

Industry and water

From barley to bottle – water focus pays off for SA beer maker



When sipping on an ice cold beer during a scorching summer's day, few people take time to contemplate how many litres it took to produce this refreshment. Yet it was exactly that question which prompted South African Breweries and its parent company, SABMiller, to implement a number of initiatives aimed at safeguarding water resources, both in this country and abroad.

Article by Sue Matthews.

Water used in the actual brewing process – including that making up the bulk of the final product, for cleaning, or lost as steam during boiling and through evaporation during cooling – is only a minor component of total water use in the supply chain. Nevertheless, in 2008 SABMiller's breweries were using a global average of 4.6 l of water to produce a litre of beer, and it was decided that this should be reduced to 3.5 l/l by 2015.

That milestone was reached a year early, in April 2014, by which time 59% of the breweries worldwide were using less than 3.5 l/l, compared to just 5% in 2008. The water savings amount to 23 billion litres of water – enough to fill an Olympic-size swimming pool ten thousand times! Since then, SABMiller has set a new target to reduce the global average to 3 l/l by 2020, while SA Breweries is aiming for 2.89 l/l at its own operations.

That sounds promising, but improving water efficiency in the brewing process is really the easy part. What about the water used to produce the raw materials needed for brewing? Prof Arjen Hoekstra created the water footprint concept in 2002 as a way of measuring the amount of water consumed along the entire supply chain, and in 2008 he co-founded the Water Footprint Network with leading global players from business, civil society, multilateral organisations and academia.

Noting conflicting figures for the footprint of beer on the network's website and in the academic literature, SABMiller conducted its first water footprint exercise that year at its South African subsidiary, which at that stage distributed about 2.6 billion litres of beer annually from its seven breweries. The following year a second water footprint exercise was undertaken in the Czech Republic, where Plzeňský Prazdroj's three breweries contribute some 20% of SABMiller's overall European beer volume.

The results, presented together in the 2009 report, *Water footprinting: identifying and addressing water risks in the value chain*, showed that while the Czech operations used approximately 45 litres of water per litre of beer, the South African footprint was significantly higher at 155 l/l. This could be attributed largely to the different evapotranspiration profiles and the greater reliance on irrigated and imported crops in South Africa. In fact, 98.3% of the SA Breweries water footprint was related to the growth of crops, with 84.2% of this due to local cultivation.

The SABMiller water footprinting report had been published in partnership with WWF, and in the same year the two organisations established the Water Futures Partnership with

the German sustainable development agency GIZ to address water security through action-orientated partnerships around the world. In light of the report's findings about the high contribution of local crop cultivation to SA Breweries' water footprint, the first project to be conducted by the Water Futures Partnership was a water risk assessment of the local hops industry.

Hops are a minor ingredient in beer, but key to aroma and flavour and for imparting a bitter taste. In South Africa they are only grown commercially at about a dozen farms – three of them owned by SA Breweries and the rest under contract – on the slopes of the Outeniqua mountains near George in the southern Cape. The area was chosen in the 1930s because it most closely met the growing preferences of European varieties (recall the quip that the prefix CAW on George's old car number plates stood for 'cold and wet'), but since the 1970s the industry has increasingly relied on locally developed cultivars that are more suited to our shorter summer days and warmer weather.

Hop-growing remains a water-intensive process though, and the drought experienced in the southern Cape between 2009 and 2011 highlighted the precarious nature of water availability. The hops industry was therefore an obvious candidate for a water risk assessment, which was conducted with

the technical assistance of the CSIR and the involvement of local stakeholders.

The hop farms, which fall mainly within two sub-catchments referred to as the Waboomskraal and Herold catchments for the purposes of the study, were found to have an annual water requirement of about 5 million m³, of which about 2.2 million m³ needs to be irrigated. Surface water storage capacity is only about 1 million m³, with few options for expansion, and registered groundwater usage a fifth of this. This means it is vital that dams are filled during the dormant season and at least once during the growing season if crop failure is to be avoided.

"We expected climate change to be the big issue, but when we did the hydrological modelling for the catchments, we realised that an even greater threat was from alien invasive vegetation," says Christine Colvin, who was part of the CSIR project team and now heads up WWF's Freshwater Programme. "The modelling showed that if the invasion continued unabated, the new normal for those catchments would be a 40% reduction in water flow."

Hakea, pine and black wattle cover some 2 800 ha, mainly in the Waboomskraal catchment, and apart from reducing runoff they increase the risk of intense fires, and hence erosion and consequent shallowing of dams through

sedimentation. WWF has since assisted in getting an alien-clearing programme underway, playing an important part in its planning and facilitation.

"We decided our role would be to help convene and catalyse collective action, because in the past few years WWF has been very involved globally in developing a framework for water stewardship," explains Colvin. "The crux of that is it's not just about reducing your own water footprint and maximising your own water use efficiency, but it's also about getting involved with your catchment neighbours – who might be completely unrelated to you in different supply chains, but who share the same 'water-scape' with you – for those big issues that you can't address alone. The big issue for this catchment was alien invasive [plants], and we realised that this was an area where farmers needed to act together."

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Lani van Vuuren

Barley is South Africa's second most important grain after wheat, with 85 000 ha planted and an annual production of about 300 000 tons.



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Hops is grown commercially at only a few farms in South Africa.



Barley being harvested in the Western Cape

"In addition, we discovered during the water risk assessment that there was a low level of measurement of water use – not just on the hop farms but throughout the catchment – so we've tried to support farmers in increasing their level of monitoring. We've installed data loggers in about 12 boreholes to help them to start monitoring their groundwater resources, and that's going to be an important baseline, especially once pumping starts from the Blossoms Wellfield at Oudtshoorn. We've also done evaluations on farms to help them see where they can operate more efficiently, in terms of both their own irrigation systems and the shared irrigation scheme."

While the hops sector may be locally important in George, the area cultivated is less than 500 ha in total, and the annual crop amounts to less than a thousand tons. By contrast, barley is South Africa's second most important grain after wheat, with 85 000 ha planted and an annual production of about 300 000 tons. Barley is as fundamental to beer as grapes are to wine, both providing the source of fermentable sugars needed by yeast to create alcohol, although barley must first undergo a process known as malting, which allows the grain to partially germinate.

SA Breweries helped to establish the local barley industry in the 1970s and is to this day the only major buyer of the crop. Initially, cultivation was limited to dryland farming in the Overberg area of the south-western Cape, and the bulk of production still occurs there in three nodes surrounding Caledon, Bredasdorp and Swellendam. Since 1994 a second production area has been developed in the irrigation areas around Vaalharts, Barkly West and Douglas in the Northern Cape, as well as Taung in the North West Province, where SA Breweries initiated a project to create a sustainable source of income for smallholder farmers. Harvested crops are delivered to the closest of two malting plants, located in Caledon and Alrode, Gauteng.

Clearly, barley-farming makes up the largest share of SA Breweries' water footprint, so improving water efficiency and encouraging stewardship is a major part of another programme run in partnership with WWF. Called 'Better Barley, Better Beer' (BBBB), the programme is essentially a voluntary framework based on a guideline document, which was adapted from the GreenChoice Living Farms Reference published by WWF-SA, Conservation International and the GreenChoice Alliance in 2009. The guideline outlines

criteria and indicators for sustainable farming practices in terms of economic, social and environmental principles, and includes a checklist that allows farmers to self-audit their performance.

The programme has been piloted since mid-2014, with 15 barley farmers in the dryland areas and 11 in the irrigation areas. Jan Coetzee was appointed as the BBBB extension officer, based at SAB Maltings in Caledon.

"I go out and visit the farmers, give them alternatives, we focus on certain risks and fix that first," he says. "One aspect we're really working hard on at the moment is chemicals management, so we're doing practical things like ensuring safe disposal of used pesticide containers, fixing up chemical storerooms, upgrading wash bays, and investigating recycling options for wastewater. We're also going to be sampling farm dams and streams that might be polluted by runoff."

"There's a huge focus on wetland and watercourse protection – educating the farmers about the value of buffer zones – plus we're helping with alien-clearing in the catchments and along the rivers. We're trying to combine that with minimum tillage to make it a holistic water management scenario."

Most of the dryland farmers have adopted minimum tillage techniques, where seed is planted in the stubble of the previous crop. Apart from being cheaper than ploughing, which over time degrades soil structure and organic content, the stubble provides a protective mulch that reduces runoff, erosion and evaporation.

Up north, the focus is on optimising irrigation processes, and considerable water savings are being achieved through the Precision Irrigation of Barley Project. Based largely on research conducted by SAB agriculturist, Frikkie Lubbe, for his PhD at the University of the Free State, it includes an irrigation-scheduling computer programme and a crop factor, which identifies the proportion of evaporation that must



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Barley under irrigation in Taung.

be replaced with irrigation for a crop to produce a commercial yield.

“Of course, by irrigating more efficiently the farmers are also reducing their electricity usage, which is a major input cost,” says Coetzee.

More recently, the BBBB guideline document has been translated into Tswana and the programme is being rolled out to about 100 small-scale and emerging farmers in Taung, but Coetzee notes that the focus there is primarily on social aspects, using a ‘from the farm to the house’ approach.

“Not a lot of the money earned from farming is benefiting the household, so that’s something we’re trying to address. For example, there’s huge potential for other business avenues that the women could get involved with,” he says. “On the water side, the main concern is the quality of water, but the farmers have

recognised its importance and are starting to manage that.”

In mid-November, news broke that SABMiller had formally agreed to a \$108 billion buy-out by Anheuser-Busch InBev. The deal still needs to get regulatory approval around the world, from countries such as the United States, South Africa, China, Colombia, Australia and India, as well as the European Union, which is expected to take about a year.

Fortunately, if this succeeds it is highly unlikely that SABMiller’s water wise initiatives would go down the drain, because AB InBev has its own very successful water management programme. All its breweries and manufacturing facilities throughout the world are subject to annually updated water risk assessments, an irrigation scheduler system called AgriMet has recently been piloted with 25 barley-growers in Idaho,

conservation agriculture practices are being promoted in Mexico, and some 2000 growers worldwide are participating in a benchmarking process called SmartBarley. This is an online and interactive dashboard that allows growers to anonymously compare their crop practices and outcomes against other growers through more than 40 performance metrics, ranging from yield to irrigation productivity.

According to AB InBev’s website, “SmartBarley is playing an important role in helping us achieve our water-management goals by identifying opportunities to improve resource management, reduce water risks, increase efficiency and water productivity, and measure the success of soil and irrigation management pilot initiatives.”

We can all raise our glasses to that!