WISE WATER INFORMATION SYSTEM FOR EUROPE

Water Notes on the Implementation of the Water Framework Directive

Water Note 10

Climate change: Addressing floods, droughts and changing aquatic ecosystems

Preparing for climate change is a major challenge for water management in the European Union. In the years to come, climate change will increase the likeness of flooding, droughts and other consequences throughout the water cycle.

The Water Framework Directive provides European countries with a common basis to address these problems. In particular, the directive's river basin approach to water management – centred on the review of river basin management plans every six years – establishes a mechanism to prepare for and adapt to climate change. Planning for droughts and floods will also be an integral part of this system.

Drought in Portugal: climate change is expected to bring more droughts and greater water scarcity to southern Europe

Europe's changing climate

The impacts of climate change are likely to be different for the northern part of the continent than in southern Europe.

In southern Europe, rainfall is already decreasing. In the second half of this century yearly rainfall on the Iberian Peninsula could be 40% lower than today. Summer rains will become more scarce and summer temperatures will rise. The International Panel on Climate Change (IPCC) warns that summers could be 6°C hotter in Spain and Portugal by 2070. This means that southern Europe is likely to face more extended periods of drought and water scarcity. Many economic sectors will suffer. With less water, higher summer temperatures and extreme weather events, crop yields in southern Europe will most likely decrease. In the energy sector, coal and nuclear plants will have less water for cooling purposes. High temperatures together with water scarcity could cause summer tourist numbers to fall.

In contrast, northern European countries are expected to receive higher levels of rainfall – a trend already seen in recent years. While farming could benefit from higher precipitation and warmer temperatures, the risk of floods is likely to increase.

Across Europe extreme weather events such as intense rains giving rise to flash flooding are expected to become more common.

The Water Framework Directive and the Floods Directive

The Water Framework Directive establishes a legal framework to protect and restore clean water across Europe and ensure its long-term and sustainable use. (Its official title is *Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy*.)

The directive establishes an innovative approach for water management based on river basins, the natural geographical and hydrological units, and sets specific deadlines for Member States to achieve ambitious environmental objectives for aquatic ecosystems. The directive addresses inland surface waters, transitional and coastal waters and groundwater.

Directive 2007/60/EC on the assessment and management of flood risks entered into force on 26 November 2007. This directive requires Member States to assess if water courses and coast lines are at risk from flooding, then to map flood risks and finally to take adequate and coordinated measures to reduce the risk

Glaciers on Grossglockner, Austria's highest mountain, are retreating as the climate warms

Shrinking glaciers, rising seas

In the Alps and other mountain areas across Europe, glaciers are receding. This trend is reducing summer flows of many rivers fed by glacier runoff, and in coming decades this will increase the risk of water scarcity and drought. Hydroelectricity production will likely fall and the warmer temperatures may reduce winter tourism.

Climate change is also expected to bring sea-level rise, which will erode coastlines and, together with strong storm surges, will put low-lying coastal cities and towns at greater risk from flooding – the IPCC warns that up to 1.6 million additional Europeans could be affected by 2070. Sea-level rise will also harm coastal wetlands.

Climate impacts will in turn affect aquatic ecosystems. Hotter temperatures and reduced water flows will increase the risks of eutrophication in many rivers, lakes, and coastal waters. This will particularly be the case in southern Europe where wetlands and other protected areas may disappear. Likewise, climate change will also harm water quality in northern Europe with warmer temperatures potentially increasing eutrophication in the Baltic Sea.

Planning ahead in each river basin

Climate change will create wide ranging impacts, which Member States can address through their river basin management plans (RBMPs).

Member State Water Directors recommend making "climate checks" of the programmes of measures in the first river basin management plans that are to be in place by the end of 2009. These climate checks should identify the measures best suited to strengthening river basins' capacity to adapt to climate change and which measures will weaken that capacity or be less effective.

Further work to incorporate climate change in river basin management planning will be needed when the management plans are revised in 2015 and every six years thereafter. Measures will need to be resilient to climate change impacts. This will be especially important for expensive and long-term investments such as large infrastructure projects. Planning for droughts, water scarcity and flood prevention will also become increasingly crucial.

Facing drought and water scarcity

The river basin management plans also provide a mechanism to address droughts and water scarcity (a drought is a temporary decrease in water availability, while water scarcity is an on-going condition where demand exceeds the resources that are available sustainably). In a 2007 Communication on water scarcity and droughts in the EU, the European Commission called on Member States to develop drought risk management plans to complement their river basin plans.

Member States can address both droughts and water scarcity by cutting excessive water use. They can do so by establishing appropriate prices for water services (see water note no. 5), and also by improving land-use planning and agricultural policies. The European Commission has called on Member States to take these and further steps to establish a "water saving culture" (see box on next page) in the EU. The Council has furthermore agreed that once all water saving options have been exploited new sources of water supply can be considered, mainly through the desalination of seawater.

The Communication on drought and water scarcity sets out a programme of actions at EU level, which will be followed up by annual reports tracking the EU's progress in tackling this problem. The EU can also help by ensuring the efficient use of European funds such as the financing under the Common Agricultural Policy. The European Union Solidarity Fund, which is described in the box on page 4, can provide assistance when droughts strike. EU initiatives to promote sustainable consumption and production will encourage water savings and the European Commission's Joint Research Centre is developing a European Drought Observatory to forecast, detect and monitor droughts across Member States.

Addressing flood risks

Since 1998, floods have caused about 700 deaths across Europe, displaced about half a million people and led to at least €25 billion worth of insured damage in addition to uninsured costs.

A new piece of European legislation – Directive 2007/60/EC on the assessment and management of flood risks – prescribes a series of common steps across the EU to reduce the adverse consequences of flooding. For many Member States, the directive introduces a new approach that shifts the focus of policy from defensive works against floods to integrated risk management.

As a first step, by 2011 Member States are required to prepare preliminary flood risk assessments for all river basin districts identifying the areas where further action is needed. By 2013 Member States will need to prepare flood hazard and flood risk maps for these areas. The flood hazard maps will show the geographic areas that could become flooded in the case of low, medium and high probability events. Risk maps will then show the potential impact of flooding outlining the number of citizens and the types of economic activities that could be affected.

With the use of these maps Member States will draw up flood risk management plans for 2015, which coincides with the second cycle of river basin management plans - also due in 2015 - at which time the two sets of plans will be coordinated.

As the risk of floods varies greatly from one river basin to another, the Floods Directive focuses on a common planning approach rather than on identifying specific measures to be taken. The flood management plans will identify goals and actions to reduce flood risks and protect human lives, economic activities and ecosystems and cultural heritage. These plans should also ensure that Member States are prepared when floods strike.

Making water use more efficient

A recent European Commission study concludes that the EU can reduce its use of water by 40% through measures in a number of sectors. Cities and towns can reduce their water use by up to 50% by repairing leaks in public distribution systems and improving the efficiency of water use in public and private buildings and promoting the use of water saving appliances.

Water use in agriculture can also become more efficient through improvements in irrigation as well as shifting to more drought-resistant crops and using treated sewage waste more widely. Water savings in irrigation alone could exceed 40%.

Industry can also reduce its water use by about 40% by more widely recycling water used by factories.

Flooding in Budapest, Hungary

Sustainable flood risk management approaches

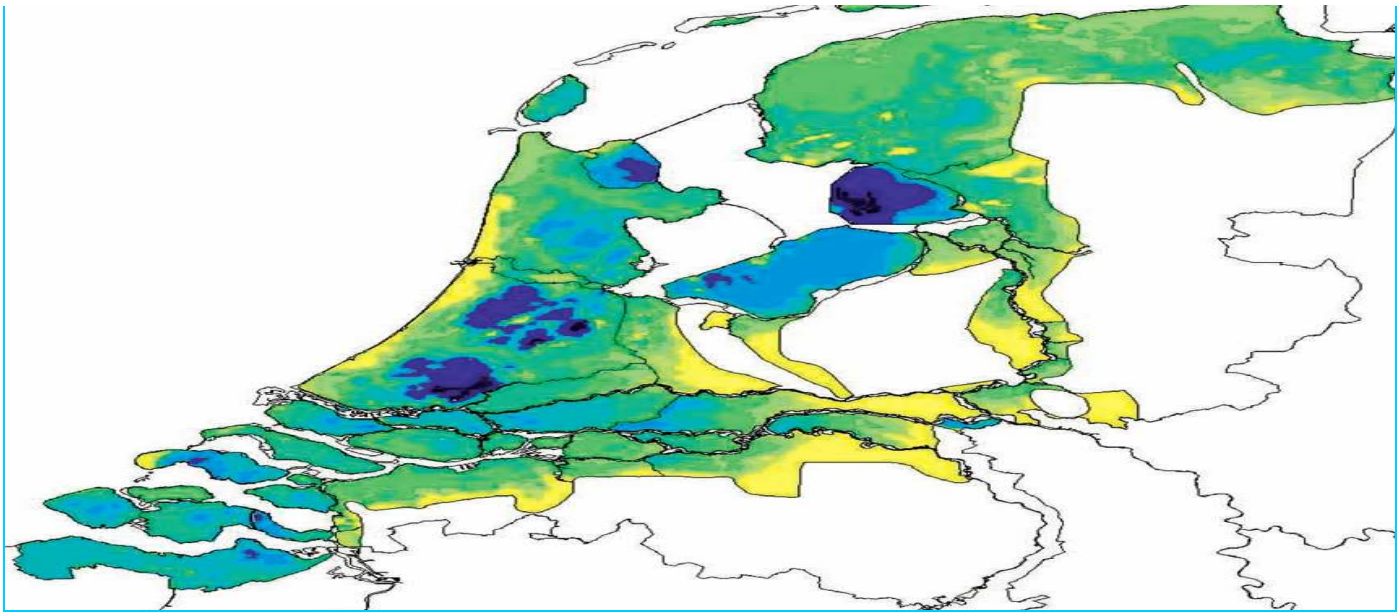
In many parts of Europe the risk of floods has risen because of urbanisation, increasing agricultural intensity and deforestation, all of which limit the ability of landscapes to retain flood waters. In some EU countries, such as Spain and Portugal, urban sprawl increased by about 2% a year in the 1990s. In these and many other countries, urban and industrial areas were built on natural flood plains and barriers have closed river courses off from these plains, thus limiting their capacity to absorb flood waters to nil.

Sustainable flood protection methods seek to reverse these developments and use more natural and cost-effective methods to reduce flood risks. Techniques include restoring upland forests and wetlands that can absorb flood waters and reconditioning the natural meanders in rivers that have been canalised into straight and narrow beds. Meanders can slow down the flow of water and reduce downstream flooding. Several Member States have introduced such methods as was done for the Devon River in Scotland, United Kingdom. Restoring flood plains is another vital step in reducing flood risks.

These actions can have further benefits. In many cases they restore natural habitats and biodiversity and improve drought management.

Map of water depth in a worst-case flood in the Netherlands

The darkest areas on the map would be flooded by 8m of water.
From the *Atlas of Flood Maps: Examples from European countries, USA and Japan*
(available on http://ec.europa.eu/environment/water/flood_risk/flood_atlas/index.htm)



Taking action

Member States need to work together on flood protection since 60% of Europe's river basins cross borders (see water note no. 1). Member States must prepare a single plan for these international river basin districts and involve non-EU countries when necessary.

The Floods Directive calls on Member States to take into account natural floodplains and to use spatial planning in addressing flood risks. Indeed, sustainable approaches can be the most cost effective methods for flood protection (see box on previous page).

Public awareness of flood risk and management measures is crucial for their success. Under the Floods Directive, Member States must consult the public when drafting flood risk management plans and all the main tools (maps, plans and flood assessments) must be made available to the public.

The EU will provide Member States with financial support for prevention. EU Structural Funds have allocated close to €6 billion for risk prevention projects for the years 2007 to 2013 covering flood risks and other disasters such as forest fires.

The European Commission has put in place a European Flood Alert System at its Joint Research Centre to provide forecasts of the impact of floods. EU solidarity provides assistance when floods strike (see box below).

The role of EU solidarity

In addition to developing the policy framework to prevent, prepare and respond to floods and droughts, the EU has also created mechanisms to facilitate common action when disasters occur.

The Community Mechanism for Civil Protection pools the civil protection services of the 27 Member States and Norway, Iceland and Liechtenstein. Its Monitoring and Information Centre co-ordinates rapid responses to disasters. Its activities also include training.

Another tool is the EU Solidarity Fund created in 2002 following the disastrous floods in the Elbe and Danube basins. The Fund has an annual budget of €1 billion to support emergency response work.

To learn more about the Water Framework Directive and Europe's waters, see the **Water Information System for Europe** (WISE) website at http://water.europa.eu.

The European Commission's web pages, which are linked to WISE, provide further information on adaptation to climate change (see http://ec.europa.eu/environment/climat/adaptation/index_en.htm), on the 2007 Floods Directive (see http://ec.europa.eu/environment/water/flood_risk/index.htm), on management of drought risks and water scarcity (see http://ec.europa.eu/environment/water/quantity/scarcity_en.htm) and on civil protection (see http://ec.europa.eu/environment/civil/index.htm).

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