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Why beer needs watering down

Brewers are teaming up with environmentalists to help to conserve water supplies — and ensure the pints keep flowing



(Getty)

Beer Story

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It's enough to make beer drinkers cry into their pints. A combination of factors, including rapid population growth, expanding food needs and unpredictable weather patterns, is heralding a global water crisis. Chronic water shortages are already hitting many regions, particularly in developing countries. Industry, which accounts for about 22 per cent of global fresh water consumption, is increasingly concerned about what will happen when the taps run dry. Brewers are among the most vulnerable: a pint of beer is up to 95 per cent water. Drinkers have been warned that, as water supplies dry up, prices could rise and supplies could be threatened. The battle is on to keep the pumps open.

Shepherd Neame, in the centre of the small town of Faversham in Kent, is Britain's oldest brewery, each year producing more than 200,000 barrels of beer with names such as Bishop's Finger, Spitfire and Canterbury Jack. The smell of boiling hops fills the town air. David Holmes is the company's master brewer. He has been in the trade for more than 30 years and is passionate about his business — his wife is also a master brewer.

"Of course the ingredients and knowhow that go into making a good pint are crucial," says Holmes. "But water is the lifeblood of the brewing industry."

SABMiller is one of the world's largest brewing companies, with brands such as Peroni Nastro Azzurro, Grolsch and Miller. Its Snow Beer, brewed in China in association with a local partner, is that country's biggest seller and, in terms of volume, one of the world's major brands. In total, SABMiller produces lakes of beer each year — nearly 37 billion pints of it. (The total market in the UK is more than eight

billion pints a year.)

Though Shepherd Neame and SABMiller occupy very different positions in the brewing industry — one a family-run, regional concern, the other a multinational with plants across six continents — both are facing water supply challenges.

Kent, particularly its southeastern corner, is one of the driest parts of Britain, with less water available per capita in terms of volumes stored in wells and rivers than Ethiopia or Sudan. Whether or not climate change is responsible for what's seen as a drying out of this corner of England is debatable. But there's no doubt the weather has become increasingly unpredictable in recent years, with sudden downpours leading to floods succeeded by lengthy periods of drought.

Summer hosepipe bans and other water restrictions have become the norm. The Campaign to Protect Rural England says that already depleted water resources in the South East will be placed under further strain by government plans to build thousands of new houses in the area: by 2025 the region could be facing water shortages of more than a billion litres a day.

Shepherd Neame is fortunate in that it has its own artesian well 100ft below its brewery, through a layer of London clay and chalk. "Traditionally, breweries were established where there was a good supply of clean water," says Holmes. "Obviously it's a tremendous commercial advantage having our own well and not paying a water company for supply. We're also lucky that, even when there have been droughts, the level of water in the well has hardly moved. But these days we're very conscious of water usage. In former times water would be spraying everywhere as barrels and storage tanks were cleaned — it would take 12 or 14 pints of water to make one pint of beer. Now, with strict computer controls, we've got that ratio down to between five and six pints of water for one pint of beer."

For SABMiller, with some of its brewing operations in regions facing water shortages, the need to secure adequate and reliable water supplies is all the more challenging. "In many areas we're going to have to cut back on water usage fairly dramatically," says Andy Wales, SABMiller's head of sustainable development and, as a former senior manager with Thames Water, the brewing giant's water guru. "The beverage industry as a whole is highly aware of the long-term risks water scarcity holds — if the issue isn't tackled then sales and revenues are going to be hit."

The scale of the world's water crisis is daunting. In terms of overall global water usage, agriculture accounts for about 70 per cent of consumption, industry between 20 and 25 per cent and domestic use 5 to 8 per cent. According to the Stockholm International Water Institute (SIWI), one of the foremost bodies monitoring the issue, water usage has tripled in the past 50 years as countries have struggled to feed themselves and rapidly expanding industrial sectors have made ever greater demands.

Recent changes in rainfall patterns have exacerbated the problem: water tables in northern China and much of India are sinking dramatically. Great river systems in Central Asia, Australia and the western US are drying up. By 2030, says SIWI, nearly half the world's population will be living in areas described as being under water stress — regions in which water resources, in terms of quantity and quality, are depleted more quickly than they are replaced.

SABMiller joined forces with WWF to use what is called water footprinting to assess the risks posed to its operations by water shortages. Developed by Professor Arjen Hoekstra and colleagues at the University of Twente in the Netherlands, water footprinting is designed to help individual consumers, communities and industries to calculate total volumes of fresh water being used, not just from the tap but through all the elements of production of various goods. In the brewing industry this includes water used not only in the beer-making process but every drop from the cultivation of crops through to bottle and can recycling.

"Water shortages are best understood by considering production and supply chains as a whole," says Professor Hoekstra. Such calculations include water used elsewhere to produce imported goods — whether T-shirts from Pakistan or microchips from China.

Two areas of SABMiller's operations were chosen for the water footprinting study — one in South Africa, the other in the Czech Republic. SABMiller's brewing business in South Africa is one of its biggest, producing 2.6 billion litres of beer a year, while its breweries in the Czech Republic account for almost 1.1 billion litres, making it one of the biggest producers in Europe. One litre is roughly two pints.

Within its global brewing operations SABMiller says that it uses an average of between four and five

litres of water to produce one litre of beer. But the study revealed that this was only a small percentage of the total amount of water consumed. By tracing water consumption back through the supply chain, it is calculated that, for every litre of beer produced in South Africa, a total of 155 litres of water is used.

In the Czech Republic the ratio is 45:1. In both countries about 90 per cent of the total amount of water used is for the growing of crops. In South Africa higher temperatures mean that more water is needed for irrigation: crops in the Czech Republic, on the other hand, are fed mainly by rainwater and lower temperatures result in less evaporation. Also, about 30 per cent of ingredients for SABMiller's beer brewed in South Africa have to be imported, some from regions where crops need to be irrigated. Beer brewed in the Czech Republic is made almost entirely from local produce. "It is forecast that areas of South Africa will be 17 per cent deficient in water resources by 2030," says Andy Wales, of SABMiller. "And that figure could well be doubled by the impact of climate change. Though we are small water users in the context of South Africa's overall consumption, we are looking to work with government, local groups and farmers to reduce water use right across the board."

Stuart Orr, the freshwater manager at WWF, says that water shortages do not only threaten human and wildlife populations, but also have considerable commercial implications too. "While some industries have got the message, it is amazing how many still ignore these crucial supply-chain issues," says Orr. "Water shortages impact on so many sectors. If, for instance, I was running a company importing T-shirts from Pakistan, where the drying-up and depletion of the Indus river basin is creating enormous problems for cotton growers and others, I'd be very worried. In our interconnected world, water shortages in one area seriously influence another."

Analysing the issue is one thing, but coming up with solutions is another. SABMiller says that it has set itself the target of cutting water consumption by 25 per cent by 2015 while, at the same time, increasing beer production and sales.

In South Africa, substituting imports of barley with local, less water-hungry crops such as cassava is one alternative. Encouraging more efficient water use among farmers through possible changes in water-charging systems is another possibility. However, such moves are highly sensitive. Conflicts over water resources have broken out in several African countries, particularly where communities suffering acute shortages live close to industries that are big water users. In India, such arguments, some involving multinationals, have also led to violence. In areas of China there is growing unrest about industry hiving off water needed for domestic use and food production.

Closely connected with water supply problems is another issue likely to affect the future of the brewing industry — a possible shortage of vital ingredients necessary for the brewing process. The hop (*Humulus lupulus*) is a close relative of the cannabis plant and, with names such as Fuggles and East Kent Goldings, gives beer its bitterness and aroma.

Tony Redsell is one of the UK's biggest hop producers, cultivating 200 acres with vines 6m (20ft) high in fields at Upper Harbledown in Kent. "Hops are what makes beer come alive, but cropping is very different these days," says Redsell. "A few years ago we wouldn't have dreamt of irrigating: rainfall would have done the job for us. Now we have to trickle-feed and sprinkle the hops. If not, they'll dry up."

Kent was once renowned as a world centre for hops. At one time, whole families from the East End of London would escape the city each September and journey south to pick hops. Those days are long gone: over the years farmers have been forced to tear up their plants as drinkers have switched to lighter, less hop-intensive lagers. Pests and disease, and competition from other growers, particularly in Germany and the United States, have taken their toll. In the 1950s, more than 20,000 acres were planted with hops in the UK, mostly in Kent. Now there are fewer than 2,500 acres.

"When I was young we'd never harvest hops before mid-September," says Redsell. "Now we start picking in August. Whether it's climate change or something else, the whole growing pattern has changed."

Hop growers in other parts of the world are experiencing similar changes. Three years ago a succession of hot, dry summers in Europe culminated in severe hop shortages and a steep rise in prices.

The Czech Republic is proud of its brewing traditions, particularly of its Pilsner-style beers, made with the country's Saaz hops. "We're now seeing considerable variations in both the yield and the quality of our hops each year," says Dr Martin Mozny, of the Czech Hydrometeorological Institute in Prague.

“Increasing droughts and rising air temperatures are creating more stress for hops.” Similar impacts have been noted in hop-growing regions in eastern Germany and central Slovakia.

Malting barley is the source of sugars essential to the brewing process. In 2007, in tandem with the global hop shortage, brewers were hit as world barley prices went up by more than a fifth in the space of a few weeks. On average, more than 1,200 litres of water are needed to produce one kilogram of barley. Bad harvests caused by drought in many parts of the world and rapidly expanding demand for cattle cereals to satisfy a growing taste for meat in China were deemed to be among the main causes of the price rise.

“The effect of changing weather patterns on all sorts of crops is going to be staggering,” says Dr Philip Wigge, of the John Innes Centre in Norwich, which specialises in plant science and microbiology. “Changes in temperature can play a critical role. While a rise in temperature might increase crop productivity in some regions temporarily, in the longer term yields are likely to be hit. Historical records show that for every 1C rise in temperature there can be a decrease in crop yields of anywhere between 2.5 and 16 per cent.”

New, more drought-resistant varieties of barley are being planted in some areas. In the United States, microbrewers — many of them bigger than regional concerns in the UK — are installing flow metres and filtration systems to control water usage.

In Atlanta, the 5 Seasons Brewing Company is filtering rainwater off its roof to use in its beer. Long Trail Brewing, in Vermont, recycles and filters its water repeatedly and says that it now uses only two litres of water for every litre of beer produced — possibly the best ratio in the industry.

Steven Chu, the US Energy Secretary, warns that California could run dry as the snow pack in the Sierra Nevada mountains, which provides much of the state’s water, disappears: the future not only of brewers but of vineyards, fruit growers and other industries is at risk. “I don’t think the American public has gripped what could happen,” says Chu. “We’re looking at a scenario where there’s no more agriculture in California.”

On the other side of the Pacific, recent rains have brought some relief to Australia, though drought conditions continue, with water in the Murray-Darling river basin at historically low levels. The Murray-Darling is vital for irrigating the country’s agricultural heartland. Jim Salinger, a New Zealand climate scientist who has studied climate impacts on the brewing industry, paints a grim picture for Australia’s beer tipplers in the years to come. Water shortages are likely to cause a big drop in supplies of barley malt. Competition for dwindling water supplies will intensify. “It will mean either there will be pubs without beer or the cost of beer will go up,” says Salinger.

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