

CHAPTER 20

Meeting future water challenges: Spain's strengths and weaknesses

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1 THE STARTING POINT: A MIXTURE OF HISTORY AND INTERNATIONAL DEVELOPMENTS

Spain has a long and enlightened history of water resources management. In the late 19th century *regenerationist* politics and politicians saw the potential of harnessing Spanish rivers and transforming the semiarid rural landscape (Del Moral, **Chapter 9**, and Arrojo **Chapter 19**). To pull Spain out of poverty and illiteracy, there was no choice but to transform the country's barren hinterlands. Engineers, political leaders and lawyers were convinced that the development of ambitious water planning and works was a national objective that would have to be achieved by the efforts of the government.

Spain passed its first Water Act 1869, and amended it to produce the 1879 Act, which all experts agree on recognising as a monument of fine legal drafting (see **Chapter 10** by Ariño and Sastre, and Embid Irujo's **Chapter 11**). However, during the 20th century, several waves of policy initiatives responded to changing paradigms: the Gasset plan in 1902, the creation of the Ebro Basin Water Authority in 1926 and finally the draft of the first National Water Plan in 1931. These paradigms—the unquestionable usefulness of controlling the river systems with dams to mitigate floods and to provide urban water, irrigation water and hydropower—only materialised in the 1950s during the Franco regime. During the 50s and 60s about twenty new large dams were built every year (Arrojo, **Chapter 19**). Spain doubled its irrigated surface in fifty years, reaching 2.5 million hectares of surface water-irrigated land at the end of the century.

Gradually, almost another million hectares that drew on groundwater resources were added to Spanish irrigated acreage. Custodio *et al.*, in **Chapter 14**, discuss this 'silent revolution' that began in the late 60s and early 70s with the use of groundwater. Ironically the most productive agricultural water uses were those initiated by private individuals using groundwater. As a matter of fact, in the most water stressed basins, Segura and Jucar, the expansion of groundwater irrigation has reduced significantly the basins' average surface reservoir levels, and the generation of hydropower, leaving a significant part of the water works' capacity severely underutilised (Gómez, 2009).

Spain turned its back for good on a history of political unrest and isolation in 1978, when the Spanish Constitution was enacted, and in 1986, when it became part of the European Economic Community (now the European Union). By the time the 1985 Water Act was passed, as Embid Irujo points out in **Chapter 11**, the Spanish Constitution provided sufficient support to governments to administer the hydraulic public domain (all surface and ground waters) and to intervene in cases of groundwater 'overexploitation'. The leadership of the public agencies and legislators was reinforced in theory by the 1985 Water Act, but got weakened by three widely different National Hydrological Plans approved between 1993 and 2005, none of which got beyond their initial stages. Each of them seemed to lag behind the evolution of the Spanish economy and society, soon becoming obsolete and being discarded by new governments entering into office.

The 1993 attempt created serious tensions with Portugal because significant transfers out of two shared rivers were planned, completely disregarding the neighbour country's interests (see Garrido *et al.*, in **Chapter 18**). And yet this opportunity, and the anticipated mandates of the WFD, put the Iberian countries in a negotiation path which led to the Albufeira Convention in 1998, which can be considered a historical landmark for two countries with five centuries of 'peacefully' conflicting relationship.

Garrido and Calatrava, in **Chapter 13**, review the economics underlying this whole sequence of government initiatives. In times of shortage, water allocation was governed by engineering constraints and administrative regulations. Constrained by water legislation that was very generous to water-rights holders, the cost of water never reflected actual supply costs. By the beginning of the 90s, fuelled by an extreme three-year drought that had serious consequences for irrigators and millions of consumers, the economics of water resources reached the point of no return. Exchanges of water-rights were legally authorised for the first time in 1999 (see **Chapters 10 and 11**). Although water markets have never been very liquid, several administrations have recently opened public tenders to buyout water rights for irrigation at prices that would have been unimaginable even as recently as the early 90s (up to 0.19 €/m³). The EU's Water Framework Directive (WFD) went even farther in mandating that Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs. Providing cheap water and supporting water-works with weak financial support could well leave Spain in breach of European legislation after the enactment of the WFD in 2000. The entire financial design of the water sector of the 1990s became not only outdated but will become outlawed in 2010 if Spain wants to show the best records in enforcing the WFD.

The demise in the economic aspects of the water sector resulting from WFD was just one inflexion point. But there were other, as for most of the 20th century, water policy was drafted and implemented by a close-knit community of hydraulic and agricultural engineers (Del Moral, **Chapter 9**). The academic community scarcely participated in the process, with the notable exception of civil and hydraulic engineers. Dooge (1999) describes the progressive interdisciplinary analysis of hydro-projects worldwide, with the successive integration of economists, ecologists and sociologists into the process. This process arrived in Spain in the 1990s, with the arrival came the serious questioning of the engineering approach.

At the turn of the 21st century, Spanish water conflicts ran deeply along regional, political and environmental axes. The WFD set out a demanding agenda, enshrining ideas that were foreign to most traditional tenets of water management. Spain's long water-policy history was forced to change course when the WFD was enacted by the European Union in December 2000. A more balanced mix of objectives replaced the traditional emphasis on supply policies, which had little concern about the quality of water and ecosystems. But the regional conflicts embittered as the political negotiations of the new Autonomous Statutes for Aragón, Catalonia, Andalusia, Valencia (already approved in 2006 and 2007), and Castilla-la Mancha (still under discussion in April 2009) took place with the NHPs of 2004 and 2005 fresh in the minds of voters and of Members of National and Regional legislatures. In local, regional and national elections, water issues became political ammunition, and the ensuing debate took place with very little scientific base. Ironically, during the last decade Spanish scientific production in all fields reached, including water resources, put in the country among the ten most advanced countries in the world.

We may question whether the WFD's ambitious goals would have been set out in a truly national water policy. The WFD has been qualified as a 'too Northern European', posing serious enforcement difficulties in Mediterranean contexts. Given the lessons drawn by Del Moral and Arrojo, it is irrefutable that Spain would never have passed national legislation of the sort of the WFD.

2 MAIN WATER POLICY ISSUES IN TODAY'S SPAIN

Spain's per capita income in 2006 was 97% of the European Union of 25 Member States. Its agricultural sector contributes a meagre 3% to the GDP, but uses between 70 and 75% of all the

water in Spain. As Maestu and Gómez (**Chapter 5**) and Aldaya *et al.* (**Chapter 6**) show, Spanish water economy is markedly dual. A small percentage of water use is very valuable, whereas the remainder is used for very low-productivity purposes. Urban consumption grew at an annual rate of 4 to 5% between 2001 and 2007; tourist resorts, urban expansion and golf courses experienced rapid growth. The irrigation sector is not supplying the resources needed to meet this demand, as neither the liberalisation of the 1999 Water Act nor national irrigation plans enabled the farm sector to free up the necessary resources. The increasing scarcity of water to meet current and future needs, including environmental ones, is being accompanied and reinforced by a number of inter-related processes.

First, recurrent droughts and long-term climate projections suggest that Spain's drought contingency planning may be hindered by reduced runoff and precipitation and ever stricter constraints on the development of new infrastructure (Iglesias *et al.*, in **Chapter 7**). Spain will be among the EU countries which will suffer the most from climate change. All models predict that run-off in all basins will diminish and extreme events will become more frequent (Bates *et al.*, 2008).

At the urban level, water shortages were faced in the early 90s with water supply interruptions of various degrees of severity. Cabrera *et al.* (**Chapter 8**) provide a sombre view of the present state of most Spanish urban supply systems. Their conclusion is that the country is not ready to provide reliable, healthy and sustained drinking water to one third of the population. Such unreliable service may be due in general to low urban water rates (Garrido & Calatrava, **Chapter 13**), insufficient private/public investment resulting from excessive bureaucracy (Sastre & Ariño, **Chapter 10**) or the lack of stewardship of strategic groundwater resources (Custodio *et al.*, **Chapter 14**; Lopez-Gunn, **Chapter 15**).

Secondly, as Schmidt & de Stefano (**Chapter 4**) show, Spanish water ecosystems have been undergoing severe processes of deterioration as the country has raised its level of water usage, together with harmful impacts and pressures. Insufficient wastewater treatment of spills both from urban and industrial users remains an unsolved problem which will take years to be tackled to the extent the most environmentally-conscious EU member states have accomplished. In the view of Garcia Novo *et al.* (**Chapter 3**), most indicators of ecosystem quality have deteriorated within the period of time they have been recorded and analysed. The irreversible loss of wetlands, biodiversity and habitats is a disaster for some, and is unquestioned by all experts. The restoration of water bodies in response to the requirements of the WFD will be a gigantic endeavour, and is one that river basin plans, due in 2009 according to the WFD timetable, will need to address with initiatives capable of withstanding the scrutiny of society through serious public participation processes (see Menéndez-Prieto, **Chapter 16**, and Barreira, **Chapter 17**). At the same time, the most pressing environmental problems seem to be worsening, and will likely be aggravated by the effects of climate change (Iglesias *et al.*, **Chapter 7**).

Thirdly, Spain shows the remarkable growth of desalination capacity installed in Spain before the coming into office of the new government in 2004. Its major water policy decision has been to halt the huge Ebro transfer, instead aiming to double the country's desalination capacity in six years. However, this plan is facing more problems than expected, as few farmers and water retailers are signing long-term contracts to become customers. In total only one third of the capacity that should be installed in 2009 became operative. Custodio *et al.* (in **Chapter 14**) offer evidence that most users prefer cheaper groundwater resources, despite the drawdown limitations and deterioration in quality of most coastal aquifers. There are clear and convincing signs to the effect that patterns of groundwater use are not being effectively controlled by government agencies. Lopez-Gunn, in **Chapter 15**, offers a compelling hypothesis about why enforcement of the 1985 Water Act provisions regarding groundwater resources failed.¹

¹In view of the inadequate treatment of groundwater resources by the WFD, the EU enacted the Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration.

3 STRENGTHS AND WEAKNESSES IN MEETING THE WFD POLICY OBJECTIVES

3.1 *Strengths*

a. Institutional framework

Spain has 75-year old basin authorities that have been working on water planning according to widely accepted rules and paradigms until very recently. Water laws and statutes are also rich and flexible enough to accommodate the set of policy instruments required. However, these agencies will need to be reorganised to fit with the administration set-up required by the WFD. And yet, Spain has decades of experience in running the water institutions, and all stakeholder, users and government agencies consider their role as essential and effective (Varela-Ortega & Hernández-Mora, **Chapter 12**).

b. Learning from past mistakes

Spain's recent history of water planning failures shows that, in the future, governments will need to draft their policies in a much open and participatory way (see del Moral and Arrojo, **Chapters 9 and 19**). Spanish society is perhaps tired of, and confused by, the inconsistencies and discontinuities of government action during the past twenty years. Data, experience and information are now readily available that would allow broader and more rigorous discussions to be held. The new planning guidelines² issued by the government represent a huge step in terms of policy thinking and issues integration.

c. The emergence of alternative forms of dispute resolution

Negotiations and new strategies to solve water disputes have been ever more widely used in the last decade, breaking deadlocks and stalemates that had been insurmountable until recently. While still timid, the effects of these diverse initiatives are accumulating in a rich social capital, which will likely pave the way for settlements on a larger scale. At the national and regional levels, the disputes have not subsided, with some ACs requesting that more inter-basin transfers should be built, and some others claiming full rights on all resources running within their territory. The best examples of conflicts resolution are found at local or even regional levels.

d. A dynamic urban water supply sector

In spite of the deficiencies identified by Cabrera *et al.* (**Chapter 8**), Spanish urban suppliers have made significant changes in the way they charge for their services, the quality of wastewater treatment and sewage collection. Most analyses suggest that consumers' willingness to pay for a reliable water service lies above current water rates (see **Chapter 13**). This paves the way for improving waste water collection and treatment, contributing in turn to healthier bodies of water. While no to the extent it was planned, the rapid increase in the desalination capacity that has been installed in several coastal regions shows that the private sector is also responding to the rise in demand for water, primarily rooted in urban growth and the development of tourism. Per capita urban water consumption has been stabilised if not diminished in many cities, after growing between 1997 and 2001 by 7% on average.

e. Greater water productivity and investment in rural areas

As Custodio *et al.* (**Chapter 14**) demonstrate, the agricultural sector attests to the relative strength of the rural economy of many areas. It seems highly likely that new assessments will show that the well-known situation in Andalusia and the Mediterranean regions could be extended to all the semiarid regions of Spain. This would mean that groundwater-irrigated agriculture that consumes about five cubic kilometers of water per year produces more value and jobs than surface water-irrigated agriculture that uses about 20 cubic kilometres per year. Although the direction of the causality cannot be established to explain these differences in efficiency, it does show that there is ample scope for increasing irrigation with surface water. The National Irrigation Plan is among the least contested planning efforts in Spanish history (Arrojo, **Chapter 19**). About 1.3 million

²*Instrucción de Planificación Hidrológica* (<http://boe.es/boe/dias/2008/09/22/pdfs/A38472-38582.pdf>).

hectares of irrigated land have been intensively rehabilitated, implementing modern water and soil nutrient control systems.

Another enabling factor is the change in EU Common Agricultural Policy (CAP), which was last reformed in 2003. The change in policy means that farmers receive support payments that are fully decoupled from production. Decoupled support measures brought to a halt farm policy incentives to produce more, and to use irrigation water for that purpose. All analyses show that the reform of the CAP has been followed by increases in land and water productivity (Gil *et al.*, 2009; Garrido & Iglesias, 2009), especially in the mainland provinces where farmers' revenue is more dependent on CAP's subsidies (Varela-Ortega and Hernández-Mora, **Chapter 12**). However, the preferential agreements of the EU with North African countries and the possible integration of Turkey in the EU are going to have a very serious impact on the Mediterranean agriculture of Spain in the long term, which will come on top of serious labour market constraints for most non-mechanised farming operations.

f. The role of European Union policies and other international agreements

All the chapters in this volume have mentioned the profound impact of the EU's WFD. While the domestic water policy agenda is clearly a national and regional matter, all initiatives must meet several important criteria laid down in the WFD. In the case of the Iberian transboundary basins, the WFD gave the co-operation between Spain and Portugal a significant push (Garrido *et al.*, **Chapter 18**), which led to the Albufeira Convention signed in 1998 in anticipation of what the WFD would request Member states about internationally-shared river basins. This opened a period of fruitful co-operation among the two countries, leaving behind decades of controversies.

Also, the agreements related to the food trade to be achieved by the World Trade Organization will also have an impact on agricultural activities, mainly in irrigated agriculture. The traditional concepts of water and food security will change in the near future, while the related concept of "virtual water" is becoming more familiar to water decision-makers. Aldaya *et al.* (**Chapter 6**) report recent evaluations of the Spanish footprint and virtual water trade. In light of the significant amounts of water virtually traded through farm trade, the water stress indicators of Spain should at least put widely accepted notions of scarcity under severe scrutiny and be thought in a more global context. Most water is used to produce low-value commodities, like cereals, which Spain is increasingly importing to feed a growing and competitive livestock sector. This process has been reinforced by the reform of the CAP, by decoupling farmers' aid regime with their farming decisions.

g. Innovative politics by regional and local governments

Spain's highly decentralised state is a source of concern, but also a hotbed of experiments and initiatives. For instance, both Garrido & Calatrava, and Embid Irujo highlight the importance of regional initiatives in the area of water pricing and of environmental policies. Water policy in Spain has been devolved to the regional governments, some of them acting as frontrunners of environmental policies and taxation. Since 2004, the Central (Spanish) government has taken coordination role (see footnote 1), and the Spanish parliament has not passed any significant piece of legislation on water affairs, which stands in sharp contrast by the numerous initiatives of the Autonomous Communities.

h. The remarkable increase in research, outreach and dissemination efforts in all water-related disciplines

Based on standard scientific indices (ISI Web of Knowledge),³ the scientific community has improved its productivity, making Spain number 6 in world science rankings in agricultural sciences, 8th in chemistry, 9th in mathematics, and 10th in engineering.

³Thomson Reuters.

3.2 *Weaknesses*

a. Financial prospects of supporting the programmes of measures

The Spanish economy was relatively healthy and has managed to maintain growth rates between 2.5% and 4% for the 1995–2007 period, but dropped to negative growth rates in 2009, together with most world economies. The crisis is expected to hit Spain harder, though, because of large contribution of the construction sector during the 2000–09 decade, which has collapsed after the explosion of the house market. Unemployment rate is expected to reach 20% by 2010, topping the ranking of all OECD countries. These prospects have lowered the environmental objectives in the list of priorities, and will further delay the water price increases for households, industries and farmers that, according to the WFD, should be implemented in 2010. The cost of complying with the WFD in full has been evaluated at €30 billion (2.4% of GDP), so it is very likely that Spain will request numerous derogations in the enforcement of the WFD (see **Chapter 16**).

b. The marked swinging character of water policies

Since 1993, Spain has attempted and failed three times to have a national hydrological plan widely accepted by the main national parties. The most recent Water Policy initiative, passed on April 22nd 2005, was backed in Parliament only by the Socialist MPs and their allies. While the initiatives taken after the 2004 election show a clear willingness to get away from outdated concepts of water planning, by 2008 it was clear that the programme AGUA was seriously delayed, especially in the number of desalination plants in operation. In 2008 too, government resumed talks to discuss a new transfer from the low Tagus to the Segura basin.

c. The chaos of groundwater governance

With a few notable exceptions, Spain's records on groundwater sustainability and government are discouraging (see Custodio *et al.*, **Chapter 14**, and Lopez-Gunn, **Chapter 15**). All efforts made since the passing of the 1985 Water Act have failed to tame the 'silent revolution' occurring in the groundwater sector since the early 70s. Twenty years of failed attempts to tackle the most serious problems of groundwater overexploitation and pollution leave a bad record. And yet, examples like the high Jucar (Mancha oriental, **Chapter 15**) or the low Llobregat (Catalonia, as reported in **Chapter 14**) provide hope for agreeing on more sustainable paths in the high Guadiana and most Southeastern aquifers.

d. The failure of water statutes to solve the most intractable problems

The leadership of the public authorities in brokering or imposing solutions to the most intractable problems has been significantly eroded after two decades of failure. Citizens and companies still regard public agencies as adversarial and inquisitive. These in turn do not inspire respect and scarcely possess the moral authority to convene opposing parties and build a sufficient level of trust (**Chapters 12 and 15**). Citizens still do not trust public agencies not grant them the required leadership to revert intractable problems.

e. The strength of the agricultural sector

Never in the course of Spanish history have irrigators paid tariffs that reflect the full direct costs of supplying surface water. This does not imply that water is cheap for all of them, as a significant proportion of irrigators pay the highest prices among OECD standards. Yet, irrigators, who take about 70–75% of all water used, have succeeded in maintaining their relatively favourable status as opposed to other water users, who pay significantly higher charges. An example of this is the regional water pricing policy of Catalonia (see Garrido & Calatrava, in **Chapter 13**). In this Autonomous Community, whose water prices are among the highest in Spain for urban and industrial users, farmers are exempt from paying the regional 'canon del'aigua'. In 2008 the Ministries of the Environment and Agriculture were merged to create the Ministry of Environment, and Rural and Marine affairs, a move that was interpreted by the Foundation for a New Water Culture and most environmental organisations as the defeat of environmental camp to the agricultural interests.

f. The worsening of water pollution and growing environmental problems

Spain's water bodies have been undergoing a serious process of deterioration, as witnessed by the loss of natural habitats (García Novo *et al.*, **Chapter 3**) and by man-made impacts (Schmidt & de Stefano, **Chapter 4**). Both of these chapters offer sombre views of these processes, and do not provide much room for short-term hope. Important basins, like the Segura and Júcar basins, have deteriorated so much that it will be extremely difficult to restore them to good ecological status. At the root of many environmental problems in most water bodies are two factors which will drive the agenda for the 2010–2015 term of the WFD. First, the need to upgrade and improve the urban water treatments of virtually all urban areas will necessarily imply increasing the households' and commercial water tariffs, which are about half or one third of those paid by French, German, or Danish consumers (see **Chapter 8**). Second, tourist and urban development in the last 15 years, coupled with very intensive agricultural use, has brought the water systems beyond the carrying capacity in most Mediterranean regions. Reversing this trend will be a daunting task that will require financial resources and a strong alliance between all users, environmentalists and government agencies.

g. The breakdown of the Constitutional design for the (regional) inter-community basins

The discussions and debate about the 2001 NHP gave rise to another equally important breakdown of consensus. In this case, regional disputes over transboundary rivers became explicit and turned into political ammunition. Although the management of inter-community water resources is, according to the Spanish Constitution, a national jurisdiction, some Autonomous Communities claimed area-of-origin rights in order to question the grand Ebro transfer scheme. Its beneficiary regions, in turn, claimed that inter-community basins were a national jurisdiction and inter-basin transfers were strategic projects for the whole country. While the 2001 NHP was repealed soon after the Socialist Administration came into office in 2004, the conflicts subsided but did not disappear. For one thing, the region of Castilla-La Mancha demanded that the Tagus–Segura transfer should eventually be phased out, on the basis that the region itself needs the water resources that are transferred annually to the Segura basin. Furthermore, the 2004–08 political term opened a period of political discussions in Catalonia, Andalusia, Valencia, Castilla-La Mancha, Aragón and Basque Country among others, to draft and approve new Autonomous Statutes. These statutes represent the cornerstone of the political autonomy of the Autonomous Communities (ACs) and mark the dividing line between the competencies of the Central administration and those of each AC. The Catalanian Autonomous Statute was the first to be established, but it was soon followed by a number of other ACs. The implications of the redefinition of the Autonomies' regimes for water and the management of inter-community river basins are doubtful. On the one hand, all new Statutes define to a larger or smaller extent new competencies over inter-community basins; the Andalusian being as deep as to declare in article 51 that the region 'has exclusive competencies over the Guadalquivir resources that flow within its territory and do not affect other Autonomous Community', adding that '[those competencies] should not affect the National Planning of the hydrological cycle, ... nor be in breach with article 149 of the Constitution', which establishes the exclusive competencies of inter-basin river basins. On the other hand, the Andalusian Statute has been brought to the Constitutional Court on the grounds, among others, that the Guadalquivir provisions of her Statute breach the constitutional principles. While the Court has yet not settled this issue (in April 2009) the Andalusian regional government has already been given competencies on the Guadalquivir and setup a regional office to manage it, which co-exists in Seville with the previous one, now in charge only of planning issues and managing the waters running through the neighbour regions. Aragón's statute mandates explicitly that its regional government and representatives should see to prevent water transfers from the rivers flowing within its territory. While it is still too soon to ascertain the impacts of this process of devolution, a prudent judgement would indicate that the role of the Central government in inter-community basins has been diminished. Water policy is increasingly a regional policy, and regions, with the eventual support of their Autonomous Statutes, will surely develop their own legislative initiatives.

Although Spain has always praised itself for not having the type of State-run water policies that Australia and the US have, the last significant policy changes with which this book ends would seem to suggest that the Spanish model has been changed in a bottom-up process to make it closer to a federal one. Garrido *et al.* (**Chapter 18**) conclude that it may be easier for Spain to co-operate with Portugal in dealing with the shared Iberian rivers than for the Autonomous communities themselves to solve their water disputes. While the WFD provides the foundation, spirit and a timetable to manage the Spanish-Portuguese co-operation, it does help very little to solve domestic water issues.

REFERENCES

- Bates, B.C., Kundzewicz, Z.W., Wu, S. & Palutikof, J.P. (Eds) (2008). *Climate Change and Water*. Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva, 210 p.
- Dooge, J.C.I. (1999). Hydrological science and social problems. *Arbor* **646** (October), 191–202.
- Garrido, A. & Iglesias, A. (2009). Lessons for Spain: a critical assessment of the role of science and society. In Garrido, A. & Ingram, H. (Eds). *Water for Food in a Changing World*. Routledge, London, in press.
- Gil, M., Garrido, A. & Gómez-Ramos, A. (2009). Análisis de la productividad de la tierra y del agua en el regadío español [Analysis of land and water productivity of Spanish irrigation]. Paper presented at the *Ecoriego Workshop*, Granada, Febr. 16–17.
- Gómez, C.M. (2009). La eficiencia en la asignación del agua: principios básicos y hechos estilizados en España [Water allocation efficiency: basic principles and stylized facts about Spain]. *Información Comercial Española* 847: 23–40.