

## CHAPTER 1

### Scope and objectives

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### 1 INTRODUCTION

While the modern Spanish State was formed in the 15th century, historical records of works, statutes, and water utilization date back to at least two centuries BC. Its ecological wealth and its mild climate, plus the relatively abundant watercourses flowing from inland Spain to the Mediterranean and Atlantic coasts, favored long-term human settlements, which soon traded with other Mediterranean cultures.

Roman engineers built outstanding hydraulic structures in Spain, many of which can be still admired today. The Muslim occupation of most of the Iberian Peninsula in the 8th century brought new methods of water supply and management. Until 1858, for example, the city of Madrid was supplied with water mainly through infiltration galleries (khanats), a technology imported by the Arabs from Iran. They also set up bottom-up institutions to manage the scarce irrigation water and avoid social conflicts. The well-known *Tribunal de las Aguas de Valencia* (Valencian Water court) conserves over nine centuries of records.

Surface irrigation systems were also developed in many other regions of Spain, but almost exclusively on the flood plains of many rivers. Their stream flow was diverted by small dams. A third of Spain's present irrigated acreage was already cultivated at the end of the 19th century.

The main concern of Spanish politicians and social philosophers during the 17th and 18th centuries was to make the country's rivers navigable. The attempts to emulate the situation in other European countries failed because of Spain's rugged topography, and the low flows during the dry season. In the 19th century private entrepreneurs made several attempts to develop hydraulic systems, mainly for irrigation, in a similar way to the development of railroads. Most of them were economic failures.

In 1898 Spain lost Cuba and the Philippines, its last colonies. This was one of the lowest points in Spain's history. A group of scholars and politicians, known as the *regenerationists*, tried to explain and overcome this depression in Spain. One of the most pervasive mottos was that the Spanish people needed *Escuela y Despensa* (education and abundant food). As this book compellingly claims, the regeneration of Spain laid the foundations for a century on irrigation and water policies. Water projects and land reclamation were the means of dragging Spain out of poverty and illiteracy. However, this development could not be achieved by private initiative. It had to be a public or government-led action, and many politicians and intellectuals supported these ideas.

In 1902 the Ministry for Development prepared the "Gasset Plan" (GP), named after the engineer commissioned to draft this National Waterworks Plan. This first comprehensive national plan was first and foremost an inventory of dams and canals, primarily meant to provide water for irrigation. Incidentally, the GP was passed in the same year that the US Bureau of Reclamation, which shared similar aims, was set up. Both were preceded, during the 19th century by similar plans drafted by British engineers across the British Empire, mainly in India. This is what Allan (1999) describes as the "hydraulic mission".

Hardly any of the infrastructures listed in the GP were built in the following four decades, probably because of political unrest and Spain's economic difficulties. Nevertheless, it helped to raise public awareness about the indisputable importance of water management and irrigation. In 1926 the Government set up the *Confederacion Hidrográfica del Ebro* (Ebro River Basin Authority) for the integrated management of water in the Spanish basin. In less than two decades all surface water in Spain was managed by such path-breaking institutions. Present-day water institutions are still founded on the basin authorities.

In 1931 the Ministry of Public Works prepared a draft National Water Plan. This included the transfer of water from northern (Ebro river) to southeastern Spain. The Government never formally approved this National Water Plan, but most hydraulic engineers considered it to be a good solution. It was basically the same model as designed and later implemented in California to solve the scarcity of water in the southern part of the State.

Spain passed its first Water Act in 1866 (amended in 1879), which all experts agree to be a monument of fine legal drafting. While the 1866 Act was to remain in force until the 1985 Water Act was passed, which attests to its value and adequacy, it was actually meant to provide the foundations for modern governmental water policy and planning initiatives. Surface water rights for irrigation, urban water supply and hydropower could be soundly established in the framework of the 1879 Water Act. In Spain groundwater was under private ownership, as it still is today in other countries like the USA (California and Texas), India or Chile.

Between the end of the Civil War in 1939 and the enactment of the Spanish Constitution in 1978 that restored democracy in Spain, the country experienced an intense rate of waterworks construction. Spain almost doubled its surface water irrigated area, reaching 2.5 million hectares by 1975. The paradigms that drove the whole process remained unquestioned for five decades. Supplying water to the fields, controlling rivers and installing more hydropower capacity were undisputed objectives.

As a result of a steady pace of construction from 1950 to 2000 (during which about 20 dams a year were put into operation), Spain has about 1,200 large dams today. In terms of dams per capita, Spain is fourth in the world.

By the end of the 20th century, as this book details, Spain had a grand scheme of waterworks, and a whole institutional edifice had been erected. Even so, water problems peaked and came to the notice of most Spaniards. The policy thrust to start addressing the water problems of the 21st century was to come from the European Union.

While many aspects of the institutional foundations for beginning to think seriously about the most pressing water problems were already in place, the 1985 Water Act maintained the principles that secured very cheap water for hundreds of thousands of farmers, many of whom were also given houses, tractors and other capital goods to settle in semi-arid terrains and depopulated areas. Water allocation was governed by engineering constraints and, in times of droughts, rationed through strict administrative rulings.

The process of forming interdisciplinary teams involved in the preparation of the National Water Plans was similar to the one described by Dooge (1999), albeit a couple of decades later. Dooge divides the design and implementation of hydroprojects into several periods. Up until the 1950s engineers were the only decision makers. During the 1960s, economists began to play a part. In the 1970s environmentalists also started to participate. In the 1980s, the people affected by the project began to have a say. Finally, NGOs now play a significant role.

In Spain pre-1960 plans were prepared exclusively by civil and agricultural engineers. In the 1960s project documentation included cost-benefit analyses for the first time, but this had little or no impact at all on decision makers.

With its accent on water planning, the 1985 Water Act ushered in a new phase. Nevertheless, the 1993 draft of the National Water Plan attached little importance to economic analyses, and environmental impact assessment was practically nonexistent. The National Water Plan approved by the Spanish Parliament in 2001 did contain economic and environmental assessments. However, these assessments were strongly criticized by many scholars and conservation groups, especially members of the New Water Culture Foundation, as discussed in several chapters of this book.

These differences of opinion, together with the strong opposition to the Ebro water transfer by the regions of Aragon and Catalonia, a cause that had also been championed by the Government elected in 2004, put an abrupt end to the more than 100-year era of huge water projects.

Meanwhile a 'revolution' within groundwater uses in the late 1960s and early 1970s silently came to be the most intractable problem facing Spanish water policy in the mid-1990s. Looking back, it is ironic that the most productive agricultural water uses were those initiated by private individuals tapping groundwater resources and not those served by irrigation projects developed to make the *regenerationists*' dreams come true.

By the time the 1985 Water Act was passed, the Spanish Constitution already provided the umbrella for governments to administer the hydraulic public domain (all surface and ground waters) and to intervene in cases of groundwater 'overexploitation'. Yet, the enforcement of the 1985 Water Act provisions on groundwater resources failed on most accounts.

In 1986 Spain turned its back for good on a history of political unrest, isolation, conflict and swinging regimes when it became a member of the European Economic Community, now the European Union (EU). The Water Framework Directive enacted in 2000 by the EU is meant to deliver important ecological improvement on most EU water bodies by 2015. Most authors of this volume agree on the importance of two landmarks that has brought traditional Spanish water management to an end. The first is the passing of the European Union's Water Framework Directive, which all 27 member states must enforce. The second is the above demise of the grand Ebro inter-basin transfer, proposed formally in 2001 but conceived since 1998, and stopped in 2004. The two also spelled the end of the univocal definition of *common interest* and, with that, the broad consensus on water policies. Post-2004 water policies have to be diverse, less centralized and more focused on the environment. On these accounts, the period 2004–08 can be characterized by four simultaneous developments: (1) the devolution to the Autonomous Communities (as regions are called in Spain) of significant water competencies, (2) the failure to develop sufficient desalination capacity along the Mediterranean coast to substitute for the water supply that would have been serviced from the Ebro transfer, (3) the increasing use of water market exchanges and water banks, and (4) the recognition that the implementing the WFD would entail enormous difficulties because of the severe environmental deterioration of many water bodies. These four ideas run across many of the books' chapters and are dealt in detail from diverse perspectives.

## 2 OBJECTIVES AND SCOPE

Against this turbulent history, this volume aims to offer a self-contained overview of water policy in Spain. This book aspires to bridge a gap that only the work of Maas and Anderson (1978), still a key reference on traditional Spanish water institutions, has been partially filled for English readers.

Specifically, the book intends to:

- provide a detailed description of Spanish geographical, climatic, and hydrological features;
- review the last hundred years of Spanish history to give an understanding of its water policy achievements and failures;
- identify the major water challenges that Spain needs successful policies to face;
- based on a detailed analysis, speculate about the country's potential to look after its water resources in an integrated manner and rely on demand management to meet its more pressing needs; and, lastly,
- list the lessons that are potentially applicable to countries and regions evolving similarly.

The book's structure is intended to offer a comprehensive overview of Spanish geographical and political diversity during four historical periods. The first ends with the beginning of the Spanish Civil War in 1936, when the grand water policy lines were traced and detailed, though not developed. The second ends with the death of General Franco in 1975, which paved the way for a political transition that culminated in the Spanish Constitution 1978. The third period came

to a gradual close starting in December 2000 with the passing of the WFD and the inception of preparatory works, and ending abruptly after the change of government in the 2004 elections. During this third stage Spain formulated new and innovative policies that never materialized in significant accomplishments. The last and fourth stage began in March 2004 and led to a political agenda, which—being part of the EU WFD—is outside direct Spanish influence and for which the country is accountable to the European Commission and other member states. Recent experience and compliance with the WFD has shown that agreements and alliances must now be forged to approve, never impose a course of action. These four stages cross-cut most chapters of the book, as they have been the cause and effect of most water-related topics. Apart from having a decidedly historical dimension, the volume is meant to help readers grapple with Spanish geographical and political diversity. Furthermore, the approval of the 1978 Spanish Constitution led to a significant process of political decentralization. Seventeen Autonomous Communities (ACs), most with boundaries crossing the territories of the main river basins, took up significant responsibilities in the area of environmental and water policies. This certainly added another factor of complexity, unprecedented in all Spain's water policy history.

### 3 THE BOOK'S STRUCTURE

In addition to this introductory and a concluding chapter, the book is divided into four parts. **Part I**, covering **Chapters 2** through **6**, reviews Spain's physical, economic, environmental and climatic conditions. **Part II (Chapters 7** through **9)** provides an overview of the constraints, opportunities and social perceptions of water policy and water issues. **Part III**, including ten chapters, develops Spanish water policies in detail, covering an array of topics. Part IV is the closing section with **Chapter 20** containing the conclusions and the editors' speculations about the future, identifying Spain's strengths and weaknesses in response to the main challenges reviewed in the volume, as well as lessons other countries can learn.

**Part I** begins with **Chapter 2** (Martínez-Cortina), which provides a comprehensive description of the physical characteristics of all water resources. **Chapter 2** reviews major man-made infrastructures describing their regulation and storage capacities at the basin level. **Chapter 2** is the geographical guide and source of maps for all the other chapters. The volume's two chapters on major environmental and pollution processes attest to the severity and magnitude of the challenges ahead of Spain if it is to fulfill the WFD's objectives. First, **Chapter 3** (García Novo *et al.*) reviews the massive process of reclaiming wetlands and impounding water bodies, summarizing some of the main ecological implications in order to define what 'good ecological status' means in the context of the WFD. Second, we learn from **Chapter 4** (Schmidt & de Stefano) that the primary causes of ecological problems are man-made impacts on water bodies, and the political unwillingness to enforce statutes and legislation.

The economic and social dimension of water uses are the subject of **Chapter 5** (Maestu & Gómez) and **Chapter 6** (Aldaya *et al.*). These chapters portray a clear picture of the importance of irrigation as the major water user, and the increasing importance of urban, and industrial uses. Sectorial use trends reflect the changes that have taken place over the last fifty years, showing the differences across regions and major basins. In terms of water uses, Spain is still a predominantly agricultural country, where 75% of the available resources are used for irrigation. Yet, booming sectors, such as tourism, second-home developments and golfing, and the expansion of cities are pushing for a redefinition of water allocations and further liberalization. **Chapter 6** reports recent evaluations of Spain's water footprint, discussing the role of virtual water trade examined in light of the increasing globalization of water.

**Part II** covers a number of topics that explain why inherited policies failed or succeeded, and influence the choices that are available for the future. **Chapter 7** (Iglesias *et al.*) focuses on drought and climate risks. The chapter first gives an overview of the indicators that can be associated with the risk of drought and water scarcity. Second, it discusses the concept of risk integrating drought sensitivity and vulnerability to exposure. Finally, the chapter examines issues related

to global environmental change. Technological gaps, plus increasing water demands and climatic vulnerability, are factors conducive to the overall environmental deterioration of water bodies and ecosystems, as reviewed in **Chapters 3 and 4**. **Part II** includes two further chapters about urban and sociological issues. **Chapter 8** (Cabrera *et al.*) reviews the situation of the water utilities in Spain and identifies the major challenges in the area of urban water supply and sanitation. **Chapter 9** (del Moral) reviews the changing discourses in Spanish society throughout the 20th century, which led to the breakdown of consensus. As a result of the tremendous social upheaval the country experienced as of 1975, water policy became a fertile ground for regional, social and ideological disputes.

**Part III** covers all relevant policy issues. It begins by critically reviewing water laws and water regulation in **Chapters 10** (Ariño & Sastre) and **11** (Embid Irujo). **Chapter 10** provides an overview of water legislation, beginning with 1866 Water Act and ending with the provisions enacted in 2003. It focuses on water sector regulation and liberalization, reviewing the way water markets were defined in the 2001 Consolidated Water Act. It also describes the rules and statutes that facilitate the private sector's participation. **Chapter 11** builds on **Chapter 10**, and focuses on the foundations of the 1985 Water Act. Although **Chapters 10** and **11** highlight the prevalence of rule of public law on regulating and managing water matters, their conclusions about the role of private initiative and water markets are markedly different.

Considering that water institutions are widely known to be as important as legal statutes, **Chapter 12** (Varela-Ortega & Hernández-Mora) focuses on water institutions and institutional reform. This chapter shows that traditional institutions are still remarkably present in the institutional framework currently in place. Irrigators, and their associations (one major edifice of Spanish water institutions), play a leading role in the basin agencies (the other major institutional component). The chapter provides an updated description the institutional set-up as it stands in 2009, after the merger of the Ministries of Environment and Agriculture in 2008 (Ministry of the Environment and Rural and Marine Affairs).

The economics of water resources in Spain is the consequence of the social prevalence of irrigation, the traditional view of the State as the major water supplier and the disregard of externalities and intrinsic environmental values. **Chapter 13** (Garrido & Calatrava) describes how water prices are set in Spain, reviews their levels in the multi-tier system established for most users, and portrays a picture marked by the heterogeneity across regions and users. In the final section the chapter reviews the most recent experience with water trading mechanisms put in place by the 1999 amendment of the Water Act.

Two chapters deal with one of the major challenges of water policy: the management of intensively exploited groundwater resources. A demand-driven process with significant policy implications began in the early 1970s as a result of the use of groundwater resources, as discussed in **Chapter 14** (Custodio *et al.*). **Chapter 14** shows that the 'silent revolution' driven by thousands of modest farmers led to a very productive and export-oriented agricultural sector. This whole process took shape behind the scenes, and governments and policies either ignored or failed to harness these developments, as **Chapter 15** (Lopez-Gunn) claims. **Chapter 15** draws on the public policy literature to identify the most significant factors underlying the failed attempts at tackling some of the most pressing and intractable problems associated with groundwater resources since the 1985 Water Act was passed. This is possibly due to the fact that intensive groundwater use is a recent phenomenon in Spain as indeed it is elsewhere.

Although all book's chapters touch in passing on a number of issues related to the Water Framework Directive (WFD), **Chapter 16** (Menéndez Prieto) is the volume's reference for this important piece of European Union legislation. Strict compliance with the word and spirit of the WFD is both a major source of uncertainty and difficulties—because even the EU is learning by doing—and a major turning point in 25 years of water policy history. For one thing, restoring the ecological quality of water resources, habitats and ecosystems is now a major priority, second only to meeting direct human needs. We know from **Chapters 3** and **4** that implementing this change of priorities will come up against tremendous technical and conceptual problems, as well as practical difficulties. Water projects, basin plans, and the criteria behind water pricing schemes must be redefined to meet the goals of the Directive.



Furthermore, the strict rules described in **Chapter 12** for facilitating the participation of users in designing policies and in managing water projects have also led to much more open processes of public participation. **Chapter 17** (Barreira) sheds light on the differences between a closed and hierarchically structured format of participation, aimed at resources sharing and water projects design, and a much more open process of public participation, targeting the generation of agreed actions and river basin plans. **Chapter 18** (Garrido *et al.*) puts Spain in the Iberian context to review the cooperation with Portugal about four main rivers they share (Miño-Limia, Douro, Tagus and Guadiana). A historical review of the treaties and legal texts that lead to the Albufeira Convention (CA) signed in 1998 confirms a vision of Spain's past water policies that almost completely disregard the interests of the neighbor country. The amendment of the CA in February 2008 poses significant challenges for Spain, as the chapter explains, but the fulfillment of WFD in terms of the basin plans due by the end of 2009 is partly a joint responsibility of Spain and Portugal for their shared rivers.

Even though most other EU countries are also experiencing serious difficulties, the Spanish case is perhaps more telling, because, as **Parts I and II** describe in detail, pressures and demands for water are still growing and all global change projections indicate that the climate will become less favorable. Not surprisingly, water conflicts have multiplied on many small and large-scale fronts, as **Chapter 19** (Arrojo) details. This chapter confirms what common sense would dictate in view of the contents of the previous chapters. A democracy, which grants liberal powers to the regions (Autonomous Communities) and encourages the identification of issues that the lay public can easily grasp, is highly vulnerable to natural resources conflicts. As **Chapters 12 and 17** details, EC environmental law and the WFD makes information widely accessible to the general public and formal participatory mechanisms must be applied to reach agreement on the best actions and initiatives.

We learn from **Chapter 19** (Arrojo) that opacity presided over the drafting the National Hydrological Plan approved in 2001, and heavily amended in 2004. One conclusion is that not only have tensions, based on the spatial and regional dimensions, grown and become more poignant, but also water problems have come to be used as ammunition in the political debate. These tensions are increased by the predominance of emotional factors and the absence of transparent hydrological and economic data. Yet technological progress in the form of accessible desalted water has partially eased the tensions in many water-scarce Mediterranean regions.

The volume suggests that there has been a great deal of policy inconsistencies, marked political swings and little bipartisan continuity across governments coming out of elections. In view of such an incomplete or constantly evolving process, one wonders what it takes to find water policy and plans that enjoy sufficient support. In the concluding part (**Chapter 20**, by Garrido & Llamas), we further speculate on Spain's major strengths and weaknesses and summarize the most important lessons to be learned from the Spanish experience.

## REFERENCES

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