Policies to Manage Agricultural Groundwater Use

SPAIN

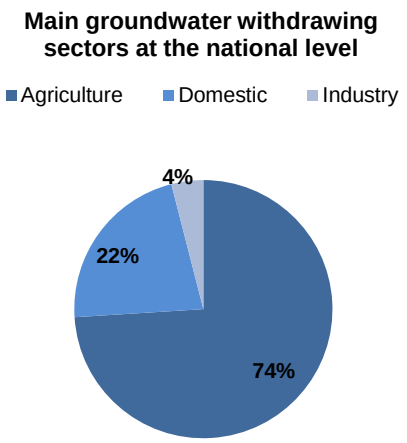
Spain is one of top five OECD countries in the use of groundwater for agricultural irrigation. The agriculture sector represents 74% of total groundwater withdrawals. A range of instruments are used to manage groundwater at the national and regional levels, covering regulatory, economic and collective management approaches. The case of the Mancha Occidental illustrates the challenges of groundwater management in Spain, with multiple pumping related negative external effects, limited natural recharge and climatic change projections suggesting a possible further pressure on groundwater resources.

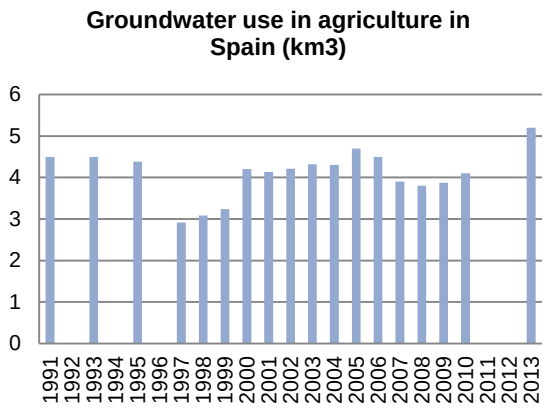
1. Main national governmental agency responsible for quantitative management of groundwater

Institution	Role
General Directorate of Water	Management at national level. Establishing uniform criteria for the systematic and review of the River Basin management Plans.
River Basin Management Agencies (Confederaciones Hidrograficas)	Develop their own river basin management plans. Protection of public water. Control of groundwater withdrawals.

2. Status and use of groundwater resources

- Total groundwater reserve (storage) is 180-200 km^3 in 1995.
- Annual groundwater recharge is approximatively 20-30 km^3 in 2013.
- Annual groundwater use is estimated to 7.2 km^3 in 2013.
- Groundwater irrigation area was 1 275 563 ha (2010 and 2013).
- Groundwater withdrawals for irrigation amounted to 4.104 km^3 in 2010 and 5.200 km^3 in 2013.





3. Inventory of national policies affecting agricultural groundwater use

Recent groundwater management reforms

Reforms	Year	Scope and objective	Degree of implementation
River Basin Management Plans	2013	Good status for all waters	Partial
Law 11/2012 on urgent environmental matters. Adopted on December 20, 2012, in what affects the changes made in the revised Water Law RD1 / 2001 and in particular the management of groundwater.	2012	For groundwater bodies in poor quantitative status, it aims to provide a quick action plan for controlling withdrawals.	Partial
Draft Royal Decree amending Annex II of Royal Decree 1514/2009 of October 2 on the protection of groundwater against pollution and deterioration is modified.	2015	Defines the methodological criteria for a better establishment of threshold values in groundwater bodies with chemical risk. Includes two new contaminants to the list of substances contained in Annex II of Royal Decree. Details the information that River Basin Management Plans must include on the pollutants and their indicators for which threshold values have been established.	Partial

Core groundwater management approaches at national level

Groundwater ownership

► Public

Groundwater entitlement characteristics

►Temporary, linked to water rights. Transferrable in special drought situations, the licensing framework through two instruments:

a) Rights transfer contracts between individuals (articles 67, 68 and 69 of the modified text of the Water Act, Royal Decree 1/2001, of 20 July), and

b) Rights Exchange Centres with subsidiary intervention of the Administrations (article 71 of the modified text of the Water Act).

Beneficiaries of entitlement

►Usually, rights are mainly individual but there is a user's association of groundwater acting as representative, for example, the Central Irrigators' Board of Mancha Oriental (Junta Central de Regantes de La Mancha Oriental, JCRMO).

Groundwater entitlement allocation doctrine

► Reasonable use

Main types of instruments used to manage groundwater use in agriculture

Regulatory approaches

Groundwater management plans
►Mandated

Coordination with surface water management
► Systematic and partial

Regulations on wells
►Approval of new well
- Accounting for well space restriction
- With environment impact assessment

►Groundwater withdrawal restrictions

Regulations in groundwater bodies with a poor quantitative status in areas where abstraction pressures are greatest.

Regulations on irrigated land
►Regulations on irrigated areas
►Regulation on the expansion of irrigated areas

Mandated metering or monitoring system for groundwater
► Mandated metering for agricultural and other users.

Economic instruments

Groundwater markets
►Temporary entitlements are marketable.
►Pumped water is marketable among users.
►Water entitlement buy-outs are possible.

Irrigation programs
►Irrigation subsidies focusing on efficiency
►Loans for irrigation efficiency improvements

- The "Sociedad Estatal de Infraestructuras Agrarias", it deals with the realization of modernization works, building and financing of irrigation, declared of General interest and included in the National Irrigation Plan.
- The rural development programs (RDPs), include investment budgets for modernization and improving the efficiency of irrigation water, funded in part by the European Agricultural Fund for Rural Development (EAFRD).

Collective management approaches

Collective management schemes
► Framed by regulations
- Water user associations
- District or community based

Other policies and programs affecting agricultural groundwater use

Agriculture water conservation programs
►Conditional payments
►Penalty

Land policies with implications on groundwater use
►Zoning with restriction on groundwater use

Watershed conservation programs
►Exclusion zone for conservation area

Climate change adaptation programs

►Investment in agriculture and groundwater R&D
►Water infrastructure investment
►Groundwater modelling and data development
►Other relevant programs

- Estrategia Española de Ciencia y Tecnología y de Innovación.
- Plan Estatal de Ciencia y Tecnología.
- Planes Hidrológicos de cuenca (RBMPs).
- Plan Nacional de Adaptación al Cambio Climático.
- Programa Nacional de Desarrollo Rural 2014-2020.
- Two type of agreements have been in place with the Castilla la Mancha University (UCLM) and the Polytechnic University of Valencia (UPV) respectively. One was dedicated to monitoring the evolution of the irrigation surface and the abstractions (ERMOT agreement, UCLM), and since the late 90s another one studying mathematical modelling of water flow in the aquifer, inforce since 2002.

Energy programs

►Electricity tax
►Other energy supporting programs (diesel, natural gas…)

- SPECIAL TAX ON ELECTRICITY, is regulated at Community level by Directive 2003/96 / EC amending the Community framework for the taxation of energy products and electricity restructuring; nationally, through Ley 38/1992 de Impuestos Especiales. The tax rate is 5.1% on the amount of supply.

- SPECIAL TAX RETURN OIL: Article 15 of the EU Directive 2003/96, restructuring the Community framework for the taxation of energy products and electricity, and provides for the possibility for Member States to apply a zero rate to energy products and electricity used for agricultural, horticultural, fish and forestry work. Under this Directive and following the increase in prices of agricultural inputs in 2005 in Spain partial reimbursement of the amount of tax on hydrocarbons supported in the consumption of agricultural diesel with effect from October 2005 was implemented, assuming the reimbursement of 7.86 cents per litre consumed. The Order EHA / 993/2010 established the procedure to practice Returns eliminating this requirement.

Others

Drought insurance programs

►Government based insurance
Agricultural insurance: The Spanish agricultural insurance system was created in 1978 with the Ley 87 of Agricultural Insurance as a risk management tool, as an instrument of agricultural policy that allows the stabilization of rents providing coverage for damage to agricultural production, livestock, forestry and aquaculture. It develops through annual plans prepared by the State Agency of Agricultural Insurance (ENESA).

4. Agricultural groundwater use at the regional level

Mancha Occidental I (Ciudad Real. Castilla La Mancha)

Agro-climatic zone	Climate change prospective (2030-2050)	Is groundwater expected to be significantly affected by climate change in 2030-2050?	Surface Irrigation
Temperate	Drier, hotter, more frequent droughts	yes	Surface water is available and not used for irrigation. It is rarely used and mainly used on-farm. As in Campo de Montiel, the source of water for irrigation in Mancha Occidental I is only groundwater based.

Characteristics of the main aquifers in the regional unit

The groundwater body of the Mancha Occidental I consists of Tertiary and Quaternary materials composed of detrital deposits, limestones, marly limestones and "rañas". The most important aquifer of this mass is formed by Miocene limestones, which thicken westward. These limestone aquifers form a free basis, karst porosity and medium-high permeability, with average thicknesses of 35 m and transmissivity between 50-20000 m2 / day. The impermeable base consists of Paleozoic deposits with low or no permeability.

Type of aquifer	Geological type	Area	Maximum Thickness	Groundwater reserve	Groundwater recharge rate	Groundwater quality concerns
Unconfined	Sand and gravel Sandstone Karst	2003 km^2 (2005)	150 m (2009)	0 km^3 (2009)	0.049 km^3 (2009)	Important The main type is nitrate pollution from agricultural activity.

	Volume	Area	Number of farms
Groundwater irrigation	0.0912 km^3 (2013)	17 200 ha (2013)	n.a.
Trends	Steady	Steady	Steady

In the period 1980-1990 the resources were overexploited (piezometric declines of more than 30m), resulting in the establishment of a regime of annual extractions to prevent overexploitation and producing a progressive improvement. Since the entry into force of the 2009 Water Plan extractions have adapted to the available resources. At present it has reached the highest level in the aquifer for 30 years (the only place in the world where this has been achieved).

	Total number	Increase in the past 10 years	Average	Range	Variance
Estimated number of agricultural wells	17 057 (2012) 15 892 used (2012)	Steady Slow			
Evolution of the depth of the water table (trend in the past 10 years)			Increasing	Increasing	Increasing

The aquifer is vulnerable to contamination and recharge variations due to irregular Mediterranean climate with long droughts followed periods of wet and medium irregular cycles. Drops occur during periods of prolonged drought, followed by rapid promotions in wet clos 2 or more years.

The intense irrigation began in the 80s of last century has caused troubles to the wetlands and Parque Nacional Tablas de Daimiel. Since 2009 there has been a great recovery due to irrigation control and the imposition of a regime of annual extraction, and the presence of a wet cycle, with recovery of about 20 meters on the level of groundwater, which has favoured the reappearance of wetlands and springs in some older Ojos del Guadiana.

Period of intense groundwater development

► 1970s and 1980s

Other uses of groundwater

	Minor	Major	Diminishing	Steady	Increasing
Domestic	✓			✓	
Industry	✓				

Pumping related external effects

	Minor	Major	Growing	Steady	Reducing
Pumping lift/cost increase		✓			✓
Stream depletion		✓		✓	
Vegetative stress		✓		✓	
Ingress of polluted water		✓	✓		
Aquifer compaction	✓			✓	
Land subsidence	✓			✓	
Other: Risk of impact associated ecosystems and reas due to the pressures for irrigation by sampling.		✓		✓	

Reforms at the regional unit	Year	Scope and objective	Degree of implementation
River Basin Management Plans	2013	Good status for all waters	Partial

Main types of instruments used to manage groundwater use in agriculture

Regulatory approaches

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  ✓ Accounting for well space restriction
  ✓ With environmental impact assessment

► Groundwater withdrawal restrictions

Regulation on irrigated land
► Regulations on irrigated areas
► Regulation on the expansion of irrigated areas
► Irrigated land buyout

Mandated metering or monitoring system for groundwater
► Mandated metering for agricultural and other users.
76 monitoring wells, These measures are enforced.

Economic instruments

Groundwater markets
►Temporary entitlements are marketable. Usually, water rights have only been purchased during drought periods.

Other policies and programs affecting agricultural groundwater use

Watershed conservation programs affecting groundwater use
►Exclusion zone for conservation area

5. Bibliography

Institutional websites

- www.magrama.gob.es/es/ministerio/funciones-estructura/organizacion-organismos/organigrama/DG_Agua.aspx
- www.magrama.gob.es/es/ministerio/funciones-estructura/organizacion-organismos/organismos-publicos/confederaciones-hidrograficas/default.a

Official reports

- River Basin Management Plans

Additional sources

- www.magrama.gob.es/es/ministerio/funciones-estructura/organizacion-organismos/organismos-publicos/confederaciones-hidrograficas/default.aspx
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This country profile was compiled by the OECD Secretariat and reflects information obtained in a 2014 OECD questionnaire on groundwater use in agriculture. Further information and analysis can be found in OECD (2015), *Drying Wells, Rising Stakes: Towards Sustainable Agricultural Groundwater Use*, OECD Studies on Water, OECD Publishing. The countries profiles for 16 countries of OECD are available for download at: *www.oecd.org/tad/sustainable-agriculture/groundwater-use.htm*