current treatment system to the requirements of Directive 91/271 concerning urban wastewater treatment. The next-largest budget item corresponds to the set of measures for irrigation projects, and in particular the acute need for modernization and completion of the new scheduled changes. By contrast with these big items, actions to restore rivers, with some 140 million euros, constitute one of the least costly measures.

A cost effectiveness analysis was made to prioritize these actions, using as an effectiveness indicator the number of water bodies whose status is improved as a result of the measures

or set of measures under consideration. Thus the measures showing most cost effectiveness are those in category 1) sanitation and treatment, and in category 6) restoration of rivers and wetlands.

13. Public participation

Along with this interest in achieving specific environmental objectives, the transparency and sweeping public consultation and participation mechanisms accompanying the process are the main novelties in this new period of hydrological planning overseen by the European Union.

In the sphere of public participation three levels of action are defined: 1) supply of information, 2) public consultation and 3) active involvement. Among the initial documents for the River Basin Management Plan prepared in March 2008, the Douro River Basin Authority drew up a Public Participation Project detailing the organization and procedure to be followed in putting public participation into practice in the planning process; this document is available on the Basin Authority's web portal.

Actions for the supply of information on the planning process, and in particular on the Basin Management Plan's contents and the underlying or supporting information used, have been channelled chiefly through the basin authority's web portal (www.chduero.es) and the Douro basin information system portal (www.mirame.chduero.es). Moreover the milestones in the process have been highlighted in the media with the highest ratings and circulation in the basin, various explanatory leaflets have been published and a range of public events organized with the aim of arousing interest in the greatest possible number of those who may be affected.

Consultation actions lead to a higher level of involvement than the mere supply of information, for a response is expected from those concerned in the form of representations or suggestions that allow the draft document to be improved. Consultations have been conducted on the initial documents and on the outline of major issues. Now a public consultation is being organized on the actual draft Basin Management Plan. These consultations extend over a period of no less than six months.

Finally, active involvement – a non-compulsory but recommended participation mechanism – involves the highest degree of participation. In this case we seek the direct involvement of stakeholders in the preparation of documents before submitting them for consultation.

Complementarily to all the above, with reference to the free involvement of stakeholders and of the public in general, certain collegiate bodies representing the various levels of government, users and the various economic and social agents, are required to take part. This involvement is to take the form of reports issued on the process and a prior endorsement of the draft DRBMP before the start of the final approval phase.

14. Monitoring and review of the River Basin Management Plan

The legislation provides for monitoring of the River Basin Management Plan with annual reporting on the results to the Douro Water Council. This monitoring should in particular cover developments in the status of water bodies, progress with the programme of measures, trends in resources and demand and the degree to which environmental flows are complied with.

Where the monitoring data show a significant deviation from the scenarios on which the DRBMP was based, the Water Council may resolve to conduct a review of the Plan, such as is in any event to be conducted in 2015 and every six years.

In order to guide the successive reviews towards a progressive improvement of the Plan, the Douro River Basin Authority has established a self-assessment model for evaluating the Plan and identifying aspects on which it would be most effective to focus improvement actions.

15. List of designated competent authorities

The competent authorities are all the public authorities with competence over the Spanish part of the Douro basin, at the three levels established by the Spanish Constitution: national government, regional government and local authorities. Consequently a full identification could include more than two thousand people.

To establish a favourable framework for cooperation between them, a Committee of Competent Authorities in the Spanish part of the Douro river basin district was set up on 18 December 2008. The Committee is presided over by the Chair of the Douro River Basin Authority and its members are six representatives of national government, seven from the autonomous regions corresponding to the Plan's geographic area and two representatives of local government.

16. Contact points and procedures for obtaining information

For any matters relating to obtaining information or submitting representations, comments or suggestions on the River Basin Management Plan for the Spanish part of the Douro basin, the contact point is the Douro River Basin Authority's Hydrological Planning Office; the email address oph@chduero.es may also be used along with the web portals of the basin authority (www.chduero.es) and of the Spanish Douro basin information system (www.mirame.chduero.es).

17. Environmental Sustainability Report

In accordance with the Hydrological Planning Regulations, the DRBMP must be subjected to the strategic environmental assessment procedure specified in Law 9/2006 on the assessment of the effects of certain plans and programmes on the environment.

Pursuant to this requirement the Douro River Basin Authority drew up a document initiating the environmental assessment procedure in July 2008. This document was responded to by the environmental authority (the Directorate General for Environmental Quality and Assessment at the Ministry of the Environment and Rural and Marine Affairs) with a reference document that sets the scope of the Environmental Sustainability Report accompanying the DRBMP and completes the list of stakeholders to be included in consultations.

This Environmental Sustainability Report analyzes possible alternative solutions for resolving the problems described in the Outline of Significant Issues, considering the environmental effects of each one. This discussion results in a combination of alternatives allowing the DRBMP's scenarios for action to be established. From this point the Plan's likely effects on the environment are analyzed, and such effects are mostly favourable, for the Plan seeks to achieve specific environmental objectives, though in some cases they are unfavourable albeit necessary in catering for socioeconomic interests. But overall the effects are clearly positive, and in the events where they are not, concrete measures are established to prevent and offset negative consequences. Also a specific monitoring programme is proposed for minimizing, limiting and controlling effects of this kind.

18. Conclusion

Pursuant to article 23 of the consolidated text of the Water Act the Douro River Basin Authority has prepared the proposed draft Plan in accordance with our legal system. The next phase is the public consultation prior to the start of the approval procedure, in which the basin authority invites the stakeholders and the public at large to submit representations or comments as they see fit. It is of particular interest for all parties to have the chance to express their views and criticisms, taking part in the preparation of a Plan intended to map out the Douro basin's future.

With the documentation received and the results of the debates held over the consultation period, the Douro River Basin Authority will draw up a discussion document on the contributions received to be included as an annex to the Plan, and those which are accepted will result in corrections and improvements in the current draft, once submitted to the collegiate bodies which have to endorse them before the Plan's final processing by the Ministry of the Environment and of Rural and Marine Affairs.

Following the public discussion, it is hoped that the DRBMP prepared will be unanimously accepted and supported by all parties. A forward-looking document for the management of the Douro basin over the coming years, effective in achieving the key aims of good status, socioeconomic development and social wellbeing