

# DRY (Drought Risk and You) research project

Gemma Mawdsley

Droughts and water shortages can have an impact on the environment, agriculture, business, infrastructure, society and culture, affecting all of us, so drought risk management strategies are vital. To develop an easy-to-use, evidence-based resource to support decision-making for UK drought risk management, in April 2014 the Natural Environment Research Council (NERC) funded the DRY (Drought Risk and You). This was a four-year research project, led by Professor Lindsey McEwen in the Centre for Water, Communities and Resilience at the University of the West of England, Bristol.

The project spanned seven river catchment areas reflecting the different hydrological, socio-economic and cultural contexts in the UK (Figure 1).

Where previous studies have focused on mathematical modelling of drought risk, a key feature of the DRY project was to access data representing a number of perspectives – from statistics derived from a hydrological model to stories and images collected from people in a river catchment area – to build a picture of drought risk in the UK, its impacts and possible adaptive strategies. To this end, the project incorporated a two-way process for gathering and sharing knowledge about drought and water shortages. Researchers held workshops with communities in the seven catchments, gathering narratives which captured local knowledge. These memories and images of historical droughts provided context for

the predictive hydrological drought models being developed by the DRY team, which are presented as a series of digital stories on the DRY Utility website.

DRY also carried out a number of citizen science projects with local people, generating information about the impacts of drought on grassland, crops, trees and domestic water use and collecting stories about volunteers' experiences and knowledge of drought.

The research generated a plethora of fascinating stories of people's experiences of past drought events, and their thinking about how we might adapt to droughts in future. These are brought together in the DRY Utility website, an online portal for knowledge sharing. The DRY project was concerned to exploit the educational value of the research; engaging with 'live' research materials which will help young people to a better understanding of drought and water scarcity in the UK. The DRY research, therefore, and the wider NERC Drought and Water Scarcity research programme, About Drought, was shared with the Geographical Association so it could be re-contextualised as a series of six key stage 3 and 4 lessons and supporting resources. These are summarised below, and available to download in full from the GA website (see references and further reading below).

*Gemma describes the DRY research project and the teaching resources that have been developed from it.*



Accompanying online materials

## Lesson 1: Is drought a global phenomenon?

*Learning objectives: to investigate myths about drought, particularly that it is a Global South phenomenon; to learn how drought affects the UK*

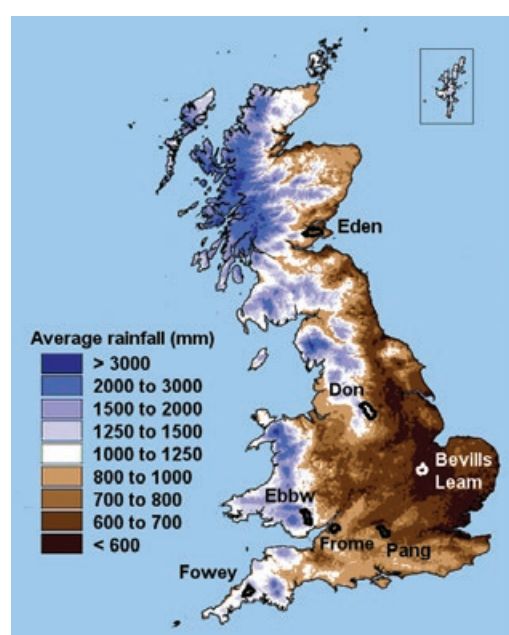
Students begin by using the 'flat chat' critical thinking technique (Mawdsley, 2019) to explore their understanding of the term 'drought.' To identify any misconceptions students are asked to identify areas prone to drought on a world map. Then they are presented with a map to show the real extent of global drought risk and water stress, dispelling the myth that drought is a Global South phenomenon.

Using the DRY website, groups of students work independently on one of the seven catchment areas (Figure 1) to identify their key characteristics and land use trends, then disseminate their learning to the rest of the class. These presentations could be recorded, to collate a documentary on the catchment areas as background information for this series of lessons.

## Lesson 2: UK drought 2010–12 – causes and effects

*Learning objective: to investigate the causes and effects of the 2010–12 UK drought*

A choropleth map showing the standardized precipitation index over the twelve months to



**Figure 1:** DRY's seven catchments, along north-west (wet) to south-east (dry) average annual rainfall gradients (1961–90). **Source:** Public sector information licensed under the Open Government Licence v1.0 (Met Office background average rainfall layer). Catchment boundary data owned by NERC – UK Centre for Ecology & Hydrology.

October 2010 is displayed, and students are asked to describe the trends. This is an opportunity to establish that this period bucks the general UK trend for relief rainfall and prevailing wind direction, rendering the west coast unusually drier than the east. Students are asked to make comparisons between this map and one for the twelve months to October 2011 (Figure 2).

Next, students read a journal article, 'The 2010–2012 drought in England and Wales' (Kendon, Marsh, and Parry (2013)) highlighting the causes of the drought, and when they have sufficient relevant information produce a timeline for the event. To understand the human impacts of the drought they listen to two of the audio accounts on the DRY Utility resource website. The lesson concludes by considering the impact, following such an extended drought, of the volume of rainfall on hydrology and human activities.

### Lesson 3: UK drought 2010–12 – responses

*Learning objective: to investigate the responses to the drought by different sectors*

Groups of students represent one of the affected sectors – agriculture and horticulture, business, health and wellbeing, amongst others – and storyboard their responses to the drought, then 'speed date' around the classroom to share their findings. Each group presents arguments for their sector's need for water being the most important.

To develop a deeper understanding of responses to drought, students read 'Water harvesting and recycling in soft fruits' (Atwood, 2013), which explores how harvested rainwater can be used to sustainably irrigate polytunnels.

### Lesson 4: The 1976 heatwave and drought – was any of it good?

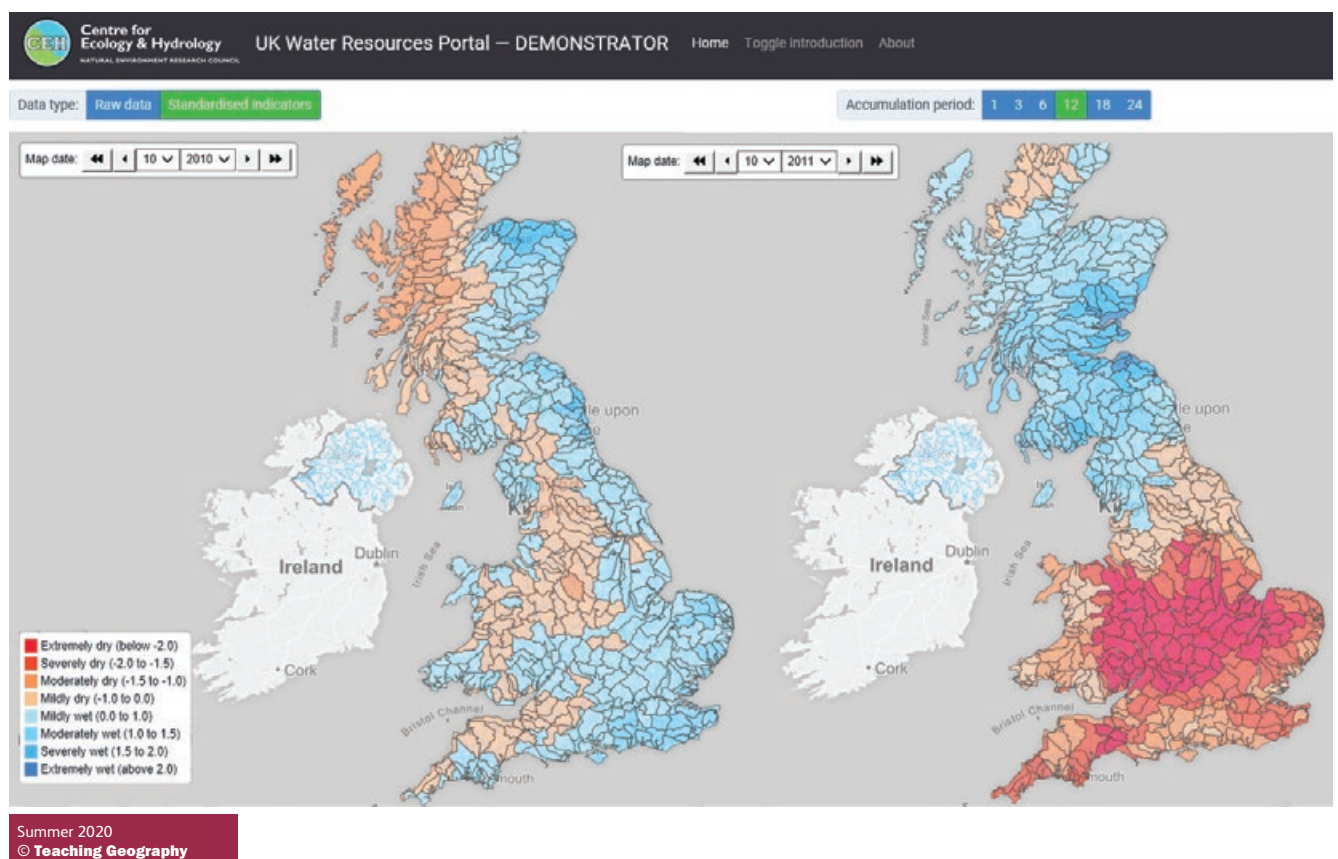
*Learning objective: to investigate the impacts of the UK's 1976 heatwave and drought*

The DRY Utility resource portal brings together fascinating stories about the impacts of the 1976 drought across the seven catchment areas. The stories highlight everyday impacts, from wonderful summer holidays with fabulous weather, to dirty nappies soaking in buckets until the mother could do her one daily wash, to those potato farmers who *could* irrigate their crops driving about in brand-new cars, and so on. These mixed responses, from significantly different catchments in terms of physical and human geography, enable students to synoptically evaluate the impacts of the 1976 drought.

The lesson begins with a question generator (available to download) to encourage questions about a photograph taken in 1976 (Figure 3).

In groups, students undertake a 'true for who' task, each taking a role (campsite owner, mother of a young baby, potato farmer) and explore their perceptions of the drought. In two bullet points they state whether the 1976 heatwave and drought were good for them or not, and why. They read out their statements to their groups and the remainder of the group has to guess their role. This will encourage empathy for, and greater understanding of the impacts on, the different sectors. In many cases, the drought had both positive and negative impacts, so once each group has completed the task all the 'potato farmers', for example, can compare their statements to see if their ideas were similar or different. To add another dimension, students can refer back to

**Figure 2:** Choropleth maps showing standardised precipitation data for the 12 months to October 2010 (left) and October 2011 (right). **Source:** UK Centre for Ecology & Hydrology







**Figure 3:** People queuing for water at a standpipe in 1976.  
**Source:** Hull Daily Mail, 5 July 2018.

their prior learning on the physical and human characteristics of catchment areas, and begin to consider the spatial aspect of the impacts and how influential demographics would have been on people's ability to cope with and adapt to the drought. They could listen to the Ebbw Vale account on the DRY Utility website's Story Bank in order to consider the economic impacts of such an event.

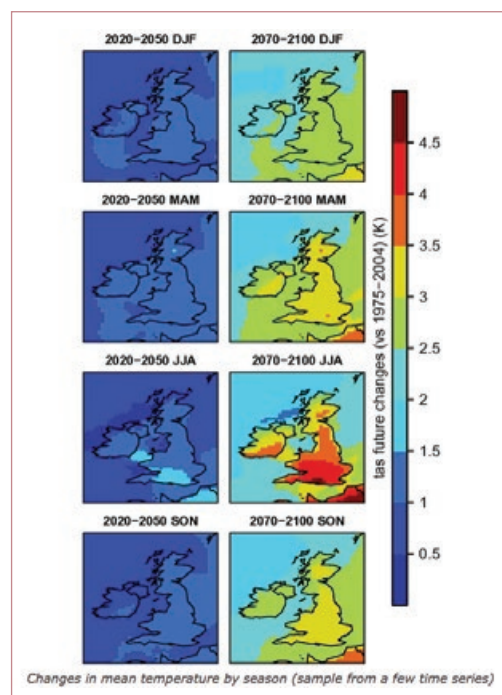
The lesson culminates in an extended writing task entitled 'The UK drought of 1976 – was it all good?'

## Lesson 5: Drought in the UK – the future

*Learning objective: to investigate how a drought in the future could affect students' lives*

This lesson encourages students to really consider how a drought could affect them. They are asked to think about how old they will be in 2020, 2050 and 2080, and what they think they will be doing then, and storyboard their ideas. They study two sets of choropleth maps showing seasonal changes in average temperature (Figure 4) and list their potential impacts on water stress and drought in the UK.

A set of choropleth maps of UK vegetation species from the MaRIUS drought risk management project (also part of the UK Drought and Water Scarcity Research Programme, About Drought) is presented to the students. Their task is to consider, with reference to the maps, the impact of drought on different species. The global impact of future drought is also considered, linking back to the Lesson 1 conclusion that drought is not a Global South phenomenon.



**Figure 4:** Maps of seasonal changes in average temperature in the UK.  
**Source:** MaRIUS project.

## Lesson 6: Changing our thinking about water resources

*Learning objective: to explore how we can change the way we use water*

During this lesson students investigate how efficiently water is used in their school. They employ fieldwork techniques of sampling, constructing surveys/questionnaires, and choosing appropriate graphical techniques to present and analyse their findings.

Using concepts developed by Grecksch and Lange (2019) students devise a water- and energy-saving campaign. They are encouraged to use the nine 'building blocks' identified as important to a successful campaign. They take it in turns to present to the class, then the class votes on which campaign should be taken to the School Council or Headteacher.

## Final thoughts

This series of lessons incorporates a number of critical thinking techniques which will dispel myths and give students an insight into the impacts of past and future drought in the UK.

Students can explore primary data collated by the DRY researchers and feel part of the process of its interpretation, acquiring a deeper level of knowledge and understanding of the issue of drought. All six lessons and associated handouts can be found on the GA website. | **TG**

## Acknowledgments

The process of development of the resources was an iterative one and I'd like to thank Professor Lindsey McEwen and Dr Neil Phillips of the University of the West of England for their input from a DRY project perspective.

## References and further reading

All websites last accessed 21/04/2020.

'All about drought' – all the lessons and resources mentioned in this article are available online from the GA at: [www.geography.org.uk/All-About-Drought-Resources](https://www.geography.org.uk/All-About-Drought-Resources)

### Online resources

The teaching resources described in this article can be found on the GA website at: <https://www.geography.org.uk/All-About-Drought-Resources>

**Gemma Mawdsley** is a Consultant to the GA on the 'Critical thinking for achievement' project. She is also an SLE for the Wade Deacon Trust, Cheshire, supporting teaching and learning in the Humanities, and a MITA reviewer and Accelerate Coach.

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About drought exemplar of research from the ENDOWS project (ENGaging diverse stakeholders and publics with outputs from the UK Drought and Water Security). Information is available at <https://aboutdrought.info/>

Atwood, J. (2013) *Water harvesting and recycling in soft fruits*. Kenilworth: Horticultural Development Company. Available at [https://projectblue.blob.core.windows.net/media/Default/Horticulture/Diseases/Recycling % 20in % 20soft % 20fruit % 20-% 20 website % 20version.pdf](https://projectblue.blob.core.windows.net/media/Default/Horticulture/Diseases/Recycling%20in%20soft%20fruit%20-%20website%20version.pdf)

Drought Risk and You (DRY) project website:

- Digital narratives: <http://dryproject.co.uk/resources/digital-narratives>
- Citizen science projects: <http://dryproject.co.uk/citizen-scientists-updates>
- Audio accounts of drought 2011–12: <https://dryutility.info/story-bank>

Drought Risk and You (DRY) project resources:

- DRY Utility information portal: [www.dryutility.info](http://www.dryutility.info)
- Teaching resources: [www.geography.org.uk/teaching-resources](https://www.geography.org.uk/teaching-resources)

Grecksch, K. and Lange, B. (2019) *Water Efficiency in the Public Sector: The Role of Social Norms* Oxford: Centre for Socio-Legal Studies. <https://aboutdrought.info/resources-for-public-sector/>

Kendon, Marsh, and Parry (2013), 'The 2010–2012 drought in England and Wales', *Weather*, 68, 4 available at: <https://rmets.onlinelibrary.wiley.com/doi/epdf/10.1002/wea.2101> (MaRIUS project investigating the management of drought and water scarcity, website at: <http://www.mariusdroughtproject.org/inforesults/science/ecology/terrestrial-ecosystems/>

Mawdsley, G. (2019) 'Critical Thinking for Achievement CPD', *Teaching Geography*, 43, 3, pp. 115–17.

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