## Water, water everywhere...

Climate change is highlighting the contrasts between water-rich and waterpoor countries. The use of water resources also differs markedly between poorer and more affluent countries. This article suggests teaching ideas focusing on the study of water as a resource, including using online drought maps and asking students to monitor their own water usage. This topic is central to several of the new GCSE and A-level specifications.

Do you use a dishwasher, or a washing up bowl, or do you wash up under a running tap? How much water do you use to wash your dishes? If your home water supply is metered, you may be very careful in your use of water, but we do tend to take water for granted in Britain, especially after three summers with rather more than average rainfall. It is easy to forget that water is a finite resource.

In 2008, Starbucks coffee chain received adverse publicity for leaving taps running in all of their 10,000 outlets (Figure 1). This was calculated to use more than 23 million litres of public water a day – enough to supply the entire population of Namibia for the same time period (Balakrishnan, 2008). After complaints, Starbucks changed its policy.



Figure 1: Starbucks received adverse publicity for their nationwide water wastage in stores. Photo: greenfinger/Morguefile.

But this incident highlights the stark contrast between water-rich and water-poor regions. Spain and Australia have been experiencing drought for several years, which may hint at longer-term climate change. Should drought conditions continue, these countries have the capital reserves to invest in major water transfer schemes and desalinisation plants.

In the Horn of Africa, notably in Ethiopia, failure of the seasonal rainfall and rising food prices have caused increasingly severe problems, with over 6 million people now in need of emergency aid. Expensive technological fixes are not an option.

University College London (UCL) has an excellent website (*drought.mssl.ucl.ac.uk*) with a global drought map that is updated monthly.

- You can select a Drought Assessment Period from 1 to 36 months, and zoom in to study regions or countries at a spatial resolution of around 100 km.
- There are five levels of drought severity in the classification. In groups, students could be asked to consider how they would respond at each of the different stages, with each stage assigned to a different group.
- Where there is variation within a country or drainage basin, A-level students could explore the potential for conflict.

• Alternatively, students could assume the roles of different users such as industry, domestic, hydroelectric power or agriculture.

UCL's website also includes links to news items on drought from around the world.

In the UK we use, on average, 150 litres of water per person per day, although domestic use only accounts for about 20% of total water use. Just one tap running for three minutes uses as much water as one African person, living in a drought-stricken area, does in one day. Many people walk miles to collect water – women in Africa and Asia commonly carry 20 kg of water on their heads, equal to some airlines' luggage allowance (see Figure 2). Figure 3 shows a group of young children in Malawi collecting water from the village pump. This contrasts with a UK child's experience of simply turning on a tap for access to safe, clean water.



Figure 2: A woman in the Thar desert, Jaisalmer, Rajasthan, India collecting water.

In the poorest countries, the issue is much more about access to safe water. According to the charity WaterAid, 884 million people in the world lack this basic resource (WaterAid, 2009). The WaterAid website (*www.wateraid.org*) has country-based case studies and many other valuable documents useful for GCSE and A-level teaching, as well as material for key stages 1, 2 and 3.

Figure 3: A group of young children in Malawi collecting water from the village pump. Photo: Ruth Totterdell.



Too much water is being taken out of the hydrological cycle. Global consumption of fresh water is doubling every 20 years, mainly to meet agricultural and industrial demands for water, with the global spread of technology and development. The human output could be added to the standard diagrams of the hydrological cycle as abstraction rates increase.

Several of the new GCSE and A-level specifications include the study of water resources. The AQA GCSE B specification, for example, uses the theme of 'Water – a precious resource' for part of the controlled assessment for their course. Edexcel and WJEC have also included this topic in their subject content at GCSE and A-level.

The authors of the new specifications have recognised that water supply and demand is a vital issue: one that is of great interest to geographers at all levels of study and one that will energise students of all ages. As global climates change, some regions will suffer increasing water scarcity and stress, and conflicts will occur between users, possibly leading to water wars. Developing students' understanding of this fundamental resource must be an essential element of the curriculum. | **TG**  Estimating water use in the home should encourage young people to understand the value of water and to develop their critical appreciation of the problems faced by many in water-poor regions.

- Ask your class to log the number of baths, showers, loads of washing, even flushes of the lavatory in their home in a 24-hour period.
- They can work out how much water is used by timing how long it takes to fill a measuring jug or bucket of known volume and then timing how long it takes to fill the bath or to have a shower.
- The amount of water used in washing machines and dishwashers should be found in the manufacturer's instructions. A lavatory uses approximately 7.5 litres per flush. Counting the volume of water used for cooking and drinking may be more difficult but student initiative may surprise here.
- Collate the class results to get a rough indication of water used. This may be set against the average rainfall for your area. You could compare the average use per family in the class with that of a family in Namibia, for example.
- You can also check these data against online water use calculators (such as the BBC news website – http://news.bbc.co.uk/1/hi/in\_ depth/629/629/5086298.stm) and then discuss the value of the different ways of assessing water use to develop students' evaluation skills in preparation for their controlled assessment.

More ideas for teaching about water can be found in *Water Works: Do we have equal rights to resources?*, one of the GA's *KS3 Geography Teachers' Toolkit* series.



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