

IWRM-net POLICY brief



Water2Adapt

*Resilience enhancement
and water demand management
for climate change adaptation*

INTRODUCTION

Focus of the project

Water2Adapt is an applied-policy research project, funded under the 2nd Call of the IWRM-net (Towards a European exchange network for integrating research Efforts on Integrated Water Resources Management), an initiative of 17 partners from 14 European countries seeking to exchange good practice and to develop new IWRM methods and tools, and hence inform the on-going efforts to implement the provisions of the EU Water Framework Directive (WFD, Directive 2000/60/EC). The Water2Adapt project addressed the [impacts of droughts and water scarcity](#), exacerbated by human-induced climate change, on communities and regional economies in representative river basins in Europe: Ebro (Spain), Po (Italy), and Weser (Germany).

POLICY FOCUS

European policy on water scarcity and drought (WS&D)

While the Water Framework Directive (WFD) introduced a common policy basis for water protection and management in the European Union (EU), the issues of water scarcity and droughts have been further addressed in the [Communication of the European Commission](#) (COM (2007) 414 final) and, more recently, in the [Blueprint for Safeguard Europe's Water resources](#) (COM (2012) 673). Efficient water use is also a cornerstone of the EU Resource Efficiency Flagship initiative as a part of the Europe 2020 Strategy. Improved efficiency of water allocation and use, coherent application of water pricing and cost recovery principle, and better planning for drought spells, likely to be amplified by climate change throughout Europe are accepted as the most effective ways of adapting to climate variability and change. Responding to the knowledge needs, the Water2Adapt has analysed the direct and indirect losses caused by selected significant drought events, and examined the empirical performance of a range of water demand management policies and measures.

PURPOSE OF THIS POLICY BRIEF

Importance of WS&D in the river basin

The [Weser river basin](#), covering an area of 49,000 km², extends from central to northern Germany with the central highlands in the south and the central plains in the north. The Weser is 452 km length and has a water discharge of 326 m³/s (Intschede) and 115.5 m³/s (Rethem) (FGG Weser, 2009). The basin has a population of about 9.3 million inhabitants. The Weser basin comprising the central plains lie largely in the federal state of Lower Saxony, and this area has provided the case study area for the Water2Adapt project. About 55% of this area is designated for agricultural use. Although dominated by agriculture, just 2% of

the total water demand in this area is used for irrigation. Industry consumes 42% of total water use and 56% is consumed by households (FFG Weser, 2009).

The year 2003 was one of the warmest and driest summer in many parts of Europe. Germany and the Weser Basin were no less affected by this event. During the summer months of 2003 (May to October), Lower Saxony experienced a drought: temperatures recorded in August of this year were 5°C higher than the 30-year average of 1961 to 1990, the mean temperature was 15.3°C - about 1.7°C above the average for this period and the precipitation level of 356 mm was about 22% lower than the multi-annual average of 458 mm (NLWKN, 2003).

Northern Germany will continue to experience an increasing risk of floods and decreased water availability in the summer months. The most relevant regional influences of climate change in the Weser region include: a seasonal shift of rainfall with a decrease in precipitation in summer months and an increase in rainfall in the winter season; a moderate increase in annual precipitation; an increase in the average annual temperatures by 1 to 2°C by 2050; and an increased frequency of temperature extremes (Gross 2011). This projections will lead to increased frequency of drought and consequently water scarce periods resulting in:

- increased pressure on groundwater bodies and increased competition among the various water demanding sectors, especially the agricultural sector;
- increased frequency of water shortages and reduced water quality;
- increased water demand because of heat waves, an augmentation of cooling water for industrial use and to keep crop yield stable as well as the water consumption of livestock farms;
- reductions in agricultural yields and crop quality; and
- higher summer temperatures and humidity levels negatively affecting quality of life in the summer.

PROJECT'S KEY OUTCOMES

Economic and social impacts

The Water2Adapt project has evaluated the economic and social losses caused by droughts in the Weser Basin. The estimated economic cost of the drought of 2003 to the **agricultural sector in the Weser river basin was approximately €370 million** in comparison to 2009. The non-irrigated winter crops and root crops suffered most as a result of the 2003 drought. There are few reports of restricted water availability in the Weser in the summer of 2003. However, the power company, STAKRAFT reported a more than 17% reduction in **hydropower** production in April 2003 and a 14% reduction in May 2003 compared to the same months in 2002 due to water scarcity (strom-magazin 2003). Power companies urged consumers to reduce their energy consumption as a result of low water levels in the rivers that provided cooling water. Despite these low water levels, shipping was not impacted mainly because of the canalisation and the eight hydroelectric dam along the river's course in Lower Saxony.

Measuring the **social costs** of drought and water scarcity is challenging, because these costs are for the most part intangible, and the socio-economic data that support such an assessment are often not publicly available. Farmers with irrigation systems have an extra work load during periods of drought which can lead to stress if there is insufficient labour available. Those farmers with an extra income from, for example, the existence of an on-farm biogas plant for energy production or a family member working off the farm are more resilient to drought events. Urban residents were not subject to water restrictions nor to increasing water prices in 2003. The water supply in the Region of Hanover can endure four consecutive years of summer drought because aquifers are sufficiently replenished in the winter months (Fürstenberg 2011).

While future water demand in the domestic and commercial sector is expected to decrease in the next thirty years because of population decline and structural improvements, water abstraction for irrigation in rural areas is expected to increase and, as a result, the risk of water scarcity.

LIMITATIONS IDENTIFIED

Effectiveness of the existing policy responses

The three main economic measures or instruments for water demand management, water tariffs, wastewater charges and water abstraction charges, have been implemented in most of the Federal States of Germany. The existing regulatory instruments in Germany for responding to drought and water scarcity are the regional [development] plan, regional land use plans, environmental impact assessment and the coordination among related sectorial planning organisations and activities. The informal instruments such as the development of actor networks, regional development concepts and interdisciplinary [scientific] projects are important for raising awareness of and disseminating information on the impacts of and potential responses to climate change.

MAIN RECOMMENDATIONS

Prospective WS/D policies and measures

The following recommendations to enhance resilience to drought and water scarcity have resulted from the Weser Basin assessment.

Recommendations for [the basin](#) in general:

- The development of national/regional water scarcity/drought management plans, including the implementation of a system of documentation (e.g., digital mapping) and monitoring (e.g., water allowances and irrigated **farmland including an “irrigation land register”**);
- Stronger enforcement of the implementation of the Federal Spatial Planning Act (ROG, 2008) in which it is stated that climate protection must be taken into account in measures for mitigation and adaptation to climate change (§ 2, 6 ROG).

Recommendations for [farmers and farm communities](#) in particular:

- Expansion of agrarian training and education in the context of agribusiness to provide farmers with the know-how to respond relatively quickly to market changes;
- An increased effort to raise public awareness of the importance of irrigation for food production;
- The cultivation of stronger crop types, requiring less water and more tolerant to heat, such as corn and buckwheat.
- Support for and development of efficient irrigation systems;
- **Establishment of associations (regional “round tables” or working groups)** addressing the environmental and social needs of a region and its natural resource base to communicate the various interests of a region to the policy sector;
- Integration of potential climate change impacts and responses into **“Landscape framework plans”**;
- Improvement and implementation of water retention measures to recharge the groundwater body.
- Research into hydro-geological systems of river sub-basins in order to quantify and establish the inter-linkages among processes of groundwater recharge, extraction and water substitution; and

Recommendations for [urban areas](#) to encourage water savings:

- Transboundary cooperation/agreements between adjacent municipalities, and regional planning of metropolitan areas;
- Increasing rainwater retention areas and greywater collection in urban centres;
- Public education and awareness-raising campaigns for encouraging efficient use of water and reducing virtual water use;
- Industrial water use: improve techniques for more efficient use of water for cooling, including the reuse of cooling water, use of rainwater and cleaning **technologies that save water, and implementation of “closed cycles”**.



WATER2ADAPT PROJECT

Starting/Ending date of project:
01/09/2010 to 31/10/2012

Participating institutions

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Type of R&D:

Policy-applied research project

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ADDITIONAL TECHNICAL/SCIENTIFIC INFORMATION

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SELECTED RELATED PROJECTS/ACTIVITIES

The Water Cap and Trade (Water Market scenarios for Southern
Europe: new solutions for dealing with water scarcity and drought
risk www.capandtrade.acteon-environment.eu), one of the other 2nd
Call IWRM-net projects. Coordinated by ACTEON.

The Icarus (WRM for Climate Change Adaptation in Rural Social
Ecosystems in Southern Europe, www.cmcc.it/research/research-projects/icarus-1/icarus), one of the other 2nd Call IWRM-net
projects. Coordinated by CMCC.

The Epi-Water (Evaluating Economic Policy Instruments for
Sustainable Water Management in Europe; www.epi-water.eu)
research project, coordinated by FEEM and funded by the EU FP7.

The Preempt (Policy-relevant assessment of economic and social
effects of hydro-meteorological disasters; www.feem-project.net/preempt) project coordinated by FEEM and funded by
the European Commission under the Financial Instrument for Civil
Protection.

The WATERCoRe (Water Scarcity and Droughts: Coordinated Actions
in European Regions; www.watercore.eu), funded under the
INTERREG IVC Programme.

The Drought R&SPI (Fostering European Drought Research and
Science-Policy Interfacing; www.eu-drought.org) FP7 funded
research project.

The Xerochore (An Exercise to Assess Research Needs and Policy
Choices in Areas of Drought; www.feem-project.net/xerochore) FP7
funded coordination action.