Project in brief

Water2Adapt: *Resilience enhancement and water demand management for Climate Change Adaptation*

ERA-net initiative, 2nd Joint Call for Research on IWRM

Participating countries/institutions

Fondazione Eni Enrico Mattei (FEEM), Italy; *Basque Centre for Climate Change* (BC3), Spain; *Chamber of Agriculture of Lower Saxony* (CALS), Germany; *Seeconsult Deutschland GmbH*, Germany; [Withdrawn] *Fundação da Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa* (CENSE), Portugal.

Web Link: www.feem-project.it/water2adapt

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Project background

The Water2Adapt project was born from the frustration about the *poor understanding* of the full effects of droughts and water scarcity on social welfare and the recognition of *an immense role of water* for climate adaptation.

Small in size and exploratory in nature, the project has been ideally suited for exploration the web of interconnected impacts triggered by WS&D.

The project collected evidence and contributed to filling the knowledge gaps, setting the stage for an evidence-based drought management approach.

European policy on Drought and Water Scarcity

European Drought Policy – A Cinderella among the European environmental legislation

It is widely held belief that the EU Water Framework Directive (2000/60/EC) is not fully equipped to adequately confront the issue of water scarcity and droughts

Growing frustration with the slow and uneven rate of implementation across Member States; the Review of the River Basin Management Plans indicates that a significant number of EU water bodies 'will not reach 'good status' by 2015 due to both long-standing and emerging challenges' (EP Resolution A7-0192/2012)

EP called several times upon the Commission to submit legislation, '*similar to the directive on floods, which encourages the adoption of an EU policy on water shortages, droughts and adapting to climate change*'.

European policy on Drought and Water Scarcity (cont.)

EC Communication - *Addressing the challenge of water scarcity and droughts in the European Union* (COM/2007/0414 final)

- Putting the right price tag on water
- Allocating water and water-related funding more efficiently
- Improving drought risk management
- Considering additional water supply infrastructures
- Fostering water efficient technologies and practices
- Fostering the emergence of a water-saving culture in Europe
- Improve knowledge and data collection

Water pricing is slowly being implemented in MS. It seems that neither the objectives of full implementation of the WFD in terms of water cost recovery or the implementation of the 'users pay' principle have been reached so far (Strosser et al., 2012)

Blueprint for safeguarding Europe's waters – little progress so far.

EU 2020 Strategy for smart, sustainable and inclusive growth

"By 2050 the EU's economy .. is **competitive, inclusive and provides a high standard of living** with much lower environmental impacts. All resources are sustainably managed .. Climate change milestones have been reached, while biodiversity and the ecosystem services … have been protected, valued and substantially restored" (2011 Roadmap to a resource efficient Europe, COM(2011) 571 final)

"By 2020, all WFD River Basin Management Plans (RBMPs) have long been implemented…. The impacts of droughts and floods are minimised, with adapted crops, increased water retention in soils and efficient irrigation. Alternative water supply options are only relied upon when all cheaper savings opportunities are taken. Water abstraction should stay below 20% of available renewable water resources"

A step change improvement in water use (efficiency) is required, through competiveness and reward for innovation (Transforming Water, M. Young & FEEM)

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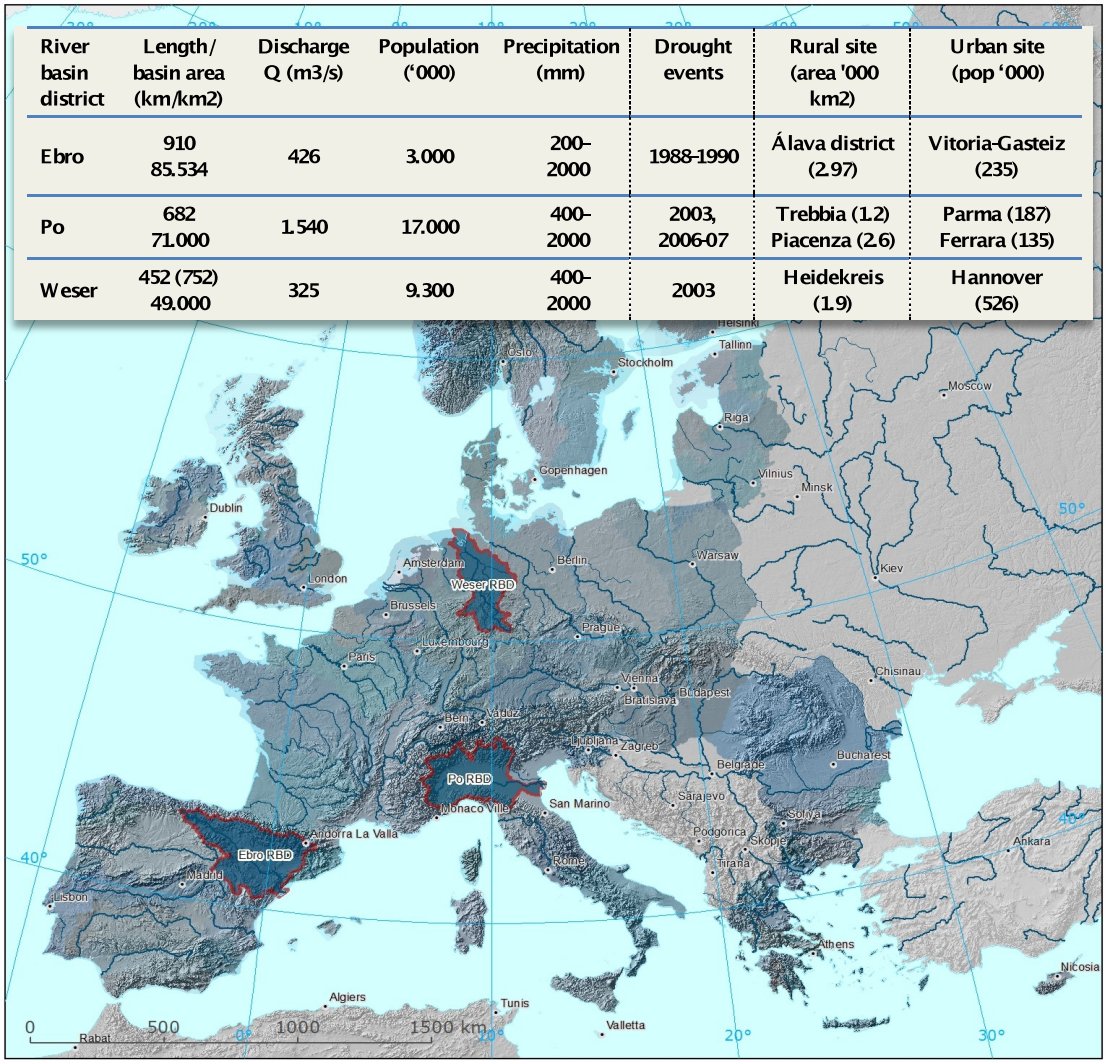
Pilot river basin districts

River basin district	Length/ basin area (km/km2)	Discharge Q (m3/s)	Population ('000)	Precipitation (mm)	Drought events	Rural site (area '000 km2)	Urban site (pop '000)
Ebro	910 85.534	426	3.000	200–2000	1988-1990	Álava district (2.97)	Vitoria-Gasteiz (235)
Po	682 71.000	1.540	17.000	400–2000	2003, 2006-07	Trebbia (1.2) Piacenza (2.6)	Parma (187) Ferrara (135)
Weser	452 (752) 49.000	325	9.300	400–2000	2003	Heidekreis (1.9)	Hannover (526)



Representative river basin districts: *Ebro* and *Po* are among international RBDs although their trans-national importance is very limited. The upper part of *Weser* RBD belongs to Central highlands, whereas the downstream part is situated in the Central plains ecological regions (ERs). Ebro and Po RBDs belongs to Ibero-Macaronesian and Italy/Corsica ERs.

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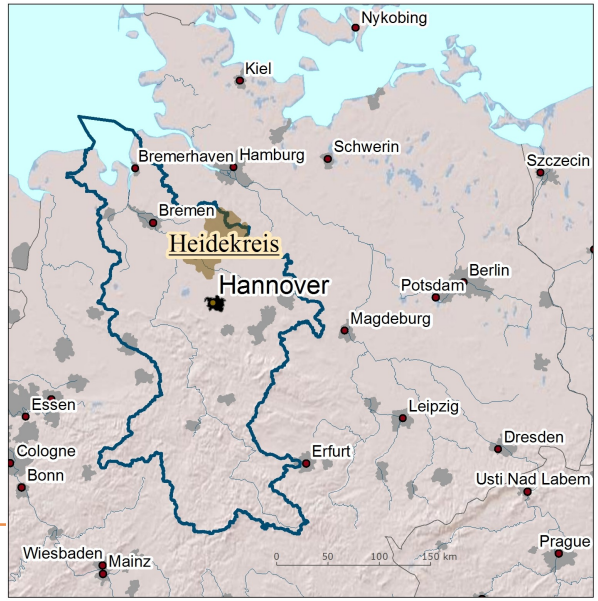
Rural and urban research sites



Case basins and sites: (left up) Ebro RBD: Álava, Vitoria/Gasteiz city; (right up) Po RBD: Piacenza-the Trebbia sub-basin, Parma and Ferrara towns. (*left down*) Weser RBD: Heidekreis district and Hannover city.

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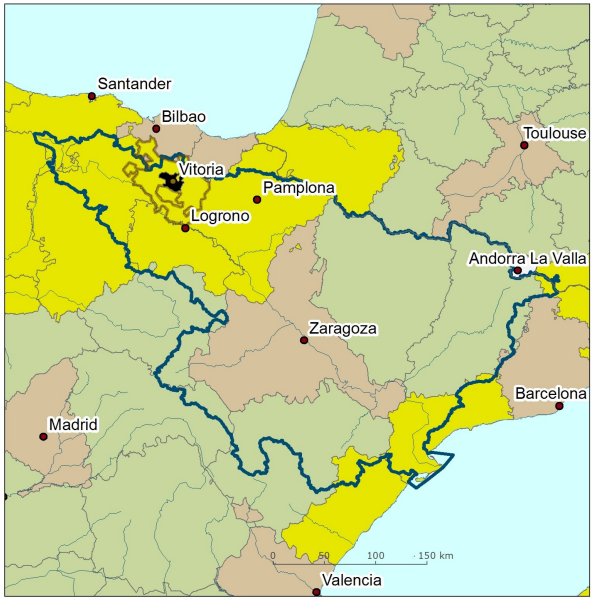

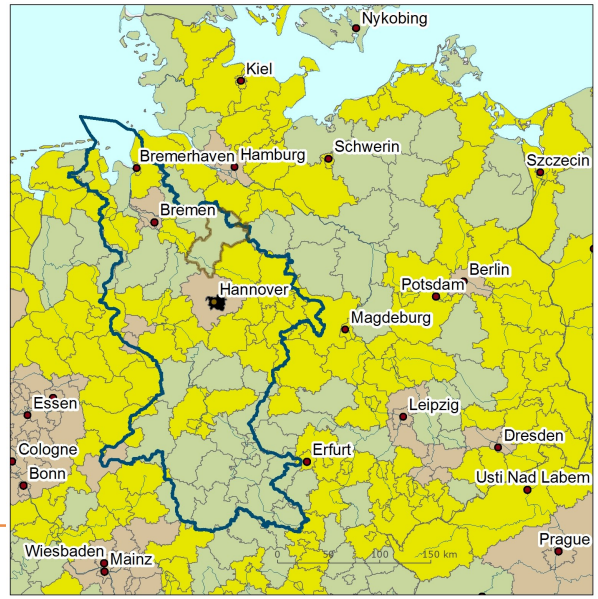

Rural sites
Intermediate
Predominantly rural
Predominantly urban

Degree of urbanisation of the case basins and sites. NUTS3 units (districts) and their classification according to Eurostat.

The GDP per capita (based on the available values 2007-2009) values) in the analysed

rural districts are all above the EU27 average, and is highest in Álava (Spain) ~ 140 per cent, followed by Piacenza (122 per cent) and Heidekreis (~107 per cent).

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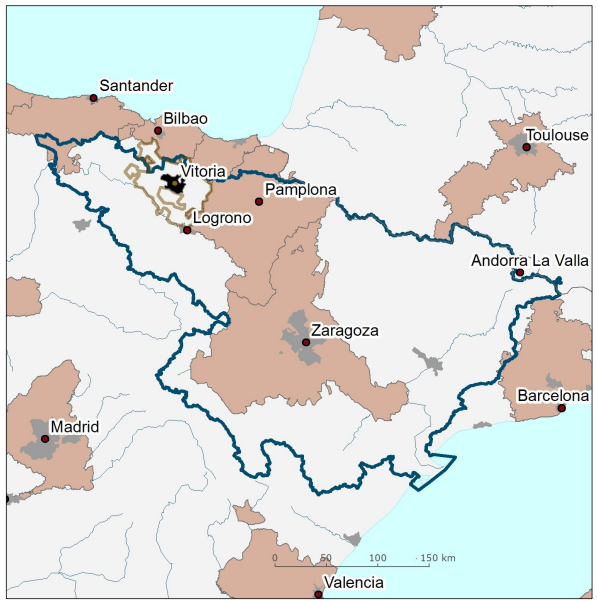

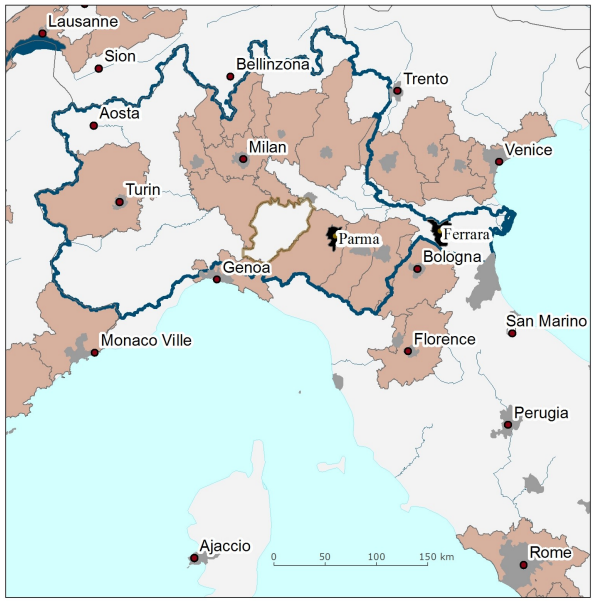

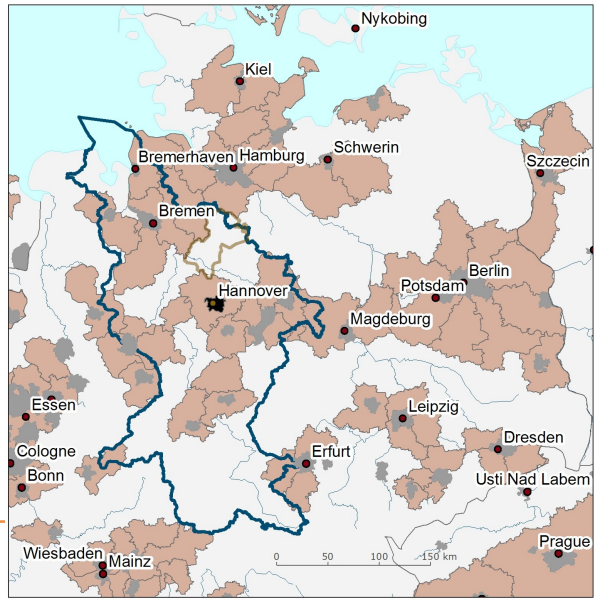

Degree of urbanisation of the case basins and sites. Metropolitan region according to Eurostat

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Revisited drought events

In the Ebro RBD, the analysis focussed on the 1988-1990 drought, one of the three most significant drought spells in BAC since 1944. During the drought that lasted for twenty eight months the stock of water in the Zadorra system fell from 180 million m3 to 5 million m3. Severe water restrictions, ranging between six and twelve hours per day, had been imposed for 10 months.

The Po RBD, normally water rich, experienced severe droughts the 2000s, in particular in 2003 and 2006-2007. The government-declared state-of-emergency persisted for twenty-one months, and exceptional meteorological conditions in parts of the basin were attested for eight out of ten years, paving so the way for agricultural aid programs.

The Weser RBD analysed the 2003 event, one of the worst drought spells on record.

Opportunities and limitation

Focus on economic and social – urban and rural communities – vulnerability, and the prospects of water demand management is centrally placed in the contemporary policy discourses.

The limited size of the project has not permitted to address environmental issues to a greater extent: ecological flows vs minimum environmental flow; ecosystem services and their preservation, and green infrastructure high on the European policy agenda but not addressed in depth by the project (partly compensated by ESAWADE).

The analysis set out by the project is one that underlies the WFD economic analysis; while at the same time set the stage for an climate adaptation strategy. *The opportunity to provide guidance for climate adaptation strategies at RBD.*

In Italy, the W2A project has led to development of a Adaptation Strategy at the RBD level.

Economics of drought

Economic costs of drought are quantifiable and should be assessed for the significant drought events. The reason for doing so is not so much an accounting perspective – how much has been lost – but to reveal a pattern of unproductive water use and vicious subsidies, and in order to inform the RBD policies.

Economic losses triggered by deficient precipitation are not fully attributable to drought. It has been shown through the case studies that losses to energy sector – in particular hydropower – are high but at least to some extent driven by ill-designed incentives for renewable energy sources (see the green energy certificates in Italy). In agriculture, the production losses are partly compensated by the changes of agricultural prices where the drought influence regional markets. The agricultural sector is undergoing transformation only moderately influenced by droughts. The sum of analysed losses should not be equalled to the costs of drought.

Economics of drought and climate adaptation

The costs of droughts tend to be underestimated. The losses directly or indirectly attributable to drought can cause billions of euro damage. A database of drought impacts for significant losses should be developed at EU level, similar to the proposed *European Flood Impact Database*.

Labour market and climate adaptation policies can become a catalyst of economic transformation. On the face of it, climate adaptation contributes to preserving existing jobs through maintaining viability and resilience of existing businesses. Many climate adaptation measures will require substantial investments which can stimulate demand for labour. Well-thought and designed fiscal and labour market policies will be of critical importance for unfolding the potential of climate adaptation action to generate new and better jobs. Yet it is difficult to disentangle climate adaptation activities from development and economic transformation driven by other factors. *Long-term, indirect and induced effects of climate adaptation policies on labour patterns and markets are insufficiently analysed and difficult to assess*.

Social effects of drought

Social impacts of drought are mediated by a host of factors, commonly referred to as ***social vulnerability*** (Cutter and Finch 2008; Stehlik and Costello 2008) and ***resilience***.

The rural-urban typology necessitates a rethinking. The EU and OECD design criteria are not suitable for the RBD scale. A more useful scheme should be based on classification of municipalities according to income and added value generated, sources of water provision and water tariffs, and dependency on primary sectors, notably agriculture.

In urban context, droughts are one among many issues related to ***reliability of service provision***. Domestic water consumption is small compared to the water uses in energy and agriculture, but the water conservation efforts are valuable in terms of energy saved both for water supply and sanitation services. A holistic management of all waters in the urban context is a valuable principle beyond the WS&D issue. Water tariffs committed to raise for other reasons than water conservation and in some places their effects on incentivising reduction of consumption has already been exploited.

Social effects of drought (cont.)

To monitor the progress in achieving the 2020 Strategy in terms of inclusive growth, the composite index *people at risk of poverty or social exclusion* is collected by Eurostat. The index combines three indicators: At *risk of poverty* are persons with an equivalised disposable income below 60 % of the national median equivalised disposable income (after social transfers). *Material deprivation* relate to nine deprivations items, among other the ability to pay rent or utility bills. People are severely materially deprived if they cannot afford at least 4 out of 9 items. Finally, the indicator *households with very low work intensity* refers to those aged 0-59 living in households where the adults (aged 18-59) work less than 20% of their total work potential during the past year. The indices (collected at NUTS2 level) vary in ***response to economic downturn which partly coincides with drought***.

Crisis responses in times of drought lead to or exacerbate the existing drivers of social disobedience and unrest, or otherwise undermine the trust in institutions.

Cornerstones of the resilience framework

Enabling environment, the first step up the ladder, comprises activities related to knowledge management, legislation and organisation of water resource management. Knowledge management includes an in-depth understanding of a river basin from a multidisciplinary perspective including climate, hydrology, ecology, economics, engineering and sociology.

Second step up the ladder is the **preservation of healthy river ecosystem and ecosystem services**. Communities draw many benefits from ecosystems, including resources (e.g. water, food, medicines, etc.), a healthy environment (e.g. air purification by forests, purification of water by wetlands, pollination of crops by wildlife, etc.) and the so-called "cultural services" (i.e. the non-material benefits such as aesthetic enjoyment, opportunities for recreation and inspiration for culture and art).

Next step up the ladder is a (more**) efficient use and application of water**, which includes measures to water conservation and shifting water from low to higher value uses, contributing so to higher community welfare and wellbeing.

Thank you for your attention

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