

# WATER

## Resources and natural environment



### WATER AND CLIMATE CHANGE:

## which adaptation strategy for the Mediterranean?

Adapting to climate change in the Mediterranean is a key issue for water management. It has not yet been significantly translated into operational reality, except in a few European Union countries. This is what the 2010 study on adaptation strategies and initiatives implemented in 7 countries (Albania, Egypt, France, Morocco, Spain, Tunisia and Turkey), which represent the range of situations across the Mediterranean basin, reveals. Against a backdrop of increasing scarcity for some, and faced with the uncertainties associated with climate change, many Mediterranean countries need to revisit their water management methods and risk prevention strategies in order to reduce vulnerability, losses and damages in the short, medium and long term. Adapting to the effects of climate change on water resources requires technical adjustments, but moreover policy, institutional and behavioural changes. Finally, an adaptive water management strategy needs to be flexible and reversible in order to handle uncertainty.

### The Mediterranean basin: a climate change "hot spot"

By 2100, the Mediterranean climate is set to change with temperature rising by an average of between 2°C and 4°C, while rainfall drops by between 4% and 30% and sea level increases by between 18 cm and 59 cm (IPCC, 2007; Plan Bleu, EIB, 2008). Mediterranean countries are particularly vulnerable to the effects of climate change due in particular to increasing degradation of their water resources (overuse, pollution, salinification, drop in rainfall) and increased

demand in the agricultural, urban and energy sectors. According to climate scenarios, some Southern and Eastern Mediterranean countries (SEMCs) could see their available water resources fall by a factor of 4 due to a drop in average rainfall (World Bank, 2008). Likewise, increasing spatial and temporal variability in rainfall distribution would lead to an increase in extreme events (floods, heat waves, droughts, etc.) and associated risks in terms of economic losses and human lives. These kinds of changes are likely to have significant consequences on an environmental, economic and geopolitical level, especially in the SEMCs.

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SEPTEMBER 2012



## Towards preventive and adaptive management of risks and resources

Climate change is likely to produce only few benefits for the water sector in the Mediterranean. The adaptation approaches<sup>1</sup> implemented therefore aim primarily to anticipate and limit potential damage to the resource and its uses. Historically, some water management practices have developed in reaction to extreme water situations or crisis (e.g. construction of sea walls, increasing numbers of boreholes). But in the long-run, the costs of reactive and isolated actions can end up much higher than those of preventive and coordinated measures. One of the challenges around adaptation in general, and for the water sector in particular, is to make sure that we move from a short-term reactive approach to preventive and adaptive management of risks and resources over the long-term. Various types of strategy are available to the parties involved in the water sector (cf. Figure 1). Adaptive water management requires the implementation of flexible measures and policies that are regularly assessed and adjusted as scientific understanding develops and climatic and socio-economic conditions change. This type of management relies on several principles for action such as promoting innovation,

<sup>1</sup> Adaptation is defined by the IPCC (Intergovernmental Panel on Climate Change) as “a process of adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities”.

long-term planning and selecting “no regrets” or “low regrets” measures that create win-win situations,<sup>2</sup> or encouraging dialogue between parties in the water sector (UNECE, 2009; European Environment Agency, 2009).

## The issue of climate change is still largely overlooked in water policies

The creation of a policy framework to implement adaptation measures at a national or regional level is vital for developing more resilient management of water resources and their uses. Figure 2 shows that France, Morocco, Spain, Tunisia and Turkey are committed to creating and adopting national adaptation strategies. These are all recent processes that have begun in the last 4 years. For European Union (EU) countries, these processes largely follow from the measures of the Water Framework Directive, which requires member states to ensure that they take into account the effects of climate change in water planning. Depending on the institutions responsible for water management processes and their prerogatives with regard to water, these initiatives deal with water from either a cross-sectoral or sectoral approach. The first type of approach generally corresponds to activities led by institutions responsible for environmental issues who become aware of climate change fairly early on, in particular through their

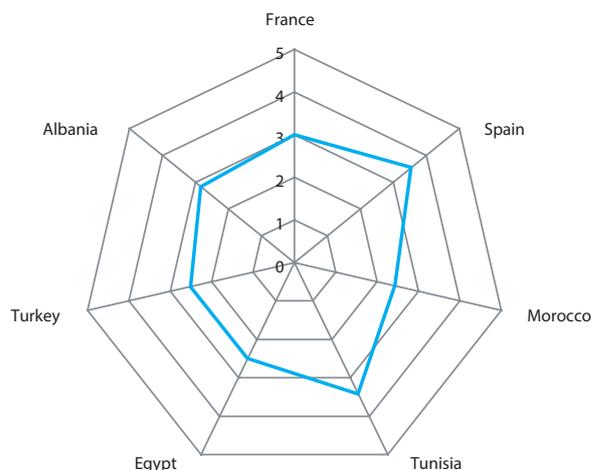
<sup>2</sup> i.e. measures that reduce vulnerability and generate environmental and social benefits regardless of hydrological changes.

**Figure 1: Types of adaptation strategies in the water sector**

Type of strategy	Examples of measures
<b>A. Bear risks and losses ("do nothing")</b>	<ul style="list-style-type: none"> <li>Where losses cannot be avoided (disappearance of some coastal aquifers, wetlands, rainfed agriculture lands, flooding of low importance land around rivers)</li> </ul>
<b>B. Share risks and losses</b>	<ul style="list-style-type: none"> <li>Set up insurance systems and financial pooling instruments against hydrometeorological risks</li> <li>Diversify drinking water supply sources</li> </ul>
<b>C. Prevent effects: technology and infrastructures (hard solutions)</b>	<ul style="list-style-type: none"> <li>Increase reservoir capacity</li> <li>Increase transfers between river basins</li> <li>Implement water efficiency schemes</li> <li>Develop wastewater reuse and desalination systems</li> <li>Improve efficiency of irrigation systems, drinking water and sewage networks</li> <li>Scale-up infrastructure and structures (raising seawalls, etc.)</li> <li>Construct flood-resistant buildings</li> </ul>
<b>D. Prevent effects: policy, regulatory and institutional responses (soft solutions)</b>	<ul style="list-style-type: none"> <li>Drought management plan</li> <li>Financial incentive programme to save irrigation water</li> <li>Change design and operation standards for structures</li> <li>Rationing</li> <li>Change water pricing</li> <li>Regulatory standards</li> <li>Adopt new decision-making methods which take uncertainties into account</li> </ul>
<b>E. Change/reorganise uses and activities</b>	<ul style="list-style-type: none"> <li>Reallocate the resource to uses with more added value</li> <li>Introduce crops that use less water or are more resistant to drought</li> <li>Move businesses and housing away from flood plains</li> </ul>
<b>F. Research and improve climate information</b>	<ul style="list-style-type: none"> <li>Improve capacity for seasonal, annual and ten-yearly climate modelling and forecasts</li> <li>Develop tools to aid decision-making and improve risk assessment methods for river basins and sub-basins (linking climate and hydrological models)</li> <li>Define relevant indicators for vulnerability and adaptation</li> <li>Set up early warning systems</li> <li>Facilitate production and release of climatic data for policy-makers, technical offices and the general public</li> </ul>
<b>G. Strengthen capacities and raise awareness</b>	<ul style="list-style-type: none"> <li>Lengthen policymakers' planning timeframes</li> <li>Strengthen technical capacities of sector professionals in management of major risks</li> <li>Raise awareness and educate the public</li> </ul>

Source: modified from Burton I. 1996; European Environment Agency, 2009

**Figure 2: Implementation of adaptation policy frameworks for the 7 countries studied**



Note: 1 = marginal; 2 = low; 3 = moderate; 4 = high; 5 = very high  
Source: Plan Bleu, 2011

involvement in international climate negotiations. The second tends more to be associated with organisations directly responsible for water and to be implemented more slowly, demonstrating the difficulties encountered in the way in which parties involved in the water sector engage with the climate issue. In 2010, only France and Tunisia had begun this type of approach. Egypt and Albania have not created strategies but have defined key orientations and a list of potential measures. More detailed work is nevertheless planned for Egypt under the Nile Basin Initiative.

Nonetheless, whichever country is considered, the implementation of national adaptation strategies and policies has not yet led to significant change in practices able to meet the challenges.

## Measures are often very general and not legally binding

Few of the strategies examined are the result of detailed regional assessment of climatic vulnerabilities and impacts, and of their costs for the relevant sectors. Overall, the strategies and policies stated include a combination of hard (technical measures requiring engineering or physical investment) and soft measures (policy or institutional measures). Hard measures are generally more expensive and largely dominant in the SEMCs. To a significant extent, they use “no regrets” strategies, because they recommend strengthening current policies as the first adaptation measure. However, some of the hard measures proposed risk causing more problems over the next 20 years (“maladaptation”), especially when these solutions have a long lifetime.

The themes covered in the strategies and policies include, by a great majority, the question of meeting agricultural and urban water needs by exploiting conventional and non-conventional water; more rational and economic use of resources and the protection of property and persons against flooding.

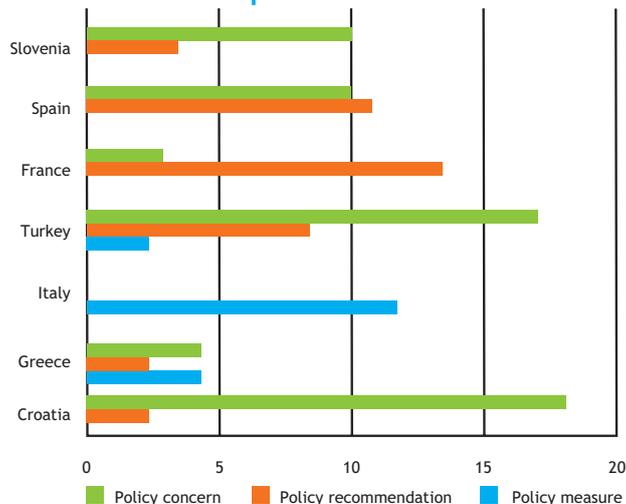
The role of ecosystems as natural adaptation infrastructure for the storage and regulation of water transfer is still hardly discussed in most countries outside the EU. Questions of water, energy and food security are preminent. So technical water

solutions remain central, rather than promoting approaches based on the resilience and adaptive capacity of natural environments or which encourage a review of production methods and resource allocation.

## Insufficient implementation, which is encountering several obstacles

On the basis of the typology proposed by a study from the University of Amsterdam’s Institute for Environmental Studies, which sorts the different adaptation actions into 3 categories (from the most general to the most specific), the actions presented by the countries studied remain fairly general on the whole, are essentially declaratory in nature and not legally binding (see Figure 3). The countries studied are primarily at the stage of improving the understanding of water impacts and identifying corresponding adaptation measures. None of the adaptation options and measures has yet led to significant changes in water policies or adaptive management of the resource. Reforms either strengthen existing measures, which aim to reduce the pressures on resources arising from non-climate sources, or respond to the effects of variability and climate change on human activities observed over the last 20 years.

**Figure 3: Progress towards adaptation in Mediterranean Europe**



Note: estimated on the basis of the number of policy concerns/recommendations/measures adopted  
Source: Massey E., Bergsma E., 2008

Several factors explain this inertia, in particular an insufficient understanding of the impacts and uncertainties associated with climate projections, which policymakers see as hindrances to action. Other reasons also play a part, such as the lack of adequate tools for assessing and integrating risks in planning and strategic coordination of the sector; or even the priority given to other short- and medium-term political and economic issues. In addition, inter-sectoral cooperation in adaptation remains insufficient and the involvement of local representatives and parties involved in the water sector is limited.

**So, in the implementation of water management adaptation policies, the policy and institutional challenges could prove bigger than those associated with technical innovations or access to technologies.**

## How can we encourage adaptation to climate change in the Mediterranean?

- Better representing and quantifying the relationships between climate and development challenges in these countries;
- Working to better take into account these issues at a policy and strategy level;
- Improving inter-sectoral co-operation and promoting transparent, fair and flexible rules, procedures and methods of interaction between institutions;
- Basing regional water governance on local institutions with increased power and the full participation of users;
- Implementing national funding strategies (especially for maintaining existing infrastructure, supporting basic research, encouraging the production and distribution of climate data, promoting the adoption of new technologies, etc.) and improving access to international adaptation funds;
- Facilitating the development of economic tools for adaptation, such as water pricing or systems offering insurance against natural risks that are still not widely developed in countries outside the EU;
- Profoundly changing current planning and water management paradigms so that policies increasingly take account of temporal and spatial uncertainties associated with climate and water changes (adaptive management principles, etc.).

## Recommendations

- The development of water and climate products and services specifically to meet the needs of planners and managers is becoming a priority, despite the limits of these tools;
- Adaptation requires innovation to design alternative futures in the water sector, which make it possible to better manage climate variability and uncertainty;
- It is important to assess the efficiency of alternative methods to hard solutions that require costly investment, such as institutional (standards, regulations) and economic (insurance, tax, pricing) solutions and services provided by natural infrastructure;
- There is an urgent need to take into account the climatic "shock absorber" role played by ecosystems and to integrate this reality into policies for adaptation and the prevention of natural catastrophes;
- Comparative assessment of costs of late or early adaptation needs to be encouraged;
- Finally, co-operation across the Mediterranean region has a key role to play in order to share understanding and know-how, increase technological transfer to the most vulnerable countries and raise the funding required for current and future changes in the water sector.

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Design and production: Isabelle Jöhr

Printed by nis photoffset  
ISSN: 1954-9350