

SCIENCE POLICY BRIEF Nr 1**JULY 2010****Scientific scope of the ACQWA Project**

The Aletsch Glacier, the largest in the Alps, feeds water into the Rhone River, one of the case-study hydrological basins of the ACQWA Project

To assess the **vulnerability** of water resources in **mountain regions** where snow and ice are a major component of the hydrological cycle

- Water in these regions will be vulnerable in a warmer climate because of reduced volumes of snow and ice

To use, refine, and develop **numerical models** to help understand interlinks between climate system components:

- climate, hydrology, snow and ice, vegetation

To predict the evolution of these systems over the next **50 years**

- closer to targets useful for water managers and policy compared to 2100

Policy-relevant issues within ACQWA

An assessment of the potential **impacts** on:

- Extreme events
- Energy
- Agriculture
- Tourism

Identification of possible **rivalries** among **economic actors**, in the context of a resource that may become rarer in a warmer climate

- To assess how such conflicts could be resolved through improved governance

Proposals for adaptation options in order to minimize the more adverse climate-generated **risks**

Policy makers should also be aware that changing patterns of climate in mountain areas can alter hydrology **not only** in the **source regions** but **far downstream**. The **upstream-downstream** (in terms of water) and **upland-lowland** (in terms of economic development) **implications** of water resources originating in mountains are a key to **successful adaptation options**



The Eموsson Dam is located on the French-Swiss border in the Rhone and Arve river catchments. Electricity generated here feeds both the Swiss and the French grids



Meltwaters at the surface of the Gorner Glacier near Zermatt. The heat transferred by warmer waters that penetrate deep into the ice through crevasses contributes to accelerated loss of ice volume



El Juncal, 6,150 m above sea level, source of the Aconcagua River in Chile, one of the ACQWA case-study hydrological basins

Policy-relevant research within ACQWA

Climate change will likely modify **seasonal** and **overall water availability** and, as a result, there will be increased competition for water. As a consequence, the ACQWA project has a number of **policy-relevant deliverables**, based on the modelling work that will enable an overall assessment of changes in water availability and the focused impact studies. The **policy deliverables** will strive to:

- **Present** different policy options and analysis of their respective costs and benefits to individual sectors and to the society as a whole, applied to different regions.
- **Analyse** costs to sectors and to society defined in terms of specific discount rate assumptions and the 1% of GDP mitigation benchmark figure adopted, for example in the 2006 Stern Review.
- **Determine** how regulatory frameworks to assure water distribution among sectors and groups may be under pressure because of increased competition for water among groups, and the changes in water governance that may be necessary.
- **Compare** water governance within the European Alps with that of other regions (Central Asia; Chile and Argentina), where political and economic structures are different from Europe.
- **Assess** the policy choices that can be envisaged within the legal environment in which such policies are implemented. This would involve an analysis of the applicable law relating to integrated water resources management. In Europe this would include an analysis of the EU Water Framework Directive, the 92 UN ECE Helsinki Convention, as well as various national, provincial, and local legislation. The aim would be to identify the key legal elements that enhance a state's/ region's ability to adapt to climate change.

Policy-relevant deliverables from ACQWA

- An integrated model linking regulations for water allocation to its actual distribution among sectors. It will include not only climate factors as but also the influence of market forces and political conditions, giving a comprehensive picture of water availability.
- Scenarios to explore particular vulnerabilities of high mountain areas and competitive aspects of water use among different sectors and regions. This includes the study of the impact of different revenue streams arising from different uses of the available land, e.g., if much more revenue can be generated from tourism more agricultural and herding land will be used for it, the same reasoning can be applied to other economic sectors.
- Analyses of the effects and economic cost under specific discount rate assumptions of the consequences of climate change on present water use patterns for different types of economic activities.
- Evaluation the costs and benefits of water allocation schemes for different sectors and different regions.
- Scenarios exploring different policy options at local and regional levels (taking into account trans-boundary water agreements) to reduce water deficits within sectors and to equitably and efficiently distribute water among users and sectors.
- Comparisons between European and non-European mountain regions (Central Asia, Argentine and Chilean Andes) to determine whether or not production technologies, consumption patterns, and regulatory frameworks developed in Europe can be successfully adopted elsewhere.



Conflict or cohabitation? Juxtaposition of traditional mountain agriculture and the necessities of an energy-based industrial sector, near Zermatt, Switzerland



Stormy skies near the Rhone Glacier, source of one of the ACQWA case-study rivers, in central Switzerland

ACQWA Project Partners

Switzerland

U of Geneva (Coordination + 4 teams), U of Bern, ETH-Zurich (3 teams), Agroscope Federal Agricultural Research Institute, HEID Graduate Institute for International Research and Development (2 teams)

Italy

ICTP, Trieste, U of L'Aquila, ARPA Piemonte, Val d'Aosta (4 entities), ENEL Rome, ISAC-CNR Turin

France

CNRS (3 teams); U Joseph Fourier, Grenoble

Germany

Max-Planck-Institute for Meteorology, Hamburg

Austria

U of Graz; U of Vienna (Bodenkultur)

Spain

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UK

U of Birmingham; U of Dundee

Chile

CEAZA, La Serena; CECS, Valdivia

Argentina

IITD, Buenos Aires

Kyrgyzstan

Academy of Sciences, Bishkek



The “Jet d’Eau de Genève”, one of Geneva’s famous landmarks. The University of Geneva is the coordinator of the ACQWA Project

For more information on the ACQWA Project

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