

# The water's edge

LMU's Professor Dr Ralf Ludwig and BayFOR's Dr Thomas Ammerl outline the project focusing on the significance of climate induced changes in water resources...

In the dimming light of the Copenhagen summit, seen by many as a fatal failure towards a global commitment to climate protection, politicians, stakeholders and researchers are struggling to identify ways on how to escape the threatening standstill in global climate policy. It can be argued that while one major column in climate policy – mitigation – is currently on its way to be redefined on a global scale, the door must be further opened to concentrate on the indispensable adaptation to climate change impacts on regional and local scales.

So, how can the European Research Community contribute to preparing Europe and neighbouring regions for the climate induced ecological and socioeconomic changes that lie ahead? A major contribution in this direction has already been granted by the European Commission, with the formulation of related priority research topics in the 7th Framework Programme for Research and Technological Development (FP7). More specifically, in order to better assess the manifold consequences and uncertainties in climate impact on man-environment systems, a coordinated topic has been established between

Theme 6 (Environment, including climate change) and Theme 8 (Social Sciences and the Humanities) of the programmatic set-up of FP7. Thus the current EU research project CLIMB (Climate Induced Changes on the Hydrology of Mediterranean Basins – Reducing Uncertainty and Quantifying Risk) is forming a cluster of independent projects with WASSERMed (both funded under the Call ENV.2009.1.1.5.2) and CLICO (funded under SSH.2009.4.2.1) to focus on climate induced changes in water resources as a threat to security.

## Motivation

According to current climate projections, Mediterranean countries are at risk of an even more pronounced susceptibility to changes in the hydrological budget and extremes. These changes are expected to have strong impacts on the management of water resources, agricultural productivity and drinking water supply. The regions of the Mediterranean landscape are already experiencing and expecting a broad range of natural and man-made threats to water security, which will give rise to an increasing potential for tensions and conflict among the political and economic players in this vulnerable region.

Effective adaptation measures need multidisciplinary preparation. While there is scientific consensus that climate induced changes on the hydrology of Mediterranean regions are presently occurring and are projected to amplify in the future, little knowledge is available about the quantification of these changes, which is hampered by a lack of suitable and effective monitoring and modelling systems. Current projections of future change, based on regional climate model results and subsequent hydrological modelling schemes, are very uncertain and poorly validated. The conditions required to develop and implement appropriate adaptation strategies are still missing. If adaptation initiatives are proposed at all, they are rarely based on a multidisciplinary assessment covering both natural and associated social and economic changes.

## Objectives

The strategy of CLIMB is aiming to employ and integrate advanced field monitoring techniques, remote sensing analyses and retrievals, climate models auditing and

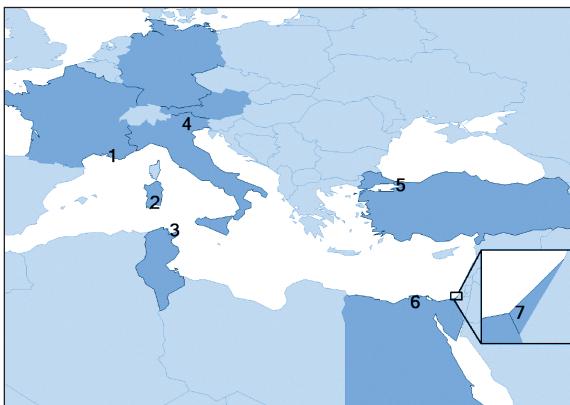


Fig. 1: The partner countries of CLIMB (plus Canada) and the location of study sites

- 1) Thau – 280km<sup>2</sup> – Coastal Lagoon, Southern France
- 2) Rio Mannu di San Sperate – 473km<sup>2</sup> – Sardinia, Italy
- 3) Chiba – 286km<sup>2</sup> – Cap Bon, Tunisia
- 4) Noce – 1,367km<sup>2</sup> – Southern Alps, Italy
- 5) Izmit Bay – 673km<sup>2</sup> – Kocaeli, Turkey
- 6) Nile Delta – 1,000km<sup>2</sup> – Nile, Egypt
- 7) Gaza Aquifer – 365km<sup>2</sup> – Gaza, Palestinian administered areas

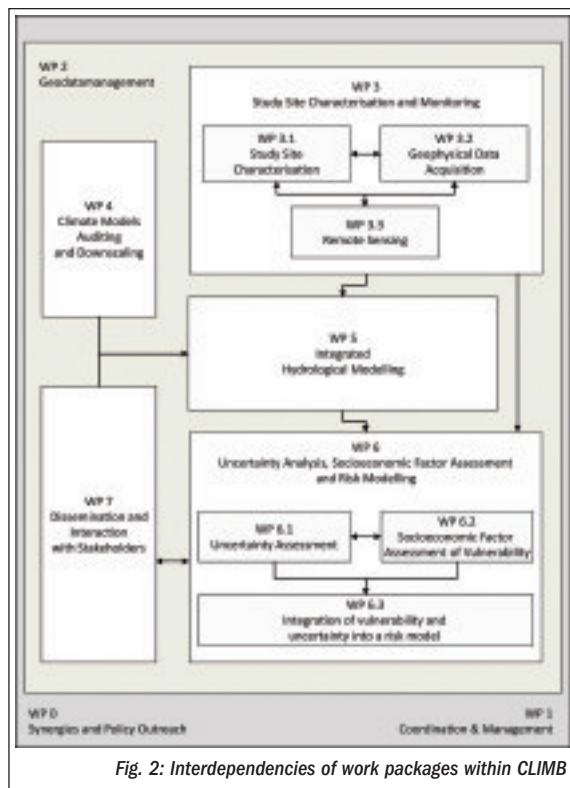


Fig. 2: Interdependencies of work packages within CLIMB

integrated hydrologic modelling and socioeconomic factor assessment, in a new conceptual framework to significantly reduce existing uncertainties in climate change impact analysis. It will create an integrated risk assessment tool for adaptive water resources management and best agricultural practice under climate change conditions.

The improved models, new assessment tools, and their results will be evaluated against current methodologies. Improvements will be communicated to stakeholders and decision-makers in a transparent, easy-to-understand form, enabling them to utilise the new findings in regional water resource and agricultural management initiatives and in the design of mechanisms to reduce potential for conflict.

### Partners and study sites

The CLIMB consortium is made up of 19 partners, comprising four European member states (Italy, Austria, Germany, and France), four SICA countries (Turkey, Tunisia, Egypt, and Palestinian-administered areas) and one non-EU member country (Canada).

An analysis of climate change impacts on available water resources is targeted on mesoscale river or aquifer systems. Selection criteria included an expected high susceptibility to climate induced changes in water availability, runoff regimes, runoff extremes and water quality. The selected sites comprise one to several of the following components, which impose a threat on future water security: high agricultural productivity, irrigation, heavy multi-source nutrient loads and pollution, sea water intrusion or growing water use rivalries.

### Structure

CLIMB comprises eight Work Packages (WP). None of these WPs stands alone, but they are interconnected by means of interfaces, dependencies and feedback loops to ensure an iterative reduction of uncertainty and a more accurate assessment of water related ecological and economic risk. WP 0 is intended to identify and foster the scientific synergies between CLIMB, WASSERMed and CLICO to establish a more focused and efficient policy outreach.

### Impact

The project combines genuine science activities with a strong link to practical application in the targeted regions of the Mediterranean area and thus provides a balance between the three building blocks of environmental research, namely understanding, assessing impact and responding to threats to security in man-environment systems. An increase in general knowledge of water management issues in an arid climate can lead to the development of potentially innovative practical and/or theoretical approaches and technologies. It is intended to intensively share and exchange expertise with the Mediterranean Water Scarcity and Drought Working Group of the Mediterranean branch of the EU Water Initiative (MED-EUWI). This can be very beneficial to provide supportive guidance for a more concise implementation process for current water related directives, such as the EU Water Framework Directive 2000/60/EC or the EU-Flood Risk Management Directive 2007/60/EC.

A close collaboration with regional and local stakeholders (eg. from ecology, socio-culture, politics, and industries) is indispensable to communicate the project findings in an uncomplicated and efficient manner that puts CLIMB and other related research results into immediate practice.

More information about experiments and participation can be found on the website [www.climb-fp7.eu](http://www.climb-fp7.eu)



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