The Waters of Spain and Their Management: An Overview

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Some basic facts

Irrigation: 18,461 Mm³/yr (82%)

Industrial uses: 407 Mm³/yr (2%)

Services: 784 Mm³/yr (4%)

Domestic water supply: 2574 Mm³/yr (12%)

Hydroelectricity: 22,000 Mm³ stored capacity (40% of all stored water)

Precipitation:
- < 400 mm
- 400-800 mm
- 800-1200 mm
- > 1600 mm

Main consumptive water uses

<table>
<thead>
<tr>
<th></th>
<th>Surface area (km²)</th>
<th>Population (million)</th>
<th>Total managed water (Mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>504.645</td>
<td>47.27</td>
<td>55.000</td>
</tr>
<tr>
<td>California</td>
<td>423.970</td>
<td>38.33</td>
<td>49.000</td>
</tr>
</tbody>
</table>
Evolution of water abstraction
Evolution of water abstraction

- Desalinated: 18.7%
- Reused: 1.4%
- Groundwater: 3.5%
Paradigms, milestones and laws

Timeline
- 1900s-1990s
- 1994
- 2001
- 2003
- 2006-08
- 2013

Paradigm
- Hydraulic paradigm
- IWRM/New Water Culture/regionalist/hydraulic

Milestone
- 1975-79 Transition to democracy
- 1991-95 Drought
- National Hydrologic Plan (NHP)
- WFD
- 2005-08 Drought
- WFD Plans

Legal reforms
- 1985 Water Act
- 1999 Water Markets
- 2001 NHP
- 2003 WFD transposition
- 2005-09 Drought Decrees
- 2013 Market reforms
1985 Water Act reformed to adapt to changing priorities and evolving EU legislation (in 2003 transposition of WFD)
- Water management by River Basin Authorities at river basin scale
- Participation of permitted water users
- Water is publicly owned (except some groundwater resources)
Dominating discourse in water resources management in Spain

How to balance??

“SURPLUS WATER” RIVER BASINS

“STRUCTURALLY WATER SCARCE” RIVER BASINS
### Administrative mechanisms for water allocation

<table>
<thead>
<tr>
<th>Spatial scale</th>
<th>Characterization</th>
<th>Legal/administrative instrument</th>
<th>Dominant allocation criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>International</strong></td>
<td>Spain shares four major river basins with Portugal (40 % of country’s territory)</td>
<td>Albufera Convention</td>
<td>Guarantee hydroelectric production, water supply, flood protection and environmental flows.</td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td>Allocation of water resources among river basin districts</td>
<td>National Hydrologic Plan</td>
<td>“National hydrological balance” for economic and territorial strategies</td>
</tr>
<tr>
<td><strong>River Basin District</strong></td>
<td>Allocation of water to different users</td>
<td>Basin Hydrologic Plan</td>
<td>Regional economic and sectoral development.</td>
</tr>
<tr>
<td><strong>User</strong></td>
<td>Holder of water use rights</td>
<td>Water use permits (concessions, private groundwater rights, historical irrigators)</td>
<td>Existing rights</td>
</tr>
</tbody>
</table>

Source: Adapted from Hernández-Mora et al. (2014)
Interbasin water transfers in Spain

SOME OBSERVATIONS ON IWT

• They can help solve regional water scarcity problems
• As the geographical scale increases, so do the social, environmental and political implications (& conflicts)
• Often IWT transfer scarcity problems from one basin to another
• The existence of transfer infrastructures can heavily condition water management decisions in both linked river basins
• On average 500 Mm$^3$ are transferred annually (in California about 10,000 Mm$^3$)

Source: Hernández-Mora et al. (2014)
Water markets in Spain

• 1999 introduction of 2 possible market mechanisms:
  • Public water banks
  • Temporary trading of water use permits
• Highly regulated but progressively liberalized
• Small volumes traded but regionally significant (mostly interbasin permit sales)

Water trading in different river basins in 2007 (Mm³)

<table>
<thead>
<tr>
<th>River basin district</th>
<th>Intra-basin permit sales</th>
<th>Inter-basin permit sales</th>
<th>Public water banks</th>
<th>Volume traded/Total consumption (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guadalquivir</td>
<td>-33.21</td>
<td></td>
<td></td>
<td>0.88</td>
</tr>
<tr>
<td>Tajo</td>
<td>-68.40</td>
<td></td>
<td></td>
<td>2.42</td>
</tr>
<tr>
<td>Segura</td>
<td>2.40</td>
<td>+74.50</td>
<td>9.52</td>
<td>4.39</td>
</tr>
<tr>
<td>M. Andaluzas</td>
<td>0.90</td>
<td>+33.21</td>
<td></td>
<td>2.55</td>
</tr>
<tr>
<td>Júcar</td>
<td>-6.10</td>
<td></td>
<td>126.00</td>
<td>4.21</td>
</tr>
<tr>
<td>Guadiana</td>
<td></td>
<td></td>
<td>3.00</td>
<td>0.42</td>
</tr>
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</table>

Source: Palomo and Gómez Limón (2013)
‘Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such’ (Statement 1, WFD)
The building blocks of the WFD

WFD ECONOMICS: Cost Recovery & polluter pays

Article 5:
Economic analysis of water use

Article 9:
Water pricing policies that encourage efficient use
‘adequate contribution’ from water uses to water service costs

INFORMATION & PUBLIC PARTICIPATION REQUIREMENTS

Whereas 14,

The success of this Directive relies on close cooperation and coherent action at Community, Member State and local level as well as on information, consultation and involvement of the public, “including users”.

Article 14 Public information and consultation

1. Member States shall encourage the active involvement of all interested parties in the implementation of this Directive,
WFD Planning: Determining status and management goals

Status of surface water in Spain (2009-2015)

- Less than 50% in good status
- Insufficient information—water bodies with undeterminate status (50% lakes, 20% rivers, 50% chemical status)
- Main challenge is ecological status of surface water bodies

Status of groundwater in Spain and planning goals

**DIAGNOSIS**
55% good status
42% less than good (88% poor chemical status)
3% not enough information

**PLANNING GOALS (2015/2021/2027)**
80% in good status by 2027
16% insufficient information
4% less rigorous objectives

Fuente: De Stefano et al. (2013)
Main pressures on surface water bodies

- Agricultural diffuse pollution
- Insufficient urban and industrial wastewater treatment
- Over-regulation and high morphological alterations
- Over-allocation of water rights

<table>
<thead>
<tr>
<th>% of River Basins</th>
<th>Urban pollution</th>
<th>Industrial pollution</th>
<th>Agricultural diffuse pollution</th>
<th>Water flow regulations</th>
<th>Morphological alterations</th>
<th>Alien species</th>
<th>Water Exactions Agric.</th>
<th>Water transfers</th>
<th>Coastal alterations</th>
<th>Water extractions Urban</th>
<th>Mining</th>
<th>Land Use</th>
<th>Recreation</th>
<th>Navigation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>70</td>
<td>60</td>
<td>50</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>
Water quality & water pricing: A pending challenge

- Cost recovery of urban water services for water supply but not for agricultural uses or wastewater treatment
- Resistance to increase agricultural water pricing
- Resistance to apply the polluter pays principle
- Spain condemned by the EU for non-compliance with wastewater Directive
  - Inadequate wastewater treatment approaches in many cases
  - No more EU funds for wastewater treatment plants
  - Current economic crisis challenges family’s ability to pay and access to public funding

Source: AEAS-AGA 2013 (data 2012)
Strengths of Spanish water management & future opportunities

- Improved understanding of the ecological functions and status of continental and coastal waters
- Improved transparency in water resources planning and management
- Cutting-edge scientific and technological innovation
- Long history of planning and well-developed drought preparedness
- Development of non-conventional water sources (desalination, water reutilization...)
- Large agricultural uses that can provide flexibility in water reallocation
- Agricultural sector in a trend to lower consumption, and increased efficiency (energy cost, being a big deterrent) – rebound effect?
Main challenges moving forward

• Need to “catch-up” with WFD implementation program and fully incorporate its goals and philosophy:
  • Incomplete transition from the hydraulic to the sustainability paradigm: river basin management plans have dual and contradictory goals
  • The traditional “water policy community” continues to dominate water management – necessary transition toward open and participatory management approaches
  • Pending integration of sectoral policies and water management
  • Insufficient information and investment in knowledge and governance
  • “Patched” water law and enforcement problems (illegal water uses, insufficient monitoring and control, etc.)
  • Inter-regional water-related conflicts exacerbated by the political instrumentation of water policies and a continued focus on supply augmentation
References cited

AEAS-AGA 2013 El agua en España: Estudio 2013. Available at:


Thank you very much

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