



Centre for
Alternative
Technology

REUSING RAINWATER AND GREY WATER

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Can I collect and use rainwater?

In the UK, mains water is cleaned to drinking water standards but we don't drink most of it. Energy is used to clean water to a much higher standard than we need for washing, garden watering and toilet flushing. Collecting rainwater and using it for some of these can save both energy and money.

The best way to make use of rainwater in this country is to put a water butt on your down-pipe, and save the water for use in the garden or for car washing. This is very cost-effective, as the equipment costs tens of pounds, rather than the thousands needed for a more complicated system.

A complete water butt kit will include a diverter pipe to fit to your down-pipe and prevent overflowing, and a stand to allow easy access to the tap.

Reduce, Re-use, Recycle

Remember that just as it is better to reduce waste before recycling what is left, so it is also better to reduce water use before considering treating it for re-use. There are many easy ways to reduce water use. Spray head tap attachments can often be fitted, while putting a full, sealed 1 litre drinks bottle in the cistern of an older toilet will cut the amount used to flush by 1 litre every time. More advanced flush reduction devices can be fitted to most existing toilets to give the option of a reduced flush. See the contacts overleaf; for more advice get our *Water Conservation in the Home* tipsheet.

Can I flush my toilet with rainwater?

If your garden is small but you have a large roof area, you may consider a more advanced system to collect water for your toilet or washing machine. A basic filter (such as the 'WISY') can separate water and send it to a collection tank, whilst debris such as leaves drops into the drain.

However, such a system will not always be financially or environmentally beneficial - benefits can be outweighed by the environmental costs. Electronic controls, used to monitor water levels and work a pump, have a surprisingly high impact.

A rainwater harvesting system to provide toilet flushing for a 3/4 bedroom house is likely to cost at least £2,000. It may be possible to put in a simpler gravity-fed system (e.g. for a ground-floor toilet) for

below £1,000. The payback time can be therefore be very long, and a system may never recover its costs if parts need replacing before savings are realised - especially if your water is not metered.

If you are on a meter then a system might make more financial sense (although the environmental impact could still be high). They are most effective integrated into new developments, especially large buildings (schools or commercial premises) with big roofs, high non-potable water use, and metered supply. Rainwater collection on this scale can also help reduce flash flooding in urban areas with poor drainage. In rural areas, a composting toilet could be a more sustainable way to reduce water use.

How much water could I collect?

A fairly simple calculation will tell you how much rainwater you can harvest and help you decide if a system would be worthwhile. The roof area is the flat area covered, not the pitched area. Average rainfall figures for many UK locations are available from the Meteorological Office. Suppliers should be able to give estimates for the other figures.

Roof area (square metres) x Annual rainfall (mm)
x System efficiency (WISY is 90%) x Run-off
coefficient of roof (a pitched, tiled roof is 0.75)
= Annual collection in litres (1000 litres = 1m³)

A tank would normally be sized to store 5% of this. Water should enter the storage tank just above the bottom - so as not to disturb debris collecting there. It will be drawn from below the surface using a submersible pump - to avoid picking up pollen etc from the top. You also need to check that your roof is clean and not made of toxic metals.

What about drinking water?

Treating rainwater to a high standard (for bathing or even for drinking) is not recommended. Besides the expense, the impact of all the equipment needed outweighs the environmental benefits of reducing mains water use. Small-scale water treatment systems use lots of energy in manufacture and use, and the filters need to be regularly replaced (creating waste). If you are off mains water, collecting and treating rainwater is an option - but in the UK, groundwater or a stream will usually be more reliable and need less treatment. Treating rainwater to a higher level is more suitable in dry countries (e.g. Australia), or places with very

dirty groundwater (e.g. Germany). In these cases, the extra expense and energy use might be justifiable against the alternatives.

Reusing Grey Water

Grey water is the water from sinks, baths, washing machines and so on. It has already been in contact with us humans and our germs, and storing it for any length of time requires fairly heavy duty treatment or it will quickly start to smell. The most suitable use is therefore direct garden irrigation.

It's best to first reduce the amount of grey water you produce. Showers should use much less water than baths, and fitting spray-head taps and a low flow shower head will make a big difference to water consumption. If you get a water meter then you'll save money as well. Again, see our *Water Conservation in the Home* tipsheet for advice.

Reducing the pollutants in grey water makes it more suitable for garden use. Shower or bath water is easy to reuse, as shampoos and soaps are fairly mild and well diluted. Simple kits enable you to divert grey water from your down-pipe. If reusing water from a washing machine, use a low-sodium detergent, as sodium damages plants and degrades soil (liquid detergents usually contain less salt than powders). Avoid phosphorus, as this causes algal blooms if it collects in ponds or rivers. Otherwise, this water has small quantities of other undesirables, such as pathogens or grease.

Ex-kitchen water can be very dirty; containing oil, grease, and chemicals. As it's produced in small quantities anyway, reuse may be unnecessary. For much more on reusing grey water, see our *Making Use of Grey Water in the Garden* tipsheet.

Grey water treatment

As mentioned above, storing grey water is very difficult. It contains bacteria and a nutrient source and is often discharged warm, giving an ideal situation for pathogens to multiply. Commercial grey water recycling systems use disinfectants that are often very energy intensive to produce - and which may cause problems if you have a private sewage treatment system.

All independent studies of systems that treat grey water for reuse in the home have found that their environmental impact outweighs any benefits, and that running costs are higher than mains water supply. Given the infrastructure and disinfectant needed, it is difficult to see these systems as environmentally friendly, especially for individual households.

If you are building a new home in an isolated area with no mains water or drainage, and your main water source is insufficient for anything other than

drinking, cooking and washing, then a composting toilet would be a better way to reduce water use.

Further Information and Contacts

See the tipsheets mentioned, or get CAT's new **Water Book**, which includes detailed chapters on rainwater and grey water reuse, including the design of garden irrigation systems. See the enclosed leaflets or visit www.cat.org.uk/catpubs for details of all CAT's publications.

Our **Water Supply, Treatment & Sanitation Resource Guide** contains details of hundreds of suppliers, installers, publications and more. This guide, and all our **tipsheets**, can be downloaded from: www.cat.org.uk/catpubs/ppv.tmpl Alternatively, post us 50 pence worth of stamps per tipsheet, and we'll send you paper copies

CAT runs residential **courses** covering water supply and treatment, including rain and greywater. For more details see our courses leaflet, or ring us on 01654 705981, or visit www.cat.org.uk/courses

CAT Mail Order supplies many water-saving and re-use gadgets:

- Spray-head Tap Magic attachments and Interflush kits to reduce toilet flushing.
- Rainwater diversion kits.
- Grey water downpipe diverters, direct bathwater diversion siphon hoses, and soaker hose kits for garden irrigation.

Tel 01654 705959 or visit www.cat.org.uk/shopping and see *Garden Products* or *Household Products*

The **Environment Agency** website has lots of advice on saving water at home, work or school. It also includes a report on rainwater harvesting. See www.environment-agency.gov.uk/savewater

UK Rainwater Harvesting Association

Tel: 01636 894900; Web: www.ukrha.org
See their website for a list of member companies. Make sure that systems include the use of water-saving equipment such as low-flush toilets.

Meteorological Office Tel: 0870 900 0100;
Web: www.metoffice.com/climate/uk/averages
Data on average rainfall for many parts of the UK.

Green Building Store Tel: 01484 854 898;
Web: www.greenbuildingstore.co.uk
Supply low flush toilets, waterless urinals, water efficient taps and showers, and flow restrictors.

CAT's free information service can give advice on further options for water supply and treatment.
Tel: 01654 705989 or email: info@cat.org.uk