TRANSBORDER COOPERATION OF SHARED RIVER BASINS UNDER THE ALBUFEIRA CONVENTION

SCOPING REPORT

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Rede Douro Vivo

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(Final)

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CONTENT

INTRODUCTION

The reason for evaluating the cooperation between Spain and Portugal in managing their transboundary rivers is because citizens and environmental groups are concerned about the ongoing deterioration of the ecological and environmental qualities of the rivers and dissatisfied with the actions taken to halt this trend. They feel that the Albufeira Convention in its current form is not helping to address the problems and are wondering whether to break open the Convention to negotiate a new one or whether other arrangements can be put in place to address the ecological and environmental problems of the shared rivers.

A group of environmental NGO's headed by GEOTA cooperate in a project titled "Reviving the Douro Basin" . The planned outcomes of this project include: Legal actions & Optimizing legal compliance, Mobilizing public pressure / campaigning, Improving understanding of importance of basin ecology, Protection / Restoration / Maintenance , Influencing policy life cycles and the legal framework and Promoting Integrated River Basin Management / Integrated Water Resources Management.

As part of this last outcome a scoping study is proposed for the establishment of a bilateral International River Basin Management Plan for the Douro River. The scoping study would be the bases for starting a process towards improved bilateral cooperation on the Douro River. In the course of the project is was decided not to limit the project to the Douro River but instead to make an assessment of the cooperation between Spain and Portugal for all four major cross border rivers and present recommendations for improvement.

The assessment would identify what works and what not, analyse whether the Albufeira Convention is the right tool to improve transborder cooperation and present recommendations for steps to arrive at genuine integrated river basin management taking the basin as one unseparated body as starting point.

An important aspect of the project would be to bring civil organisations together and increase their knowledge on Integrated Water Resources Management and River Basin Management to empower them in promoting sustainable river basin management.

Parallel to the scoping study a screening of existing legislation in Portugal directly or indirectly related with water management and river protection is being carried out by CEDOUA to identify potential legal conflicts and pinpoint at legislative holes that jeopardize river protection.

SUMMARY

Next to severe droughts in 1993-1995 an important impetus for starting the negotiations on the new Albufeira Convention was the Portuguese wish to assure stream flows for the Alqueva dam, located in the Guadiana River. It is therefor no surprise that the Albufeira Convention is very much geared towards cooperation on water quantity in addition to water quality aspects but less so on the ecological aspects of river basin management.

This report will start with a brief introduction to all four shared river basins before clarifying some basic principles of Integrated Water Resources Management and the River Basin Approach that both lay at the foundation of the European Water Framework Directive.

The directive requires that the MS coordinate all programmes of measures for the whole of the river basin district in order to achieve the objectives of the WFD, but each Member State can chose the appropriate administrative arrangements, including the identification of the competent authority for international river basin districts.

An overview of international treaties and conventions relevant for cross border river basin management will be presented. This overview shows that both Portugal and Spain are party to a number of conventions and treaties that provide legal support for river basin management and the establishment of joint bodies for shared river basins.

Two examples of cross border cooperation on shared river basins will be presented namely for the River Rhine and the River Sava to show how transborder river basin management is organised for these two international rivers. It shows that ecological restoration combined with flood protection measures and measures to improve the water quality are important elements of managing the River Rhine. Participating countries have developed a shared vision for the future of the Rhine which they take as a starting point for their national River Basin District Plans. Cooperation between the Sava Basin countries on the contrary is more focused on navigation and early warning systems. Environmental NGO's in the Sava Basin are pushing ecological restoration and nature based solutions to flooding issues but without much success. Environmental NGO's in the Rhine Basin are closely cooperating under the Green Rhine Corridor Initiative (https://greenrhinecorridor.org/).

The findings from the interviews with a number of key stakeholders in management of the shared river basins show that overall the Albufeira Convention is seen as a useful and successful tool in supporting cross border cooperation on the shared river basins. But it is also recognized that there is room for improvement especially when it comes to harmonized River Basin Management Plans. Issues where the cooperation should be improved include securing sufficient and consistent water flows including the definition of what ecological flows means and establishing ecological flows, the use of climate models and climate impact predictions, monitoring and data exchange, assessment of the status of water bodies and the design of the Programme of Measures. And for environmental NGO's an important impediment is the is a lack of involvement of civil society in the decision taking procedures in the Albufeira Convention.

The final chapter will present conclusions and recommendations.

1 THE ALBUFEIRA CONVENTION

The first water treaties between Portugal and Spain date back to the 19th century and several treaties were later signed in the 1920s and 1960s. The latest, from 1998, is the Albufeira Convention. This convention seeks to balance environmental protection with sustainable use of water resources within the framework of International and EU Law. In 2008 a seasonal flow regime for the Douro, Tagus and Guadiana was defined (as a revision of the convention), which includes minimum flows for different times of the year.

A severe drought in the peninsula in 1993-95 provided an impetus to negotiate and at the same time a hardening of the positions of the two states prior to the signing of the 1998 Albufeira Convention. Intense media coverage of the Spanish plans for the construction of power plants in Portugal fuelled the popular image of Spain 'stealing' Portugal's water. The Portuguese priority in the Convention was to assure stream flows for the Alqueva dam, located in the Guadiana River. Another impetus for negotiating and signing the Convention was the growing water demand in Spain that had reduced the amount of water flowing into Portugal.

The Convention covers four trans border river basins: Minho and Lima, Douro, Tejo and Guadiana. See the map below.

River Basin	Surface in km2 Spain	Surface in km2 Portugal	Surface in km2 Total	Percentage Spain	Percentage Portugal
Minho	16230	850	17080	95%	5%
Lima	1300	1180	2480	52%	48%
Duero/Douro	79000	18600	97600	81%	19%
Tagus	55800	24800	80600	69%	31%
Guadiana	55300	11599	66800	83%	17%

Leonardo COSTA, J. C. (2008). *Shaping a new Luso-Spanish Convention* . Porto: Faculdade de Economia e Gestão, Universidade Católica Portuguesa[i].

Having sufficient water for the Alqueva dam in the Guadiana river has always been an important issue for Portugal within the implementation of the Albufeira Convention.

One of the primary reasons that Portugal refused actual joint management of the shared rivers was to protect its authority to manage Alqueva. Portuguese negotiators argued that the project would be beneficial to Spain, as Spanish irrigators would potentially receive water from Alqueva. Spain accepted Alqueva in 1996, which has been interpreted as "an act of generosity" designed to improve bilateral relations and signal good faith in the negotiations. However, a member of the Spanish negotiating team believes that giving up "the only serious card we had to play" early on made it harder to achieve Spanish goals in the talks (Bukowski, Jeanie J.)[ii]

As can be concluded from the above table the vast majority and the catchments of the rivers is located in Spain with an exception for the Lima River where Spain and Portugal have more or less an equal share of the catchment.

The Abufeira Convention deals with issues such as exchange of information, information of the public, consultation on transboundary impacts, evaluation of transboundary impacts, pollution control and prevention, water uses, water streams, droughts and resource scarcity, assignment of rights, dispute resolution, etc.

Under the Convention an International Technical Commission has been established called the Commission for the Application and Development of the Convention (CADC) composed by delegations nominated by each Party. The CADC discusses and reviews information related to hydrological data, new water uses, transboundary environmental impacts etc and is also responsible for making proposals to the Conference of Parties, the governing body of the Convention.

The main issue regulated by the Convention is the issue of stream flow allocation but this issue is part of the so called “non-significant harm” . Except for the Lima River, the Convention established annual guaranteed stream flows to Portugal in normal years. It is however argued that from an environmental point of view the guaranteed stream flows had been set too low.

It was agreed that Spain would discharge only one third of the water that flowed into Portugal in recent decades before the signing of the Convention. And this applies only to years with “normal rainfall”. In exceptionally dry years, Spain is bound only by the “Non-significant harm” rule meaning that the discharge can even be lower than one third. Only for the Guadiana River, the definition of a normal year depends also on the volume of water held back by Spain behind its dams on this river. By transferring water from northern basins to the Guadiana River Basin, Spain reduces the number of exceptional dry years in this river. The “non-significant harm” rule was expected to implicate that Spain would supply to Portugal at least the ecologically stream flows in dry years, once the CADC established them.

There are no agreed definitions and amounts of discharge for ecological flow of the transboundary rivers defined either by the CADC or included in the River Basin Management Plans that either Spain or Portugal have sent for review to the European Commission. The lack of a clear definition of ecological flow and the lack of translation of this definition in ecologically defined water discharge amounts and frequencies is a cause for further degradation of the ecological quality of the rivers.

The National Water Plan for Portugal proposes ecological stream flows for the shared rivers but these proposals have not been adopted by the CADC and are also not included in the RBMPs. These proposed annual ecological flows are on an average higher than the guaranteed river flows laid down in the Albufeira Convention.

River Basin	Annual Stream Flow (hm3				
	Average	Guaranteed	Ecological Flow Average Year	Ecological Flow Very Dry Year	Ecological Flow Very Wet Year
Minho	4970	3700	2627	1421	4449
Lima	n.a.	n.a.	506	174	958
Douera/Douro	9000	3500	3081	1118	5112
Tagus	9500	2700	3032	1000	5848
Guadiana	1540	600	1766	162	4140

Leonardo COSTA, J. C. (2008). *Shaping a new Luso-Spanish Convention* . Porto: Faculdade de Economia e Gestão, Universidade Católica Portuguesa.

In alignment with global concerns and European policy, Portugal developed the National Strategy for Adaptation to Climate Change (NSACC; Resolution of the Council of Ministers No. 24/2010), in which water resources are highlighted as a strategic sector. Hence, the National Water Plan includes the topic “climate change”, its impacts and the risk to water resources, as a priority for analysis. At the level of risks resulting from climate change, a number of specific aspects for mainland Portugal should be highlighted, such as the decrease in river flow from Spain and measures for water retention in transboundary river basins in Spain, which can lead to the reduction of water availability in Portugal[iii].

2. BRIEF INTRODUCTION INTO THE RIVER BASINS

2.1 Guadiana River Basin

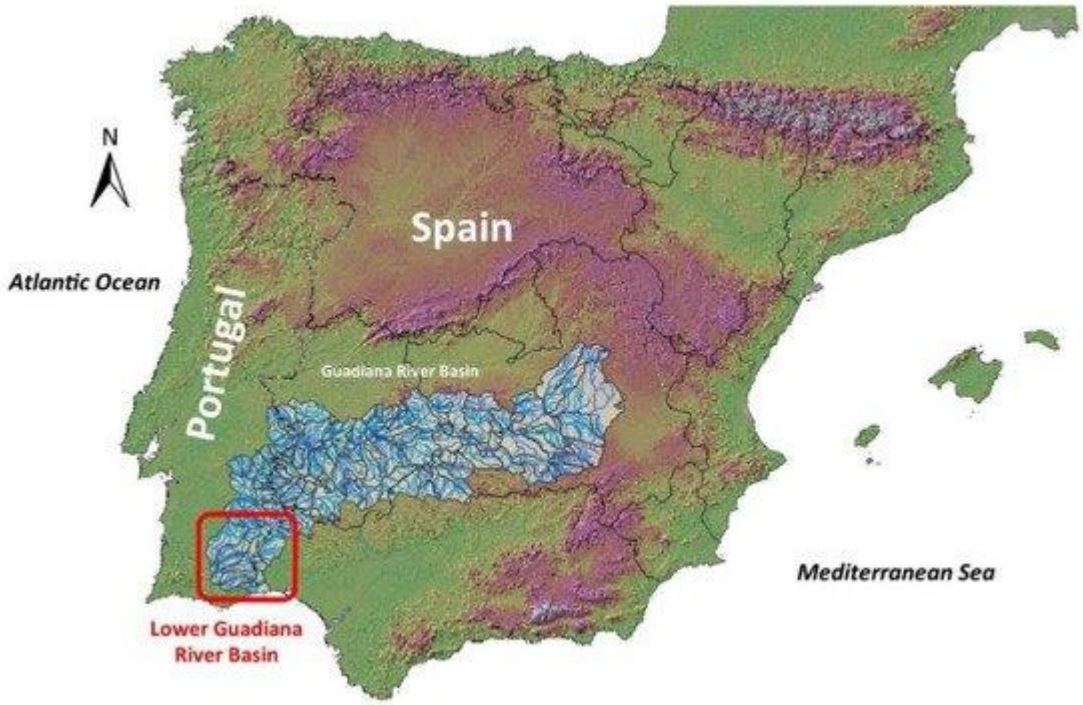


Figure 1; the Guadiana River Basin [iv]

The Guadiana flows east to west through Spain and south through Portugal, then forms the Spanish-Portuguese border; it flows into the Gulf of Cádiz, part of the Atlantic Ocean, between Vila Real de Santo Antonio (Portugal) and Ayamonte (Spain). It is 818 kilometres long, of which 578 kilometres are within Spanish territory, 140 kilometres within Portugal, while 100 kilometres (62 mi) are shared between the two nations. About 82 percent, 55,444 square kilometres of its basin is in Spain, while about 17 percent, 11,560 square kilometres is in Portugal. (Wikipedia).

There are over 30 dams on the river basin. The following are the dams on the Guadiana river itself:

- Alqueva Dam, the largest reservoir in Western Europe, located near Moura, in the Beja District. (250 square kilometres and a capacity of 4,150 cubic hectometres)
- García Sola Reservoir
- Cíjara Reservoir
- El Vicario Reservoir
- Orellana Reservoir

The mean annual precipitation is 521 mm with significant spatial and temporal variability with a minimum precipitation of 264 mm in the low estuary and a maximum of 1397 mm in the higher altitudes of the basin. Most precipitation is falling in the period from October to April. The mean annual temperature is 18.24 ◦C. The minimum and maximum temperatures can reach values of −4 ◦C in winter and +44 ◦C in summer. [v]

The river discharges into the Gulf of Cadiz between Ayamonte and Vila Real de Santo António, where it forms a estuary with salt marshes. Several parts of the estuary are designated as protected areas including the Marismas and Isla Cristina in Spain and Reserva natural do Sapal de Castro and Vila Real de Santo Antonia in Portugal. The "Sapais de Castro Marim" in Portugal is designated as a Ramsar site. The estuary has a maximum width of 550 metres, and its depth ranges from 5 to 17 metres. The tidal height varies from 0.8 to 3.5 metres.

Despite the dry conditions in big parts of the catchment it is one of the most biodiverse and unspoiled parts of the Iberian Peninsula. Especially the part from Badajoz until the mouth of the river is valuable from an ecological point of view

In Spain water of the Guadiana is used for extensive irrigation schemes supported by a large amount of dams which are both used for hydropower and irrigation purposes. Guadiana's waters are used for what is perhaps the most successful irrigation project in Spain. This counts especially in the Toledo mountains in the Badajoz province where already in the 1950-ties four major dams have each created reservoirs of more than 32 km2. Between Badajoz city, Spain, and Monsaraz, Port., and again downstream from Pomarão, Port., the Guadiana forms parts of the Spanish-Portuguese frontier. Navigation of small boats is possible for only 68 km upstream to Mértola, Port while larger vessels can navigate between Pomarão and the coastal ports of Ayamonte in Spain, and Vila Real de Santo António in Portugal. (Timmerman, J.G., and J. Doze (2005), Transboundary river basin management regimes: the Guadiana basin case study, Background report to Deliverable 1.3.1. of the NeWater project, Lelystad[vi])

The water quality in the Guadiana river basin is negatively impacted by mainly sewage water discharges from agro-industrial units and agricultural land uses, both in Portugal and Spain. There are three ecological constraints in the Guadiana river basin. The first of them is the aquifers over-exploitation in the upper basin, which supports extensive irrigation areas. The second ecological constraint is the non-point source pollution originated in these areas and from industries, decommissioned mines, untreated sewages, sewage treatment plants and landfills. The aquifer overexploitation in the upper basin is trying to be mitigated with sustainable water use and with water transfer from the Tagus basin; however this led to the introduction of non-native fish species in the Guadiana basin (Fornés et al. 2000). The third main ecological constraint of the Guadiana basin is the intense damming. Initially, dams were essential to maintain water supply during the sporadic, but sometimes long drought periods.

The first dams of this basin, and also of the Iberian Peninsula, were built by the Romans in II A.D. These dams, Cornalvo and Proserpina, had a total capacity of 10 hm3 and 4 hm3, respectively. Later, several others were built and until 1956, when the Cijara dam (1670 hm3) was built, the total amount of water stored in reservoirs was 115 hm3. In 1964, this value increased to 3850 hm3, increasing slightly until 1988, when it raised again to 7540

hm3 and to 8575 hm3 in 1990. Today, after the construction of the Alqueva dam in February 2002, 12730 hm3 of water can be stored in the 1824 dams of the Guadiana basin. The average total flow of the Guadiana is 4400 hm3 (Dias & Ferreira 2001), however the major 86 dams retain ~150% of the average annual rainfall (UNEP 2006).[vii]

The amount of water drained to the Portuguese basin decreased by about 60% in the last 30 years and the quality is rather poor. Of the total needs for irrigation and domestic water supply, 81% and 75% are consumed and generated in Spain, respectively. The land use is predominantly rural and irrigation accounts for 93% of water consumption in Spain. Here, non-sustainable agriculture practises cause conflicts between environmental sustainability and socioeconomic interests *(Morais.P.)*

Because of a reduction of river flow the amount of sediments transported to the coast has been decreased significantly which has led to an decrease of the estuarine plume. This on its turn has had a negative impact on the value of the estuary for fish species as spawning area but also during their adult stage. This has led to an overall decrease of the number of fish species in the estuary. *(Morais.P.)*

Dams have severely compromised the conservation status of endemic fishes, like *Anaecypris hispanica* in the Guadiana basin. (*Morais.P*.) Five fish species present in the streams of the lower Guadiana are listed in the Annex II of Habitats Directive: lamprey (*Petromyzon marinus*), several cyprinidae (*Rutilus alburnoides*, *Cobitis maroccana* and *A. hispanica*) and sturgeon (*Acipenser sturio*). As mentioned, *A. hispanica* is an endemism of the Guadiana streams and is in threat of extinction.

In addition the construction of various large scale tourist resorts areas have destroyed in largely pristine in the basin for example north of Ayamonte where a centre for 20 000 inhabitants, lodged in 6 000 houses and in 3 luxury hotels, and equipped with 7 shopping centres, 2 golf courts and 1 marina.

Natural Reserve of Castro Marim and Vila Real de Santo António is designated as a Ramsar site and listed under the Birds Directive and the Habitats Directive. This salt marsh area is vital for several steppe species, such as thick-knees (*Burhinus oedicnemus*), calandra lark (*Melanocorypha calandra*), little bustard (*Tetrax tetrax*), and to lesser short-toed lark (*Calandrella rufescens*). This species has in this area the only nesting location in Portugal (Leitão 2003).

The salt marsh is also a nesting place for two birds of prey, western marsh-harrier (*Circus aeruginosus*) and Montagu's harrier (*Circus pygargus*) (Leitão 2003). The intertidal areas adjacent to the sewage treatment plant are feeding grounds for nine limnic species, ruddy turnstone (Arenaria interpres), dunlin (Calidris alpina), curlew sandpiper (*Calidris ferruginea*), Kentish plover (*Charadrius alexandrinus*), common ringed plover (*Charadrius hiaticula*), black-tailed godwit (*Limosa limosa*), grey plover (*Pluvialis squatarola*), little tern (*Sterna albifrons*) and common redshank (*Tringa tetanus*); some of which are included in the Annex I of Bird Directive (Dias 1999, Dias et al. 2003).

2.2 The Tagus River

The Tagus River is the longest river in the Iberian Peninsula. It is 1,007 km long, 716 km in Spain, 47 km along the border between Portugal and Spain and 275 km in Portugal, where it empties into the Atlantic Ocean near Lisbon. It drains an area of 80,100 square kilometres the second largest in the Iberian Peninsula after the Douro. The Tagus is highly utilized for most of its course. Several dams and diversions supply drinking water to places of central Spain and Portugal, while dozens of hydroelectric stations create power. Between the dams it follows a very constricted course, but after Almourol it enters a wide alluvial valley, prone to flooding.

Its mouth near Lisbon is one of the largest European estuaries. This area is an important stop over for migrating birds in the African Eurasian Flyway for water birds. The site is designated as an SPA under the Birds Directive and as Important Birds Area by BirdLife International and is at risk due to the planned extension of Montijo Airport. This designation is based upon counts of 49,000 Black-tailed Godwits, 12,000 Dunlin, 6000 Avocet, 4500 Wigeon, 3300 Greylag Geese, 2000 Grey Plover and 1600 Greater Flamingos.

At present, approximately nine million people live in the basin, which contains the capital cities of both countries. The river is highly regulated with a large number of dams, creating a total storage capacity of nearly 14 km3, of which 80% in Spain. Installed hydropower potential amounts to 3300 MW and the mean annual power production is approximately 5000 GWH.

On the Portuguese territory the Tagus is free flowing for about 120 km while there are only 2 dams. The number of dams in Spain are significantly higher and the vast majority these dams are built to generate electric power. Given the characteristics of hydrological variability, the volumes of water stored in reservoirs add some resilience under scarcity periods.

The upper Tagus cuts into limestone rocks and flows generally south-westward through narrow, sinuous valleys with deep canyons and abundant ravines. Near Trillo (Guadalajara province) it runs more peacefully, and just before the town of Bolarque it is held back by the dams of Entrepeñas and Buendía, forming an artificial lake known as the Sea of Castile, which covers an area of 132 square km. The Tagus flows mostly through semi-arid lands, and government efforts have been dedicated to increasing land irrigation and creating hydroelectric power in its basin.

Major efforts to harness the Tagus and its tributaries for these purposes were undertaken from the 1960s, and by 1980 more than 60 dams had been built with a total installed power capacity of more than 1,200,000 kilowatts. In the highlands of the Tagus basin, coniferous trees are numerous, supporting a well-developed timber industry. About one-third of the basin's cultivated land is devoted to cereal farming, and everywhere are olive trees and vineyards. In Extremadura, in western Spain, only oaks and cork trees break the monotony of a rolling and rocky landscape.

Animal life near the river is abundant and diverse, with both European and North African species. Fishing for royal carp, luces, and black bass is possible in the artificial lakes of Entrepeñas and Buendía, and trout, barbels, and many other kinds of fish are caught in the Tagus and its tributaries. There is big-game hunting in Gredos, noted for its Pyrenean, or Spanish, ibex; in the ridges of Cuenca and Guadalajara fallow deer and chamois are found.

The climate in the basin is temperate Mediterranean, with a dry period of two months for July and August. The average annual temperature varies between 7.4 ◦C (in areas further north and higher altitude) and 16.9 ◦C (in estuary area), and the annual rainfall is between 2744 mm (in the northern part of the region and at an altitude of more than 1300 m) and the 524 mm (in the south, near the coast). In wet years, the annual rainfall is about 130% of the precipitation at normal year, while in dry year, this only reaches about 70% of normal precipitation[viii]

In terms of water demand, 80% of the water use is related to agricultural needs and the 20% remaining for drinking-water production, since both Madrid and Lisbon use the Tagus River Basin as the source of their water supply. Water abstractions for agriculture purposes attain 1929 hm3 y −1 and urban water supply reaches 741 hm3 y −1 in the Spanish Tagus River Basin. In Portugal, Tagus water is strongly demanded for the irrigation (~1173 hm3 y −1) of intensive rice paddies, orchards and arable crops area (1482 km2), and for drinking water supply (~392 hm3 y −1). It should be pointed that Lisbon drinking water is abstracted from a reservoir that is located in a Portuguese Tagus tributary, Zêzere River.

The availability of water is jeopardized by transferring water to the more productive irrigated agriculture in the Segura River basin in Spain close to the Mediterranean coastline. This area is connected to the Tagus by a water transfer channel diverting part of the Tagus flow into the Segura basin for irrigation and food production. This poses a serious threat on river Tagus and a very complex pressure to manage, namely during drought events.

The plan to divert water to the Segura River was initially developed in 1902. The plan was to siphon off water from here the Tagus near Aragon and divert it to the Segura river to irrigate farms in the arid southeast in what is known as the Tajo-Segura transfer. Construction began in 1966 and water started flowing out of the dammed Tagus headwaters to the Segura in 1979. However, the amount of available water was miscalculated and Spain's

cyclical droughts were not factored in. Today only 47% of the predicted water resources exist and levels in the two headwater dams are down to 11% capacity, too low to allow any transfers.

Nitrogen pollution from agriculture, livestock, and urban discharges is a key environmental pressure on the Tagus River Basin. Nitrogen load in Spain is ≈13 times higher than in Portugal mainly coming from livestock. Nitrogen concentration in the Spanish Tagus River is low, but the input to Portugal is significant (14 kt y−1), accounting for approximately the same amount as the total sectorial load in the Portuguese region (18 kt y−1). However, reported water quality status was slightly better in Spain than in Portugal. (Claudia. M)

2.3 Douro River Basin

The Douro is the third-longest river in the Iberian Peninsula after the Tagus and the Ebro. Its total length is 897 kilometres of which only a few sections in Portugal are navigable by light rivercraft. In Spain, the Douro crosses the great Castilian *meseta* and meanders through five provinces of the autonomous community of Castile and León: Soria, Burgos, Valladolid, Zamora, and Salamanca, passing through the towns of Soria, Almazán, Aranda de Duero, Tordesillas, and Zamora. Important tributaries are the Pisuerga, passing through Valladolid, and the Esla, which passes through Zamora. This region is generally semi-arid plains, with wheat and in some places, especially near *Aranda de Duero*, with vineyards, in the Ribera del Duero wine region. Sheep rearing is also still important.

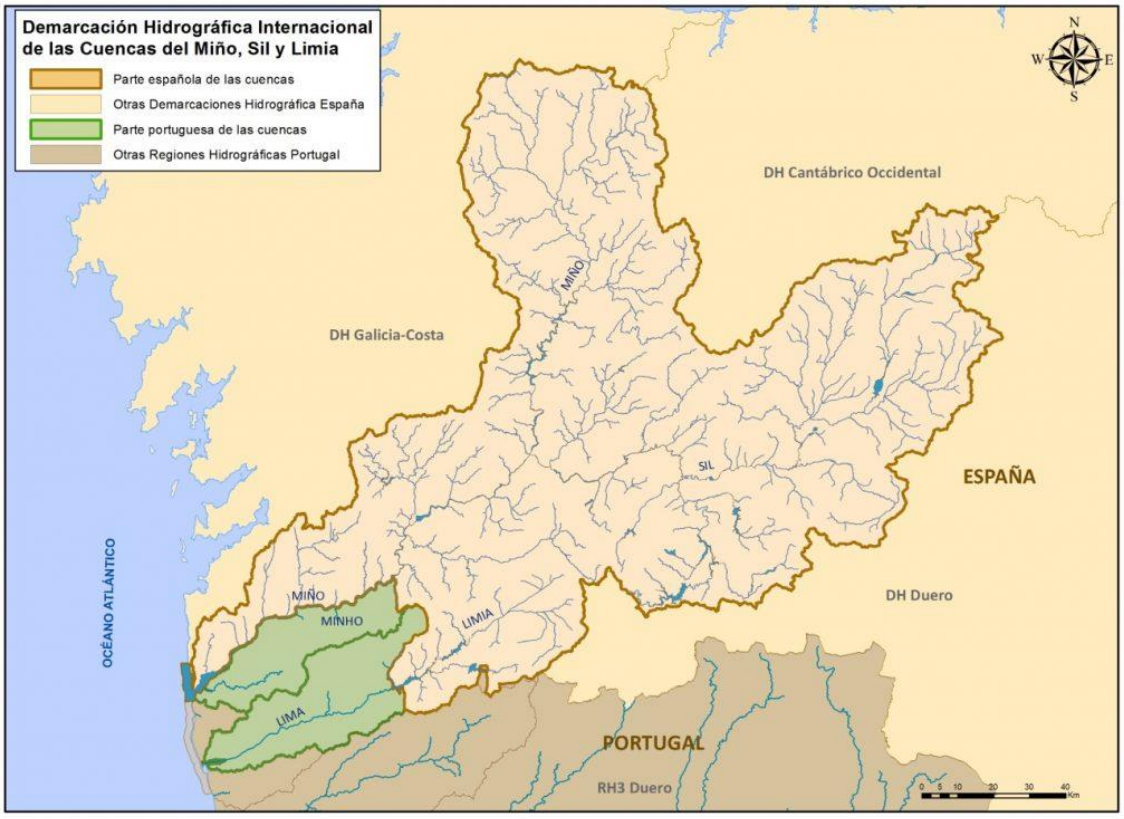
For 112 kilometres, the river forms part of the national border line between Spain and Portugal, in a region of narrow canyons. It formed a historical barrier to invasions, creating a cultural/linguistic divide. In these isolated areas, where the Aldeadavilla Dam is located and impacting the river continuity, there are two protected areas: the International Douro Natural Park International Douro Natural Park (on the Portuguese side) and the Arribes del Douro Natural Park (Arribes del Duero Natural Park) on the Zamoran margin.

The Douro fully enters Portuguese territory just after the confluence with the Agueda River; once the Douro enters Portugal, major population centres are less frequent along the river. Except for Porto and Vila Nova de Gaia at the river mouth, the only population centres of any note are Foz do Tua, Pinhão and Peso da Régua. Tributaries here are small, merging into the Douro along the canyons; the most important are Coa, Tua, Sabor, Corgo, Tavora, Tamega and Sousa. None of these small, fast-flowing rivers is navigable.

Fifteen dams have been built on the Douro to regulate the water flow, generate hydroelectric power, and allow navigation through locks. Beginning at the headwaters, the first five dams are in Spain: Cuerda del Pozo, Los Rábanos, San José, Villalcampo and Castro Dams. The next five downstream are along the Portuguese-Spanish border; the first three are owned and operated by Portugal: (Miranda, Picote and Bemposta Dams), while the next two belong to Spain: (Aldeadávila and Saucelle Dams).

The last five dams in Portugal are built to support navigation; Pocinho, Valeira, Régua, Carrapatelo, and Crestuma–Lever dams. Vessels with a maximum length of 83 metres and width of 11.4 metres t) can pass through the five locks. The highest lock, at Carrapatelo Dam, has a maximum lift of 35 metres. The waters of Pocinho lake reach 125 metres above sea level. Unannounced releases of water from upstream Spanish dams occasionally causes navigation issues in these locks.

2.4 The Minho/Lima River Basin



Minho River, also called Miño (in Spain), has a length of about 330 km. The source of the river lies in Spain north of Lugo in Galicia, in a place called *Pedregal de Irimia*. about 695 metres above sea level. After it flows underground it surfaces in the lagoon Fonmiña (in the municipality of A Pastoriza). This lagoon located in the province of Lugo, is historically considered as its birthplace. The Minho flows through the Galician massif and Cantabrian Mountain range and the mountains of Leon, two of the areas of the Iberian Peninsula with the highest precipitation, being one of the main rivers of the Atlantic slope.

After flowing through canyons first until the valley widens north of Ourense. In the last 70 km, the river defines the border between Portugal and Spain. By discharge, it is the fourth river of the Iberian Peninsula, after the Douro, Ebro and Tagus. The Minho is used for providing water to vineyards and farmland and is used to produce hydroelectric power.

Along its length, it has the following reservoirs: Belesar with 654 cubic hectometres, Peares with 182 cubic hectometres, Velle with 17 cubic hectometres, Castrelo with 60 cubic hectometres and Frieira with 44 cubic hectometres.

About 20 kilometres north of Ourense at Os Peares, the Minho, with an average discharge of 102 m^3/s, receives the waters of its main tributary, the Sil, with 184 m^3/s. Passing Ourense, there is one major dam at Frieira near the town of Ribadavia, which is famous for its Ribeiro DOP wine (called after the name of the region). There the Minho averages 316 m^3/s of discharge. Later on, the river flows in a southwest direction until after 260 kilometres through Galicia reaching the Portuguese border near Melgaço.

From that point onward the Minho forms the border between Portugal and Spain for about other 70 kilometres, mainly flowing west. The valley is a lush, green agricultural area where the land is used to produce corn, potatoes, cabbage, even kiwi fruit, or just grass, depending on the time of year, and everywhere edging the fields, rivers and gardens, wherever there is space, the vines which produce the light, slightly sparkling “Vinho Verde” and the Ribeiro wine, both peculiar to this area. The very best of these wines, Alvarinho in Portuguese or Albariño in Spanish and Galician, is produced in the area around Monção, Arbo and Melgaço.

Passing the medieval towns of Melgaço and Monção, the Minho divides the Spanish Tui and Portuguese Valença do Minho, towns that guarded an important bridge for road and rail. Both towns preserve fortifications and are national monuments. The Minho reaches the Atlantic between the Galician A Guarda and the Portuguese Caminha, with an average discharge of 420 m^3/s.

All the upper course of the river where it flows its first 64 kilometres across the plateau of Lugo (Terrachá), has been declared a Biosphere Reserve. The main tributaries are the Sil, Neira, Avia, Barbantiño, Búbal, Arnoya rivers.

The Minho river has become one of the most important glass eel fisheries on the Iberian Peninsula. Management of the eel stock is under the responsibility of the “Ministério da Agricultura, do Desenvolvimento Rural e das Pescas”. Two kinds of laws are implemented in the Spain concerning glass eels fishery. An agreement between Portuguese and Spanish

authorities allow to fish glass eels during defined periods of time per year using a stow net.[ix] Glass eels enter year-round. However, most of these entries occur between November and April, depending on weather conditions. Eel density drops as we move farther away from the river's mouth towards the Upper Minho, and average size rises.

The river Minho and its estuary were once considered the fish farms of Portugal, thanks to the high biodiversity and rich variety of fish with economic value. It is designated as a Site of Community Interest (SCI) and its estuary as a Special Protection Area (SPA), within the Natura 2000 Network.

Pressures on the ecological quality of the River are stemming from pollution from both point and diffuse sources, water extraction, flow management, morphological alterations, land use, and other impacts from human activities.

The basin is heavily managed with more than 100 dams, which are mainly used for hydropower generation. For the period 1978-2012, the repercussions of the liberalization of the Spanish energy market in 1998 were studies (Cláudia M. d. S. Cordovil). This study concludes that the dams in the Miño-Sil river basin had no influence on the natural river flows over the period of interest. Moreover, despite being used so heavily for hydropower, the liberalization of the Spanish energy market did not increase the degree of intervention in river flows. Indeed, for three reservoirs in particular the correlation between inflow and outflow improved. It is also clear that for the reservoirs considered, the mean water storage and monthly inflows were lower during 1998-2012 than during 1978-1997.

From a management perspective the river Minho is looked at in combination with the River Lima. (Portuguese *Rio Lima*; Galicisch *Río Limia*) The Lima has a length of about 108 km and its source is on the mountain Talariño, in the Spanish province Ourense. The river flows through the city of Xinzo de Limia after which it is named. At the village of Lindoso the river enters Portuguese territory flowing through Ponte da Barca and Ponte de Lima. Ponte de Lima is one of the most characterful and charming towns of northern Portugal, if not the whole of the country. The town sits on the southern banks of the slow-flowing Lima River, and this location has been the main river crossing since the Romans constructed a bridge in 1AD. After another 67 km on Portuguese territory the river discharges in the Atlantic Ocean near the city of Viana do Castelo. During Roman times the river was referred to as *Lethe* or *Oblivio*

In the upper parts the river is flowing through a gentle landscape; the highest point with 1,154 metres is the Faro de Avión. The landscape is further characterised vineyards and orchards, and many natural sites of great value, such as Pena Corneira and the banks of the Miño, Arnoia and Avia. The vegetation is the result of the combined action of Nature and human influence. The fertile soil and mild climate offer good opportunities for agriculture and especially wine production but also for the development of a diverse flora and fauna. The different varieties of O Ribeiro gave these lands' wines a reputation of quality that was already recognised in times of the Roman Empire.

The River is also called Lethe- the River of Forgetfulness by the Romans who believed that those who crossed would forever lose their memory.

3. TOWARDS A TRANSBOUNDARY RIVER BASIN APPROACH

3.1 River Basin Approach

A river is a living organism with its specific flora and fauna that depend on the morphology of the river and the quality, quantity and dynamics of the water flow. The water quality and flow dynamics of the river are inseparably related to the land uses in the river basin and land use changes, morphological changes and pollution are all reflected in the ecological quality of the river as a whole.

According to the definition used by the EU a River Basin is "the area of land from which all surface run-off flows through a sequence of streams, rivers and, possibly, lakes into the sea at a single river mouth, estuary or delta".
(*https://www.eea.europa.eu/themes/water/wise-help-centre/glossary-definitions/river-basin)*

Land uses in the river basin steer for a significant part the discharge patterns of the river. Large scale agricultural lands for instance with efficient drainage systems have limited capacities to store and retain water during periods with heavy rainfall leading to quick above surface run off and high peak discharges in rivers. The same counts when large surfaces are paved with no chance for rainwater to percolate into the soil. Natural areas on the contrary can retain water more easily resulting in the replenishment of groundwater, storage of water in wetlands and other low lying areas and reduced peaks in water discharge patterns. More obvious; pollution from either point or non-point sources in the upper reaches of the river will have an impact on all downstream laying parts of the river.

Managing River Basins also implies managing groundwater. Although invisible groundwater streams have a big impact on both the qualitative and quantitative aspects of surface water. Delineating river basins will therefore need to include an analysis of groundwater flows. Land uses in ground water recharge areas impact the quality of surface waters in areas where ground water wells up again. In areas with high levels of nutrients or other forms of pollution in the soil water that percolates into the ground will pick up these pollutants and carry these to where this groundwater wells up or is pumped up.

Rivers are more and more considered as living organisms and as the main artery of a landscape. This holistic view on rivers and river basins is further fuelled by the so called "landscape approach'. (www.globallandscapesforum.org). The Landscape Approach provides a broad framework that can fully integrate agriculture, the natural environment, different livelihood systems and social interactions

3.2 Integrated Water Resources Management

The EU Water Framework Directive is based on the principles of **Integrated Water Resources Management** (**IWRM**) as defined by the Global Water Partnership (GWP) . The GWP defines IWRM as follows: "IWRM is **a process** which promotes the coordinated development and management of water, land and related resources, in order to maximize the

resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems." In other words: IWRM aims at integrating the three E's:

- **Social equity**: ensuring equal access for all users (particularly marginalised and poorer user groups) to an adequate quantity and quality of water necessary to sustain human well-being.
- **Economic efficiency**: bringing the greatest benefit to the greatest number of users possible with the available financial and water resources.
- **Ecological sustainability**: requiring that (aquatic) ecosystems are acknowledged as users and that adequate allocation is made to sustain their natural functioning.

IWRM is based on the understanding that water resources are an integral component of the ecosystem, a natural resource, and a social and economic good.

There are a number of reasons that make the integrated approach a valuable and globally accepted principle to water resources management. First of all it acknowledges the central role water plays for nature, food production, industry and households and it incorporates social and environmental considerations in policy making and management. Another important characteristic of IWRM is the required involvement of stakeholders and sectors in decision making. It helps consequently to make balanced decisions about investments and policy directions. The promotion of IWRM is therefore an important element of SDG 6; "clean water and sanitation". According to the UN- SDG 6 Implementation Tracker, the degree for the implementation of IWRM in Spain is 82 % and in Portugal 74%. (https://www.sdg6data.org/indicator/6.5.1)

Integrated Water Resources Management is based on the so called "Dublin Principles" agreed upon during a meeting of international water and environment experts in Dublin in January 1992. The Dublin Statement on Water and Sustainable Development recognises the increasing scarcity of water as a result of the different conflicting uses and overuses of water. The declaration sets out recommendations for action at local, national and international levels to reduce the scarcity, through the following four guiding principles:

1. Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment
2. Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels
3. Women play a central part in the provision, management and safeguarding of water
4. Water has an economic value in all its competing uses and should be recognized as an economic good.

The statement that water should be recognized as an economic good has drawn criticism and has led to Resolution A/HRC/15/L.14,of the UN Human Rights Council reaffirming an earlier General Assembly resolution (64/292 of 28 July 2010) which clarifies that *the human right to safe drinking water and sanitation is derived from the right to an adequate standard of living and inextricably related to the right to the highest attainable standard of physical and mental health, as well as the right to life and human*

dignity . This step was seen as a decisive step towards the recognition of water as universal right.

Integrated Water Resources Management is a management approach to water resources in general and the outcome is not only geared towards river basin management plans. Instead the principles of IWRM can also be used to produce for instance an agricultural water allocation plan, a river restoration plan, a drinking water strategy or a flood protection strategy.

3.3 The EU Water Framework Directive

The European Water Framework Directive adopted in 2000 as the primary legislation on Integrated Water Resources Management in the European Union requires integrated management of water and land in ***river basins.***
Basic principles of the WFD include:

- Overall aim is to achieve "good status" of all water bodies by 2027
- Good status means ecological, physical and chemical status;
- This requires a systematic analysis of all pressures on water bodies
- And the design of measures to address key pressures
- Recovery costs for water services- to promote efficient water use.
- And it requires stakeholder involvement in the planning process

The adoption of the WFD has introduced significant changes in the way water management is applied in many countries, both at institutional level and at the way we look at water resources and especially at rivers and river systems.

Based on the EU WFD member states are obliged to develop River Basin Management Plans in which steps towards achieving good ecological status of water bodies are clarified. Water bodies are river stretches or other surface waters like wetlands, lakes and canals that share similar physical, biological and chemical attributes.

For each of these water bodies an analysis of the current physical, biological and chemical status has to be made as well as an analysis of the pressures and impacts. This forms the basis for the design of the Programme of Measures in which the actions that are required to achieve good ecological status have to be described.

Based on the analysis of the current status the water body can be designated as "heavily modified". This label is given to water bodies if it has been modified by physical alterations to such an extent that changes are irreversible and Good Ecological Status is no longer achievable. In these cases, the objective is to achieve Good Ecological Potential.

In case of transborder rivers the EU-WFD requires countries to cooperate and coordinate the management on shared river basins. The WFD does not require the establishment of transborder river basin management organisations.

Looking at the recommendations from the European Commission upon assessing the first cycle of RBMPs from Portugal and Spain the Commission comes to the following conclusions and findings.

There has been no joint implementation of Programme of Measures (PoMs) in Portugal and Spain. In some cases, the Portuguese RBMP contains an overall measure which relates to Spanish authorities implementing their RBMP in order for the surface and groundwater at the border to be in good ecological status.

As the Portuguese Water Authorities report, for the new planning cycle (2015-2021), Portugal and Spain have agreed at the December 2013 plenary session of the Commission for the Implementation and Development of the Albufeira Convention (CADC), to enhance communication and coordination in the various stages of the process, in particular on:

- Updating the delimitation of national and trans boundary water bodies;
- Updating the classification systems;
- Status assessment of national and trans boundary water bodies;
- Defining common environmental objectives for national and trans boundary water bodies and related compliance timeframes;
- Harmonisation of PoMs;
- Definition of common elements for public participation processes of each RBMP (eg. Non-technical Summary, joint public meetings, etc.);
- Coordination on pressures and impacts, water body status and initial objectives (planned for October 2014).

Some improvements are seen in the second cycle of RBMPs but the problem remains that there is no shared vision on the rivers basins as a whole which translates into a lack of synchronisation of the Programme of Measures for the River Basins. This lack of harmonisation of the PoMs can be attributed to different approaches for assessing the status of water bodies, for not using the same climate forecasting models, for not using the same approach for assessing pressures and impacts and for using different approaches to ecological flow calculation.

The two countries are currently working on the 3rd cycle of RBMPs and to what extent the problems identified above will be addressed will become clear once presented.

3.4 Ecological flow

The Water Framework Directive acknowledges the critical role of water quantity and dynamics in supporting the quality of aquatic ecosystems and the achievement of environmental objectives. To address the unclarities and questions concerning the definition of ecological flows and its relation with the objectives of the EU Water Framework Directive the Commission issued in 2015 a guidance document called “Ecological Flows and the Implementation of the Water Framework Directive”. (Guidance Document 31) [x]

The Guidance document presents the following definition of “ecological flows”: *“an hydrological regime consistent with the achievement of the environmental objectives of the WFD in natural surface water bodies as mentioned in Article 4(1)*”.

Considering Article 4(1) of the WFD, the environmental objectives refer to:

- non deterioration of the existing status
- achievement of good ecological status in natural surface water body,

- compliance with standards and objectives for protected areas, including the ones designated for the protection of habitats and species where the maintenance or improvement of the status of water is an important factor for their protection, including relevant Natura 2000 sites designated under the Birds and Habitats Directives (BHD).

Where water bodies can be designated as heavily modified water bodies and/or qualify for an exemption, related requirements in terms of flow regime are to be derived taking into account technical feasibility and socio-economic impacts on the use that would be affected by the implementation of ecological flows. The flow to be implemented in these water bodies is not covered by the working definition of ecological flow and requires a specific approach with socio-economic issues playing a more dominant role.

To be consistent with the environmental objectives in article 4(1), the definition of Eflows should be the result of a technical/scientific process with no consideration of the associated socio-economic impacts. These latter impacts should only be considered when deriving the flow regime to be implemented in Heavily Modified Water Bodies (HMWB) or water bodies subject to an exemption, consistent with the conditions set by the WFD.

Cost-effectiveness and impacts on important uses such as hydro power production must be taken into account. However, one has to bear in mind that ecological flow is just one possible mitigation measure, improving of morphology by e.g. habitat restorations just as important and often more effective.

Member States are encouraged to make best use of the shared understanding of Eflows in all steps of the WFD process. The site-specific Eflows implementation might also take into account other aspects like national or regional legislation, specific environmental values or ecosystem services, while at the same time respecting the obligations under the WFD, Habitats Directive and other EU Directives and international commitments (World Heritage, Ramsar Convention, etc).

Given their importance for the achievement of environmental objectives and the potential impacts of their related measures on users, participation schemes are particularly crucial for the achievement of ecological flows.

An evaluation carried out in 2017[xi] showed that despite the guidance document challenges with defining and calculating Eflows still exist especially when it comes to a commonly agreed methodology for Eflow calculation. More efforts are required, namely in the: i) the development of a verifiable link between ecological flow regimes and biological indicators and ii) the implementation of an ecological flow regime and the assessment of its effects in the water bodies status.[xii]

According to the evaluation the Commission has asked Spain to “avoid presenting the maintenance of ecological flow in new dams as an ecological benefit of the dam, while they should be considered as a mitigation measure”. It also appeared that only four countries (Cyprus, Portugal, United Kingdom, Spain), are evaluating the ecological effects of the ecological flows regimes.

For the Mediterranean rivers it is important to note that these rivers have a high flow regime variation combining dry and wet seasons with sometimes sudden peak discharges.

These specific circumstances must be taken into consideration when defining Eflow and the programme of measures.

3.5 The role of Wetlands

Wetlands play an important role in improving the sustainability of water resources management and in improving the resilience and ecological quality of rivers through the provision of a series of ecosystem services. These include purification of water from nutrients and other pollutants, retaining water during periods of high precipitation and releasing of water during periods of drought.

Ecosystem Services provided by healthy rivers and wetlands:

Provision of Food	Fish, Waterfowl, Mussels, Clams, Rice.
Water purification/waste water treatment	Healthy wetlands and rivers break down pollutants and improve water quality
Flood mitigation	Healthy river basins absorb and store rainwaters and reduce floods.
Drought mitigation	By absorbing and storing rainwaters drought periods can be overcome and ground waters are recharged
Provision of habitat	Healthy rivers and streams provide habitat for numerous species
Soil fertility maintenance	Healthy river floodplains renew soil fertility though regular flooding
Nutrient delivery	Rivers carry nutrient rich particles to deltas maintaining their fertility
Maintenance of coastal salinity zones	Freshwater flows maintain the fresh water flows in deltas and estuaries
Provision of cultural and spiritual values	Natural river basins are sources oof inspiration and cultural and spiritual values enhancing the quality of human life
Recreational opportunities	Fishing, boating, hunting, wildlife observation, picnicking etc
Biodiversity conservation	The diversity of natural river basins provide good conservation conditions to a wide variety of species

Adapted from the Ramsar Convention

4 INTERNATIONAL AGREEMENTS IN WATER RESOURCES MANAGEMENT

4.1 Convention on the Protection and Use of Transboundary Watercourses and International Lakes.

The Convention on the Protection and Use of Transboundary Watercourses and International Lakes, also known as the Water Convention, is an international environmental agreement and one of five UNECE's negotiated environmental treaties. The Convention was adopted in 1992 and entered into force in 1996. The purpose of this Convention is to improve national attempts and measures for protection and management of transboundary surface waters and groundwaters.

The Convention requires states to, 'prevent, control and reduce transboundary impact, use transboundary waters in a reasonable and equitable way, and ensure their sustainable management'. On the international level, Parties are obliged to cooperate and create joint bodies. The Convention includes provisions on: monitoring, research, development, consultations, warning and alarm systems, mutual assistance and access as well as exchange of information. Both Portugal and Spain have ratified the treaty.

The Convention recommends the establishment of joint river basin management bodies as an important element of improving the management of transboundary rivers. At their second meeting the State Parties decided to help countries in establishing joint bodies, as required by certain provisions of the Convention. At the fifth session of the meeting of the parties in November 2009, a Guide to implementing the Convention was adopted.

Under the Convention the Working Group on Integrated Water Resources Management is established. The focus of this Group are the intersectoral activities related to the integrated management of transboundary water resources. Activities focus on preventing damage to the environment, promoting the ecosystem approach in the framework of integrated water resources management, and ensuring conservation and possibly, restoration of water-related ecosystems. Further efforts include promotion of the concept of payments for ecosystem services, prevention of accidental water pollution, and adaptation to climate change in the transboundary context, including floods and droughts management.

In 1997, more than one hundred nations joined together to adopt the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (UNWC)—a flexible and overarching global legal framework that establishes basic standards and rules for cooperation between watercourse states on the use, management, and protection of international watercourses. The convention entered into force on August 17, 2014.

The UNWC governs the utilization, management, and protection of international watercourses. The convention defines a watercourse as a single unit of surface and underground waters that includes the main river, its tributaries and distributaries, and any connected lakes, wetlands, and aquifers. The UNWC requires states to use international watercourses in an equitable and reasonable manner consistent with their protection. The goal

is to utilize these resources in an optimal and sustainable way, while paying special regard to vital human needs and to the interests of the other watercourse states (Articles 5-7, 10).

Significant analysis has shown that the UNECE Water Convention and the UN Watercourses Convention do not contradict each other. However, as would be expected from a regional vis-à-vis a global instrument, the UNECE Water Convention on the whole provides more detail than the UN Water Convention. In particular, the obligation to establish joint agreements and related institutional arrangements is more pronounced in the UNECE Water Convention.[xiii]

4.2 Ramsar Convention

The Ramsar Convention on Wetlands (Ramsar Convention) promotes the protection and management of wetlands, requiring countries to consult with each other in relation to transboundary wetland systems or shared freshwater resources. Existing Ramsar resolutions further recognize the need for transboundary water cooperation, but available guidance only goes as far as to recommend, for example, that states jointly identify and manage transboundary wetlands, establish management regimes for shared river basins, and exchange expertise and information.

The Ramsar Convention has published various guidelines to support the implementation of the Convention and one of these is on the integration of wetlands into River Basin Management. (Handbook no 9 on River Basin Management) [xiv] The Ramsar Convention works mostly by moral persuasion and lacks detailed binding rules clarifying the rights and duties of states sharing water resources. Both Portugal and Spain are Contracting Party to the Convention.

The objectives of the Convention are implemented through the three pillars of the Convention:

1. Parties will work towards the wise use of all their wetlands; This implies that Parties commit themselves to identify the distribution and status of the wetlands in the country; the services they each provide and to prioritise them for conservation and management. It also implies that parties ensure that their legislation is compatible with wetland conservation and wise use.
2. Parties will designate suitable wetlands for the list of Wetlands of International Importance (the “Ramsar List”) and ensure their effective management; (see https://rsis.ramsar.org/). This also includes the obligation to Draft and implement management plans that include maintenance of the full range of services that a wetland site provides
3. Parties will cooperate internationally on transboundary wetlands, shared wetland systems and shared species.

See Annex 1 for Ramsar sites that could be identified as having a direct relation with one of the transboundary rivers between Portugal and Spain.

4.3 The UNE Freshwater Strategy 2017 – 2021

The UN Freshwater Strategy aims to unlock the potential of integrated collaboration on freshwater issues globally. The Strategy has a clear link with the Sustainable Development Goals with a focus on SDG 6; Clean Water and Sanitation. Strategic priorities of the Strategy include protecting and restoring freshwater ecosystems (SDG target 6.6) and advancing Integrated Water Resources Management (SDG target 6.5).

The UN Deputy Secretary General described SDG 6 as the 'docking station' for all aspects of sustainable development. Agriculture is seen as one of the main causes of water scarcity. It accounts for 70% of all global freshwater withdrawals (for irrigation, livestock, and aquaculture) and has acquired a reputation for inefficiency.

4.3 OECD Water Governance Principles

It is important to note that successful IWRM and consequently the successful implementation of the EU WFD and transboundary river basin management can only be achieved through adequate governance structures. This is an often forgotten aspect in water management. **Water governance** is "the set of rules, practices, and processes (formal and informal) through which decisions for the management of water resources and services are taken and implemented, stakeholders articulate their interest and decision-makers are held accountable" (OECD, 2015a).

Therefore, the establishment of Basin Committees that oversees the various plans and projects in a certain river basin is promoted. In cases where rivers are crossing state borders these basin organisations are international with representatives from the countries that share a river basin. Mostly these basin organisations have a coordinating role as the prime responsibilities for water resources management remain in the hands of the national governments.

Since 2010, the OECD has provided evidence on the main governance gaps hindering water policy design and implementation, and suggested a set of policy responses and good practices for overcoming them. The "OECD Multi-level Governance Framework: Mind the Gaps, Bridge the Gaps"[xv] was developed as an analytical framework and tool for policymakers to identify and bridge governance challenges that affect, to a greater or lesser extent, all countries, regardless of their institutional setting, water availability or degree of decentralisation. The analysis looks at gaps on the following governance issues: Funding, Accountability, Capacities, Policies, Information and Administration.

Coping with current and future challenges in water management requires robust public policies, targeting measurable objectives in pre-determined time-schedules at the appropriate scale, relying on a clear assignment of duties across responsible authorities and subject to regular monitoring and evaluation. Establishing an effective water governance structure is essential for contributing to the design and implementation of such policies, sharing responsibilities across levels of government, civil society, business and the broader range of stakeholders who have an important role to play alongside policy-makers.

The OECD Water Governance Principles consider that water governance systems (more or less formal, complex, and costly) should be designed according to the challenges they are required to address. This problem-solving approach means that "forms" of water governance should follow "functions" of water governance. Structuring, institutionalising, and/or formalising institutions should not detract from the ultimate objective of delivering sufficient water of good quality, while maintaining or improving the ecological integrity of water bodies. This also implies taking into account Principle 2; manage water at the appropriate scale(s) within integrated basin governance systems to reflect local conditions, and foster co-ordination between the different scales.

4.4 Global Water Partnership

The Global Water Partnership is a multi-stakeholder action network with over 3000 partners worldwide including 16 from Spain and 3 from Portugal. The GWP aims to leverage global policy frameworks on water management and to bring voices of water to the table "and get things done". (https://www.gwp.org/)

GWP's vision is to advance governance and management of water resources for sustainable and equitable development. GWP mobilises action on the global water crisis through a unique combination of social capital, shared values, credibility within the global water community, bottom-up orientation, and expertise. Being a network of networks, the GWP ensures the 'voices of water' can influence local, national, regional, and global development priorities.

The Strategic Priorities are:

1. Provide Water Solutions to Development Solutions
2. Catalyse Climate Resilient Development
3. Enhance Transboundary Cooperation.

The GWP endorses the IWRM as a guiding principle or water resources management. *Integrated water resources management is based on the equitable and efficient management and sustainable use of water and recognises that water is an integral part of the ecosystem, a natural resource, and a social and economic good, whose quantity and quality determine the nature of its utilisation*

The Portuguese Water Partnership (http://www.ppa.pt/) is one of the 3 Portuguese members. The mission of the Portuguese Water Partnership's is to promote an effective link between professionals, institutions and companies in order to project the knowledge and skills of the Portuguese water sector in the world, and to catalyse opportunities in international markets and in the area of cooperation within the framework of the development of sustainable projects in line with the Sustainable Development Goals.
The main objectives of the PWP are:

- Promote the sharing of knowledge and experience among Portuguese companies interested in internationalization

- Identify and support new opportunities for the development of projects and initiatives in global markets
- Promote dialogue between partners and international institutions and establish multipurpose partnerships
- Promote innovation in the water sector, facilitating cooperation between companies and research centres
- Advance the establishment of a forum for reflection on future challenges

One of Spain's 16 members is the Mediterranean Network of Basin Organisations. MENBO is a Regional Network that promotes an integrated water resources management at the river basin level, as an essential tool for sustainable development. It is a regional network inside INBO (International Network of Basin Organisations). MENBO seeks to improve relationships among organisations in charge of water management in the Mediterranean region.

5 RHINE AND SAVA

5.1 Introduction.

In this chapter we will look how two transborder river basin organisations are dealing with issues of transborder river basin management ; the International Sava Basin Commission and the International Commission for the Protection of the Rhine and whether they can serve as a model for the Douro and other transborder rivers.

5.2 International Commission for the Protection of the Rhine

5.2.1 Brief history

In the second half of 19th century pollution levels of the Rhine increased sharply because of the rapid growth of industry and a growing population. Due to the increasing pollution, the Dutch in their position furthest downstream felt their very existence in danger, as they use Rhine water for their drinking water supply and for irrigation in agriculture. Rhine water was also used to flush the polders in order to prevent the polder soils and waters from silting.

After many unsuccessful attempts from the Netherlands to interest the governments of France and Germany in the problem of the pollution the Rhine Salmon Treaty was signed in 1885. On 26 August 1948, the Salmon Commission concluded in Basel that Rhine pollution was a serious issue of concern which however went beyond the mandate of this Commission. It proposed to the representatives of the Rhine bordering countries to work towards the creation of a new commission in charge of this issue. This led to the establishment of the International Commission on the Protection of the Rhine against Pollution in 1950. The main objective was to harmonise monitoring and exchange monitoring data.

Thirteen years after its foundation the ICPR was given a status under international law. On 29 April 1963 the envoys of the German, French, Luxembourgian, Dutch and Swiss government signed the "Convention on the international Commission for the Protection of the Rhine against Pollution" in Berne.

In the course of the 20th century a number of new agreements and protocols were agreed upon each time new issues emerged and new international agreements entered into force new protocols or agreements were signed. (For instance after the Convention of 17 March 1992 on the protection and use of transboundary watercourses and international lakes and the Convention of 22 September 1992 on the protection of the marine environment of the north-east Atlantic) the with respect to managing the River Rhine.

After a fire in a warehouse belonging to the Sandoz AG near Basel on 1st November 1986, firefighting water mixed with up to thirty tons of pesticides flowed into the Rhine and killed fish and other organisms along hundreds of kilometres of the Rhine. The Sandoz accident became a turning point for environment and water protection in the Rhine catchment. During the Conference of Parties in 1987 the ministers adopted the ambitious "Rhine Action Programme" and confided its coordination and success control to

the ICPR. The objective was to reduce the discharged quantities of 40 dangerous chemicals by half within 10 years.

In 1999 a new Convention for the Protection of the Rhine was signed by the countries sharing the Rhine Basin plus the European Union. It is relevant to look at the geographical scope of the Convention:

- aquatic and terrestrial ecosystems which interact or could again interact with the Rhine;
- the Rhine catchment area, insofar as its pollution by noxious substances adversely affects the Rhine;
- the Rhine catchment area, insofar as it is of importance for flood prevention and protection along the Rhine.

The establishment of the ICPR and the signing of the Convention on the Protection of the Rhine was preceded by intensive diplomatic traffic, fierce legal battles and long negotiations and carefully working on gaining mutual trust and understanding. The Netherlands in particular has sometimes used legal instruments to force industries in the Netherlands and upstream countries to commit to the arrangements made in the Rhine Commission.

5.2.2 Aims of the Convention

According to the Convention on the Protection of the Rhine the Contracting Parties shall pursue sustainable development of the Rhine ecosystem in particular through:

- a)maintaining and improving the quality of the Rhine's waters, including the quality of suspended matter, sediments and ground water, notably by - preventing, reducing or eliminating as far as possible pollution caused by noxious substances and by nutrients from point sources (e.g. industry and municipalities) and diffuse sources (e.g. agriculture and traffic) - including that from groundwater - and pollution from shipping; - ensuring and improving the safety of installations and preventing incidents and accidents;
- (b) protecting populations of organisms and species diversity and reducing contamination by noxious substances in organisms;
- (c) maintaining, improving and restoring the natural function of the waters; ensuring that flow management takes account of the natural flow of solid matter and promotes interactions between river, ground water and alluvial areas;
- (d)conserving, protecting and reactivating alluvial areas as natural floodplains; conserving, improving and restoring the most natural habitats possible for wild fauna and flora in the water, on the river bed and banks and in adjacent areas, and improving living conditions for fish and restoring their free migration;
- (e) ensuring environmentally sound and rational management of water resources;

- (f) taking ecological requirements into account when implementing technical measures to develop the waterway, e.g. for flood protection, shipping or the use of hydroelectric power;

Other aims of the Convention are to ensure that drinking water can be produced from the Rhine, that ecological requirements will be taken into consideration in planning for flood prevention and that the quality of the North Sea will be improved.

After the EU WFD entered into force the ICPR also acts as coordination body for the River Basin Management Plan that have to be drawn up for each river basin district. The ICRP has however no formal role in drawing up river basin management plans as required by the EU-WFD but in practical terms each RBMP builds upon the goals set among others by the ICPR.

5.2.3 Achievements

Between 1987 and 1999 the ICPR developed a comprehensive international water management approach integrating qualitative and quantitative aspects of surface waters and groundwater, which has since inspired many river catchments all over the world. The experience of the ICPR in international water protection served as an example, when river basin related EU directives for environment and water protection were drafted. On 22 December 2000, the EU Water Framework Directive entered into force, continuing the approach of integrated water management which had proved successful along the Rhine.

Since the water quality of the Rhine was so bad in the 1970-ties that it was considered ecologically dead the water quality of the Rhine together with the ecological quality has significantly increased. The increase in quality began before the EU WFD entered into force but was further amplified by the WFD.

Awareness about the need to invest in improving the ecological quality of the Rhine was significantly supported by choosing the Salmon as a flagship species and the Salmon became the symbol of ecological restoration efforts. The “Salmon back in the Rhine” became a very well-known slogan across the Rhine basin countries and the Salmon became the icon of an improved ecological quality of the Rhine.

The connection of the different habitats along the Rhine from Lake Constance to the sea in order to achieve habitat connectivity has shown successes but is not completed. With a view to restoring the ecological continuity of the Rhine and its tributaries the ICPR has drafted a "Master Plan Migratory Fish Rhine" (Technical Report no. 179, PFD 4,2 MB) .

At the 6th Conference of Rhine Ministers in Amsterdam on 13 February 2020 the achievements of the expiring "Rhine 2020" were assessed and a new, forward-looking "Rhine 2040" programme with ambitious goals was adopted. The "Rhine 2040" programme is intended to reconcile the various uses with the protection of the ecosystem. It includes new, ambitious targets for different fields of action including adaptation to climate change, cope with droughts and low waters, and improve river connectivity.

Concluding it can be stated that the Sandoz disaster proved to be a pivotal wake up call for agreeing on joint actions and investments to turn the tide of ever deteriorating ecological quality of the Rhine. But this joint effort was built on a long standing culture of cooperation through which trust and understanding were created.

5.3 The International Sava Basin Commission

5.3.1 Brief history of the ISBC

On 14 December 1995 the representatives from Serbia, Croatia and Bosnia-Herzegovina signed the so called Dayton peace agreement that put an end to the 3,5 year war in and between the former Yugoslav republics. Where before Yugoslavia fell apart the Sava River was flowing through one single country its management was now the responsibility of 4 independent states; Slovenia, Bosnia-Herzegovina, Croatia and Serbia. In June 2001 the Stability Pact for South Eastern Europe launched the Sava Basin Initiative and invited the Netherlands to support rehabilitation of joint management of the River Sava next to support provided by USAID. The Dutch support was based on a pledge made during the Second World Water Forum in 2000 and focused on promoting the integration of ecosystems in river basin management.

After signing a Letter of Intent in 2001 the Sava Basin Countries signed the Framework Agreement for the establishment of the International Sava Basin Commission in December 2002 and it was foreseen that the parliaments of the respective countries would ratify the agreement by the end of 2003. This however lasted until June 2005 when the International Sava Basin Commission was officially established. Given the legal complexities of establishing an international commission this was considered quite an achievement and would not have been possible without considerable international pressure and support. Various issues were extensively discussed in the period between the Letter of Intent and the signing of the agreement not the least of them where the seat of the Commission would be. Croatia had the best offer and so it became Zagreb.

In between the signing of the Framework Agreement and the ratification by the different parliaments the Interim Sava Basin Commission was working in line with the organisational set up and duties agreed in the Framework Agreement. Work of the Interim Commission was focused on a number of protocols that further needed to clarify the work and duties of the Commission including protocols on navigation and on hazards and pollution.

During the process the Netherlands provided input on organisational and institutional aspects of setting up a basin organisation and facilitated meetings of the “Rehabilitation and Development Working Group” that provided technical support to the Interim Commission. The Rhine Commission was used as an example and representatives of the Rhine Commission were invited to introduce their way of working and organisational set-up.

During the period towards the establishment of the Sava Basin Commission it was decided to establish a number of working groups to support the work of the Interim Commission including a working group on ecology and IWRM and a working group on flood prevention. However, the only working group that was established was the working group on navigation.

An important topic during the process to establish the Commission was its relation with the International Commission for the Protection of the Danube River (ICPDR). Because the Sava is part of the Danube catchment the Sava is part of the overall strategies for the Danube catchment. Next to its relation with the ICPDR also the relation with each of the basin countries needed to be clarified as each of these countries remained to be responsible for their part of the Sava River.

Despite all the hurdles that had to be taken the signing of the Framework Agreement was the first international agreement the former Yugoslav republics signed after the war. An important incentive for signing the agreement was the wish of the participating countries and especially Croatia and Bosnia-Herzegovina to resume navigation on the Sava and to increase the status of the Sava for navigation involving dredging and cutting of meanders. The Dutch input aimed at integrating ecological concerns into the work of the Commission did not gain much support from the Sava Basin countries.

5.3.2 Aims of the Sava Basin Commission

According to the website of the Sava Basin Commission the Commission has the following mission.

Establishment of an international regime of navigation on the Sava River and its navigable tributaries, which includes provision of conditions for safe navigation on the Sava River and its tributaries, inter alia, by:

- adopting the plan on marking, maintenance and development of navigable waterways;
- adopting the unified rules of navigation, taking into account specific conditions of certain parts of the navigable waterways;
- adopting the technical rules concerning inland navigation vessels and rules on obtaining the boat master certificates;
- establishing the River Information Services;

Establishment of sustainable water management, which includes cooperation on management of the Sava River Basin water resources in a sustainable manner, including integrated management of surface and ground water resources, in a manner that would provide:

- water in sufficient quantity and of appropriate quality for the preservation, protection and improvement of aquatic eco-systems (including flora and fauna and eco-systems of natural ponds and wetlands);
- water in sufficient quantity and of appropriate quality for all kinds of use/utilization;
- protection against detrimental effects of water (flooding, excessive groundwater, erosion and ice hazards);
- resolution of conflicts of interest caused by different uses and utilizations; and
- effective control of the water regime;

Undertaking of measures to prevent or limit hazards, such as floods, ice, droughts and accidents involving substances hazardous to water, and to reduce or eliminate related adverse consequences.

5.3.5 Achievements

Nature conservationists and scientists consider the Sava River to be one of the "crown jewels" of European nature. It is one of the few rivers where the floodplains are largely intact, hosting the largest complex of alluvial floodplain wetlands and the largest lowland forest complex. Extensive livestock breeding with a focus on meat production is still an important land use. The fact that the Sava was also one of the core areas in the Pan European Biological and Landscape Diversity Strategy was the main reason for the government of the Netherlands to support the establishment of the Sava Basin Commission and to ensure the biodiversity aspects were taken into account in the future management. Ecological Network

According to the "*Sava White Book*[xvi]*"* the Sava performs much better in the hydrological classification than other major rivers: 53% of it falls into class 2 (*slightly modified)*, predominantly in its long free-flowing middle stretch and some in its free-flowing upper stretches. A total of 4% is rated as class 1, *near-natural*: this comprises a long gorge stretch on the upper Sava and some very short stretches in the meandering middle river reach

The ecological importance of the Sava and its floodplains is reflected by the significant number and size of protected areas; about 36% of the morphological floodplain (322,875 ha) and 64% of the Sava river course (excluding headwaters) are designated as protected areas. The most prominent are the Lonjsko Polje Nature Park in Croatia and the Obedska Bara Nature Reserve in Serbia, both of which are Ramsar sites. In addition, large stretches of the Sava and tributaries in Croatia as well as some stretches in Slovenia are Natura 2000 sites. Furthermore, the Sava basin is a pan-European biodiversity hotspot, hosting about 250 breeding bird species (e.g. little tern, spoonbill) or endangered fish species such as the huchen, the Cactus roach and the sterlet.

When starting the process on the establishment of the Sava Basin Commission it was concluded that the most urgent tool to manage the river was the design of a joint GIS system and setting up a monitoring and early warning system.

An evaluation of the flood defence system revealed several weaknesses mainly because a backlog in management as a result of the war. Given the presence of large alluvial plains cut off from the hinterland by dikes, ample opportunities were identified to restore these floodplains and create "room for the river" as a way to reduce peak water levels. Meanwhile also the International Commission for the Protection of Danube River developed a long term protection and retention strategy in which the restoration of the floodplains including those along the Sava play an important role.

Since 2005 in the last 15 years 11 major floods with a transboundary impact have occurred and affected much of the basin at the same time. In 2014 major floods struck the middle and downstream part of the Sava killing sixty people, including twenty in Doboj in the middle course of the Bosna and another twenty in Obrenovac at the Kolubara-Sava confluence in RS. The estimated overall damage was at least €3 billion.

IUCN together with the Wageningen Centre for Development Innovation and the nature protection agencies in the four Sava countries took the lead in a Life 3rd countries project titled: "Protection of Biodiversity of the Sava River Basin Floodplains" which started in 2006. The aim of this project was to work towards the creation of an ecological network along the Sava as an input to the River Basin Management Plan that had to be drafted in

accordance with the EU-WFD. The Life project produced a transborder ecological network which included a number of potential floodplain restoration sites with opportunities to store peak waves and restore biodiversity. The Sava Basin Commission rejected the invitation to become a partner in the project.

The current situation is that although some dredging to improve navigation has been carried out the river still hosts important landscape and biodiversity values. Also with respect to improving the flood safety little has been done. Various threats are hanging as a dark cloud over the Sava however. These are primarily plans to construct a vast number of hydro power dams in the river. Secondly gravel mining is taking its toll on the geo-morphology of the river and thirdly the threat of dredging and increasing navigation is still actual. Until now however funding for the dredging activities has lacked partly due to the low return on investment and also because of opposition from nature conservationists.

In 2013 the Sava River Basin Management Plan (RBMP) was published in accordance with the requirements of the EU Water Framework Directive (WFD). In October 2019 the first joint Flood Risks Management Plan in the Sava River Basin (Sava FRMP) was approved. This plan asks each Party to prepare Flood Maps for the areas identified in the Preliminary Flood Risk Assessment. Each Party shall, through the Sava Commission, inform other Parties on the Flood Maps prepared for its territory. There is no specific guidance on how to address flood risks.

The Sava River Basin Management Plan nor the Flood Risk Management Plan do embrace a comprehensive plan for the protection and restoration of the ecological integrity of the Sava River, reason why EuroNatur has published it White Book on the River Sava with recommendations for an integrated approach to flood risk management and ecological restoration.

Although the Rhine Commission is also primarily a coordination body it sets much higher ambitions in terms of biodiversity protection, nature based flood protection approach and improving the ecological status of the Rhine than the Sava Basin Commission does for the Sava.

5.4 Conclusions

The main conclusion for the two examples presented here is that the establishment of a joint management body for the shared river basin based on an international agreement between the basin countries has been crucial for coordinated planning of their national RBMPs. The drive for establishing these joint bodies has in both cases been to acknowledge that there is a joint interest in managing the river. For the Rhine it has been the understanding that a healthy river benefits downstream as well as upstream countries. For the riparian countries of the Sava River is has been the joint interest in improving the navigation and transport over the river.

This difference in focus between the two basins analysed is reflected in the level of attention paid to the environmental aspects of river management where the management plans and the Programmes of Measures for the Rhine are very much focused on restoring the river ecology. Management of the Sava River prioritises improving navigation on the river including environmentally damaging plans for dredging and river bed straightening. Having

said this it has to be understood that the Rhine has been intensively modified in the past for shipping purposes while the Sava River is still flowing in a relatively natural flow bed.

Another conclusion can also be that the establishment of a joint management body not directly means that more attention is given to environmental aspects. Whether this is the case will depend on a variety of factors including the strength of civil society organisations, the level of economic development and the level of "naturalness" of the river in question.

An important element supporting the acceptance of the input of environmental organisations in the management planning for the Rhine is the intensive cooperation between these organisations in the Rhine basin. Next to that it is also important to note that these organisations are accepted as observer in the official meetings of the Rhine Basin Committee. (https://www.iksr.org/en/icpr/about-us/observers)

Civil societies along the Sava River are much weaker as is the level of cooperation. The push for more environmental friendly management of the Sava including the push for nature based solutions for especially the weak flood defence system is coming from international organisations like EuroNatur, WWF and IUCN.

6 INTERVIEWS

In addition to the information gathered through analysing relevant documents and reports 7 interviews were held with representatives of organisations involved in or related to management of one of the shared river basins both from Spain and Portugal. In the following a summary of the main conclusions will be presented based on the answers given on the questions asked.

Question 1: Have you been or are you involved in the elaboration of the River Basin Management Plan and what is your role?

The majority of the interviewed persons were from the Basin Organisations, both in Spain and in Portugal and directly involved in the elaboration of the 3rd cycle of RBM Plans in accordance the EU-WFD.

The responsibilities with respect to the elaboration of RBMPs are shared differently in Spain and Portugal. In Spain the River Basin Organisation for each River Basin is responsible for the process while in Portugal the River Basin Organisations are providing support to the elaboration process that is coordinated and managed by the Portuguese Environmental Agency. This difference is relevant in terms of cooperation and coordination of the planning process because it implies that representatives of Spanish basin organisations need to communicate about shared management issues with their Portuguese counterparts through the Spanish Ministry for the Environment. This hampers swift and direct interaction.

Three of the interviewed persons are working for scientific organizations and one at an NGO and not directly involved in the management planning.

Question 2: What is/are to your opinion the most urgent issue(s) to be tackled in the RBMP

- Flooding; Mondego, Tejo and Douro (because of fluctuating discharge patterns).
- Pesticides and deteriorating water quality (because of the impact of agriculture) on the Tejo, Mondego, Guadiana, Lima, Minho and Douro
- Invasive species; all rivers; both fish species, (e.g. red swamp crayfish or Louisiana crawfish) and plant species.
- Erosion is mentioned for the Douro, Tejo and Mondego.
- Radioactive pollution. There are worries in PT but monitoring networks in ES do not detect radioactivity. Douro
- In PT tourism along the Douro is increasing and could cause of problem in the future if not well regulated.
- Ecological flow regimes; Douro, Tejo, Guadiana.
- Impact of Climate Change; All rivers. This was especially seen relevant in combination with the creation of ecological flow regimes. The ecological flow regime is further jeopardized by decreased water discharges, decreased water quality and increased water demands exacerbated by climate change.

- River morphology specifically mentioned for the Guadiana (but is applicable to all rivers)
- Lack of ecological quality data needed for setting ecological flows
- Lack of good and efficient cooperation in setting goals and objectives.
- Lack of implementation of Programmes of Measures was also often mentioned. The following reasons were mentioned; shattered responsibilities, lack of political will and commitment and lack of financial resources.
- One person summarized the problems to be; water quality, water quantity and connectivity.

Question 3: To what extent is cooperation with Spanish/Portuguese authorities crucial to successfully tackle this issue(s)

This question was unconditionally supported by all persons interviewed. And not only by the Portuguese experts, which is obvious, but also by the Spanish experts. This having said not all persons interviewed were satisfied with the intensity and effectiveness of the cooperation. One person promoted to abolish the Albufeira Convention and to be replaced by agreements.

In general, there was also satisfaction about the communication across the border and the exchange of information from both the Spanish as well as the Portuguese experts.

However it was more than once stipulated that there is no formalised cooperation at the basin level; it mostly depends on personal contacts in addition to the formal meetings under the umbrella of the AC. Ad hoc meetings are set up whenever considered necessary. In addition, there are a number of working groups in which transboundary issues are discussed and coordinated. (Minho and Lima Rivers). In the RBMP elaboration process monthly meetings are held (Minho, Lima). According to the information received, the issue of ecological flow definition in combination with floodplain restoration activities has been tackled in the new RBM for the Minho/Lima.

For the Guadiana River the situation is different and the cooperation and exchange of information is less intensive and considered “problematic” due to organisational and institutional differences between Portugal and Spain.

For the Douro the cooperation was considered satisfactory and relates to ecological flow development, issues related to hydropower and the elaboration of the RBMP. For the Douro river the irregular discharge patters remain to be an issue. Cooperation between PT and ES is mainly organised under the umbrella of the Albufeira Convention while in addition and next to the meetings under the AC two times per year a meeting between PT and ES representatives are held where issues related to management of the Douro River are discussed.

For the Tamega river (tributary of the Douro) establishing ecological flow is not a problem as the river has no hydro-power dams in Spain. In Portugal, there is the Torrão dam as well as Iberdrola´s Tâmega Hydropower Scheme, under construction

In general, the impression is that the cooperation, exchange of information and informal contacts between Spanish and Portuguese experts for the Minho and Lima rivers was smoother and more direct than for the Guadiana river. Also, the cooperation on the management of the Douro river seems to be smooth and direct. Whether this good cooperation translates into well coordinated and tuned RBMPs and PoMs needs to be seen.

Question 4: What is the impact of climate change and how should it be tackled in the RBM and what is the transborder component in this

Climate change is for all river a key issue to be addressed though the RBMPs. The changing climatological situation has an impact on the discharge patterns through a number of processes. First of all precipitation patterns are changing with longer dry periods and decreasing discharges. According to calculations used by the Spanish River Basin Organisation for the Douro and based on RCP 4,5[1] the precipitation is estimated to reduce with 11% in the coming 20 years. In addition, there will be more heavy rains while the evapotranspiration will increase. These combined processes have a considerable impact on the water resources of the river as at the same time the demand for water is increasing. This increases the stress on the available water resources significantly and requires a thorough planning based on input and involvement of all relevant sectors. How this will play out will have to assessed in the RBMPs.

Portugal and Spain do not use the same models when it comes to forecasting the impact of climate change, the occurrence of torrential rains and droughts and the levels of future precipitation. The elaboration of the flood protection plans is not the responsibility of the river basin committee which hampers integrated planning (Guadiana).

For the Douro (Spain) flood issues are not an important topic.

Question 5: To what extent is the Albufeira Convention helpful in addressing cross border management issues.

In general, the interviewed persons believed the Albufeira Convention has contributed to improved cooperation between Spain and Portugal. The AC has been instrumental in the preparation of the flood risk plans and in gathering and analysing hydrological data. A new protocol on the exchange of river discharge data is under development. This would be helpful in determining ecological flow and establish more regular flows consistent with the ecological requirements. In its current form the AC only indicates minimum flow quantities without a stating when these quantities are to be released. (it are quarterly released amounts)

One person was of the opinion that the AC had not brought any good.

Having said that quite a number of constraints and options for improvement were brought on the table. Next to high (annual?) level meetings between the responsible

[1] Representative Concentration Pathway (RCP) is a greenhouse gas concentration (not emissions) trajectory adopted by the IPCC. Four pathways were used for climate modelling and research for the IPCC and 4,5 is one of them.

ministers/ministries there are a number of working groups and technical meetings organised. For outsiders like NGO's there is a lack of clarity and transparency about what is going on in the frame of the AC. Involvement of NGO's is limited and the information presented on the web-site of the AC is outdated.

The website does for instance not provide up-to-date information about the main issues to be tackled for each river basin; there are no quality data available and quantity data are limited to minimum flows but do not reflect fluctuations in time. It is recommended to show (real time) monitoring data.

In addition to monitoring and showing quantitative data also the monitoring and presentation of ecological quality data is lacking and required.

Also, the fact that the main contact points for the AC are in the Ministry of Foreign Affairs is considered problematic and makes the AC too formal. In the current situation the institutional set-up hampers to quickly organise meetings to discuss exceptional situations like droughts and floods.

Especially in the context of the elaboration of the 3rd cycle of RBMPs the AC is not providing the level of support that is required. Spain and Portugal use different approaches for the assessment of the status of water bodies including water quality assessment and geo-morphological assessments and that difference is reflected in the way the Programmes of Measures are set up in both countries. Real joint management planning based on a shared vision for each transborder river basin including setting objectives for river restoration and dam removal is not the case.

The lack of a joint Convention secretariat hinders the accessibility of the Convention for those not directly involved in (transborder) water management.

When it comes to the elaboration of the RBMPs for the shared river basins it was mentioned that the responsible organisations (Environmental Protection Agency in Portugal and River Basin Authorities in Spain) are in regular contact to exchange information.

Last but not least it was also mentioned that the AC is not considered helpful in tackling issues of river pollution.

Question 6: What is your opinion about the availability of data (quality, quantity, pressures) and monitoring from Portugal/Spain?

The transparency and information provided through the web-site of the AC is evaluated in general as poor. See also above regarding the remarks about the availability of monitoring data about the discharge of the rivers (time series not available)

As mentioned above the Convention website is not very helpful in obtaining data and information about what is ongoing under the Convention. The website also lacks information about the elaboration process of the RBMPs for the transborder rivers.

In general, the persons interviewed showed little enthusiasm for the website and the information it provides.

That having said, the availability of information and data at national level through the competent authorities seems to be working well.

It was mentioned that ecological data are not easily to obtain.

Question 7: What is your opinion about the institutional and organisational aspects of transborder river management; is there a need for a cross border river basin management organisation?

Despite the fact that cooperation at the basin level is not organised through the Albufeira Convention in general the respondents were not unhappy with the current organisational and institutional set-up of transborder river basin management. Improved representation of stakeholders in the various working groups was mentioned as a way to improve stakeholder involvement. Making better use of digital platforms was another recommendation that was made to improve the functioning of the AC. In that way earl involvement of stakeholders in the planning process can be promoted.

Besides the formal and informal cooperation there is cooperation on joint management issues in the frame of projects (Minho and Lima). The need for setting up joint basin committees was mentioned once. There was general reluctance to open up the Convention to improve the Convention and include issues like climate change adaptation and joint monitoring systems. It was mentioned that this could also be organised through protocols under the AC.

Question 8: Do you have an opinion about the Albufeira Convention (what is good about it and what should be changed)

See above. In general, the respondents were very positive about the Convention and its contribution to improved transborder cooperation on the shared river basins. Recommendations for improvement are also mentioned above and include to improve joint water quality and water quantity monitoring, setting up an early warning system, joint strategy to tackling climate change impacts and synchronizing the approach to the assessment of water bodies and the elaboration of the Programme of Measures. Tackling the transborder pollution, including radio-active pollution of the Douro, is also an issue where the AC is currently considered not effective.

Question 9: What would be the role of stakeholders and is there a need to strengthen their involvement and if so; how?

The general view was that stakeholders do not seize the opportunities the procedures offer to influence the elaboration of the RBMPs.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

First of all it is important to note that the analysis of the cross border cooperation between Spain and Portugal and the conclusions drawn have taken place while the two countries are both working on the 3rd cycle of River Basin Management Plans. From the interviews and additional information received it seems that these plans will be much better tuned than the previous ones and that cross-border cooperation is improving.

No doubt the Albufeira Convention played an important role in improving cross border cooperation between the two countries. The Convention has initially helped to solve issues related to the availability of water for Portugal by ensuring the release of agreed amounts of water from Spain to Portugal. Except for the Lima River, the Convention established annual guaranteed stream flows to Portugal in normal years. It is however argued by some that the guaranteed stream flows had been set too low.

The agreed amounts are indicated per quarter and this means theoretically that the agreed amount can de released over a period of two weeks and the rest of the period water could be withhold behind dams. Or the water could be released every second day. In any case water flow from Spain from Portugal for the Douro, Tagus and Guadiana is unevenly distributed over time and rather unpredictable.

It was agreed that Spain would discharge only one third of the water that flowed into Portugal in recent decades before the signing of the Convention. And this applies only to years with “normal rainfall”. In exceptionally dry years, Spain is bound only by the “non-significant harm” rule meaning that the discharge can even be lower than one third. Only for the Guadiana River, the definition of a normal year depends also of the volume of water held back by Spain behind its dams on this river. By transferring water from northern basins to the Guadiana River Basin, Spain reduces the number of exceptional dry years in this river. The “non-significant harm” rule was expected to implicate that Spain would supply to Portugal at least the ecologically stream flows in dry years, once the CADC established them.

There are no agreed definitions and amounts of discharge for ecological flow of the transboundary rivers defined either by the CADC or included in the River Basin Management Plans that either Spain or Portugal have sent for review to the European Commission.

Besides water quantity issues the Albufeira Convention deals with issues such as exchange of information, information of the public, consultation on transboundary impacts, evaluation of transboundary impacts, pollution control and prevention, water uses, water streams, droughts and resource scarcity, assignment of rights, dispute resolution, etc.

Although the Albufeira Convention has contributed to improved cooperation and exchange of information, real cross border river basin management planning is still not the case. One could argue that the Albufeira Convention is even hampering management planning at a basin level because there is exchange of information and there are common agreements made via the CADC so why bother.

Cooperation at the basin level would also be easier if the institutional and organisational set up of water management in Spain and Portugal would be more harmonized. In Spain River Basin Authorities are bearing the responsibility for the elaboration of the RBM Plan in Portugal these organisations, although still existing, have little responsibilities and the elaboration of RBM Plans is the responsibility of the Portuguese Environment Agency. This difference in responsibilities poses also a hurdle to effective transborder cooperation.

From the interviews we learn that the elaboration process of the 3rd cycle of RBMPs happens still rather autonomously in both countries despite frequent contacts and meetings

either at basin level or in the CADC. This lack of coordination and tuning of approaches is reflected in the fact that the assessment of the status of water bodies is using different criteria, ecological flow assessment s insufficiently coordinated, ecological data gathering is insufficient, the assessment of pressures and impacts is not synchronized and assessing the impact of climate change is not sufficiently coordinated. This means that the Programmes of Measures in both countries are insufficiently coordinated and priorities are set differently.

One of the most difficult issues for the future management of the cross-border management of all four river basins is agreeing on ecological flows needed to achieve good ecological potential or good ecological status for the water bodies. Ecological flow is meant to support achieving the ecological objectives set for the identified water bodies.

It is important to set ecological objectives not only for the different water bodies of a river basin but for the river as a whole. The establishment of ecological flow is directly related to the assessment of the status of water bodies. For heavily modified water bodies ecological flow calculation differs significantly from water bodies that are not assessed as being heavily modified.

Where water bodies can be designated as heavily modified water bodies and/or qualify for an exemption, related requirements in terms of flow regime are to be derived taking into account technical feasibility and socio-economic impacts on the use that would be affected by the implementation of ecological flows. The flow to be implemented in these water bodies is not covered by the working definition of ecological flow and requires a specific approach with socio-economic issues playing a more dominant role.

In order to ensure increased and better inclusion of the ecological values in river basin management planning some believe that breaking up the current Convention to negotiate a new Convention in which the ecological aspects are treated equally as the water quality and water quantity aspects is worthwhile trying.

The impact of climate change is maybe the most prominent emerging challenge in river basin management. This global driver of transboundary problems is particularly significant with respect to increased hazards and their impacts on river basin ecosystems. Other drivers further aggravate river basin problems; for example, population and economic growth not coupled with sufficient investment in environmental projects, or the differences and potential conflicts between economic/political systems of riparian countries.

The request of some for breaking open the current Convention is also fuelled by the need to pay more attention to the impacts of climate change in the future management of the transboundary rivers. According to the IPCC, Mediterranean countries are expected to experience serious climate change. This is likely it will produce changes in precipitation, vary the flow of rivers and most likely increase the intensity and frequency of droughts and floods. The Mediterranean will be one of the most vulnerable areas in the world regarding Climate Change impacts and this presents one of the most important challenges for the environment and the rest of water-related actions.

7.2 Recommendations

The OECD Guidelines for Water Governance indicate that “forms” of water governance should follow “functions” of water governance and should choose a problem-solving approach. Structuring, institutionalising, and/or formalising institutions should not detract from the ultimate objective of delivering sufficient water of good quality, while maintaining or improving the ecological integrity of water bodies.

The OECD Principles on Water Governance are developed on the premise that there is no one-size-fits-all solution to water challenges worldwide, but a menu of options building on the diversity of legal, administrative and organisational systems within and across countries.

They recognise that governance is highly contextual, that water policies need to be tailored to different water resources and places, and that governance responses have to adapt to changing circumstances.

The Principles are rooted in broader principles of good governance: legitimacy, transparency, accountability, human rights, rule of law and inclusiveness. As such, they consider water governance as a means to an end rather than an end in itself, i.e. the range of political, institutional and administrative rules, practices and processes (formal and informal) through which decisions are taken and implemented, stakeholders can articulate their interests and have their concerns considered, and decision-makers are held accountable for water management.

Water governance according to the OECD is "the set of rules, practices, and processes (formal and informal) through which decisions for the management of water resources and services are taken and implemented, stakeholders articulate their interest and decision-makers are held accountable"

Changing the current institutional and organisational set-up of cross border river basin management by breaking up the Albufeira Convention would require a long trajectory of negotiations and deliberations. Whether the outcome of these deliberations would be better from an environmental point of view is not guaranteed.

Yet it is also clear that based on the assessments there is a need to improve cross border management of the shared river basins in order to achieve true river basin management and have agreed approaches to evaluating the status of water bodies, assessing impacts and pressures, assessing the impacts of climate change, setting up joint monitoring systems but especially to agree on an overall vision for the restoration of the ecology of the rivers. Once these preconditions are fulfilled well tuned and feasible Programmes of Measures can be drawn up.

Among the issues that are missing is how nature based solutions could help to address the environmental stresses on the rivers. Although flooding does not appear to be the biggest problem also for the lack of water and for improving the flows in accordance with ecological requirements nature based solutions can help. This would for instance require a basin wide analysis of water retention options to support a more gradual release of water after periods of precipitation surplus or after torrential rains.

From the limited assessments carried out it also appears that the integration of land use into river basin management as required by the principles of Integrated Water Resources Management is limited.

Based on all this it is recommended not to abolish the Albufeira Convention but to negotiate additional protocols to the Albufeira Convention through which for each of the cross-border river basins basin committees can be set up. These committees are to beheld responsible for designing basin wide visions for the future development of the rivers including how to organise ecological restoration. These protocols would need to include the following:

- Clear description of the mandate of each basin Committee
- Clear description of how these new institutions are embedded and the existing institutional set up of water management in both countries.
- Overview of topics to be dealt with by each Committee. These topics would at least include:
    - ✓ Joint criteria for the assessment of the status of water bodies
    - ✓ Assessment of the river ecology including an assessment of river habitats, river floodplain habitats, river species
    - ✓ Assessment of the geomorphological status of the river
    - ✓ Agreement on a joint monitoring programme

- ✓ Agreement on the use of climate models for assessing the impacts of climate change on the river
- ✓ Agreement on the objectives for river restoration including objectives for restoring river connectivity
- ✓ Agreement on water quality monitoring and exchange of information
- ✓ Setting up an early warning system
- ✓ Indication of nature based solutions for tackling problems related to fluctuating discharge patterns and water quality problems
- ✓

- Establishment of a secretariat for each Committee under the Albufeira Convention

The OECD has developed the "OECD Multi-level Governance Framework: Mind the Gaps, Bridge the Gaps" as an analytical framework and tool for policymakers to identify and bridge water governance challenges. It is recommended to use this framework to look in more detail at issues like funding, accountability, capacities, policies, information and administration.

ANNEX 1

Workshop on Cross-border water management between Spain and Portugal

Date: 10-12-2020

Brief Meeting Report

The main purpose of the workshop was to present and discuss the draft scoping report on cross border cooperation between Spain and Portugal on their shared rivers. The draft scoping report was sent prior to the workshop to the participants so that the presentation could focus on the key aspects of cross border cooperation on shared rivers and on the findings and recommendations.

To guide the discussions the workshop participants were asked to discuss three questions in two break out sessions after which the findings and opinions of the break out discussions were reported back to the plenary. This report is a summary of the findings from the two subgroups as reported to the plenary.

1. Why is transborder cooperation important to you?

- The importance of and need for cross border cooperation was acknowledged by all participants.
- There appear to be different perceptions between PT and ES about cross border cooperation. One participant stated that cross border cooperation is important to understand other's perceptions.
- ES and PT share the same problems. Water does not recognize administrative differences. Cooperation is important to overcome the differences in institutional setting between ES and PT, which are an obstacle for smooth and efficient cross border cooperation on water management, and to manage possible risks and conflicts. Also, cooperation should be enhanced, especially through the amelioration of public consultation processes.
- Cross border cooperation offers an opportunity to understand and acknowledge the underlying conflict about the distribution of the increasingly scarce water resources and to carry out research into the demands from both countries for these water resources.

2 Is the Albufeira Convention fit for purpose?

- The majority of the participants think the instruments and norms and also the wording of the Albufeira Convention are good. The problem is in the implementation of the arrangements laid down in the Convention including the fact that the Convention does not have a permanent secretariat.
- The lack of political will to use the Convention effectively was mentioned. Especially the fact that the responsibility for cross border cooperation is in the hands of the Ministries of Foreign Affairs is a problem. This results in too much bureaucracy and too complicated procedures.
- The Convention was established to solve a problem but does not encourage forward-looking nor the answer to several environmental issues.
- There are legal aspects which were never addressed by both PT and SP.

- Some participants were of the opinion that the Convention needs to be modified and modernized. The agreement on the volumes of water need revision.
- The lack of public involvement in the work of the Albufeira Convention is seen as a big problem.
- Public participation is hampered by the lack of transparency about what is on the agenda of the meetings of the Albufeira Convention and its working groups and about decisions taken.
- Even though the Albufeira Convention is a suitable tool to improve cooperation, cooperation requirements established by the WFD do not seem to be met.

3 What are your 3 recommendations for improving transborder river management

- Each river basin has its own characterisation and needs to be treated differently. Update the Albufeira Convention to enable differentiating between basins.
- More effort needs to be done to meet the Water Framework Directive requirements and to incorporate the Water Framework Directive targets into the (implementation of the) Albufeira Convention to meet challenges ahead.
- The focus on the ecological aspects of river management should increase. The lack of ecologically-based discharge patterns is an impediment for ecological restoration. Also social and economic requirements have to be taken into account.
- There is a need for improved monitoring data and integrate the data collected by both countries. Identify what is happening to the water before it reaches the border.
- Stakeholders should be involved in the work of the Albufeira Convention.
- A common vision needs to be created on the future development of the river basins and an analysis of the shared problems and possible conflict that block the realisation of this vision. Establish scenarios based on current conditions for political decision-making. The general feeling is that there is a lack of political will to seriously strengthen cross border cooperation on the shared river basins.

Participants

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ANNEX 2

Ramsar Sites in Portugal and Spain connected to one of the shared river basins

Paúl de Boquilobo. 08/05/96; Regiao Lisboa e Vale do Tejo; 529 ha; 39°23'N 008°32'W. Biosphere Reserves, Special Protection Area EC Directive; Nature Reserve. A freshwater marsh subject to winter floods of the Tejo River. The site supports characteristic aquatic vegetation and various tree species create hedges around the wetland, providing excellent cover for breeding waterbirds and other fauna. The site, an internationally important wintering site for Anas acuta, includes a major heronry. Human activities are agriculture and, in the surrounding areas, hunting. The area is important for maintaining the water table. Ramsar site no. 824. Most recent RIS information: 1993.

Paúl de Tornada (Tornada Marsh). 24/10/01; Regiao Lisboa e Vale do Tejo; 50 ha; 39°27'N 009°03'W. A small freshwater permanently flooded marsh in a small alluvial plain, with extensive reed beds and numerous areas of open water, surrounded by agricultural and forest land. It fulfils the representativeness Criterion 1 and also supports a considerable diversity of species, particularly of migratory birds, as well as some threatened fish, mammal, reptile, and amphibian species. The site is presently located on private property that is rented to the environmental organizations GEOTA and PATO, with national and local government support, and a visitors' centre and observatory are in place. Ramsar site no. 1106. Most recent RIS information: 2001.

Estuário do Tejo. 24/11/80; Regiao Lisboa e Vale do Tejo; 14,563 ha; 38°50'N 008°57'W. Special Protection Area EC Directive; Nature Reserve. An estuary, with extensive mudflats, saltmarshes, reedbeds, human-made salt pans, and reclaimed agricultural polders. The area is important for at east 16 species of wintering or staging waterbirds, numerous species of breeding birds, and the otter Lutra lutra. Human activities include fishing and shellfish collecting, and intensive hunting and agriculture outside the Reserve. Ramsar site no. 211. Most recent RIS information: 1992.

Paúl de Arzila. 08/05/96; Regiao Centro; 585 ha; 40°40'N 008°33'W. Special Protection Area EC Directive; Nature Reserve. Permanently flooded wetland including ponds and drainage channels along the **Mondego River, surrounded** by pine forest and farmland. The dominant feature is extensive reedbeds associated with Salix. The area supports important breeding and wintering populations of several species of wetland birds. The site is important for water retention and flood regulation. Human activities include fishing, reed cutting, and environmental education. Ramsar site no. 822. Most recent RIS information: 1993.

Paúl de Madriz (**Bas Mondego**). 08/05/96; Regiao Centro; 226 ha; 40°08'N 008°38'W. Special Protection Area EC Directive. Permanently inundated freshwater marsh in an open alluvial plain with extensive reedbeds, Salix, and other marshland species. A freshwater spring ensures water availability in exceptionally dry years. There is a bird sanctuary supporting important concentrations of the breeding mallard Anas platyrhynchos and other species of breeding and wintering waterbirds. The otter Lutra lutra occurs in the area. Ramsar site no. 823. Most recent RIS information: 1993.

Paúl do Taipal (Taipal Marsh). 24/10/01; Regiao Centro; 233 ha; 40°11'N 008°41'W. EC Birds Directive Special Protection Area. A freshwater permanently flooded marsh in a small alluvial plain in the **Mondego river valley**, with extensive reed beds and some open water. The wetland is surrounded by agricultural land, with rice fields downstream. It has great bird diversity and habitats of major importance for migratory birds for wintering (including more than 1% of the Mediterranean population of Anas clypeata) and resting areas (for example, transaharan passerines and palearctic birds). It also supports a significant portion of the indigenous fish species Rutilus macrolepidotus,

Barbus bacogei, and Cobitis maroccana in all life-cycle stages. The area is very important for local regulation of the underground water table and may also act as a buffer zone, contributing to increased protection of adjoining farmlands against erosion by winter floods. The marsh is publicly owned and managed, with educational activities and traditional fishing practiced within the site; conventional corn and rice cultivation takes place on private lands roundabout. Ramsar site no. 1107. Most recent RIS information: 2001.

Mondego Estuary. 02/12/05; Região Centro; 1,518 ha; 40°08'N 008°50'W; National Ecological Reserve, Important Bird Area. Comprises the estuary of the Mondego River as it passes around the Murraceira island, including intertidal areas, salt marshes, salt pans, reedbeds, rice fields and fish farms. This site is one of the main stopover and refuge areas for migrating birds along the northwestern coast of Portugal and is particularly important for waders, especially Recurvirostra avosetta and Phoenicopterus ruber. During the breeding season the site is regionally important for species such as Black-winged Stilt Himantopus himantopus and Little Tern Sterna albifrons. Aquaculture and fishing are the chief economic activities, which is focused on three migratory species of high economic value, the Sea lamprey, Allis shad, and Twaite shad. Traditional salt production has been decreasing or been transformed for aquaculture, which has led to a loss of suitable habitats for waders and other waterbirds. Potential threats come from increasing eutrophication due to intensive use of fertilisers and herbicides and the subsequent occurrence of macro-algae blooms. The neighbouring expanding harbour and the adjacent industrial region put further pressure on the site. Ramsar site no. 1617. Most recent RIS information: 2006.

Spain

The **Zújar** is a 214 km long river in Spain. It the largest left hand tributary to the **Guadiana** Embalse de Orellana. 26/03/93; Extremadura; 5,500 ha; 38°59'N 005°32'W. Special Protection Area EC Directive. A vast, artificial reservoir built for irrigation purposes and subject to seasonal variations in water level. Located at altitude, the site includes several islands and is surrounded by forests. Of particular importance for nesting birds, the islands support a major colony of Gelochelidon nilotica (500 pairs), up to 65,000 wintering waterbirds of various species, and high densities of several raptor species. Human activities include hunting, fishing, boating, and substantially increasing tourism and recreation. Ramsar site no. 597. Most recent RIS information: 1999.

FOOTNOTES AND REFERENCES

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We are an independent, not-for-profit organization with 10 members from 6 European countries. We work to raise awareness about wetland ecosystems and to advocate the sustainable use of wetlands for people and nature, in particular by linking science, policy and practice. Wetlands are the source of water that supports all forms of life. Despite our efforts to promote their importance, loss and damage to wetlands and their biodiversity continues. Our vision is a world where wetlands are treasured and nurtured for their beauty, the life they support and the resources they provide.