# The EU Water Framework Directive implementation in the Iberian context

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ABSTRACT

Transboundary Rivers are of main importance in Europe where they represent more than 60% of the territory. This is also the case for the Iberian Peninsula countries (Portugal and Spain), sharing five rivers: Minho, Lima, Douro, Tejo and Guadiana. These five river basins cover an area of 268 500 $km^2$ of which 21% belong to Portugal and represent 65% of the Portuguese territory.

Since the 18th Century, Portugal and Spain, have been celebrating several Treaties and Conventions, having in mind the establishment of common water management coordination. In 1998, the Convention on Co-operation for Portuguese-Spanish River Basins Protection and Sustainable Use, usually referenced as the Albufeira Convention, established the basis for a basin-based water management and a decision-making process on those basins, with principles that were confirmed to be in compliance with the Water Framework Directive (WFD) requirements, approved later in 2000.

In order to comply with WFD implementation schedule, both countries have been developing an intense internal activity, namely in terms of reforming their national institutional, legislative and administrative water frameworks, as well as coordination of efforts and actions concerning water resources management of the shared river basins, framing those on the existing bilateral agreements and bodies. The specific effects and changes that the WFD implementation originated in both countries, in internal and bilateral terms, and the foreseen approaches and actions for achieving it are presented, relating those to some important identified interrelated bilateral water issues, namely: the necessary institutional adequacy; the coordination of extreme hydrological situations (floods and droughts); the establishment of an ecological flow regime, having in mind environmental interdependence; and, also, the need to foster public participation and climate change effects in water management framework and policy.

## 1. Introduction

The Iberian Peninsula may be considered as an interesting example of the issues related with shared river basins. In fact, since the 18th Century, the two countries, Portugal and Spain, have been celebrating several Treaties and Conventions, having in mind the establishment of common water management coordination, although until about a decade ago mostly restricted to the bordering regions and river stretches. The Convention on Co-operation for Portuguese-Spanish River Basins Protection and Sustainable Use, approved in 1998 and usually referenced as the Albufeira Convention, finally defined the framework of bilateral co-operation for the sustainable management of all the five shared river basins: Minho, Lima, Douro, Tejo and Guadiana.

The Albufeira Convention was already framed taking into account the development process of the Water Framework Directive (WFD), approved in 2000, foreseeing a basin-based water management and decision-making process. Both Portugal and Spain have been developing a big effort to comply with the WFD implementation goals and calendar. That means not only internal institutional, legislative and administrative adequacy efforts but also, at the shared river basins' level, some joint cooperative and coordinated effort, namely (and basically) through the Albufeira Convention boards.

This work aims to provide an outlook and general interpretation of the WFD in order to frame the specific effects and changes that its implementation already originated in both countries. Moreover, a special emphasis will be given to the medium and long term influence of WFD at two levels: (i) the national level (with emphasis on Portugal); and (i) the Iberian level with bilateral approaches and necessary integration of diverse multi-sectoral and multi-disciplinary expertise.

## 2. Shared Portuguese-Spanish River Basins Context

### 2.1 Characteristics of the river basins

Transboundary Rivers are of main importance in Europe where they represent more than 60% of the territory of the EU (European Union). This is of main relevance for the Iberian Peninsula countries (Portugal and Spain) sharing five rivers (Figure 1): Minho (Miño), Lima (Limia), Douro (Duero), Tejo (Tajo) and Guadiana, this last the only retaining the same name in both Portuguese and Spanish languages. These five river basins cover an area of 268 500 km$^2$ of which 21% belong to Portugal and represent 65% of the Portuguese territory. Moreover, it should be pointed out that about 95% of this area is occupied by the Douro, Tejo and Guadiana river basins (Maia, 2006a).


Figure 1: Shared river basins in the Iberian Peninsula (www.cadc-albufeira.org)

Table 1 summarizes the area, total internal water resources (surface water, SW, and groundwater, GW), water use and storage capacity corresponding to those basins.

Table 1: Iberian Peninsula's shared river basins: main characteristics (based on INAG, 2001)

| | | Minho/Lima | % | Douro | % | Tejo | % | Guadiana | % |
|---|---|---|---|---|---|---|---|---|---|
| Area (km$^2$) | Spain | 17.530 | 90 | 79.000 | 81 | 55.800 | 69 | 55.300 | 83 |
| | Portugal | 2.030 | 10 | 18.600 | 19 | 24.800 | 31 | 11.500 | 17 |
| | Total | 19.560 | | 97.600 | | 80.600 | | 66.800 | |
| Total internal natural water resources ($10^3$xhm$^3$) (SW/GW) | Spain | 12.7/2.8 | 81/90 | 13.7/3.0 | 60/79 | 10.9/2.4 | 64/47 | 5.5/0.8 | 74/67 |
| | Portugal | 3.0/0.3 | 19/10 | 9.2/0.8 | 40/21 | 6.2/2.7 | 36/53 | 1.9/0.4 | 26/33 |
| | Total | 15.7/3.1 | | 22.9/3.8 | | 17.1/5.1 | | 7.4/1.2 | |
| Water Use ($10^3$xhm$^3$) | Spain | 0.6[(a)] | 70 | 3.9 | 70 | 4.4 | 61 | 2.7 | 87 |
| | Portugal | 0.2[(a)] | 30 | 1.7 | 30 | 2.8 | 39 | 0.4 | 13 |
| | Total | 0.8[(a)] | | 5.6 | | 7.2 | | 3.1 | |
| Storage capacity ($10^3$xhm$^3$) | Spain | 3.1 | 89 | 7.7 | 88 | 11.1 | 80 | 9.2 | 72 |
| | Portugal | 0.4 | 11 | 1.1 | 12 | 2.8 | 20 | 3.6[(b)] | 18 |
| | Total | 3.5 | | 8.8 | | 13.9 | | 12.8 | |

[(a)] only irrigation for Lima river basin; [(b)] with Alqueva dam

Based on Table 1, one may conclude that not only more than 70% of total water use on those river basins corresponds to Spain but also that more than 2/3 of the corresponding existing storage capacity is located in the Spanish territory.

### 2.2. Bilateral Treaties and Conventions

The river basins shared by Portugal may serve as a good example of the temporal evolution of a case of bilateral management of shared water resources: until the last decade of the 20$^{th}$ Century, the shared water resources management was confined to the bordering stretches of those rivers; from then on, the entire river basins started to be considered. This perspective reflects not only the adequacy of the bilateral agreements between the two countries, but also

the common policy for water resources management meanwhile implemented by the EU. A description of the context and evolution of those bilateral agreements can be found in Maia (2003) and Delgado Piqueras (2002).

The sequence of those common agreements resulted then in the celebration of the Convention on Co-operation for Portuguese-Spanish River Basins Protection and Sustainable Use, usually referenced as the Albufeira Convention (DR, 1999), signed in 1998 and coming into force in January 2000.

### 2.3. The Albufeira Convention

The Albufeira Convention aims at the sustainable development of all the shared river basins by: (i) solving the former Conventions mutually recognised limitations (mostly concerning sharing of hydro-electric potential and the bordering river stretches) and (ii) defining the framework of bilateral co-operation. According to its Article 32, the Albufeira Convention is in force during seven years, being automatically renewed for three years periods. Currently it is already under the first renovation period.

This Convention defined two new institutional boards: the Parts Conference and the Commission for Convention Development and Appliance (CADC). The Parts Conference guarantees the cooperation of the two countries at the highest level by means of representatives indicated by the governments and its presidency is assured by a Ministry of each part (or delegate). This institutional board has mainly a political role, meeting whenever the two countries find it necessary to reach consensus on issues related with the Convention's implementation. The CADC was defined has having the operational (deliberative, consultative and supervisory) role in order to: (i) define and establish, for each shared river basin, the necessary flow regime; (ii) proceed to the inventory, assessment and classification as also to define common quality criteria and purposes for transboundary waters; (iii) do common studies on floods and drought situations and to define correspondent measures to adopt; and (iv) identify projects or activities that shall be subjected to transboundary impact assessment. The specific statutory rules of the CADC should be proposed by this board and approved by the Parts Conference.

#### 2.3.1. Institutional Boards Definition and Development

Until now, the Parts Conference only occurred twice: the first time in July 2005, in Lisbon, in order to discuss the work undertaken and to agree on the need of increasing cooperation mechanisms, more specifically on droughts situations and also for WFD implementation; the second meeting took place in February 2008 with the main purpose of the approval of the statutory rules of the CADC and also the approval of a new flow regime celebrated through the signature of an amendment to the Albufeira Convention (CADC, 2008a).

The Convention rules that the CADC shall meet in plenary sessions at least once a year. That was the case from 2000 until 2005 (with exception in 2004, in which no session occurred). CADC activity has increased since then trough now, with two plenary sessions per year (in 2006 and 2007) and one already occurred last February (2008). Nevertheless, according to the CADC statutory rules, although the Commission carries out its functions formally through a Plenary, it has the authority to create Work Groups (WK), Sub-commissions and eventually public audition forums (Article 2 of the statutory rules of the CADC). Also, the Commission is composed by two delegations, one from each country, with an equal number of members (maximum: nine) that are designated by each country's government.

Although the referred statutory rules format was already "active" in 2003 and some WG (nine, one specific on WFD) were by then formed and active (Maia, 2003), the CADC "final" statutory rules were only finally approved in February 2008 (as referred above). Four Work Groups and a Sub-commission were formed in 2006 (CADC, 2006a) and are active. Those Work Groups (merging the former ones) are dedicated to: (i) Flow regime, droughts and emergency situations; (ii) Information exchange; (iii) Hydraulics infra-structures' safety and floods; and (iv) Water Framework Directive and water quality. The Sub-commission is dedicated to public participation. In May 2007, a new WG on Procedures was announced (CADC, 2007a). Barreira

(2008) describes in detail the main purposes of the CADC and summarizes the evolution of the WGs and Sub-commission.

In addition to those referred boards, in 2006, both Portugal and Spain formed each their own Technical Secretariat in order to deal with issues related with the CADC's role and assist in the development of the programmed work. Nevertheless, in accordance with suggestions made before (Maia, 2006b; Barreira, 2008) the creation of a joint and sole Permanent Technical Secretariat would surely be a better solution and more in accordance to what occurred in other active Conventions involving European shared river basins (as in the Danube and the Rhine). In fact, a proposal for a Permanent Technical Secretariat, common to both countries, was recently presented by the CADC to the ($2^{nd}$) Parts Conference, held in February 2008, and accepted. The Permanent Technical Secretariat will have a permanent structure that shall be rotating location in each of the countries for two-year periods. Its goals for the period 2008-2010 include, namely, the definition of methodologies for the elaboration of the River Basin Management Plans (RBMP) of the shared River Basin Districts (RBDs) and adequate the RBMP's flow regime to the Convention flow regime provisions (CADC, 2008b).

2.3.2. Activity and Adequacy to WFD implementation

Despite the initial lack of adequacy of the executive role attributed to the CADC, remarkable progress has been achieved since its creation, namely after 2005. The Parts Conference has recently acknowledged the importance and increasing role of the CADC in the fulfilment of the Albufeira Convention and has emphasized CADC's role on achieving a coordinated and sustainable management of shared river basin's water resources (CADC, 2008a). Long before, both countries had already agreed and decided that the CADC coordination role should be adequate also to WFD provisions (Maia, 2003). In accordance, already in 2005, Portugal indicated to the EU the CADC as the competent authority for coordination of WFD appliance for the Portuguese part of the shared river basins and Spain referred its intention to declare it as well as the coordination board for the Spanish corresponding parts, when indicating to EU the list of competent authorities (CADC, 2005).

A specific WG on WFD issues was already created in 2001, reformulated in 2006 as WG on WFD and water quality with the mission, namely, to coordinate joint technical activities and define priority actions for the Water Framework Directive implementation and to articulate woks on the elaboration of the shared RBD's River Management Plans (CADC, 2006a). This WG activity enabled namely to overcome existing discrepancies on the delimitation of the bordering and shared water bodies, enabling the approval of common related cartography, in compliance with WFD requirements (CADC, 2007b).

The activity of the other WGs and Sub-Commission has also been fostered by WFD aims and implementation scheduling, as will come clear in section (3.). That is translated also in the CADC objectives for the 2008-2010 period, reflecting the main current concerns of the two countries: (i) definition of the methodologies for the elaboration of the Management Plans of the 5 River Basin Districts for 2015; (ii) adequacy of the flow regime of the River Basin Districts Management Plans with the flow regime of the Convention; (iii) operation of the Procedures Manual; and (iv) assessment of the bi-national public participation process (CADC, 2008b).

2.4. Legal and institutional framework context and development

In both Portugal and Spain, the last 10 years have shown an intense evolution of the legislative framework existing so far, clearly fostered by the WFD. In fact, although the WFD was approved in 2000, its final form is almost fixed since 1999. That has been negotiated and prepared since 1997, and the following considerations shall take this aspect into account:

- In Spain, water resources' management is based (since 1926) on the river basin level and institutions ("Confederaciones Hidrográficas"). The 1985 Water Act adapted and suited those water administrations to the Autonomous Regions' State organization: the ones which river basins pertain to more than one Autonomous Region ("intercomunitarias") were ruled by a River Basin Authority, under the central government responsibility; the remaining (called "intracomunitarias) were ruled by an Hydraulic Administration, under the responsibility of the

corresponding Autonomous Community. The river basin structure under the" Confederaciones" was in fact mostly unchanged up to 2007, by then adapted to the RBD's WFD formulation (in general, by adding only transition and coastal waters to the former river basin definition), as referred bellow.

The 1985 Water Act was revised in 1999 (BOE, 1999) in order to adapt it to the European Union rules. The refunding text of the Water Law, incorporating some other related pieces of water legislation, was approved in 2001 (BOE, 2001a). This last was strongly modified by the transposition of the WFD to the internal Law (BOE, 2003), in addition to other different changes. A Preliminary Project on a new Water Law was already prepared by spring 2007 by the Spanish Ministry of Environment but is still under scrutiny (Embid Irujo, 2008). According to that author, this last change is mostly aimed to adequate the current Water Law to the Spanish Autonomous Regional Communities ("Comunidades Autónomas") claims and to some reformulation of those and/or of their constitutional statute.

The WFD transposition changes introduced in the 2001 Water Law were related not only to the hydrologic planning process but also to corresponding needed changes in the public water administrations, namely the definition of the River Basin Districts ("demarcaciones hidrográficas"), by then referred to be of the responsibility of the Government, and the creation of the Competent Authorities' Committee (CCA), in addition to some other corresponding to WFD objectives, goals and scheduled actions. As the transposition was inadequate and incomplete, and in order to complement it, three new Decree-Laws were prepared and approved, although only in 2007: (i) two in February, one, fixing the geographical delimitation of the RBD's (BOE, 2007a) and, the other (BOE, 2007b), the corresponding composition and responsibilities of the CCAs, (cooperation board of the "demarcaciones intercomunitarias", the ones shared with Portugal (or France) and/or with territory in more than one Regional Community); (ii) the third one in July, completing the framework of the Hydrological Planning (BOE, 2007c) by which the Rules for Hydrologic Planning are reframed and completed. Nevertheless, on this last, it is emphasized that the coordination of those rules with the envisaged and necessary changes on the Spanish Water Public Administration (namely taking into account the two referred February 2007 Decree Laws, with some "demarcaciones intracomunitarias" delimitation still to be formally definitively confirmed) is still to be done.

In compliance with the 1985 Water Act, Spain approved 14 mainland River Basin Plans, all (except one, Galicia-Costa, "intracomunitario") made public in 1999. This water planning framework was completed and complemented by the approval of the Spanish National Water (BOE, 2001b), aimed to coordinate all the River Basin Plans and, mostly, to define inter-basin transfers. This law was modified in 2005 (BOE, 2005), following a change of policy and government, namely in what concerns the foreseen inter-basin transfer from Ebro River Basin, and establishing a definition of ecological flows and the notion of fluvial natural reserves.

Some more specific legislation developments, namely related to drought planning on monitoring will be emphasized later, in the adequate context.

- In Portugal, in 1994, by means of a set of legislation (Decree-Laws 45, 46 an 47/94) a new institutional framework was by then defined based on a water management model with shared responsibilities between the National Water Administration (Portuguese Water Institute, INAG) and the Regional Environmental and Territorial Planning Administrations. Decree-Law 45/94 (DR, 1994) regulated the water resources planning process and the elaboration and approval of water resources plans (National Water Plan and River Basin Plans). These legislation principles and institutional organization were also translated in the 1997 Environmental Basis Law principles (DR, 1987), by which a national co-ordination of environmental and land-use territory policies was strongly required.

Although the 15 mainland river basins were defined in 1994, the corresponding River Basin Plans (RBPs) were only approved in final 2000/early 2001, the ones corresponding to the shared river basins (except Lima) by then under the responsibility of INAG (Portuguese Water Institute). The Portuguese National Water Plan, aimed to relate and coordinate the measures and actions of the RBPs was approved in April 2002. Comparing to Spain, it should be emphasized that in Portugal there are no continental Autonomous Regions and the water

administrative regions did not (until 2005) coincide with the river basins, although water resources' planning was already made on a river basin basis. That was achieved by the approval of the new Water Law (the former, completely outdated, dating back to 1919), by it doing also the necessary transposition to the internal law of the WFD (DR, 2005a). The transposition process was completed in 2006 (DR, 2006) by some complementary technical rules. Also in 2005 (DR, 2005b), the water resources entitlement regime was reframed, although basically maintaining possible private groundwater use rights, as attached to land ownership. This set of legislation was completed in 2007 with the approval of a new regime on water uses and licensing (DR, 2007a), of rules for delimitation of public waters domain (DR, 2007b) as well as of the organic role and frame of the RBD's Authorities (DR, 2007c), in accordance not only with the water institutional and transversal reform of the Environment, Territory and Regional Development Ministry due in 2006 but also with the 2005 Water Law requirements. With that, reframing of the institutional framework and legislation in compliance with the WFD was basically completed.

In addition to the referred intense legislative activity of each country, on bilateral terms the Albufeira Convention was also fostered by WFD implementation, as referred before. None of the countries had, up to 1997/1998, a so intense framework legislative production. In fact, both in Spain and in Portugal, the "old frame of water law" had been kept mostly unchanged for a long period and up to that date (Embid Irujo, 2008; Maia, 2003).

## 3. National and Bilateral WFD implementation

### 3.1. Current status of the WFD implementation

In accordance with Article 18 (3) of the WFD, the Commission prepared a document on the first stage of the implementation of the WFD (SEC, 2007), based on the summary reports delivered by the Member States, taking into account three main aspects: (i) the conformity of the legal transposition, (ii) the compliance with Articles 3 (Delimitation of RBD's and Competent Authorities) and 5 (Characterization of RBD's), and (iii) the overall reporting performance.

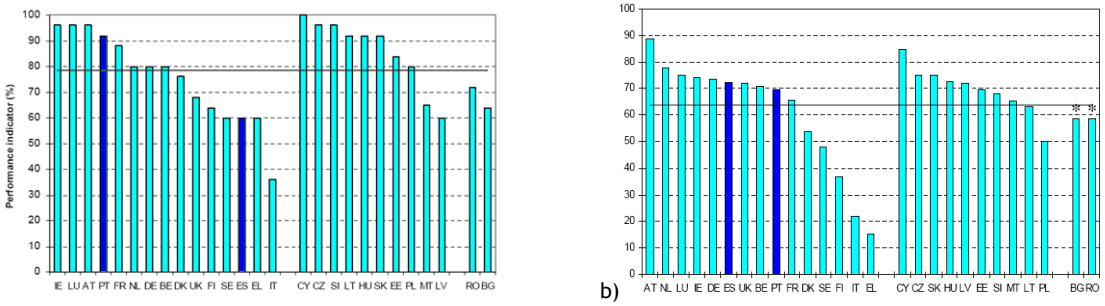
The transposition of the WFD into national legislation was the first step to be undertaken by each Member-State and was scheduled for end 2003. According to SEC (2007), the initial transposition analysis only identified three Member States that seem to have an overall satisfactory transposition with Portugal among them. By the same time, the River Basin Districts and the involved Authorities had also to be identified. Spain formally complied (at the last day of 2003) but, in fact, only recently (2007) defined most of the Spanish RBD's delimitation (including the ones shared with Portugal) and the Competent Authorities. Portugal delayed that up to 2005, but then made it in accordance with WFD requirements.

Next step (in 2004) was the characterisation of the different river basins in terms of pressures, impacts and economic analysis. This step was important as it is the main source of information for the elaboration of the River Basin Management Plans and the Programme of measures to be delivered in 2009. Portugal formalized it in September 2005 and Spain later in 2007. Figure 2 (a and b) presents the performance indicator, by Member State, taking into account the above referred issues, more specifically the implementation of Articles 3 and 5 of the WFD (SEC, 2007). The situation of Spain concerning the Figure 2a) situation has surely currently been improved, in accordance with the implementation progress occurred in the meantime, as referred in section (2.4).

The Commission report (SEC, 2007) also highlighted the need of a supplementary effort in what concerns international coordination, and more specifically in what relates to river basins shared between Member States, as the reports delivered by each Member State were often not conclusive. This was the case for the bilateral cooperation between Spain and Portugal, where further information was requested. In what concerns the Competent Authority set-up, the Commission could conclude (but not specifically) that some of those are complex, with unclear level of coordination and attribution of responsibilities.

Also, according to the WFD implementation schedule, Member States were required to have set up their monitoring programmes, trying to adapt their own already existing monitoring systems

to the needs and goals of the WFD, by December 2006, providing an overview of their monitoring programmes in 2007. Until March 2008, 26 of the 27 Member States had reported, including Portugal and Spain (EU, 2008a), supposedly with compatibility work by the CADC's WG on WFD and Water Quality for bordering water bodies, according to the CADC 2007 Activity Report (CADC, 2008b).




a) b)

Figure 2: Performance indicator per Member State, based on Member States' reports regarding the implementation of (including the EU-27 average): a) the administrative set-up – Article 3 WFD; b) the environmental and economic analysis – Article 5 WFD (COM, 2007) (Scores for Portugal and Spain are highlighted in dark blue; signalled (*) scores for Bulgaria (BG) and Romania (RO) are referred to be based on preliminary assessments)

Meanwhile, for the first time at the European level, an exercise of intercalibration was carried out from 2003 and 2007. The first results of the intercalibration groups were delivered in June 2007, and will be published during 2008. Portugal and Spain (together with Italy, France and Greece) form the Mediterranean Geographical Intercalibration Group, and have performed intercalibration work in all applicable rivers except the bigger ones (where the shared ones are included). A specific working team has already been created in order to support this intercalibration exercise (Ferreira et al, 2008). This work will be of great added value for the elaboration of the River Basin Management Plans (EU, 2008b).

In accordance with the deadlines for WFD implementation, all Member States shall present in 2008 a draft of the River Basin Management Plans (RBMP), water planning instruments to guarantee the prosecution of the environmental objectives defined in the WFD. In what concerns Portugal, the work programme prepared by INAG in January 2007 defined that a draft version of the RBMP was to be ready by December 2008 in order to comply with the date of December 2009 for the final versions. Complementarily, all the measures foreseen in the RBMP will have to be implemented until 2012 (INAG, 2007). In fact, that schedule shall be most surely delayed, as the corresponding process (envisaged to begin in mid 2007) is still to begin, as those plans shall be coordinated by the new RBD's Administrations, already nominated (in 2007) but still to become operative, although until that occurs the Portuguese Water Institute (INAG) shall assume that responsibility, according to Portuguese Water Law. According to La Calle Marcos (2008), Spain is also experiencing some difficulties in carrying out both the elaboration of the River Basin Plans and the public participation process. The importance of the CADC to the joint coordination and development of the RBMP's has been emphasized in section (2.3).

Although both Spain and Portugal have been intensifying their common work in order to attend the WFD goals, still not only a lot of work is to be jointly developed but also the two different implementation processes have to be carried out in a more dynamic and coordinated way (SEC, 2007).

### 3.2. Foreseen efforts and actions for WFD implementation

The socio-economic development of both Portugal and Spain since its adhesion to EU in 1986 has been putting water resources use under pressure, leading to a common imperativeness of better water conservation and efficient water use, taking into account the most important water use (agriculture), water pricing policies and eventual inter-basin water transfers. Maia (2003) resumed those and other interrelated water problems and common issues as by the time of the beginning of the WFD's implementation phase. More recently, also because of some political changes, some water policy approaches have changed, in both countries. Also, a severe

drought period has occurred meanwhile, the southern regions of Spain still under it for the fourth consecutive year. Spain is referred to be moving away from a supply oriented approach and from big water transfers (cancelled the envisaged Ebro transfer) towards implementing WFD principles (Weyndling, 2008). Meanwhile, in Portugal a major dam-building programme has been recently announced (INAG, 2008). Nevertheless, still in both countries, water pricing in agriculture is biased and the implementation of the WFD principle of recovery of costs in agriculture will surely be a "hot issue" in the coming years.

Those recent approaches surely relate to some important identified interrelated bilateral water issues addressed below in this section, in the context of the WFD national and bilateral implementation: the necessary institutional adequacy; the coordination of extreme hydrological situations (floods and droughts); the establishment of an ecological flow regime, having in mind environmental interdependence; and, also, the need to foster public participation. The analysis of climate change effects in water management framework and policy shall also be taken into account.

3.2.1. Institutional Adequacy

As referred before, in order to internally transpose WFD requirements, the 2005 Portuguese Water Law (DR, 2005a) established that the 15 River Basins formerly defined in the Portuguese National Water Plan (DR, 2002) should be joined into eight River Basin Districts (RH's, "Regiões Hidrográficas"), with the Portuguese RH´s corresponding to rivers shared with Spain defined in accordance with former's Spanish River Basin's ("Confederaciones") definition: Minho and Lima were joint in one (RH1), in direct relation with Spanish "Confederación del Norte", where the corresponding Spanish rivers basins parts were (by then) included, together with some other northern Spanish river basins; the others – Douro (RH3), Tejo (RH5) and Guadiana (RH7) – defined independent RH's, in direct correspondence with the also independent Spanish ones. Meanwhile, in 2007, Spain decided to better adequate the River Basin District's definition to WFD requirements, formally defining the "demarcaciones intercomunitarias" geographical delimitation (BOE, 2007a). In what concerns the shared rivers with Portugal, Spain chose to basically divide the former North RBD ("Confederación de Norte") in two, one joining together the Spanish basins of Minho (Miño) and Lima (Limia) in a same RBD (now called "demarcación hidrográfica del Miño-Limia"), the rest of it forming the current "demarcación del Norte". All the other shared river basins kept basically the same geographical definition as before (Figure 3a).

It is interesting to note that Spain, although with a long tradition of water management on a river basin level, supposedly due to the complexity of the Autonomic regions reality and to water southern regions water scarcity, was unable to effectively comply with the WFD timing in what concerns RBD´s delimitation and could only do that in definitive terms for the river basins with territory shared between different countries (Portugal and also France, but in this case only with small territory partition) or Autonomous Communities, recently, in 2007, as referred in section (2.4). It is hoped that the complete definition of all the others ("demarcaciones intracomunitarias") may come soon.

In Portugal, the 2005 Water Law also established five River Basin Districts Administrations (ARH's, depicted in Figure 3b) as basic water resource's planning and management units and institutions, also responsible for the elaboration and execution of the River Basin Management Plans (RBMPs). Concerning the referred shared river basins, the Figure shows that: Minho and Lima (RH1) and Douro (RH3) are joined together with a national Portuguese river basin (RH2) in ARH North; Guadiana (RH7) is also joint to other national Portuguese river basin (RH6) in ARH Alentejo; Tejo (RH5) is the only River Basin District with its own sole ARH (Tejo).

The solution envisaged for the River Basin Administrations, commonly (except for Tejo) "mixing" (on different ways) the shared rivers' RHs with "national" ones has still to prove to be an adequate solution to best Integrated River Basin Management (IRBM) development and WFD implementation, namely on the Iberian shared rivers. Also, the ARH's will assume a regional role in water resources planning and management, which represents a very different approach of what has been done in Portugal before, where water planning was due to different institutions, INAG and CDRs (Commissions for Regional Development), these last with a broader scope and limits of action different from hydrological boundaries.

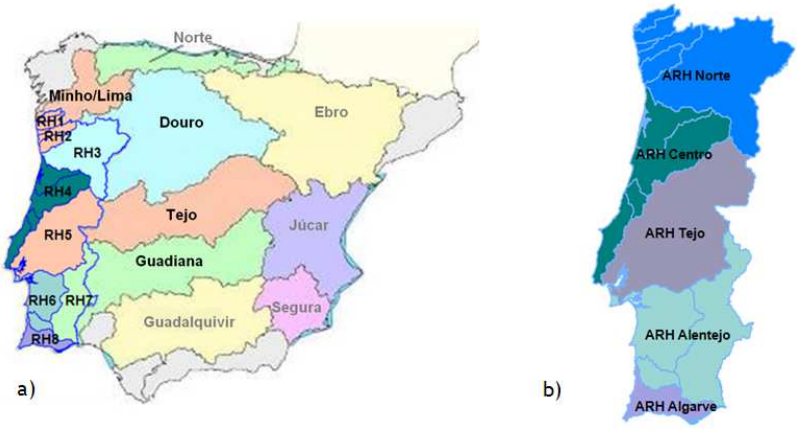



Figure 3: Map of: a) the Spanish "Demarcaciones Hidrográficas" and the Portuguese RH's (adapted from www.mma.es) b) Portuguese River Basin Districts Administrative Regions (adapted from www.snirh.pt)

In what concerns the nomination of Competent Authorities, both countries have chosen to indicate different and more than one per RBD. Although there is no consensus and there is discussion if that complies with WFD (La Calle Marcos, 2008; Embid Irujo, 2008), the question for EU is currently more of the consistency of criteria for that (SEC, 2007). That shall be of accrued importance for Portugal and Spain, and relate to the effective role CADC shall have in WFD implementation.

3.2.2. Coordination of extreme hydrological situations

Concerning droughts, the Albufeira Convention defines that both sides shall "coordinate actions to prevent and control drought and water scarcity situations, setting the exceptional mechanisms to mitigate consequent effects and define the nature of exceptionality to the general regime established in the present Convention...". The same document defines that both sides should "undertake joint studies of drought and water scarcity situations to define measures to be applied and define the criteria and indicators of the exceptional regime…".

A specific CADC Work Group (WG) on Droughts was created in 2001 to undertake studies on droughts and on measures to be adopted in those situations. Under its scope, in 2003 the need to establish an indicators' system and respective trigger values and to identify the main uses to be assured under special circumstances was recognized by the CADC (2006b). The main idea was to build a simplified and homogeneous indicator system, specific to the identification and characterization of droughts under the Albufeira Convention agreement, but that still has not been created. In fact, more recently (CADC, 2007b), the (broader) WG on flow regime, droughts and emergency situations informed that both Portugal and Spain are working on droughts indicators and that a strong interest in adopting a common position towards the European Union does exist.

However, Spain already finished a special action plan for drought situations for each of the Spanish river basins, supported by its specific hydrological indicators system. That is based on operative indicators (hydro-meteorological variables, different from those adopted under the Albufeira Convention for the shared river basins) being drought's severity final evaluation achieved with a standardization of the different type of variables through a special index (called **"**Índice de Estado"). It is supposed to enable detection, with sufficient anticipation, of different drought severity levels in order to adopt adequate mitigation measures and actions, and is the basis for the implementation of the specific Drought Plans at the river basin level. Portugal, on the other hand, is working independently on the preparation of its own drought management plans. It should be noted that, independently of the way followed for the definition of indicators for the Iberian Peninsula, they should be compatible and homogenized between both countries. The latter that effort is made the more difficult that will be.

In what concerns floods, although there is already an operational effective bilateral cooperation, a need for its institutionalization was recognized (CADC, 2002; Maia, 2003). A Protocol Agreement for bilateral data exchange was approved in April 2002, by then only automatically

for Tejo. Nevertheless, still that was the case in 2006, and the coordination procedures for flood events was scheduled to be agreed in 2007 (CADC, 2007b). Meanwhile, both countries shall comply to the 2007 WFD's complementary directive on Floods (2007/70/EC) under which Member States on each RBD (national or shared) shall implement a three stage process: carry out a preliminary assessment (by 2011) to identify zones at risk of flooding and, for such zones, draw up flood risk maps (by 2013) and establish flood risk management plans (by 2015). The harmonization of procedures for joint studies aiming the compliance with the Floods Directive for the shared river basins was scheduled on the WG on Infrastructure Safety and Floods' Plan of Activities for 2007-2008 (CADC, 2007a). It should be emphasized that, mostly in the sequence of the exceptional drought period of 2004-2005, it was decided in 2006 (CADC, 2006a) that trimester periodicity meetings should be held to analyze exceptional hydro-meteorological situations.

3.2.3. Establishment of a river flow regime, attending to environmental interdependence

One of the most relevant aspects to be dealt with within the Albufeira Convention application is related with the establishment of an adequate river flow regime for all the shared river basins. More specifically, the Convention states that the necessary flow regime shall be defined and guaranteed for each shared river basin, having in mind, namely, environmental goals. Temporarily, the Convention only set values for the minimum guaranteed annual flows (but non-applicable to "exceptional years") and a minimum instantaneous flow for two sections of the Guadiana river (one at the upstream entrance in Portugal; the second, at the downstream section at the entrance of the common and estuarine river stretch).

This regime has been under scrutiny by Portugal even before the Convention approval, requiring not only smaller time period (monthly/ weekly/ daily) flow regime guarantee provisions to be considered but also the downstream consumption needs and reserves to be also taken into account and adequate/coordinated with Spanish river basins' provisions (Maia, 1999; Maia 2000). In fact, still in 2000, the Portuguese authorities proposed to the Spanish ones an environmental flow regime taking into account different hydrological year types, on a monthly basis, later publicly acknowledged as aiming to be a draft basis for the definition of the shared rivers flow regime (DR, 2002). Still in 2002, the Portuguese delegation to the CADC declared that as in both countries the River Basin Plans were already nationally approved it was time to (re)define the shared river basins flow regime under the Albufeira Convention provisions (CADC, 2002). Nevertheless, only in 2006 (CADC, 2006b) the revision of the flow regime was defined as a goal of the (by then) new WG on flow regime, droughts and emergency situations, being recognized that it should attend both to normal and exceptional situations.

Reaction of Spain to this issue was slow, and only in November 2007, the Spanish delegation presented a report on the "Revision of the flow regime of the Convention" to a CADC Plenary session (CADC, 2007b), following a methodology proposal of flow regime goals presented by the Portuguese Delegation in 2006. In sequence of that proposal, the WG on flow regime, drought and emergency situations was endorsed to carry on the elaboration of a common proposal for revision of the flow regime that was submitted by the CADC to the final approval of the Parts Conference in February 2008. The current approved regime, resumed below, keeps the former guaranteed annual flow (established by the Albufeira Convention) and establishes a new trimester flow regime at the referenced monitoring stations. Table 2 shows the values established from the Minho, Douro and Tejo River Basins. In those two a minimum weekly flow at the monitoring stations was also established.

The annual values shall be guaranteed in all non-exceptional years, those defined when the averaged precipitation (in referenced precipitation stations) since the beginning of the hydrological year (1$^{st}$ October) up to some reference date does exceed an established percentage of the yearly averaged precipitation in the basin in the same period (those respectively: in Minho, 1$^{st}$ July and 70%; in Douro, 1$^{st}$ June and 65%; in Tejo, 1$^{st}$ April and 60% or 70%, this last if the annual precipitation in the previous year was lower than 80% of annual average). The trimester values have similar application percentages (in Tejo only the single value of 60% applies) but based on a six previous month period comparison (ending the 1$^{st}$ day of the third month of the trimester) (CADC, 2008a). The weekly flow guarantee (Douro and Tejo) is only valid if the trimester flow regime conditions are applicable. Exception periods for Minho

and Douro (based on annual values) end the first month (after December) the sum of precipitation after the beginning of the hydrological year over the river basin is bigger than the correspondent reference averaged values on the same period.

Table 2: Monitoring stations and minimum flows defined in the new flow regime of the Albufeira Convention (CADC, 2008b)

| River Basin | Monitoring Station | Flows ($hm^3$) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Annual | 1st Trimester | 2nd Trimester | 3rd Trimester | 4th Trimester | Weekly |
| **Minho** | Frieira dam[(a)] | 3700 | 440 | 530 | 330 | 180 | |
| **Douro** | Miranda dam [(a)] | 3500 | 510 | 630 | 480 | 270 | 10 |
| | Bemposta dam | 3500 | 510 | 630 | 480 | 270 | 10 |
| | Saucelle dam + Águeda HS [(a1)] | 3800 | 580 | 720 | 520 | 300 | 15 |
| | Crestuma dam [(b)] | 5000 | 770 | 950 | 690 | 400 | 20 |
| **Tejo** | Cedillo dam[(a)] | 2700 | 295 | 350 | 220 | 130 | 7 |
| | Ponte Muge HS[(b)] | 4000* | 445* | 530* | 330* | 190* | 10* |

(a) upstream bordering section; (a1) common stretch intermediate section; (b) section by the mouth of the river; (*) sum of minimum flows at Cedillo and minimum required flows in the Portuguese River basin.
NOTE: HS stands for Hydrometric Station

In what concerns the Guadiana river basin, the new trimester flow regime is based, similarly to the former integral annual volume, and in addition to the referenced precipitation values, on the storage volume in (Spanish) referenced predefined reservoirs. Table 3 summarizes the approved flow regime. In this case, the trimester flow regime is applicable only in non-exception time periods. Those are over on the first month (after December) in which the total storage volume in the reference reservoirs exceeds 3150 $hm^3$.

Table 3: Flow regime for the Guadiana river basin

| **Badajoz weir [(a1)]** | | | |
|---|---|---|---|
| **Annual flow regime (Minimum volume - $hm^3$/year)** | | | |
| | | Reference precipitation (Pref) accumulated since the beginning of the hydrological year (from 1st October to 1st March) | |
| | | Pref > 65% Pmed | Pref < 65% Pmed |
| Storage volume in reference reservoirs ($hm^3$) | > 4000 | 600 | 400 |
| | 3150 – 4000 | 500 | 300 |
| | 2650 – 3150 | 400 | Exceptional year |
| | < 2650 | Exceptional year | Exceptional year |
| **Trimester flow regime (Minimum volume - $hm^3$/year)** | | | |
| 1st October to 31th December | | | |
| Storage volume in reference reservoirs ($hm^3$) | > 3700 | 63 | 42 |
| | 2850 - 3700 | 53 | 32 |
| | 2350 - 2850 | 42 | Exceptional year |
| | < 2350 | Exceptional year | Exceptional year |
| 1st January to 31th March | | | |
| Storage volume in reference reservoirs ($hm^3$) | > 4000 | 74 | 49 |
| | 3150 - 4000 | 61 | 37 |
| | 2650 - 3150 | 49 | Exceptional year |
| | < 2650 | Exceptional year | Exceptional year |
| 1st April to 30th June | | | |
| Storage volume in reference reservoirs ($hm^3$) | > 3700 | 42 | 28 |
| | 2850 - 3700 | 35 | 21 |
| | 2350 - 2850 | 28 | Exceptional year |
| | < 2350 | Exceptional year | Exceptional year |
| 1st July to 30th September | | | |
| Storage volume in reference reservoirs ($hm^3$) | > 3400 | 32 | 21 |
| | 2550 - 3400 | 26 | 16 |
| | 2050 - 2550 | 21 | Exceptional year |
| | < 2050 | Exceptional year | Exceptional year |
| **Pomarão HS [(a2)]** | | | |
| **Average daily flow ($m^3$/s)** | | | 2 |

($a^1$) Upstream bordering section; ($a^2$) upstream section of common downstream bordering stretch
NOTE: HS stands for Hydrometric Station

One shall refer that since the Albufeira Convention is active, only once a situation of exception was declared, and that was in the Douro river basin in the dry hydrological year of 2004-2005, when a situation of drought occurred over most of the Iberian Peninsula. This situation of

exception ended in March 2006 (CADC, 2007a). In this same period, Spain did not comply twice with its annual minimum flow obligations under the 1998 Convention on this issue: one in Douro, in 2001-2002, reportedly due to abnormal precipitation distribution and low storage capacity (CADC, 2003); another, by a small amount (16 $hm^3$), in 2005-2006, in Guadiana, compensated by flow discharges on the 1st October 2006 (CADC, 2007a).

It should be emphasized that the flow regime revised agreement foresees that future revisions of the established values shall take into account the flow regimes to be established by the River Basin Management Plans (1st generation under the WFD, currently in preparation), that shall guarantee and take into account the goals of establishing the good (or potential) ecological and chemical status of the river bodies. Although in Spain in some RBD's some studies to redefine ecological regime were already made, a Commission is currently working to frame guidelines to evaluate environmental flows and regimes to be followed by all the "demarcaciones hidrográficas" in the RBMP development and implementation phase, and that shall take into account namely dry periods and flow regimes time variation (Sanchez et al, 2008), Those issues should necessarily be coordinated with Portugal, under CADC.

3.2.4. Public participation

In both countries, public participation currently emerges as a fundamental dimension in water resources planning and management, and has also an important role in the implementation of the WFD as contributing to: (i) more sustained decision making processes; (ii) best understanding of the environmental problems and the contributions of the different sectors for the achievement of the environmental objectives; (iii) decrease in the possible conflicts originated by unawareness of lack of information, and; (iv) increase of the probability of successful implementation of the WFD (INAG, 2007).

In this context, important efforts have been carried out by Portugal and Spain as both countries have a poor tradition in public participation processes (Maia, 2003). As previously referred, a specific Sub-Commission has been created in the context of the CADC. In 2007, this Sub-Commission has mostly been involved in the elaboration of the activities reports and of specific reports of public participation evaluation and also in the organization of the information in order to be delivered to the public, with emphasis on the development and update of the common internet website of the CADC (2008b).

In addition to two public sessions previously organized by the CADC in 2006 (in Portugal - Beja and, in Spain - Zamora) one session on "Hydrologic Planning and Climate Change" was recently held last April (2008), in Lisbon, where representatives from both countries presented preliminary results on the public participation process being carried out in their respective countries. In Portugal, the process of public participation for the elaboration of the RBMP is expected to be concluded by the end of the first semester of 2008, already in delay when compared with the defined schedule, as also seems to be the case in Spain.

As a transversal and general issue, it should be emphasised and taken into account that from now on all the above referred issues and approaches shall no more be framed in the traditional hydrological historic (repetitive) scenario, due to climate change effects, currently probably the most challenging and concerning environmental problem at EU level. In fact, the best estimates for global warming presented in the 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007) range from 1.8℃ to 4℃ of temperature rise compared by 2100 to 1990 levels. It corresponds to three to six times the temperature increase the globe has experienced since pre-industrial times. The WFD, specially through the process of elaboration of River Basin management plans (6 year cycles) beginning in 2009, enables the integration of climate change effects considerations and elaboration of regional policies and practical implementation of measures. Following the EU Communication on climate change targets (COM, 2007) it is expected that the first cycle of river basin management plans already integrates a first climate check on the corresponding programmes of measures (Gammeltoft, 2008). Also, in what regards specifically water scarcity and droughts issues, climate change impacts shall be fully addressed, focusing on water demand management measures, ineffective water pricing policies and land use and planning as the most effective sort of actions.

At the Iberian Peninsula level, the two countries are at different stages in addressing climate change, Spain being ahead: following a 2005 first General Preliminary Assessment of the Impacts in Spain due to Climate Change, Spain already prepared a National Adaptation Plan to Climate Change (OECC, 2006) that was on the basis of a first work programme on Climate Change Impacts evaluation over water resources, biodiversity and coastal areas, with a first results divulgation in March 2008. In Portugal, a specific national assessment was made under a research Project SIAM – Scenarios, Impacts and Adaptation Measures in Portugal (Santos et al, 2002).

## 4. Conclusions

The European Union (EU) Water Framework Directive and some complementary EU legislation (e.g., the Groundwater and the Floods directives) have been important triggers of reform of the water policy and of the institutional settings of the Member States. In countries with shared river basins, that implementation has to be coordinated and take into account and be in agreement with former State agreements, those eventually also having to adequate to the new EU water framework. That is the case of Portugal and Spain, Iberian countries sharing five rivers, and that just before the WFD approval celebrated the Albufeira Convention for the sustainable use of all those river basins.

In fact, and in order to comply with WFD implementation schedule, an internal intense legislative framework production as well coordination of efforts and actions concerning water resources management of the shared river basins has been made by both countries in the recent years, as described. Meanwhile, the Commission for Convention Appliance has been adequate to be not only the driving force for the Convention goals effective development but also for the common WFD implementation. The recent approval of a Permanent (common) Technical Secretariat will surely foster that dual role, and (hopefully) contribute to real empowerment of CADC as the Competent Coordination Authority for a real coordinated and integrated water resources management of the Luso-Spanish river basins.

Although both countries did show some real common coordination efforts in terms of, namely, institutional adequacy and establishment of shared rivers flow regime still this last has to take into account the environmental upstream-downstream interdependence and the establishment of ecological flow regimes. Some necessary coordination of actions on extreme hydrological events and, namely, a strong coordination effort in terms of droughts management and policy could also be signalled. Finally, a coordinated strategy in terms of climate change analysis, scenarios and actions, transversal to all shared water resources management actions would be necessary.

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