

## THE WRONG SORT OF DROUGHT OR THE RIGHT SORT OF HEATWAVE?

**The hot dry weather has got the “drought debate” going again, but what does drought mean and when is a drought not a drought? But before that, perhaps what we are seeing is a heatwave and not a drought at all.**

At present, the only UK-specific definition of a heatwave is limited to England, and targeted primarily at health professionals and emergency planners. Created in conjunction with Public Health England, it uses temperature thresholds that vary by region. In London, qualifying temperatures must be at least 30 degrees Celsius over two consecutive days, plus an overnight temperature of at least 15 degrees Celsius in between. By 3rd July, it looks like most of the UK is experiencing a heatwave.

There is much debate about a universal definition of a drought. What a drought is to one person is not a drought to another. However, there are three commonly used descriptions.

### HYDROLOGICAL DROUGHT

Hydrological drought refers to shortages of water resources, when for example; groundwater, reservoir, or stream levels are significantly reduced. Conditions for hydrologic drought are built over extended periods of time. Hydrological droughts occur over catchments and one catchment will differ from another. It takes time for reservoirs or streams to become depleted, which can correspond to long replenishing periods. The consequence of a hydrological drought depends on what is affected, which is why we have the other definitions below. The solution is to wait for rain.

### AGRICULTURAL DROUGHT

Agricultural drought refers to circumstances when soil moisture is insufficient to sustain crop growth and production. Agriculture can rebound or be impaired within a very short period of time depending upon the strength of drought conditions. In certain situations such as pot grown horticulture, drought conditions can take

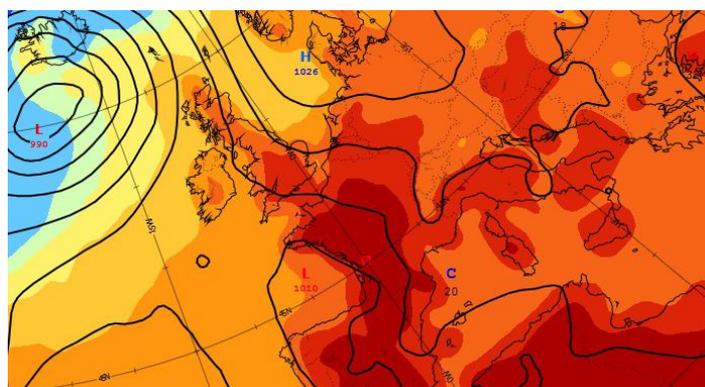
only hours to become effective. The consequence of an agricultural drought is company failure and a lack of food. The solution is irrigation.

### ECOLOGICAL DROUGHT

Ecological drought is defined as “the prolonged and widespread deficit in soil moisture, or biologically available water, that imposes multiple stresses in terrestrial and aquatic ecosystems.” Ecosystems have evolved to cope with drought and have an inbuilt resilience. However, they suffer from frequent and prolonged drought exacerbated by artificial abstraction. The consequence is generally a temporary loss of habitat which can lead to fish death in particular. The solution is to wait for rain, and reduce abstraction where this will make a difference. In certain circumstances, interventions such as oxygenation and fish rescues can alleviate a crisis.

### ENGINEERING DROUGHT

A fourth contender, that we have introduced, is an Engineering Drought. This is brought about by a water supply system being unable to meet increased demand brought on by a heatwave, or a hydrological drought. The consequence is a lack of water pressure at the point of delivery. The proper solution is investment in infrastructure which may include the development of more supply sources, storage, treatment and distribution. The short term, crisis solution, is to restrict supply and control demand.



# THIS “DROUGHT”

Droughts are naturally occurring events and all droughts involve an extended period of lower than average rainfall. Whether the impact of any particular drought falls on the environment, on public water supply or on other water users in the wider economy will depend on the individual characteristics of each drought. All droughts differ in severity, extent and duration. The effect of droughts will also be different depending on whether the majority of the water sources affected are rivers, reservoirs or groundwater.

Table 1 provides rainfall totals during the week 20 – 26 June 2018, and shows that rainfall was less than 1mm across all areas of England<sup>1</sup>. Cumulative rainfall totals range from 6% of the June long term average (LTA) in southeast and England to 62% in north-east England. But looking back a bit further the totals over the last 3, 6 and 12 months are much greater than average.

River flows data for a range of indicator sites across the UK for mid June show that daily mean flows remained normal for the time of year at almost half of sites and most of the remainder are “below normal” for the time of year<sup>1</sup>.

This seeming paradox between a very dry June and generally normal or slightly below normal river flows, is a result of groundwater. The very high rainfall over the preceding 3 to 6 months in particular led to aquifers being filled. Figure 1 shows the status of aquifers as measured by groundwater levels at the end of May 2018<sup>2</sup>. Over the summer the aquifers naturally release water to the rivers slowly, maintaining their flow. This contribution decreases and is supplemented by summer rainfall. In catchments with little groundwater the reduction in river flow is rapid.

## Key

-  Monthly rank/Period of record (record figure when circled)
-  Exceptionally high levels
-  Notably high levels
-  Above normal
-  Normal range
-  Below normal
-  Notably low levels
-  Exceptionally low levels

## Aquifer

-  Chalk
-  Jurassic limestones
-  Permo-Triassic sandstones
-  Magnesian Limestone
-  Carboniferous Limestone

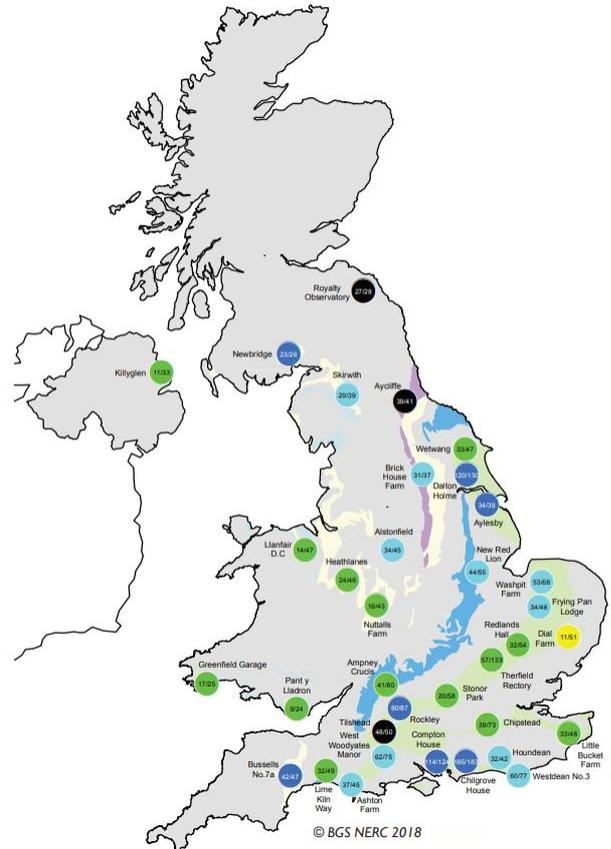


Figure 1 Groundwater Levels May 2018<sup>2</sup>

Geographic regions	Latest week: 20 to 26 Jun 2018	Latest month to date: Jun 2018		Last month: May 2018		Last 3 months: Mar to May 2018		Last 6 months: Dec 2017 to May 2018		Last 12 months: Jun 2017 to May 2018	
	Total (mm)	Total (mm)	% LTA	Total (mm)	% LTA	Total (mm)	% LTA	Total (mm)	% LTA	Total (mm)	% LTA
North-west	0.5	44	56	35	49	204	88	551	102	1,373	118
North-east	0.4	37	62	31	52	222	121	421	105	943	115
Central	0	18	31	62	107	245	147	440	124	804	112
East	0	9	18	42	88	188	133	363	127	686	115
South-east	0	3	6	59	108	232	141	451	125	804	110
South-west	0.2	11	18	45	69	292	138	611	116	1,138	113
England	0.2	19	31	46	78	230	126	463	114	925	112

Table 1 Latest rainfall summary information (Met Office © Crown Copyright, 2018)<sup>1</sup>

## IS IT A DROUGHT?

So, with groundwater levels at near normal levels, it is hard to support the idea that there is a hydrological drought in catchments with a large groundwater input. There is without a doubt an agricultural drought with soil moisture deficits without irrigation already impacting on crop growth and in some places ecology is suffering due to high temperatures, low oxygen levels and low flows in small streams, ponds and lakes, and rivers with a low groundwater inflow.

Water companies are beginning to warn of restrictions and Northern Ireland Water have introduced a hosepipe ban. If there isn't a hydrological drought why is this necessary? That is where an Engineering Drought kicks in. The very hot weather, a heatwave in fact, increases demand to a point that while water may be available at source, the engineering infrastructure required to exploit it isn't available. It's lack of investment, not lack of water that leads to Engineering Droughts.



still use a watering can. Keep tubs watered regularly so that the soil doesn't get too dry and water is wasted by it running through.

**REMEMBER...The heatwave won't last forever and when the rain comes, it will be flooding that we are worried about.**

References:

<sup>1</sup> Environment Agency Weekly Rainfall and River Flow Summary. Weekly Bulletin: Wednesday 20 June to Tuesday 26 June 2018. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/720855/Rainfall\\_and\\_river\\_flow\\_summary\\_20\\_to\\_26\\_Jun\\_2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/720855/Rainfall_and_river_flow_summary_20_to_26_Jun_2018.pdf)

<sup>2</sup> CEH and BGS Hydrological Summary for the United Kingdom, May 2018. <http://nora.nerc.ac.uk/id/eprint/520282/>

## PLEASE HELP

Despite that there are things we can do to help:

-  Leave the car dirty, the dust will protect the paintwork from the sun.
-  Forget paddling pools, why not give the kids a bucket of water and a water pistol instead.
-  Taking a short, cooling shower, rather than a long bath.
-  Don't let the tap run when brushing your teeth.
-  Full washing loads please.

We use about 130 litres of water on an average day and right now this is jumping up to 170 litres a day! If everyone could just use around 20 litres less each, it would make a massive difference to supplies. 20 litres is less than a bath full, and is about 4 toilet flushes — do you need to flush a wee?

Lawns don't need watering, the veg patch might though — but if you use a sprinkler use it in the late evening when demand is low, and it is cooler. More water will reach and penetrate the soil, where it is needed. Better

## ABOUT ENVIREAU WATER

**Envireau Water provides expert guidance on the management and regulation of water supplies. Planning is an important part of minimising the risk of Engineering Drought. Contact us for more details of how we can help you.**

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-  Built Environment
-  Oil & Gas
-  Food & Drink
-  Manufacturing & Pharmaceuticals



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