

# Cutting farm costs by improving water efficiency

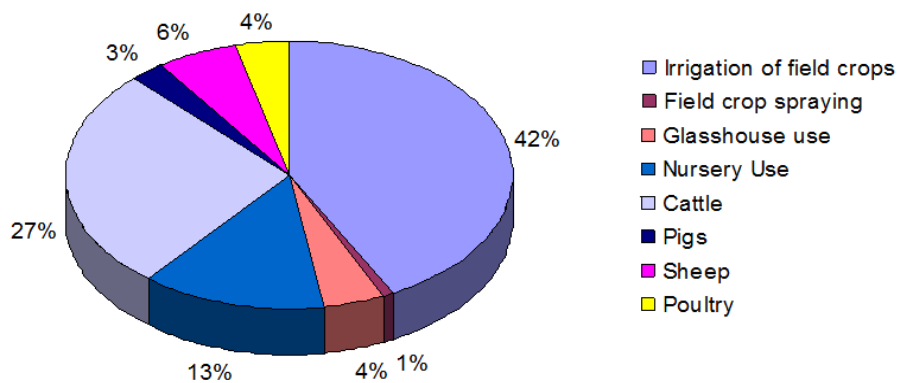
## Introduction

Following such a wet period during 2012, it may be difficult to consider water as a resource under stress. However, during the early months of 2012, UK water resources were under considerable pressure. In many catchments, not just in the south and east, there was little or no water available for abstraction during dry periods. Predictions indicate that the extremes experienced in 2012 are likely to become more common in the future due to climate change.

This article aims to highlight areas where you can reduce the vulnerability of your business to such extremes of weather and your exposure to the increasing cost of water.

The total volume of water used in agriculture, through mains water use and direct abstraction, is around 180 million cubic metres (m<sup>3</sup>) per year (Defra, 2011). Irrigation of field crops accounts for 42% of this total, followed closely by drinking water for livestock at 40%.

**Figure 1: Current water use by agriculture**



Mains water is the most common water source for farming, used by 83% of all farms. Water is abstracted from surface waters (e.g. lakes, rivers and streams) by 60% of grazing livestock farms and 46% of mixed farms, but by few pig or poultry farms. The predominant water sources for crop irrigation are surface waters (52%) and groundwater (i.e. water held underground in rock formations) (41%).

## Problems

### Increased demand

Changing weather patterns and climate are likely to have an impact on water availability. In certain areas, projections show a warmer climate with less rainfall in summer. This is expected to increase the demand for irrigation, particularly for high-value crops. However, the supply of water through abstraction licences would be limited if there was less water available in the summer.

### Reduced supply

Temporary weather events may lead to an increased risk of low pressure/supply in summer droughts and bans or restrictions on irrigation. Nearly all the water used for irrigation is used by crops or lost by evaporation. In contrast, water abstracted for other uses, such as domestic supply, enters the drainage and sewer system and, after treatment, is returned to surface waters, which helps to maintain water levels. Therefore, irrigation can have a much greater impact on the environment compared with other uses.

### **Increased abstraction**

Increased abstraction can reduce water quality because water flow is reduced, which means less water is available to dilute pollutants. As many as 1,075 water bodies in England and Wales (11% of the total) are at risk of not supporting good ecological status through reduced river flows. In addition, 35% of groundwater bodies are not achieving good groundwater quantitative status as defined in the Water Framework Directive (WFD). In response to this, action may be required to change abstraction policy across England and Wales.

### **Increased cost**

Water availability is very likely to affect the availability and price of many agricultural commodities in the future. The average cost of water across all sources, including mains water, is £0.49/m<sup>3</sup> (Defra, 2011). However, the average cost of mains water alone is £1.17/m<sup>3</sup> (Defra, 2011) with variations across river basin catchment areas ranging from £0.95/m<sup>3</sup> (South East and Northumbria) to £1.50/m<sup>3</sup> (South West). The cost of mains water has increased by about 38% over the last 20 years. This increase in water costs is a reflection of the investment that has been made in upgrading infrastructure to improve water quality and increase the reliability of mains water supply. Those directly abstracting water will also have experienced an increase in charges to reflect the cost of managing water resources effectively and restoring sustainable abstraction.

## **Solutions**

### **Water auditing**

Water use and costs can be reduced by improving the efficiency with which water is used. A first step may be to conduct a water audit, a simple way of working out where, when and how much water is being used. This can then be used as a benchmark to assess performance against that of other farm businesses.

The information required to carry out a water audit can be obtained from or will include:

- Water bills from the last two years.
- Details of any abstraction licence(s) held.
- Volumes of water abstracted directly.
- The number and type (species and age) of livestock.
- Crop protection and irrigation records.
- A map of the farm water network showing water pipes and uses.

For more information about how to conduct a water audit, please refer to the Environment Agency (EA) document 'Waterwise on the farm', which can be downloaded [here](#).

Following a water audit, measures may be identified and implemented to improve water use efficiency including:

### **Stopping leaks**

A leak of one litre per minute raises water consumption by the same amount as increasing a dairy herd by 25 animals.

You can reduce water loss through leaks by taking simple actions, including:

- Actively searching for and repairing leaks quickly.
- Insulating pipework.
- Reading and recording meter readings regularly to detect anomalies.

### **Rainwater harvesting**

Rainwater harvesting is easy to incorporate into new and existing buildings. Rainwater harvested from the roofs of farm buildings can be used, with the right treatment, instead of mains water for irrigation, washing the yard, washing equipment or helping to top up a farm reservoir. Collecting clean roof water may also avoid the creation of dirty water, which can reduce slurry storage requirements and pollution risk.

Rainwater harvesting can help to significantly reduce mains water consumption on a farm, but it does require investment. A system based on a new above ground 30m<sup>3</sup> tank costs around £5,500 or 80p/m<sup>3</sup> (Defra, 2012)

when written off over a period of 10 years. Systems vary greatly depending on whether a second hand or new tank is used and whether it is placed above or below ground and the filtration requirements. Siting of the tank will be important with regard to storage period, freezing of pipes and heating if it is situated in a sunny location. As mains water costs are likely to continue to rise, rainwater harvesting technologies will become increasingly cost-effective. If treated, harvested rainwater will also reduce concerns over water shortages in dry periods, giving partial protection to businesses from drought, depending how much storage capacity they have.

The EA's publication 'Rainwater Harvesting: an on-farm guide' can be downloaded [here](#).

### **Creating or extending farm reservoirs**

The costs of reservoir construction are variable, ranging from £1 to £6/m<sup>3</sup> for the costs of earthworks and lining (Cranfield, undated). The lower cost is for simple balanced excavation where the spoil is used to create a bund around the reservoir, allowing deeper storage. Costs will increase where the spoil is not suitable and is likely to leak so a butyl liner may be required. This may potentially double the cost of the reservoir. A good figure to budget on is £4/m<sup>3</sup> for a balanced excavation, which will provide 2m<sup>3</sup> of storage for each 1m<sup>3</sup> excavated. Surveys and planning applications, including surveys for archaeological remains, will add further costs and take time. These costs are highly dependent on the size of the planned reservoir and sensitivity of the location, and can lead to total costs of over £10/m<sup>3</sup> (EA, undated).

Although this may require significant capital investment and involve a major engineering project, diverting rainfall, river flows or groundwater to reservoir storage can provide benefits. In suitable areas, a correctly specified system is generally cost-effective for seven out of ten years for responsive crops and farm business income can be maintained or increased through improved yield or quality. They are particularly useful on farms growing high value irrigated crops such as potatoes, as they reduce the risk of water scarcity by securing a supply. Additional income may be generated through water trading with neighbours, the asset value of land is increased and there will be reduced abstraction charges. Reservoirs also provide the opportunity to potentially increase the amenity of the land, for example, by providing duck flight ponds for shooting.

There are, however, limits on the quantity of water that can be stored above ground. A permit issued by the EA will specify how much water can be stored and what it can be used for subject to amendments depending on the availability of water season to season, so limitations may be applied in dry seasons. Farmers who already have reservoirs usually fill them during the winter. However, recent dry winters and summer floods have led some farmers to apply to vary their abstraction licences to fill their reservoirs with high flows in summer as well. Farmers who are interested in taking high flows in summer should talk to the EA on 03708 506 506.

### **Efficient irrigation**

Efficient irrigation means assessing a number of factors to ensure that the correct amount of water is being used in the correct manner for the crop requirements. This will help to reduce the amount of water that is wasted and will reduce costs.

- Managing a good soil structure and using organic matter will help to ensure that water is retained in the soil and used by the crop effectively. Compaction on heavy soils and capping/low organic matter on light soils has the potential to reduce water efficiency.
- Irrigate at times of day when evaporation will be minimised.
- Use an irrigation scheduling tool.
- Maintain correct (and precise) levels of soil moisture with targeted irrigation.
- Consider irrigation methods to reduce the potential for capping and inappropriate/inefficient run-off from land that has been irrigated.
- Rain guns are least efficient at irrigation where sprinklers on booms result in reduced losses from evaporation and inaccurate spread e.g. to roads or adjacent fields
- Choose crops that require less water/are drought resistant.

There are Entry Level Stewardship (ELS) options to maintain ground cover and soil structure in arable and risky crop situations, and free one-to-one support available under Catchment Sensitive Farming (CSF) for farmers in

target catchments (particularly East Anglia and the South East). For more information about ELS or the support available through CSF, please contact Natural England on 0845 600 3078.

### **Water Abstractor Groups**

Some farmers who take water directly from boreholes or surface sources have formed Water Abstractor Groups (WAGs). These groups share water or knowledge, and help farmers to work with regulators and manage the impacts of drought. During the drought of 2012, farmers in an East Anglian WAG agreed to make a voluntary 20% cut in their annual abstraction. This allowed the EA to delay or avoid restrictions. The UK Irrigation Association has published a leaflet to help farmers understand WAGs, available [here](#).

### **Further information**

The Farming Advice Service will be holding events to further explain and discuss options to increase water efficiency on the farm. To view the events in your area, please click [here](#). There is also a helpline for more detailed information, please call **0845 345 1302** to speak to an adviser.

CSF can offer eligible farmers free training and advice on farm infrastructure, and grants towards farm infrastructure improvements. Click [here](#) to check if you are in a priority catchment and to find out more.

The EA's [Climate Ready Support Service](#) provides you with the opportunity to access more detailed information about how climate change will impact the UK/your local area, rainfall/water levels, etc.

### **References**

Cranfield, undated. Water use in UK agriculture – resources, limitations. Cranfield University, 17pp.

Defra, 2011. Water Usage in Agriculture and Horticulture. Results from the Farm Business Survey 2009/10 and the Irrigation Survey 2010, 9 June 2011. 46 pp.

Defra, 2012. Farming Advice Service. Presentation on Water Use and Management-Crops on behalf of FAS. 30 May 2012.

EA, 2008. Environment Agency, Water resources in England and Wales – current state and future pressures, 2008. 22 pp.

EA, undated. Thinking about an irrigation reservoir? Environment Agency and Cranfield University, 15 pp.

### **Useful publications**

Thinking about an irrigation reservoir? <http://79.170.40.182/iukdirectory.com/iuk/pdfs/Reservoirs.pdf>

Effective Use of Water on Dairy Farms [www.dairyco.org.uk/resources-library/technical-information/environment/effective-use-of-water-on-dairy-farms-\(1\)/](http://www.dairyco.org.uk/resources-library/technical-information/environment/effective-use-of-water-on-dairy-farms-(1)/)

Effective Use of Water on Dairy Farms: Dairy Farm DIY Full Audit Pack  
[www.dairyco.org.uk/media/105314/diy%20full%20water%20audit%20pack.pdf](http://www.dairyco.org.uk/media/105314/diy%20full%20water%20audit%20pack.pdf)

A Guide to Water Rights Trading  
<http://publications.environment-agency.gov.uk/dispay.php?name=GEHO0711BTZK-E-E>

Top tips for complying with your abstraction licence  
[www.environment-agency.gov.uk/static/documents/Business/water\\_abstraction\\_Top\\_tips\\_July2011.pdf](http://www.environment-agency.gov.uk/static/documents/Business/water_abstraction_Top_tips_July2011.pdf)

Briefing note: Spray irrigation - Abstracting water to aid the lifting of crops  
<http://publications.environment-agency.gov.uk/pdf/GEHO1111BUIU-E-E.pdf>

Water audit information can be obtained from the [EA website](#)

## Best practice guides

The Department for Environment, Food and Rural Affairs (Defra) and ADAS have produced four Irrigation Best Practice guides:

- Water Management for Field Vegetable Crops – A Guide for Vegetable Growers.
- Water Management of Soil and Substrate-Grown Crops – A Guide for Top and Soft Fruit Growers.
- A Guide for container-grown ornamentals.
- Water Management for Potatoes – A Guide for Growers.

Copies are available from ADAS. Please call 01954 268214.

## Tools

UK Irrigation Association benchmarking tool for potato growers  
<http://79.170.40.182/iukdirectory.com/benchmarking/>

The [Climate Resilience for Catchment Methods Guidance Tool](#) allow you to assess the likely resilience of river basin management measures to future climate conditions. It provides quick and easy access to the climate resilience score of river basin management measures, to help you achieve the objectives of the Water Framework Directive.