



ADAPTATION STRATEGIES RELATED TO WATER MANAGEMENT AND WATER SERVICES

An Example of the Situation in Southern Europe

A case study of Portugal

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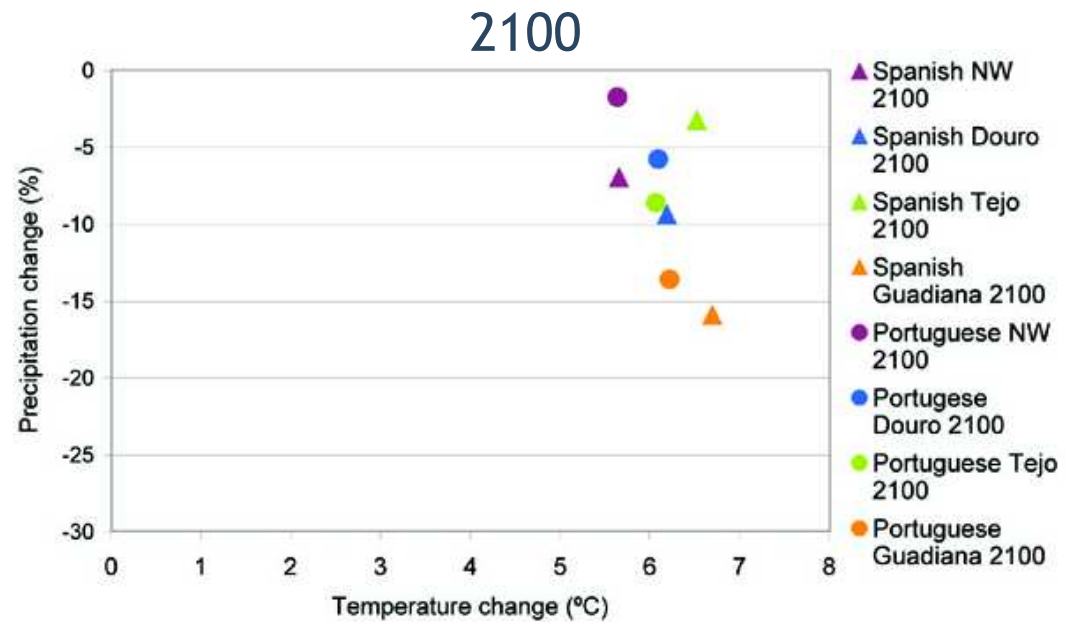
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Portugal

Climate Change Impacts on Water in Portugal



- North-South significant asymmetry
- East-West strong interrelationship



Major impacts of climate change of water resources in Portugal

- Overall annual runoff reduction;
- Water availability: increase of regional asymmetry
 - stronger reduction of runoff and of groundwater recharge towards the South;
- Water availability: increase of seasonal asymmetry
 - slight runoff increase in Winter and strong runoff decrease in all other seasons;
- Flood risk increase, particularly in the North:
 - due to rainfall intensity increase and sea level raise;
- Surface water quality decrease, particularly in the South:
 - mainly due to temperature increase but also to non-point sources pollution resulting from the increase of rainfall intensity.
- Groundwater quality decrease
 - saline contamination due to aquifer recharge reduction and to sea level increase.
- Water demand increase

Framework of adaptation strategies related to water management in Portugal



- New Water Law (2005)
- New Water Management Agencies (2007)
- Revised Water Supply and Sanitation Strategic Plan (PEAASAR, 2006)
- Second generation of River Basin Plans, being developed (2006-2009)
- Portuguese-Spanish Convention on shared watersheds (1998)
- Revised National Climate Change Program (2007)
- Climate Change in Portugal: Strategy, Impacts and Adaptation Measures, SIAM1(2001), SIAM2(2006)
- Communication on Water Scarcity & Droughts (2007)
- Early national discussion on climate change adaptation

Action domains

- Water availability
- Water demand
- Flood protection
- Institutional system

Types of measures

- T - Technical
- L - Land Use
- E - Economic
- I - Information
- R - Regulatory

ww (Priority given as a win-win measure)

Adaptation measures related to water availability



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	Measure	Action taken or foreseen
T	Better use of existing storage capacity of surface and ground water	River Basin Plans
T	Increased use of groundwater resources	River Basin Plans
T	Increased storage capacity	Some dams under construction or projected
T	Water transfer between hydrographic basins or within a basin	Douro -> Tejo (existing) Guadiana -> Sado (under study) Mira -> Algarve (projected)
T L	Better land use management to promote groundwater recharge; artificial recharge	New agricultural practices
T	Due and fog harvesting	Promising in Madeira and Azores Islands
T	Development of regional water conveyance grids	PEAASAR, 2006 Operational in Algarve and under improvement
T	Desalinization of saline and brackish waters	Operational in Porto Santo Promising & planned in Algarve

Adaptation measures related to water demand

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	Measure	Action taken or foreseen
E I	Reduction of water consumption	National Plan for an Efficient Water Use (2001)
T E	Reduction of water losses in water supply systems	National Plan for an Efficient Water Use (2001)
T E	Water reuse and recycling	Water Law (2005)
L E	Adjustment of water use sites through land use planning	Water Law (2005)
T E	Use of water of a lesser quality	Some local applications are already operational
E R	Reduce pollutant loads into water bodies	PEAASAR (2006) New agricultural practices

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Adaptation measures related to flood risk increase



	Measure	Action taken or foreseen
T	Reinforcement of flood defense structures	River Basin Plans
T	Increased flood storage in reservoirs	River Basin Plans
E L	Displacement of people and facilities from high risk areas	Flood directive Land use municipal plans
I	Monitoring strategies and systems improvement	SNIRH is operational and is a leading example in Europe
I	Flood insurance	Flood Directive Definition of flood risk areas

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Adaptation measures related to the institutional system



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	Measure	Action taken or foreseen
I	Reinforcement of R&D on climate change and climate change impacts	SIAM I (2002), SIAM II (2006), FP7
R	Reassessment of water policies and planning procedures	Water Law (2005) and New water management agencies (2007) River Basin Plans
R I	Improvement of monitoring strategies and systems	Operational: SNIRH, INSAAR, SNIRLit To be developed (2008): SNITURH
R I	Improvement of emergency situations management	National Civil Protection System National drought commission
I	Promotion of education and public awareness	River Basin Plans Operational through SNIRH
I	Reinforcement of public participation	New water manag. agencies (2007) River Basin Plans
I	Reinforcement of stakeholders participation	New water manag. agencies (2007) River Basin Plans
I L	Improvement of transboundary management of shared water resources	River Basin Plans Albufeira Conv. improvement (2007)

Final remarks

- A significant percentage of the proposed measures provide benefits in any case (win-win measures), mainly in the water demand control and institutional domains;
- Economic, informational and regulatory measures are as important as technical oriented measures;
- Some measures, namely technical oriented ones, have significant economical and environmental impacts.

Action domain	Type of measures				
	Technically oriented	Land-use related	Economic	Information	Regulatory
Water Availability	*****	*			
Water demand	***	*	*****	*	
Flood risk	**	*	*	*	*
Institutional system		*		*****	***