

## INFO SHEET

### Copa-Cogeca climate change series

## Water and agriculture under a changing climate



**Water is an essential production factor in agriculture, both for crops and for livestock.**

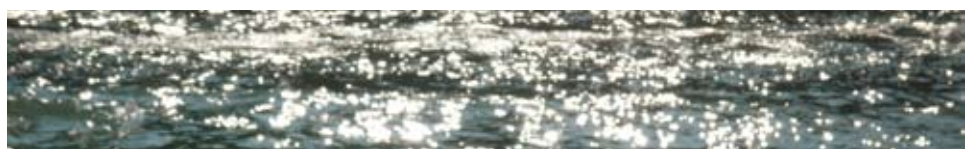
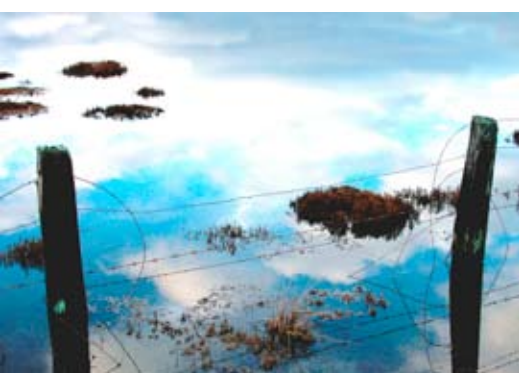
**Climate change will have a significant impact on agriculture in terms of water quantity and quality. This will be exacerbated by the increasing demand for food worldwide as population and real incomes increase.**

**European agriculture is already dealing with the consequences of extreme events such as floods, storms and drought, which might imply excess water or scarce water availability, that are likely to become more frequent as a result of climate change.**

**European farmers, who manage more than 50% of land in the EU 27, are essential players in ensuring that water resources are sustainably managed. They have and will continue to adapt their practices to manage water more efficiently.**

**For centuries, farmers have controlled the water cycle locally, either through irrigation or drainage. As an integral part of the climate system, the hydrological cycle can be positively influenced by using adapted agricultural practices.**

**Solutions allowing greater production using less water are a critical future priority. If European agriculture is to continue to deliver social, environmental and economic benefits, access to adequate water supplies is essential.**

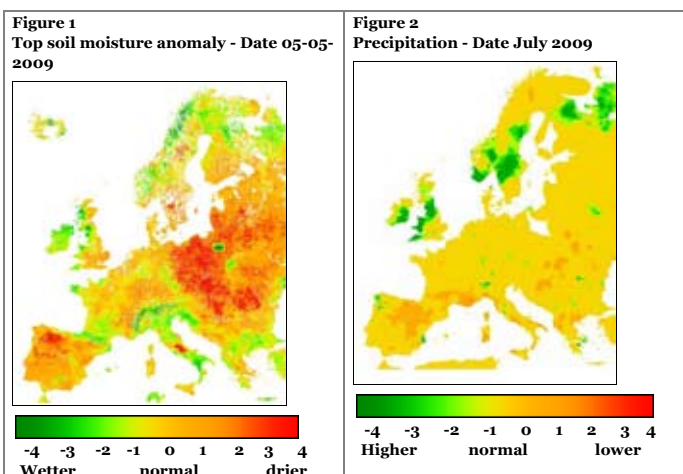


## The importance of water in agriculture

Water is an essential production factor in agriculture. The production of biomass is inextricably linked to the need for fresh water, and livestock depends on water to drink.

Plants capture water in their biomass and put it back to the atmosphere by means of transpiration - a process which positively influences micro-climatic conditions. Plants are able to convert "blue" water into "green" water captured in the biomass. Soils covered with plants have higher infiltration and soil moisture rates, and thus reduced runoff. On abandoned land, especially if desertification occurs, the capacity to retain water is much lower and completely lost once the soil is sealed.

Agriculture depends on the climate and on natural conditions. Changing climatic conditions lead to imbalances between rainfall and crop needs during vegetation and have a strong impact on yields and the quality of agricultural products. The increased frequency and severity of extreme weather conditions will increase the vulnerability of the European farming sector (see figures 1 and 2).

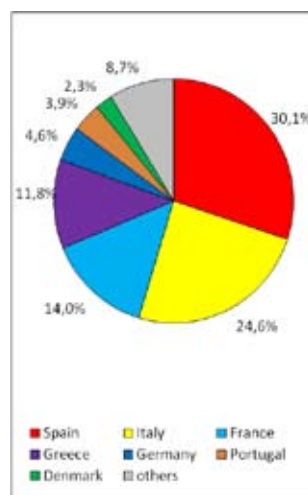


Source: European Drought Observatory

Irrigation is a vital means by which production can be sustained in various areas. Without irrigation we risk land abandonment and severe economic hardship, not to mention the potential relocation of agricultural production. Improved irrigation technologies and water saving practices will become essential to safeguard agricultural production in certain regions.

9.8% of European agricultural land is irrigated, and agriculture under irrigation is very productive. The majority of irrigated land is concentrated in the Mediterranean region. France, Greece, Italy, Portugal and Spain account for 9.15 million ha, corresponding to 84% of the total area equipped for irrigation in the EU 27 (see figure 3). In those countries, a large share of the water abstracted is used for agricultural purposes. In Spain, for example, the 14% of agricultural land under irrigation yields more than 60% of the total value of

Figure 3 National share of total irrigated area in the EU 27



Source: Eurostat 2009 (Farm structure survey 2007), Germany estimation

agricultural products. In Italy, 50% of agricultural production and 60% of the total value of agricultural products come from the 21% of agricultural land that is under irrigation. These regions provide healthy, nutritious and readily-available fruit and vegetables.

In the northern EU Member States, irrigation is used to complement natural precipitation. For example, in 2007 in the Netherlands, 19% of the total number of agricultural holdings used irrigation on their crops at least once a year.

## The impact of climate change on water and agriculture


Just 3% of the earth's water resources is fresh water and only 1% of this is available for human activity, including agriculture. The amount of water necessary for crop production varies depending on soil conditions, crop variety and temperature. Imbalances between water availability and demand will most likely be exacerbated by climate change, and, like access to energy, water management is becoming one of the main geostrategic challenges of the 21st century.

Agriculture accounts for 24% of water abstraction in Europe but peak abstraction typically occurs in the summer when water is least available. Hotter, drier summers will therefore enhance pressure on resources.

Increased frequency and severity of extreme weather conditions will increase the vulnerability of the European farming sector. Water stress situations or drought as a result of hotter, drier summers will have a serious impact on European soils, and the impact on both crop quality and variability will lead to a higher need for water in European agriculture. Equally, waterlogged soils on which excess water needs to be frequently drained may not only lead to crop losses, but can impact severely upon crop quality and variability.

Southern and south-eastern Europe are most prone to an increase in the risk of drought, although the 2003 drought also hit northern Member States and caused agricultural losses across the whole of Europe, affecting 53% of the EU and leading to a financial impact of 12.5 billion Euros in the agricultural sector of the EU 15.

There has been an increase in the occurrence and frequency of flood events in large parts of Europe. Formally drained



land areas are particularly affected. Where agricultural land is designated as flood plains it is necessary to compensate farmers adequately, e.g. to change cropland into grassland. In those regions it is necessary to reduce the vulnerability of farmers by providing them with detailed information to allow risk instead of crisis management. This has obvious consequences for the amount of land available to produce food but can also lead to a need for increased, expensive investment in farm infrastructure such as drainage systems or housing for livestock.

Moreover, floods, hail, storms and torrential rains lead to crop damage and have a negative impact on farmers' incomes.

*The summer of 2007 was the wettest in England and Wales since records began in 1914, where the average rainfall across the UK was 95% higher than the long-term average. Extensive flooding caused severe damage, especially in the agricultural sector. The total area of flooded agricultural land came to around 42,000 ha, with arable land strongly affected.*

EU agriculture will also be affected by an increase in pests, diseases and weeds due to conditions which are either too warm and dry or too wet. There could also be greater problems with pesticide resistance, through both the increased number of generations per year and warmer winters improving the survival of any resistant pests.

Water quality and quantity are closely interconnected and climate change will make this even more evident. Less water available makes management of its quality more difficult.

### ***Adapting to the impact of climate change on water – some agricultural solutions***

The uniqueness of the agricultural sector, where production does not occur under clear, defined and controllable conditions, and the high diversity of local conditions and agricultural production practices within Europe make it difficult to determine the right level of adaptation needed. Indeed, some EU regions already suffer from prolonged and even permanent droughts, the effects of which are being exacerbated by changing conditions. Consequently, in these areas, desertification and the abandonment of land which was previously productive have little to do with unsuitable agricultural practices and the effects could be alleviated by the appropriate policy instruments.

Raising awareness within farming communities on ways in which they can adapt to climate change and providing better information on challenges and solutions are vital first steps towards stimulating and enhancing activity within the sector.

Solutions that are cost-effective and accepted by farmers will be the most successful. Voluntary measures with sufficient flexibility and limited administration should therefore be favoured.

It is also important to support them by providing specialised advisory systems. To reduce adaptation costs it is crucial to align adaptation efforts with investments, taking into account the comparatively long investment cycle for farming technology.

Water use efficiency in European agriculture is improving every year and water efficiency measures that provide complementary benefits, such as reduced energy needs or other environmental benefits, will also deliver better results.

In many Member States, efforts are being made to increase the water storage capacity of soil under agricultural land use. The modernisation of irrigation systems has steadily progressed and water productivity has also improved considerably. Nevertheless, there is still the potential to save water, and it is essential to avoid the occurrence of saline or other intrusions which can arise in over-abstracted areas.

Moreover, farmers not only use water; groundwater recharge in agricultural land use, whether it is rain-fed or under irrigation, is also of great importance. As such, farmers act as natural resource managers<sup>1</sup>. But groundwater recharge is endangered in many regions of Europe due to lower than average precipitation and an increase in heavy rain and temperatures, leading to higher evapo-transpiration and lower infiltration rates.

Solutions to secure the water supply for agriculture through better water storage (either technically or as soil moisture) and by reducing water needs are therefore essential. Early adaptation to lower yearly rainfalls in the Mediterranean region and to lower summer rainfalls in central European countries is crucial. Significant efforts will be necessary in regions where agriculture uses an important portion of the area's total water resource and where water scarcity presents a risk to agricultural business and to the environment.

- Water saving measures already undertaken by many farmers to increase their resilience to climate change should become more widespread. These include rainwater harvesting, crop rotations that make best use of available water, the adjustment of sowing dates according to temperature and rainfall patterns, the use of crop varieties better suited to new weather conditions (e.g. crop varieties with shorter cycles, more resilient to water stress), the adoption of water conservation practices that favour infiltration and soil water storage, the reuse of water, improvement in the performance of irrigation systems through better maintenance, and adapting the scheduling of plant watering or the planting of hedgerows or small wooded areas on arable land that reduce water run-off and act as wind-breaks. Beyond the farm level, measures such as modernising the irrigation infrastructure can be applied.
- Maintaining irrigation is essential to prevent the loss of highly-productive agricultural land as well as an

<sup>1</sup> For example in Denmark 90% of drinking water is groundwater, most of which originates from agricultural land.

increase in the risk of fire and soil erosion, and thus to prevent the loss of important carbon stocks. Irrigating at optimum level ensures the right crop quality and increases yields, reducing crop wastage and therefore water wastage. To prevent land abandonment and the loss of local production and to meet consumer demands for healthy, nutritious and readily-available fruit and vegetables we must not limit water resources available for irrigation. Instead, the focus should be on improving irrigation efficiency by modernising and improving the performance of irrigation systems and by better scheduling applications.

- Amongst other measures, correct water pricing can contribute to a reduction in water use and the prevention of water wastage. Water pricing should properly reflect social, economic and environmental aspects and local differences in use.
- It is often difficult to adapt to extreme weather events such as hail or torrential rain. Technical solutions such as hail nets are fairly expensive. Insurance against such weather extremes could help to avoid tremendous economic losses.
- While designing water saving measures at field level, we must remember that initial reduction efforts are much easier and cheaper to obtain than additional reductions. More efficient water use brings about savings for farmers (in terms of water and energy costs).

### ***Challenges ahead***

The clear acknowledgement that the farming sector plays a unique role in the water debate is essential. The farming sector can play an active role in finding solutions to water problems and is not simply a water consumer.

Ensuring the maintenance of agricultural production in the face of new climatic challenges is vital if rising world demand for food is to be met and hunger eliminated.

It will be essential for the CAP to assist farmers in meeting the challenge of climate change in a way which brings the most benefits to society as a whole. This can be done by enabling farmers to become more water-efficient and by slowing global warming while continuing to EU and world food needs. Agri-environmental schemes which enable farmers to adapt to the effects of climate change through the better management of soil and water resources will be needed.

Key examples include measures to encourage more efficient water use and the use of crops and technologies adapted to water scarcity as well as measures aimed at developing new farming water supplies such as irrigation networks and small-scale reservoirs.

More research is needed into water resources' vulnerability to climate change and in order to support the development of adaptive strategies for agriculture. Much has been achieved during recent years to reduce knowledge gaps, e.g. by setting up the European drought observatory. Efforts to

share innovative solutions among European farmers have strongly increased, but there is still much that could be done. It will be necessary to provide farmers with practical, cost-effective solutions.

Farmers are willing to take on their share of the responsibility for sustainable water management in agriculture but they will need adequate support if agriculture is to play its full part in meeting the challenge of climate change to the benefit of society as a whole.

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