Managing Water in a Changing World

about the author …

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the summer of 2022 …

Since the turn of the century, the Environment Agency has been predicting we can look forward to many more summers like the one recently experienced. Likely characteristics include long dry spells in summer leading to drought conditions, coupled with wetter flood-prone winters, both caused by changing weather patterns, which in turn are caused by climate-change impacts. From a UK perspective, if 2022 proves typical, just the slight move evident this summer of the epicentre of low-pressure weather systems northwards means less rain and more heat in southern England.

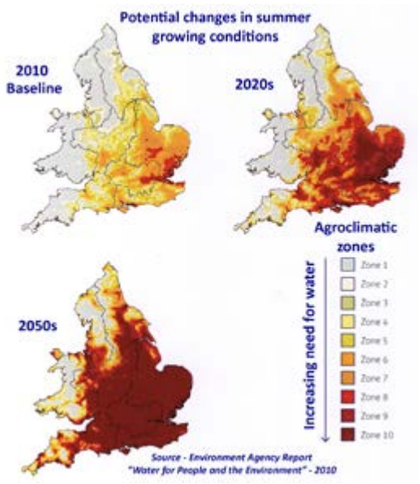
With plenty of other worries dominating public attention, be it the banking crisis of the noughties, to Brexit and the more recent pandemic, fuel costs and associated economic crises, it is easy to overlook that we may be stumbling towards the biggest crises of all, namely threats to the water supplies on which ultimately people and nature depend. This particularly applies throughout England south of the Humber estuary, as reflected in the adjacent 2010 map which looks uncannily similar to the heat maps which accompanied this summer's TV weather forecasts. Worryingly, this is also the geography that accounts for the bulk of the UK's population, GDP and food production.

responding to change …

As with much to do with managing climate-change impacts in coming years, responding to the changing water management situation in the UK, will require the combined efforts of Government, of the water utility companies, and of the general public. So far, the Government and the utilities are "on the case" with wide-ranging strategic reviews underway aimed at curbing demand through higher building standards, whilst improving the security of mains supplies. But will this be sufficient, without the public and commercial engagement that can add scale to what Government and the utilities can achieve alone? And can we afford to focus on winter floods and summer droughts as two separate problems, when they both hinge on the effective management of the same rainfall?

farmers at the forefront …

As reflected in the adjacent map, the farming industry is at the forefront of the battle to avoid future droughts, it will be important for farmers to become self-reliant in assuring their summer water supplies and the productivity of their land. To do this, they will increasingly need to capture winter water for summer use in farm-level reservoirs using natural topography to do so, or by abstracting from nearby watercourses at a time of year when their water levels are high. However, to do this without parallel consideration being given to the impact that could have on downstream flood risks would be a bizarre oversight if flood risk measures were taken that exacerbate later drought risks.

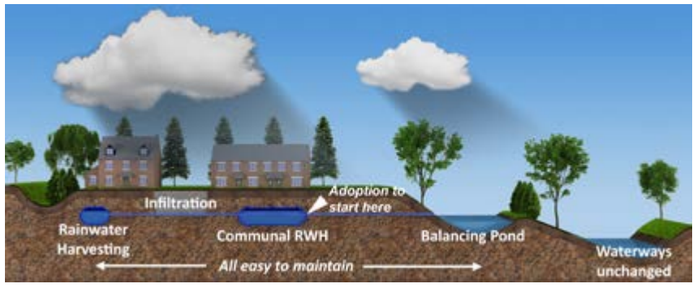


Typically, the reservoir capacity needed to see a farmer through a future dry summer would likely be full to its capacity by mid-winter, therefore playing no part in reducing downstream flood risks for the remainder of the winter. This could be addressed by including in the reservoir some "attenuation" capacity, that is capacity over and above what is required to meet the farmer's summer needs. This would be designed to hold back water temporarily during peak weather events, before later releasing it at a rate with which downstream drainage infrastructure can cope without leading to flooding. Self-evidently, as the attenuation capacity adds to the expense of the reservoir and is for the benefit of downstream communities, these extra costs must flow from the public purse via flood-protection budgets.

whilst in urban areas …

Similar considerations apply in urban areas where summer droughts and winter floods need to be managed in tandem, rather than separately, with Government applying a light touch to encourage industry and the public to play their part.

Of the potable water delivered to a home through public water supplies, around 50% is "wasted" on non-potable applications such as toilet-flushing and clothes washing machines. This 50% can as easily be provided by well-established water re-use technologies such as rainwater harvesting and greywater recycling. This ratio of potable to non-potable water consumption is even more slanted in most commercial buildings where there is likely to be a strong bias towards the flushing of toilets, for example, rather than other water uses.



Straw polls indicate that hardly any member of the public is wedded to the notion that toilets need to be flushed with potable water, provided the water used looks aesthetically clean. Despite this, there is little public pressure to prevent this waste of an already scarce and becoming scarcer commodity. That will inevitably change as pressures on water supplies intensify – but by then it will be too late to switch effectively to more sensible water re-use options which will take time to build up the capacity needed to affect the national picture.

Whilst maintaining its current emphasis on the avoidance of wasting water at the point of consumption or through leaks, Government encouragement is also needed for water re-use as a measure aimed at avoiding future floods and droughts, as a measure which will reduce the carbon footprint of water consumption, and as a measure that will help reduce loads on overloaded storm drainage systems.

rainwater harvesting & greywater recycling …

Rainwater harvesting systems are simple to install when a building is being built or refurbished. The water falling on the roof, which would otherwise be channelled to soakaways or the storm-drain, is diverted instead to an underground storage tank used exclusively to supply toilet cisterns, clothes washing machines and outside taps. These are served via separate non-potable pipework, with systems sized to match their collection and usage potential. This is largely dictated by roof area, and occupancy, the latter determining how much non-potable water is likely to be used. Commercial buildings and larger detached houses might typically have their own independent system, whereas smaller terraced homes might share a larger communal system.

If that all sounds like more project cost, then that is where triple bottom line thinking enters the equation. As a straightforward "add-on", then water re-use is an added cost. However, if it is engineered into the overall development design from the outset, and is fully integrated with the site's sustainable drainage requirements as illustrated, then incremental costs are minimised, and the environmental benefits maximised.

On commercial developments, such as conference centres and sports stadia for example, where the rainwater collection areas and the demand for non-potable water are both high, then the water savings and cost-effectiveness of rainwater harvesting both peak.

On commercial developments where there is a mismatch between available collection roof area and the occupants' potential demand for non-potable water, in a hotel or students' hostel for example, then a greywater recycling system comes to the fore. These collect and cleanse bath and shower water for non-potable re-use, there generally being an excellent match between the water used for bathing and that needed for toilet-flushing in such buildings. Greywater recycling systems are also particularly effective at reducing loads on stressed sewerage systems, as they serve to half the capacity needed.

UK Rainwater Management Association

For further information visit www.ukrma.org