environment victoria

fact sheet

Save water: Change what you eat

A fact sheet on embodied water

What is embodied water?

Each year, the average Australian uses about 120,000 litres of water for things like showering, washing, cooking and drinking.[1] It might sound like a lot but that's just the start — we use much more than that indirectly, through the food we eat.

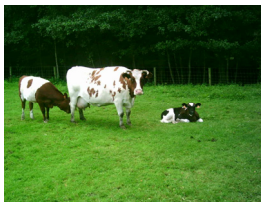
That's because huge amounts of water go into growing food. Producing a kilogram of beef doesn't just require water to process and package the meat, it also requires water for the cow to drink as it grows, and, even more importantly, water to grow the grass, grain and the pellets the cow eats. When all of this is added together, producing one kilogram of Australian beef can require 17,000 litres of water.[2]

The amount of water which goes into making something is known as embodied water, although it also goes by a whole lot of other names – embedded water, virtual water, hidden water and the water footprint. Embodied water isn't just for food – just about everything we purchase uses water in its production. But it's particularly important for food, because about three quarters of Victoria's water use is for irrigation[3], and irrigation is mostly used for food production[4].

One study in Melbourne found that for every litre of water consumed directly in the household, about nine more litres are consumed indirectly through embodied water in food.[5] In other words, what you eat has a huge effect on the amount of water you consume. On top of that, Australia is a major exporter of embodied water, in the foods we export, despite being the driest inhabited continent in the world.

How much embodied water is in different foods?

Figures on embodied water vary a lot (see the box on the next page for more). However as a rough indication:



1 serve of lettuce (approx. 1 cup) – 11 litres
1 serve of white bread (1 slice) – 40 litres
1 serve of broccoli (77g) – 41 litres
1 serve of white rice (280g) – 95 litres
1 serve of tofu (approx. 1/2 cup) – 229 litres
1 egg (60g) – 241 litres
1 serve chicken (230g) – 1250 litres
1 serve of steak (230g) – 4660 litres[6]

So what do I do?

First of all, we as a nation need to shift away from old ways of doing agriculture, which are heavily dependent on sucking water out of our rivers for irrigation. We need to develop new technologies in agriculture based on natural systems that are adapted to low water, nutrient and energy inputs. That would be technology we could be proud to export.

Next, we as individuals need to take embodied water into account when we go shopping for food. It's not the only factor to take into account – organic, locally grown beef might well be more sustainable than highly packaged, genetically modified tofu produced on the other side of the world. For food with a low environmental impact, consider things like its embodied water content, where it was produced, whether it is in season, whether it is organic, whether its genetically modified and how much packaging it has. There are no clear right and wrong answers. However asking yourself these questions when you shop, and reducing your consumption of beef and dairy products, should significantly reduce your environmental footprint. Try not having meat in every evening meal, or having it as a side serve instead of the main part of the meal. Think of all those great meatless pastas out there!

Reducing your beef and dairy consumption will save thousands, if not hundreds of thousands of litres of water every year. You can't assume that water you save will automatically end up back in our river systems, but you can be part of the shift towards more sustainable agriculture and more sustainable lifestyles in Australia.

1. Australian Conservation Foundation, The University of Sydney, New South Wales Environmental Trust, 2007, *Consuming Australia: Main Findings*, Australian Conservation Foundation, Melbourne
2. Hoekstra, A. and A. Chapagain, 2006, "Water footprints of nations: Water use by people as a function of their consumption pattern", *Water Resources Management*, vol. 21, no. 1, p.35-48
3. The Victorian Government Department of Sustainability and Environment, 2008, *Victorian Water Accounts 2006-2007: A Statement of Victorian Water Resources*, Victorian Government, Melbourne, p. 35
4. Australian Bureau of Statistics, 2008, *Water Use on Australian Farms, 2006-07*, Australian Government, Canberra
5. Rutherfurd, I., Tsang, A. and Tan, S. K., 2007, "City people eat rivers: estimating the virtual water consumed by people in a large Australian city", in Wilson, A.L., Dehaan, R.L., Watts, R.J., Page, K.J., Bowmer, K.H., & Curtis, A., 2007, *Proceedings of the 5th Australian Stream Management Conference: Australian rivers — making a difference*, Charles Sturt University, Thurgoona
6. Kreith, M. and Davis, C.A., 1991, *Water Inputs in California Food Production*, Water Education Foundation, Sacramento.

Warning: Slippery figures

Embodied water figures are slippery things, because different researchers calculate them in different ways. For example, some calculations include the rain water that goes into making something and others just include the irrigation water. This makes for different figures, and different implications – growing irrigated crops in Victoria means building dams and taking more water out of our rivers, whereas growing crops from rain has less impact on our waterways. In other parts of the world irrigation can be more sustainable, but diverting water from rivers always has an impact on their health.

Embodied water figures are also complicated by the fact that how much embodied water is in a product will depend on where it was grown and how. When you take just the irrigation water into account, there is half as much embodied water in milk from East Gippsland as there is in milk from the northern Victoria irrigation region. (This is because it rains more in East Gippsland and farmers have less need for irrigation.)

When looking at how food is grown, it's also important to look at the whole picture. Most Australian beef is grown on rangelands, where the cows live off rain-fed vegetation, so have a minimal impact on our waterway. However beef cattle tend to be taken to feedlots to be fattened up before being slaughtered, and the feedlot food is often grown using irrigation water.

Finally, it's worth looking at what an embodied water figure is for. If you're comparing embodied water per kilo of coffee with embodied water per kilo of milk, you need to remember that there are many, many serves of coffee in a kilo, and only a few serves of milk. If you're comparing how much embodied water there is in one dollar's worth of something, you need to remember that one dollar worth of milk is a much larger volume of milk than one dollar worth of beef.

There are few straight forward answers but plenty of food for thought.