

# ECONOMIC ANALYSIS OF WATER RESOURCES MANAGEMENT

## DESCRIPTION

The main lines of research of the group are:

**Water management in areas vulnerable to extreme weather events: drought risk and water scarcity.** The group has large experience and significant expertise on water scarcity and drought risk management, in particular, related to the specific conditions of EU Mediterranean countries and drought prone areas beyond the EU (Latin America, Central Asia, Australia, western States of the USA, etc.), with strong links to climate change effects and the enhancement of adaptation. IMDEA Water has worked on economic policy instruments (EPIs) to induce individual decisions regarding water use in order to contribute to the collective goals of reducing vulnerability to scarcity and increasing aquatic ecosystem resilience to drought risk. In particular, IMDEA Water has delivered extensive work on insurance schemes as an innovative instrument to reduce vulnerability of sensitive economic sectors such as agriculture, protecting at the same time vulnerable water resources (Pérez et al., 2015a, Pérez & Gómez, 2014a, Pérez & Gómez, 2014b). Also, research has been developed on smart water pricing (Pérez et al., 2015b) to manage incentives for water consumption and in water trading as means to adapt to changing conditions (Delacámara et al., 2015, Delacámara & Gómez, 2014; Gutierrez et al., 2014, Pérez & Gómez, 2013a; Pérez & Gómez, 2013b; Gómez & Pérez, 2012; Gutiérrez & Gómez, 2011). This is only a part of a wider research line on the use of economic policy instruments for sustainable water management (Delacámara et al., 2013; Gómez et al. 2013; Gómez et al., 2011a; Gómez et al., 2011b; Zetland et al., 2011; Gómez et al., 2011a, 2011b; Lago et al., 2011). Furthermore, IMDEA is currently leading the SPADIS Action Group of the European Innovation Partnership (EIP) in Water, focusing on smart prices and insurance to tackle water scarcity and to manage drought risk.

**Tools and methods for assessing potential climate change impacts, costs & benefits, and risks & opportunities:** the team has wide experience and expertise in cost-benefit analysis, cost-effectiveness analysis, and in the valuation of natural capital flows and ecosystem services. It also has relevant expertise in modelling: Agent-Based Models (Viavattene and Pérez, 2013) to assess water trading under drought conditions, Risk Assessment Models (Gómez and Pérez, 2012) for drought risk management, Irrigation Decision Models, which use mathematical programming methods to reveal the implicit multi-attribute objective function lying behind the observed cropping decision of farmers (Pérez et al., 2015b, Gutiérrez and Gómez, 2011). IMDEA's Water Economics group has also experience in integrating these methods in Decision Support Systems (DSS) designed to reach the environmental objectives of the WFD, and applied General Equilibrium Models, both static (Gómez and Tirado, 2006; Tirado et al., 2006a, 2006b; Gómez et al., 2004) and dynamic (Gómez et al., 2008).

**Link between science (i.e. water economics) and policymaking (i.e. EU Freshwater Policy).** As part of a Framework Contract on EU Freshwater Policy (2012-2016), Carlos M. Gómez and Gonzalo Delacámara are water policy advisors of the European Commission (EG ENV). Within that Framework Contract, IMDEA Water is currently supporting WFD CIS Working Groups, including WG Economics and Water Accounts (both supported by Gonzalo Delacámara). Besides, we are also working on economic analysis of reclaimed wastewater reuse, and on the potential for growth and job

# scientific & technical offer

creation through the protection of water resources. Carlos M. Gómez also supported UN-Water for the background research on Water in the Green Economy: Towards Rio+20 (UN-DESA, 2011), and on the 2015 UN-Water Annual International Zaragoza Conference on Financial and Economic Instruments for a Sustainable Water Future.

**Hydroeconomic analysis of water investments.** Within the 2030 Water Resources Group (WB, IFC, WEF – 2013-2016) framework contract, IMDEA's Water Economics group is working on the prioritization of water investments in the Pacific coastal catchments of Peru, and on the hydroeconomic analysis of water demand reduction and water supply augmentation in Mongolia.

**Economic analysis of biophysical flows of ecosystem services.** This research line on the economic valuation of ecosystems (both water and terrestrial natural systems), focuses on estimating the economic value of welfare variations as per water provision for a wide range of final uses (drinking water and sanitation, irrigated agriculture, industrial uses, hydropower generation, etc.), pollution natural assimilation capacity in aquatic ecosystems, recreational fishing, carbon fixation in histosols (i.e. peat bogs) and biological diversity conservation. There is a much wider research line on the economic valuation of natural capital flows (Azqueta & Delacámara, 2006; Azqueta & Sotelsek, 2007; Maestu & Gómez, 2012). Currently, within a pilot project for EC DG ENV (2013-2015) on natural water retention measures, the group is responsible for estimating the benefits of improved or maintained biophysical flows of ecosystem services. IMDEA Water is also leading the economic analysis in the RiverRes Action Group of the EIP Water, focussing on a roadmap to address current policy challenges as opportunities for innovation through river restoration, as an example of nature based solutions. IMDEA Water is also currently working on future trends of Blue Growth in the Mediterranean Sea, integrating pressures from river basins and coastal areas towards the marine environment (WWF, 2014-2015), as part of the EU MED Programme. Within the newly granted H2020 project AQUACROSS (2015-2018), IMDEA's Water Economics Group will lead the development of a common framework for the assessment of aquatic ecosystems and ecosystem-based management approaches.

**Groundwater management.** IMDEA Water worked on the FAO-World Bank-UNESCO-IAH-GEF project on "Groundwater Governance: a global framework for country action, 2011-2015). It is a GEF funded project aimed at influencing political decision-making by achieving a significantly increased level of awareness of the paramount importance of sustainable groundwater resources management in averting the impending water crisis. IMDEA Water staff members are not only part of the Permanent Consultation Mechanism (PSCM) of the project but also authors of the Thematic Report on Macro-economic trends that influence demand for groundwater and related aquifer services and reviewers of the Thematic Report on Legal Issues.

## IMDEA-WATER SOLUTIONS

- Water pricing schemes
- Insurance schemes
- Decision Support Systems
- Economic modelling
- Prioritization of investments for water management
- Hydroeconomic analysis
- Integrated assessment frameworks

## IMPLEMENTATION SECTOR

The Water Economics group does not develop technology, but it mainly works and collaborates with the following organizations on knowledge development:

- Public and private institutions, such as think tanks, other foundations, research institutes, NGO's.
- Private companies and SMEs working on the water sector and more widely on environmental fields.
- International organizations such as the World Bank, IFC, GEF, IDB, UN-ECLAC, UNESCO, FAO, WHO-PAHO, UNDP, European Parliament
- European Commission, mainly with the DG Environment and DG Research
- National and regional governments
- Water users associations and other stakeholders

## ADDITIONAL INFORMATION

Websites:

- AQUACROSS project: <http://aquacross.eu/>
- EPI-Water project: <http://www.feem-project.net/epiwater/>
- Natural Water Retention Measures Project: <http://nwrn.eu/>
- SPADIS Market Place: <http://www.eip-water.eu/working-groups/smart-prices-and-drought-insurance-schemes-mediterranean-countries-spadis>

## TECHNOLOGY KEYWORDS

Water management, drought risk, vulnerability to water scarcity, resilience, ecosystem services, economic valuation, economic policy instruments, incentives, water pricing, insurance, water markets, cost benefit analysis, cost-effectiveness analysis, decision support systems, hydroeconomic modelling.

## CONTACT PERSON

**Gonzalo Delacámara**

gonzalo.delacamara@imdea.org