Water Management on Your Farm: Rainwater Harvesting

Farm Advisory Service

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As climate conditions continue to change the sustainable management of water on farm is of great concern for many land managers around Scotland. From unprecedented wet weather to drought conditions, farms need to become resilient to ensure that they can try to minimise the impact of these changing weather patterns on land.

Why should you store water on your farm?

With climate change many areas of Scotland will experience uncertainty of availability of water. The east coast of Scotland is already becoming noticeably drier than the western part of the country. This year, SEPA declared significant water scarcity on river catchments of Tyne, Tweed, Ythan and Enrick. The **significant water scarcity**, meaning that the average river flows have remained exceptionally low for 30 days in a row, was affecting areas in East Lothian, Fife, Aberdeenshire and Highland. Other eastern regions, such as Angus, Perth and Kinross, Stirling, Clackmannanshire, Falkirk, West and Midlothian and Scottish Borders, were also affected by moderate water scarcity during July and August.

Farms in these areas, especially those with generally high-water demand, such as dairy, beef and fruit farms, are at risk of not having sufficient amounts of water over the summer months. Ensuring that farms are mitigating water losses and utilising the water when it is present will be key to overcoming those risks during drier summers in the future. This document looks at rainwater harvesters and how farmers can incorporate them within their farm.

Rainwater harvesting

Rainwater harvesting (RWH) means collecting rainwater instead of letting it evaporate, soak into ground or disappear in drains. RWH is best included in design of new buildings, however, retrofitting in existing buildings is also possible.

RWH can be a relatively simple system consisting of rain gutters collecting rainwater directly from roofs (such as from farm sheds and barns) and instead of diverting the water into drains or soakaways, the water is collected in storage tanks (Figure 2). The tanks come in various sizes (from couple hundreds of litres to tens of thousands of litres) and the size required is mostly determined by the usual water consumption on the farm and the availability of storage space. The storage tanks can sit above ground, or they can be buried underground. If the choice is an above a ground tank, it is important to ensure the tank is made of dark-coloured material (usually polyethene), which sufficiently blocks the sunlight, therefore, prevents algal growth in the water. An electric pump is usually used to pump the water from storage tank around the farm where it's needed (unless it is a gravity-fed RWH system).

Figure 1: Rainwater harvester in Perthshire

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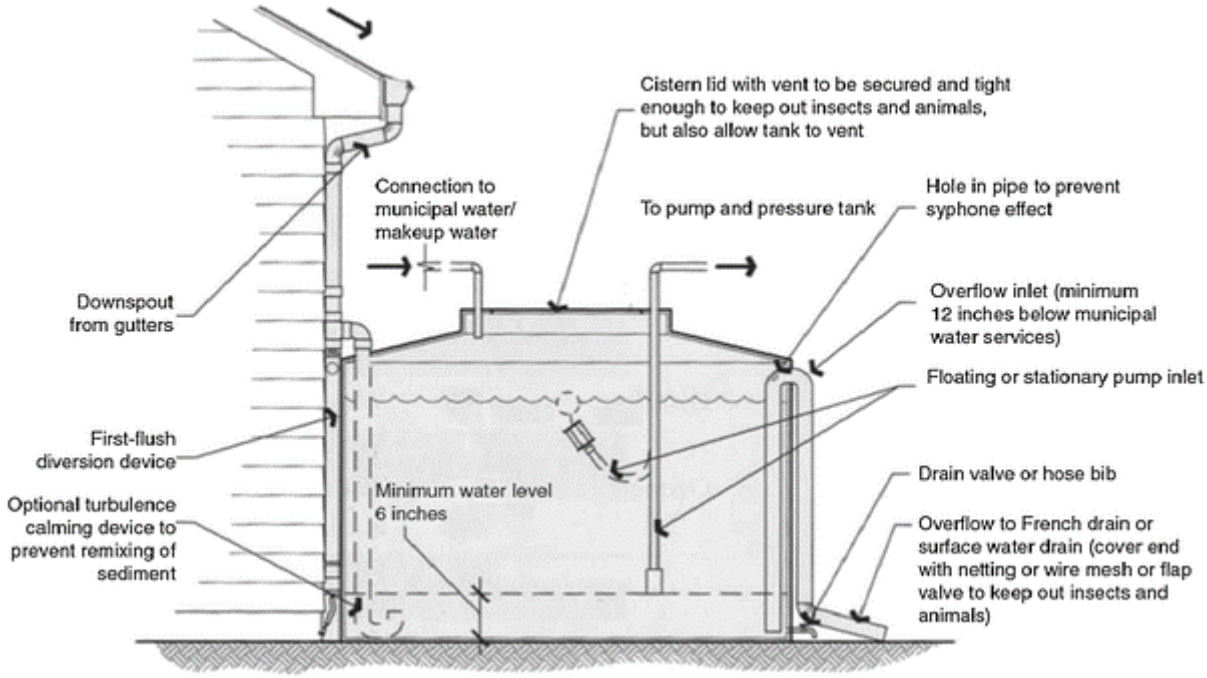

Figure 2: The plumbing diagram for a rainwater harvesting system
© Traboulsi, H., Traboulsi, M. Rooftop level rainwater harvesting system. Appl Water Sci 7, 769–775 (2017)

RWH systems need to maintain adequate water quality for given use of water. It is important to have fitted filters to screen out debris (such as bird faeces and vegetation debris on the roof) from the water and ensure the stored water is clean. The typical uses for stored rainwater on farm include irrigation, harvesting, drinking water for livestock, spraying, cleaning of vehicles and machinery, pen washing or sludge treatment. The water can be also used domestically for toilet flushing, clothes washing; or for grounds maintenance. For irrigation or ready-to-eat crops, food processing or potable water, an additional water treatment, such as sanitation using the UV light, is likely required.

Potential benefits of rainwater harvesting

- Reduced risk of water insecurity
- Financial savings
    - » Due to reduced water use from mains
    - » Reduced volume of water discharged into sewerage on farms where water discharge fees apply
    - » Reduction in required capacity of slurry storage as rainwater is captured by RWH, therefore lower volumes of contaminated water need to be disposed of, reducing the disposal costs
- Rainwater is sometimes considered safer for irrigation and spraying on crops than mains water, which is usually chemically treated
- Improved business continuity and sustainability. Reduced pressure on natural environment arising from farm's water demand
- Flood control in areas prone to local flooding Depending on the location of the farm and the local conditions, improved soil condition from reduced water intake and compaction can also occur.

Things to consider

If your farm is located in areas that have been affected or are likely to be affected by droughts in the future, RWH may be an option to mitigate the risks of water scarcity. There are a few factors, which need to be considered prior to installation of RWH system:

- **Farm water consumption -** if the general water consumption on your farm is low, installation of RWH may not be viable for your business.
- **Potential yield of RWH -** this can be calculated by taking the roof area of the building where RWH is planned and the average annual rainfall in your area. By multiplying the two figures you get the maximum potential volume of rainwater that can be harvested. However, you should also include a percentage of water being lost (not making it to the storage tank). There are also online calculators available, which can provide indication of the potential yield form the roof area and annual rainfall figures.
- **Appropriate type of RWH -** the most common types are indirectly pumped system, directly pumped system and gravity-fed system. The choice of the type will mostly depend on the end use (e.g. water pressure required), budget available and whether connection to mains as a backup option is required.
- **Impacts on energy use and greenhouse gas footprint** from the use of electric pump and UV filters (if required).

If the farm is located in an area that is affected by prolonged periods of droughts, RWH on its own is unlikely to be a sufficient measure to maintain water supply. Other measures such as ensuring the most appropriate irrigation scheme is in place or looking at way to slow and retain water on your land can be considered by farmers to mitigate the risks of water scarcity.

There are several UK-based companies specialising in RWH for domestic and agricultural use. Those can provide site-specific advice and guidance on RWH and the installation costs. Speak to your local farm advisor for more information, call the FAS helpline on **0300 323 0161** or watch our interview with a farmer with a RWH system in place.

Further Information

Enrivonment Agency (2009) Rainwater Harvesting: An On-Farm Guide

All our water is FREE! How does our rainforest harvesting system work? - Youtube

Rainwater harvesting - Making use of Scotland's bumper crop - Youtube

A guide to Rainwater Harvesting on Farm - Youtube