Wetter summers: evidence from South East Worcestershire

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That springs and summers have become wetter in recent years is often mentioned anecdotally. Wetter periods are sometimes offered as a cause of population change because increased rainfall at key times can result in lower productivity in plants and animals, especially birds and insects. However, memory of the rainfall of a "typical" month can be rather unreliable and whether a period has been wetter than usual may be difficult to establish.

I have been collecting rainfall records on my patch of land in Aston Somerville, South East Worcestershire, for 13 years (2005 – 20017). I argue here that this rainfall data does support the idea that recent years have become wetter than the 30-year average. Furthermore, late spring and early summer do appear to have become disproportionally wetter. I compare my data with that of the Met Office 30-year average data (Climate period 1981-2010) for Worcestershire (based on the Pershore Climate Station).

My rain gauge is robust and accurate (Remex). It has been in the same location (SP 0467 3814, 52°02′N, 1°55′W, elevation 52 m asl) since January 2005. It is situated well away from trees and buildings. I try to read it every day at about 09:00 (BST in summer, GMT in winter) and record precipitation to the nearest 0.5 mm. If there is snow or ice I bring the collection funnel indoors to thaw out and then take a reading. If I miss a day I simply record the cumulative total the next day. I am not trying to get an accurate record of each day's precipitation and I present here the results of readings aggregated into monthly and annual totals. The method of recording and the precision have been the same over the 13-year period. This would seem to be an adequate basis for looking at differences between months and years, and for making comparisons with the Met office data for the Pershore Climate station (52°09′N, 2°02′W, at an elevation of 35 m asl) which is 13.2 km away from my site (https://www.metoffice.gov.uk/public/weather/climate/gcq2vmx21).

Annual and monthly rainfall

Over the 13-year recording period annual rainfall has shown considerable variation (Figure 1). The annual mean (horizontal red line) was 732.5 (SD 179.2) mm, and the trend line (two-period moving-average; black line) indicates that there have been two periods of higher rainfall with a distinct period of lower rainfall, in 2010 and 2011.

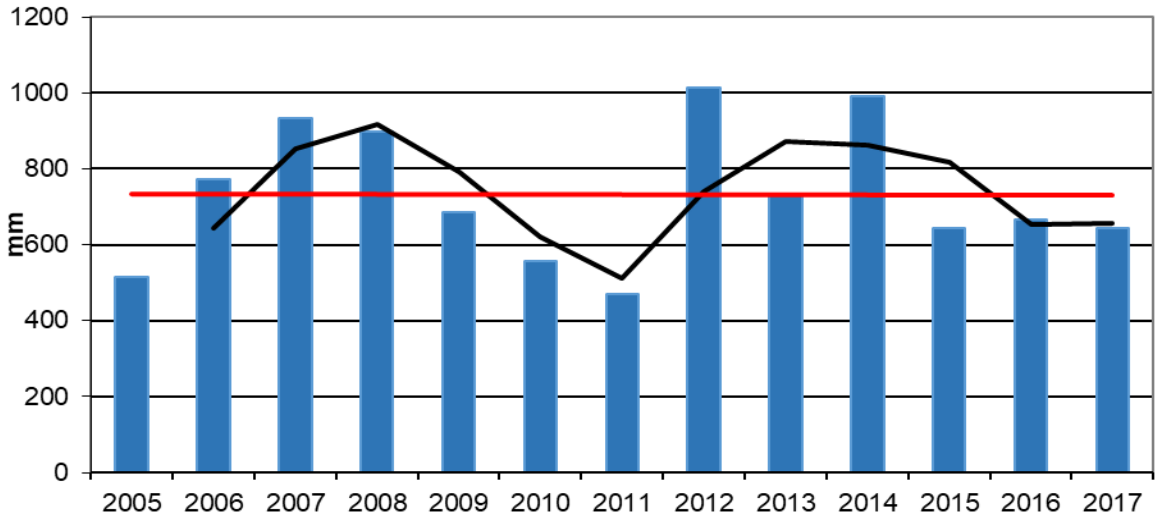
The Aston Somerville 13-year mean (732.5) is more than 100 mm (≈ 20%) higher than the Pershore 30-year mean (606.4 mm). The difference could be due to conistent over estimation in my measurements and it could also reflect a difference in rainfall between the two locations. However, the sampling periods used for the 30-year Met Office data and my 13-year sampling periods overlap only over six years (2005-2010). It is possible, therefore, that differences in sampling periods, rather than differences in the accuracy of readings or site differences, are the main contributors to the differences in annual average rainfall. This interpretation is supported by comparison of monthly rainfall averages (see below). Figure 2 shows the average rainfall in each month in the Aston Somerville 13-year sample (dark blue bars) alongside the same measure for the 30-year period at the Pershore Climate Station (light blue bars). In nine of the months the average rainfall recorded over the 13-year period was higher than the average 30-year values. The difference is statistically significant when comparing the monthly averages ($p=.001$, t-test). However, for April and September the 30-year averages were higher and for October they were almost identical.

The 13-year data can thus be interpreted as supporting the idea that in recent years total rainfall has increased and there has been an uplift in rainfall across most of the year. Of particular interest, however, are the late spring/summer months (May, June, July, and August). My records show that in recent years these four months received about 32% more rain than during the time covered by the 30-year data. This clearly lends support to the idea that in south Worcestershire, late spring and summer have been wetter in recent years. The trend line (two-period moving-average; Figure 2, black line) indicates that over the year the months of May and July are much wetter than either early spring or autumn. There is a distinct late spring/early summer peak in rainfall which is of equal magnitude to the November – January rainfall peak.

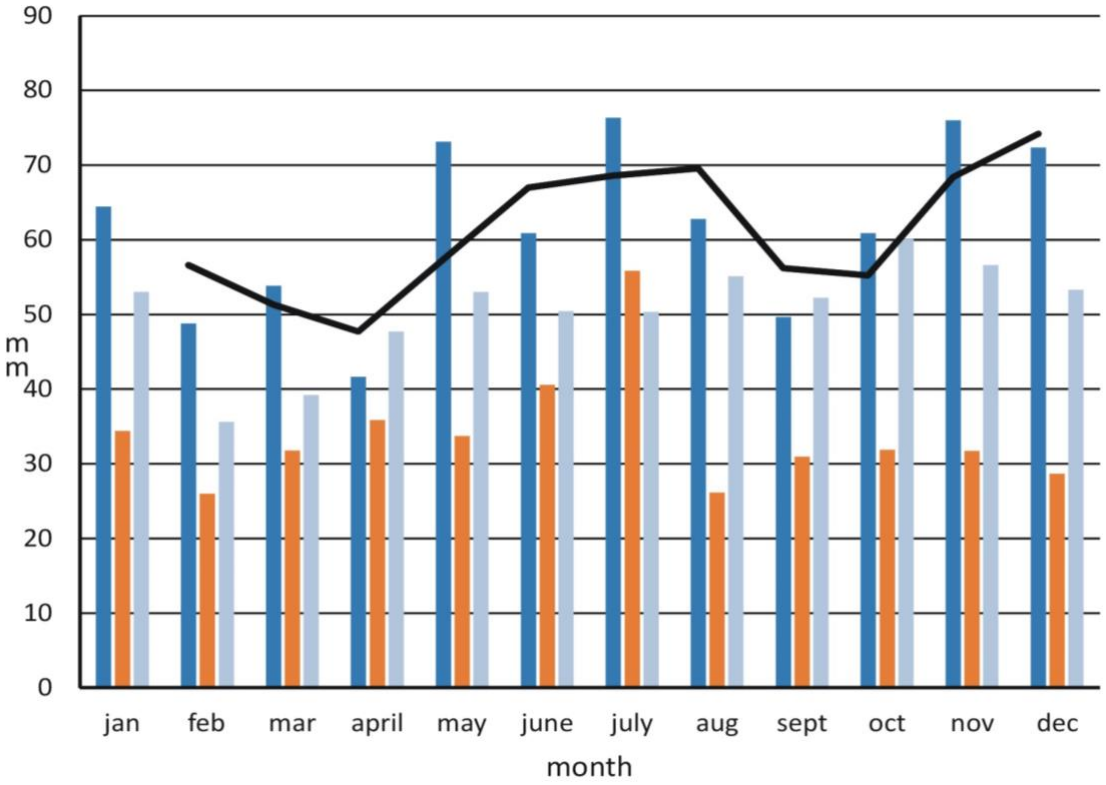
The standard deviations of the monthly averages (shown as orange bars) are relatively large indicating that there is considerable variation between years in rainfall in every month. However, the months of June and July are notably more variable (standard deviations are higher) than in all other months (Figure 2). This indicates that accurate rainfall predictions for the summer are particularly difficult.

A climate shift?

The thirteen year data run is relatively short. It provides only suggestive evidence of wetter years and of wetter springs and summers. However, changes in rainfall patterns have been predicted by models of climate change due to global warming. This is based upon the simple observation that warmer air can hold more moisture than cooler air. Therefore with higher average temperatures there is more precipitation in the Earth's climate system. What drives the distribution of rainfall through the annual cycle needs the expertise of a meteorologist. However, this run of 13 years of rainfall data from South East Worcestershire does seem to support the common view that recent years have been wetter and that late spring and early summer are becoming disproportionately wetter.



01. Annual rainfall recorded between 2005- 2017 at Aston Somerville, South East Worcestershire. Horizontal red line indicates the annual mean. Black line indicates the trend assessed as a two-period moving-average.



02. Mean monthly rainfall recorded between 2005 - 2017 at Aston Somerville, South East Worcestershire (Dark blue bars). The Standard deviations of these measurements are shown as orange bars. The mean monthly rainfall recorded at Pershore Climate Station 1981 – 2010 are shown as light blue bars. The black line indicates the trend of the Aston Somerville data assessed as a two-period moving-average.