

Science for Environment Policy

New tool assesses the effects of global change on water resources

Water resource management needs to adapt to changes in climate, water demand and land use. A new tool has been developed by the LIFE+ Water Change Project to assess these 'global change' impacts on water resources and inform decisions on optimal adaptation strategies. A recent study has applied the tool to a river basin in Spain.

The quality and quantity of water is strongly affected by long-term human-induced [climate change](#) and natural climate variability; changes in [land use](#) (such as urban sprawl and deforestation) and changes in [water](#) demand (e.g. induced by population growth or consumption change). Together, these are known as 'Global Change'. The potential cost of water scarcity and drought in Europe has been estimated at €100 billion and an awareness of the future trends in Global Change and its impacts on water resources can help decision-makers and stakeholders implement measures to avoid or minimise negative consequences.

Research in this area has a range of techniques, such as scenario analysis, modelling and cost-benefit analysis, but it tends to use just one of these techniques or limit itself to one domain of study, such as hydrology or water quality. The LIFE+ Water Change Project¹ aimed to integrate and link different methods and models in order to provide a user-friendly means to assess the impacts of Global Change and provide strategies to deal with them.

The first step in the project's methodology is the representation of the impacts of Global Change on resources, supply system and the end-users. This is done using the DPSIR (Driving forces, Pressures, State, Impacts, Responses) framework. The use of this framework provides a clear idea of the many links between initial drivers and final impacts. In a second step, a new tool developed in the project, called the Water Change Modelling System (WCMS), is used to link existing models and to develop Global Change scenarios. The tool has a Graphical User Interface, allowing users to execute and analyse simulation results of the possible Global Change scenarios.

The WCMS provides decision-makers with a long-term view of how supply and quality of water will be affected under different Global Change conditions. On this basis, different adaptation strategies are developed, consisting of alternative sets of measures and policies. Examples are: introduction of a desalination plant, greywater reuse and subsidies for efficient domestic water fixtures. The Water Change tool evaluates these using a cost-benefit analysis to assess economic and social aspects.

The project applied the tool to the case study of the Llobegrat river basin in Catalonia, Spain. A set of 65 different Global Change scenarios were used and various adaptation strategies were developed. The results indicated that, the damages caused by the expected water shortages have considerable economic impact for most of the scenarios, so adaptation is in general desirable. Strategies that provide the desired water availability with the minimum cost, involved demand-side management, such as efficient water use.

In general the results highlight the difficulty of choosing one 'winning' adaptation strategy. The researchers suggest that it will depend on priorities in the area under consideration, for example, whether stakeholders want to minimise the damages of the drought or minimise the cost of intervention for an uncertain adaptation strategy. The tool is useful for river basin agencies and water companies to develop long-term water resource management plans that consider future changes in climate, land use and demand and take into account the goals of the users.



**October 2013
Thematic Issue 43
LIFE Projects**

**Subscribe to free
weekly News Alert**

Source: Pouget, L., Escaler, I., Guiu, R., *et al.* (2012). Global change adaptation in water resources management: The Water Change project. *Science of the Total Environment*. 440:186-193. DOI: 10.1016/j.scitotenv.2012.07.036.

Contact:
pouget@cetaqua.com

Read more about:
[Climate change and energy](#), [Water](#)

The contents and views included in *Science for Environment Policy* are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "[Science for Environment Policy](#)": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

1. www.life-waterchange.eu