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New climate change adaptation tool to manage water

To identify the best policies to help Mediterranean communities adapt to the effects of climate change on water supply, a team of Spanish researchers have created a methodology that links science outputs to water management policy options.

Water demand often exceeds supply in Mediterranean areas and, as climate change is predicted to raise temperatures by 2-4°C in Southern Europe and reduce river flows and surface runoff, the problem is likely to worsen. As a result, communities living around the Mediterranean may need to make significant social and political changes to ensure water supply and demand are managed and that available water is effectively distributed to meet the needs of agricultural and urban users as well as ecosystems.

This adaptation will need new water management policies which also meet the requirements of the EU's Water Framework Directive[1] and the associated Common Implementation Strategy[2]. However, translating scientific observations and analyses of changes in water availability into water management policy can be a challenge.

To address this, the researchers devised a methodology to identify policy options based on scientific evidence. They began by using a water availability and policy assessment (WAPA) model that takes data on rivers, reservoirs, water flow, environmental conditions and agricultural and urban demand to link supply, demand and management options.

When applied to climate change scenarios for the Ebro basin in the Mediterranean, the WAPA model made predictions similar to those of the IPCC and the European Environment Agency. It indicated that flood risk would increase, as would spring and summer drought. The model could also use information on water demand in the region to help identify management options under climate change scenarios.

For the Ebro basin, the model suggested that there was no single optimal management option for the area as the climate changed. Instead, more risk-averse policymakers may prefer to reduce the supply of water for irrigation, whereas those willing to accept a greater level of risk could opt for a less reliable water supply.

The researchers' methodology also included an indication of how socio-economic factors could affect a region's ability to adapt to climate change, for example, economic factors could determine whether a region could invest in new technologies or food security. To do so, they calculated an 'adaptive capacity index' based on specific policy-relevant indicators for each country, normalised against a baseline. When applied to seven Mediterranean countries the index suggested that France had the greatest adaptive capacity at 0.687 (on a scale of zero to one), followed by Italy at 0.599. At the bottom of the list was Syria, on 0.306.

Finally, the researchers identified water scarcity thresholds based on reliability of supply and whether supply could meet demand and related these to policy options. From this, the researchers presented a number of possible policy responses to different levels of water scarcity and adaptive capacity.

For instance, where water scarcity is low (i.e. water is plentiful) and social and economic factors are the weakest component of adaptive capacity, the area requires supply management policies, such as infrastructure investments to ensure equal access to water. In contrast, when water is scarce the same region may need policies to ensure that water pricing and prioritisation do not disadvantage poorer people.

1. http://ec.europa.eu/environment/water/water-framework/index_en.html
2. http://ec.europa.eu/environment/water/water-framework/objectives/implementation_en.htm

Source: Iglesias, A., Garrote, L., Diz, A., Schlickenrieder, J. & Martin-Carrasco, F. (2011). Re-thinking water policy priorities in the Mediterranean region in view of climate change. *Environmental Science and Policy*. 14: 744-757.

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