



Policies to Manage Agricultural Groundwater Use

PORTUGAL

Portugal is one of the top ten OECD countries using groundwater for agricultural irrigation. The agriculture sector accounts for over three-fourths of total groundwater withdrawals. Groundwater use is subject to a range of policy instruments, from regulatory to economic and collective-action based. Other policies focusing on land and conservation complement this approach. At the same time, broader agriculture and energy policies may have mixed effects on the conservation and use of groundwater in agriculture. The example of the Tejo e Ribeiros do Oeste region illustrates the specificities of groundwater irrigation in Portugal.

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

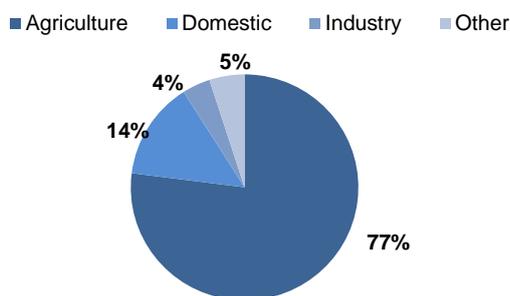
Institution	Role
Portuguese Environment Agency (APA) of the Ministry of Environment, Spatial Planning and Energy (MAOTE).	National Water Authority, according to Decree-Law 17/2014 (organic law of Ministry for Environment, Spatial Planning and Energy - MAOTE), is responsible for the planning and management in an integrated way of water resources without prejudice to the duties of other institutions, namely from the Ministry of Agriculture and Sea (MAM).
Directorate General for Agriculture and Rural Development (DGADR) of the Ministry of Agriculture and Sea (MAM).	According to the Decree-Law 18/2014 (organic law of the MAM), to participate in the issues related to water, by collaborating in the National Water Plan and in the river basin district plans based on the Public Irrigation development strategy, the livestock licensing (NREAP), and implementing the Nitrates Directive (91/676/EEC) and the Sludge Directive (86/278/EEC).
Office for Planning, Policies and General Administration (GPP) of Ministry of Agriculture and Sea (MAM).	According to the Decree-Law 18/2014 (organic law of the MAM), responsible for defining the sectorial policy (agriculture) and its articulation with other policies, including water policy

2. Status and use of groundwater resources

- Total renewable water availability in mainland Portugal is 29,058 km³ in 2013. (Renewable water availability = precipitation – evapotranspiration + external flow – water requirements + returns.)
- Annual groundwater recharge 7,909 km³ in 2013.
- Annual groundwater use is estimated 2,43 km³ in 2013.
- Groundwater withdrawals for irrigation 1,857 km³ in 2009.
- Total irrigation volume 3,745 km³ in 2009.
- Total irrigation area is estimated 466 800 ha in 2009.

Source of information: Combined data from 2009 National Statistics (2011 Agricultural Census) and 2013 provisional data of River Basin Districts of mainland (2014 November report).

Main groundwater withdrawing sectors at the national level



Note: Agriculture includes also the livestock sector, Industry includes also the mining sector and Other includes the tourism sector. The Energy (thermoelectric and hydroelectric) sector is not a groundwater consumer's.

3. Inventory of national policies affecting agricultural groundwater use

Recent groundwater management reforms

Reforms	Year	Scope and objective	Degree of implementation
New rules on the use of water resources and respective titles (Decree Law 226-A/2007)	2007	Issuing entitlements for water use, as a management tool for River basin Districts taking into account the guidelines set out in the Water Framework Directive (Directive 2000/60/EC) and the Water Act (Law 130/2012).	Partial
Implementation of the PNUEA 2012-2020: National Programme for the Efficient Use of Water	2001	Strategic objectives: reducing water losses in irrigation water conveyance systems and irrigation; gradual harmonisation between revenues associated to tariffs and the real cost of water, focusing on the volumes used, without loss of competitiveness for the sector	Partial
Policies that impact on water quality	1997	<p><u>1997 - Vulnerable Zones under the Nitrates Directive:</u></p> <ul style="list-style-type: none"> • Programme of Action - Ordinance 259/2012, of 28 August - To reduce water pollution caused or induced by nitrates from agricultural sources and to prevent the spread of this pollution in vulnerable zones. Delimitation - Ordinance 164/2010. • Code of Good Agricultural Practices (CBPA): Water Protection against nitrate pollution from agriculture <p><u>2008 - Licensing scheme of livestock holding (REAP)</u> – compels the intensive livestock farming to apply a Livestock Manure Management Plan.</p>	Partial
Common Agricultural Policy	2000	Pillar 2 of the CAP: Rural Development Programmes - support for investment in more efficient irrigation equipment and the promotion of less intensive production systems. Compliance with the permit conditions of livestock farming including practises of water use, where applicable. Agri-environmental measures and support for less favoured areas are necessary to meet cross-compliance requirements.	Partial

Pillar 1 of the CAP: Beneficiaries of single payments must meet cross-compliance requirements (besides the Nitrates Directive, good agricultural and environmental conditions: establishment of buffer strips along water courses; use of water for irrigation subject to authorisation procedures; protection of groundwater against pollution listed in the Annex of Directive 80/68/EEC in the version in force on the last day of validity, as regards agriculture (Annex II - Cross-compliance rules under article 93 of Reg. (EU) 1306/2013). From 2015 onwards, beneficiaries are subject to agricultural practices beneficial for the climate and the environment (crop diversification, maintenance of permanent grassland and ownership of areas of ecological interest).

National strategy for sustainable operational programmes targeted to Producer organisations of fruit and vegetables (PO-0001-DSPMA PO) - Environmental Action 7.1: Saving water through conversion or modernisation of irrigation systems

Core groundwater management approaches at national level

Groundwater ownership	▶ Private (use conditioned by State)
Groundwater entitlement characteristics	▶ Temporary
Beneficiaries of entitlement	▶ Individuals, collective bodies and Companies
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

Regulations on wells

- ▶ Approval of new well
 - Accounting for well space restriction
 - With environment impact assessment
- ▶ Groundwater withdrawal restriction.

Under article 37 of Decree-Law 130/2012, protection measures are provided for water abstraction with restricted use, namely groundwater for human consumption, areas at risk of saline intrusion, and others. The Ordinance 702/2009, of 6 July, and the Decree-Law 382/99, of 22 September, establish perimeters of protection and restrictions for abstractions of surface water and groundwater for public supply of human consumption.

Groundwater abstraction is regulated in Portugal by the licensing scheme laid down in Decree-Law 226A/2007 of 31 May. According to the quantitative status of groundwater bodies, there may be restrictions in water

Economic instruments

Economic instruments to regulate quantity: pricing

- ▶ There are charges on pumped water in agriculture and other sectors. They are based on a scheme cost recovery, and in implementation phase.
- ▶ They account for the scarcity value of water.

Groundwater markets

In Portugal there are no established groundwater markets. The holder may grant concessions to another entity for use under certain conditions. The concessionary entity is required to pay a fee and also the rental of equipment.

Irrigation programs

- ▶ Generic irrigation subsidies
- ▶ Irrigation subsidies focusing on efficiency

Collective management approaches

Collective management schemes

- ▶ Voluntary (self-regulation)
- ▶ Water user associations

abstraction in compliance with this Decree, in order to strike a sustainable balance between abstractions and available groundwater resources.

The Environmental Impact Assessment scheme only applies to agriculture, forestry and aquaculture sectors (Annex II of the Decree-Law 151-B/2013) in case of agricultural development projects that include irrigation and drainage infrastructures in areas ≥ 2000 ha or, in vulnerable areas, ≥ 700 ha. These conditions are applied regardless of the origin of the irrigation water supply (surface or underground).

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. These measures are enforced.

Other policies and programs affecting agricultural groundwater use

Agriculture water conservation programs

- ▶ Subsidies
- ▶ Conditional payments
- ▶ Penalty

Land policies with implications on groundwater use

- ▶ Zoning with restriction on groundwater use
- ▶ Regional Allocation System with groundwater priority for other uses
- ▶ Urban rural cooperation e.g. contracts and other

Climate change adaptation programs

- ▶ Investment in agriculture and groundwater R&D
- ▶ Water infrastructure investment

Watershed conservation programs

- ▶ Exclusion zone for conservation area
- ▶ Limits of groundwater use close to protected areas

Energy programs

- ▶ Electricity subsidies – for energetic efficiency
- ▶ Other energy supporting programs (diesel, natural gas) – tax of Petroleum Fuel and reform of environmental taxation.
- ▶ Other: **PNUEA** (National Programme for the Efficient Use of Water - 2012-2020 Implementation), to increasing energy efficiency in the use of irrigation systems; **PNAEE** (National Plan of Action for Energy efficiency), with a Program of agricultural measures.

Supply side management approaches

Aquifer recharge programs

- ▶ Artificial recharge of aquifers requires an authorisation of Administration. There is no license issued till now.

Programs supporting the development alternative water supplies

- ▶ Surface water reservoir expansion

Others

Agricultural income support policies

- ▶ Crop linked payments towards water intensive crops
- ▶ Crop-linked payments to recharge inducing-crops

Drought insurance programs

- ▶ Government subsidized plans for field crops
- ▶ Government based insurance

4. Agricultural groundwater use at the regional level

River Basin District of 'Tejo e Ribeiras do Oeste'

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 and more frequent floods	yes	Surface water is available and used for irrigation. It is conjunctively used with other sources, on-farm and off-farm.

Characteristics of the main aquifers in the regional unit

From the hydrogeological perspective, each of the units considered has its own characteristics:

- ▶ The rocks of the 'Maciço Antigo' (eruptive and metamorphic) are hard fractured rocks where water circulates via the network of fractures.
- ▶ The rocks of the 'Bordadura Ocidental' are very different because they include formations of very low permeability (clay and marl), formations of fissural and interstitial permeability (sandstones) and formations of high permeability, of karsic type (limestones).
- ▶ The formation of the 'Bacia Terciária do Baixo Tejo' make up the largest national aquifer, which gives the Ribatejo a unique wealth in the Portuguese territory. This diversity gives existing water systems a huge heterogeneity. From the geomorphological perspective, the Portuguese side of the river Tagus basin occupies an important position: first, because it establishes the connection between the northern and southern regions, which have quite distinct physical characteristics; second, because the sedimentary basin of the Tagus is the largest in the country.

Type of aquifer	Groundwater quality concerns
Confined	Limited The main type: (1) Areas designated as vulnerable under the Nitrates Directive: Tejo (covers groundwater bodies 'Aluviões do Tejo' and 'Bacia do Tejo-Sado / Margem Esquerda') and Estremoz-Cano (covers only one groundwaterbody 'Estremoz Cano'). (2) Based on provisional data available for the River Basin District (2014 November report), urban waste water represents: 89% of BOD5; 82% of COD; 84% of total P and 90% of total N and the pressure from livestock and agriculture sectors are not yet accounted for.

	Volume
Groundwater irrigation	0,597 km ³ (2013)

Other uses of groundwater

	Minor	Major	Diminishing	Steady	Increasing
Domestic	✓			✓	
Industry	✓			✓	

Reforms at the regional unit	Year	Scope and objective	Degree of implementation
<u>Hydrographical Regions (first cycle)</u> Management Plans established for 8 River Basin Districts (full coverage of mainland Portugal)	2012	Protecting and improving the status of water bodies	Partial

5. Bibliography

Institutional websites

- www.apambiente.pt
- www.dgadr.mamaot.pt
- www.gpp.pt

Official reports

- Characterisation Report of the River Basin District of 'Minho e Lima', APA, November 2014, www.apambiente.pt/_zdata/PoliticAs/Agua/PlaneamentoGestao/PGRH_ParticipacaoPublica/PGRH_2_Art5/RH1_Art5.pdf
- Characterisation Report of the River Basin District of 'Cávado, Ave e Leça', APA, November 2014, www.apambiente.pt/_zdata/PoliticAs/Agua/PlaneamentoGestao/PGRH_ParticipacaoPublica/PGRH_2_Art5/RH2_Art5.pdf
- Characterisation Report of the River Basin District of 'Douro', APA, November 2014, www.apambiente.pt/_zdata/PoliticAs/Agua/PlaneamentoGestao/PGRH_ParticipacaoPublica/PGRH_2_Art5/RH3_Art5.pdf
- Characterisation Report of the River Basin District of 'Vouga, Mondego e Lis', APA, November 2014, www.apambiente.pt/_zdata/PoliticAs/Agua/PlaneamentoGestao/PGRH_ParticipacaoPublica/PGRH_2_Art5/RH4A_Art5.pdf
- Characterisation Report of the River Basin District of 'Tejo e Ribeiras do Oeste', APA, November 2014, www.apambiente.pt/_zdata/PoliticAs/Agua/PlaneamentoGestao/PGRH_ParticipacaoPublica/PGRH_2_Art5/RH5A_Art5.pdf
- Characterisation Report of the River Basin District of 'Sado e Mira', APA, November 2014, www.apambiente.pt/_zdata/PoliticAs/Agua/PlaneamentoGestao/PGRH_ParticipacaoPublica/PGRH_2_Art5/RH6_Art5.pdf
- Characterisation Report of the River Basin District of 'Gadiana', APA, November 2014, www.apambiente.pt/_zdata/PoliticAs/Agua/PlaneamentoGestao/PGRH_ParticipacaoPublica/PGRH_2_Art5/RH7_Art5.pdf
- Characterisation Report of the River Basin District of 'Ribeiras do Algarve', APA, November 2014, www.apambiente.pt/_zdata/PoliticAs/Agua/PlaneamentoGestao/PGRH_ParticipacaoPublica/PGRH_2_Art5/RH8_Art5.pdf
- Agricultural Census 2009, INE 2011 www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_publicacoes&PUBLICACOESpub_boui=119564579&PUBLICACOESmodo=2
- Survey on Structure Farm 2013, INE 2014
- National Report on the implementation of Directive 91/676/CEE [Poluição Provocada por Nitratos de Origem Agrícola - Relatório 2008-2011, MAMAOT 2012], concerning the protection of waters against pollution caused by nitrates from agricultural sources on the 2008-2011 period. snirh.apambiente.pt/snirh/download/relatorios/PT_Rel_Directiva_Nitrados_2008_2011_final.pdf
- Publication by the Seminar on the Use of Water in Agriculture ra09.ine.pt/xportal/xmain?xpid=RA2009&xpgid=ine_ra2009_publicacao_det&contextopu&PUBLICACOESpub_boui=119580060&PUBLICACOESmodo=2&selTab=

Additional sources

- www.apambiente.pt/index.php?ref=16&subref=7&sub2ref=9&sub3ref=848
- snirh.apambiente.pt/index.php?idMain=1&idItem=1.4&idSubItem=&uh=T
- snirh.apambiente.pt/
- sir.dgadr.pt/
- www.dgadr.mamaot.pt/rec-hid/diretiva-nitratos
- www.dgadr.mamaot.pt/images/docs/hidrologia/Tab_Nec_Hidr_Cult.pdf
- www.dgadr.mamaot.pt/ambord/utilizacao-de-subprodutos-de-origem-animal-como-fertilizantes
- www.dgadr.mamaot.pt/ambord/valorizacao-lamas
- www.apambiente.pt/index.php?ref=17&subref=826
- www.dgadr.mamaot.pt/ambord/reap
- www.apambiente.pt/zdata/consulta_publica/2012/pnuea/implementacao-pnuea_2012-2020_junho_.pdf
- www.dgadr.mamaot.pt/images/docs/hidrologia/i009404.pdf
- www.dgadr.mamaot.pt/ambord/reap/procedimentos-aplicaveis-as-atividades-pecuarias
- www.gpp.pt/pdr2020/
- www.gpp.pt/pac2013/programacao_pd.html
- www.gpp.pt/MA/PO_FH/PO_Accoes_ambientais_7.1.pdf

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