2018/06: Should Australia ban the sale and production of bottled water?

What they said...
'We're lucky enough in Australia, to live in a country where we have an effective and efficient government, that is obligated to provide us with safe water. Water is a common resource, it should not be commodified'
Professor Gay Hawkins, Western Sydney University Social and Cultural Theory Department

'Any comparison of bottled water to tap water is absurd. Bottled water doesn't compete with tap water and has never claimed to. Bottled water competes with every other beverage it shares shelf space with... People willingly pay for the convenience of a zero kilojoule hydration option when they're out and about'
The Australian Bottled Water Institute, representing Australia's water bottlers

The issue at a glance
In March, 2018, a study was released revealing plastics contamination in the vast majority of bottled water brands tested.
The research was conducted on behalf of Orb Media, a United States-based non-profit journalism organisation. Professor Sherri Mason, a microplastics researcher, who carried out the laboratory work at the State University of New York, tested 259 bottles of water purchased in nine countries.
The 11 brands tested include the world's dominant suppliers - Nestle Pure Life, Aquafina, Dasani, Evian, San Pellegrino and Gerolsteiner - as well as major national brands across Asia, Africa, Europe and the Americas. Researchers found 93 per cent of all bottles tested contained some sort of microplastic, including polypropylene, polystyrene, nylon and polyethylene terephthalate (PET).
In May, 2018, a bottled water contractor lodged a development application with the Gold Coast City Council to extract underground water, less than 700m from the world heritage-listed Springbrook National Park.
This application has met with local opposition as have numbers of other similar contracts around Australia allowing water bottlers to extract water which communities believe is needed to maintain the environment and for agriculture.
In July 2009, the town of Bundanoon, located in the southern highlands of New South Wales, became the first community in Australia and the world to ban the sale of plastic water bottles.
A range of pressure groups are pushing for similar bans. However, bottled water manufacturers and others maintain that such bans are unnecessary and that the problem has been over-stated.

Background
A Brief History of Bottled Water

1622
Water is first bottled for sale in the United Kingdom's Holy Well bottling plant. The practice grows popular with the bottling of mineral spring water across Europe and the U.S. in the 1700s, since the natural springs are believed to have healing and therapeutic effects. For this reason, bottled water is often sold as a medicinal remedy in pharmacies until the 1900s.

1783
In an effort to mimic the fizziness of mineral water, Johann Jacob Schweppe manufactures carbonated water in Geneva, Switzerland, founding the eponymous Schweppes Company.

1809
Carbonated water starts its boom in the U.S. after Joseph Hawkins receives a patent to produce "imitation mineral water." Soon after, production booms, thanks to advances in bottling speed and decreases in glass costs. This, coupled with the public's fear of cholera and typhoid, leads to millions of bottles being sold annually in the U.S. by the mid-1800s.

1905
An English doctor ends the waterborne typhoid epidemic with chlorination, which uses chlorine to kill dangerous bacteria. The process is soon introduced in other countries as well. The demand for purified bottled water wanes.

1973
Polyethylene terephthalate (PET) bottles are patented. They are the first plastic bottles that can contain the pressure of carbonation, thus creating a much cheaper alternative to bottling than was possible with glass.

1977 to 1981
Perrier positions itself as 'Earth's First Soft Drink' with a series of print and television ads, benchmarking the moment when bottled water begins its commercial dominance (although the initial boom is just for sparkling mineral water - not flat water).

Early 2000s
The tap vs. bottled war is fully engaged, with beverage companies playing to consumers' fears of illness and contamination from tap sources. One major player in the assault on tap water is Brita filters, with ads that say 'Tap and toilet water come from the same source. Don't you deserve better?'

2012
United States annual consumption reaches 9.67 billion gallons - that's an average of 30.8 gallons per person. Residents of Louisiana, Texas, and Arizona consume the most, but as a whole Americans are drinking more bottled water and less tap water (36 gallons fewer than in 1980), fuelling domestic bottled water sales of $11.8 billion.

Internet information
On March 27, 2018, The Border Mail published a news report titled 'Water proposal buried after Indigo councillors vote to stop Stanley groundwater being bottled'
The report details local opposition to a proposal to harvest water for bottling in the area.
The full text can be accessed at

On March 24, 2018, The New Daily published a report titled 'Fears of contaminated bottled water spark global investigation'
The article treats the results of a recent survey which found plastics contamination in major brands of bottled water sampled worldwide.
The full text can be accessed at

On March 23, 2018, Orb Media Network released a worldwide study it has commissioned which showed plastics pollution in the vast majority of bottled waters it had had tested.
The full report can be accessed at

On March 21, 2018, consumer advice magazine Choice published an analysis titled 'Is bottled water safer than tap?'
The analysis concluded there were no health benefits from drinking bottled water and that the

product was far more expensive than that supplied by municipalities.
The full text can be accessed at Australians opt for bottled water

On August 17, 2017, The Washington Post reported on the Trump administration's decision to overturn a ban previously placed on bottled water being sold un United States National Parks.
The full text can be accessed at

On June 28, 2017, The Guardian published a report titled 'A million bottles a minute: world's plastic binge as dangerous "as dangerous as climate change"'. The article details the extent of plastics pollution and the impact it is having on the environment.
The full text can be accessed at

On March 27, 2017, ABC News carried a report titled ' World Science Festival: Why do people buy bottled water when it's free from a tap?'
The report details the apparently needless quality of bottled water consumption when Australia has good quality water supplied on tap and outlines some of the negative environmental consequences.
The full report can be accessed at

On February 27, 2017, ABC News published a Science report titled 'Plastic and how it affects our oceans'
The report treats the extent of plastics pollution and the harm it causes.
The full text can be accessed at

On January 31, 2017 the UAE publication, The National, published an analysis by Jonathan Gornall titled 'Global environmental impact of bottled water is "enormous"'
The report details the extent and negative impacts of world-wide plastics pollution attributable to bottled water.
The full text can be accessed at

The April/May 2016 edition of Food Safety Magazine published an article titled 'Polyethylene Terephthalate: The Safety of Bottled Water'
The article defends bottled water against a number of the charges commonly made against it.
The full text can be accessed at

On April 20, 2016, the environmental lobby group Sustainable Table published an opinion and analysis titled 'Bottled water makes as much sense as Donald Trump being President'.
The article treats in detail the cost and environmental impact of bottled water consumption.
The full text can be accessed at

On December 3, 2015, ZipWater.com published an article explaining the benefits of bottled water for hydration when compared to sports drinks.
The full text can be accessed at

On April 2, 2014, the environmental group Eco Watch published an analysis titled '22 Facts about Plastics Pollution (and 10 Things We Can Do About It)'
The analysis looks at the harms caused by plastics pollution and suggests some actions that might be taken.
The full text can be accessed at

On October 30, 2013, National Public Radio published an analysis titled 'How Much Water Actually Goes Into Making A Bottle Of Water?' which examined the water costs associated with producing a bottle of water.

The full text can be accessed at

On July 29, 2013, The Huffington Post published an analysis and comment titled ' Plastic Water Bottles Causing Flood of Harm to Our Environment'
The article details some of the large-scale environmental damage attributable to plastic water bottles.
The full text can be accessed at

On March 18, 2009, Live Science published a report titled 'The Energy Footprint of Bottled Water' which examines the resource costs associated with bottled water.
The full text can be accessed at

On July 31, 2007, The Economist published an article outlining the convenience advantages that prompted consumers to purchase bottled water.
The full text can be accessed at

Sydney Water has prepared a fact sheet outlining the benefits of piped water relative to that supplied through purchasing bottled water.
The full text can be accessed at

The British Plastics Federation has released an information sheet titled PET Plastic Bottles - Facts Not Myths which outlines the advantages of this form of plastic and seeks to address some of the misconceptions about it.
The full text can be accessed at

The education Internet site produced by CoolAustralia.org outlines a range of arguments as to why bottled water is unnecessary, expensive and environmental harmful. It links to many other sources students can access to extend their understanding of this issue.
The site can be accessed at

Greenpeace has a campaign to reduce plastics pollution in the world's oceans titled 'The Trash Vortex' The environmental groups site details some of the harms caused by this pollution.
The site can be accessed at

The International Bottled Water Association has detailed the economic advantages that the bottled water industry brings to the United States.
The full text of the article can be accessed at

The Australian Beverages Council has brought out a publication detailing the economic advantages the beverages industry, including bottled water production, brings to the Australian economy.
The full text can be accessed at

Arguments in favour of banning the sale of bottled water
1. The product is unnecessary and expensive
Critics argue that purchasing bottled water is unnecessary in developed countries, where bottled water is most commonly sold. They claim that consumers are purchasing the image associated with bottled water and that they are doing so at considerable expense.
In an article published in Choice on March 21, 2018, Kate Browne noted perplexedly, 'Bottled water is a product people are happy to pay top dollar for - despite most Australians having access to safe drinking tap water at a fraction of the price.'
Browne went on to argue that consumers appear to be responding to positive images of the product created through marketing. She stated, '(Consumers) found the imagery of clean and

natural sources displayed on the bottled water packaging ...reassuring.'
A Fairfax Media survey of bottled water sold in Sydney's cafes, supermarkets and convenience stores in July, 2016, has found seven out of 34 brands are 'purified' tap water. The average price of bottled tap water is $2.75 per litre. The average price of spring and mineral water is $5.18
Donna Lewis, acting engagement, education and partnerships manager at Sydney Water has observed, 'Our research found that the perception of water quality is the primary driver for choosing bottled water over tap. The reasons for this association are numerous, but much of it comes down to clever marketing campaigns by bottled water distributors.
By telling consumers the safest drinking water comes from a bottle, beverage companies indirectly imply that tap water is unsafe and can't be trusted. '
The Fairfax Media survey found a third of the bottles were tinted blue, which strengthens the image of purity. Some have opted to use see-through labels, such as Capi, Fiji and the new-look Evian, which desires to ''showcase the purity of the contents''.
Gary Mortimer, marketing expert at Queensland University of Technology, said manufacturers use labels, colours and design to appeal to different market segments. Mortimer further stated, 'Marketers can't claim bottled water is better for you than tap water, so they use things like ''fresh'', ''natural'' or use images like snow-cap mountains to lead us to believe that.'
Extensive studies have demonstrated that in most countries tap water is at least as safe as that purchased in a bottle. The Australian Drinking Water Guidelines specify that tap water 'should contain no harmful concentrations of chemicals or pathogenic micro-organisms, and ideally it should be aesthetically pleasing in regard to appearance, taste and odour. Water authorities use filtering, settling, coagulation and disinfecting to ensure the safety of drinking water. They also use sufficient disinfectant to stop the re-growth of microorganisms as the water travels through the pipe system to the tap. Additionally, water utilities monitor the water quality 24 hours a day, seven days a week, and conduct thousands of tests each year to ensure quality and safety.
CoolAustralia.org has highlighted the cost to Australian consumers of purchasing a product they can acquire for virtually nothing from a tap. The organisation's website asks, 'Put your hand up if you are happy to pay more than 1,000 times over the cost for anything. No hands showing? Now put your hand up if you would buy a bottle of something down at the shops for $3.50 that you can get for free with no effort. No hands showing? Well our hands should be up - this is what millions of us do every day.'
Responding further to the question it has asked, CoolAustralia.org states, 'Australians purchased over 726 million litres of water in 2015. The average cost of the most popular bottled water in Australia is $2.75 per litre. Therefore Australians may have spent up to $2 billion dollars on bottled water in 2015.' Those who believe bottled water is in no way superior to tap water argue that purchasing bottled water is simply a waste of money.

2. Bottled water contributes to pollution
Plastic bottles add to physical pollution on land and in rivers and oceans as a result of the dumping of the plastic bottles which contained the product.
It has been estimated that more than half a trillion plastic bottles will be sold annually by the end of the decade. The demand, equivalent to about 20,000 bottles being bought every second, is driven by an apparently constant demand for bottled water and the spread of a western, urbanised culture to China and the Asia Pacific region.
More than 480bn plastic drinking bottles were sold in 2016 across the world, up from about 300bn a decade ago. If placed end to end, they would extend more than halfway to the sun. By 2021 it is estimated this will increase to 583.3bn.
Water bottles are predominantly made of polyethylene terephthalate (PET) plastics. PETs do not biodegrade, rather they photo degrade, which means they break down into smaller fragments over time. Those fragments absorb toxins that pollute waterways, contaminate soil, and can sicken animals, including those that form part of the human food chain. Plastic rubbish also absorbs organic pollutants like BPA and PCBs. These contaminant may take centuries to decompose while sitting in landfills.

According to the Ocean Conservatory, plastic bottles and plastic bags are the most prevalent form of pollution found on our beaches and in our oceans. Worldwide, round 100 million tonnes of plastic are produced each year, of which about 10 million tonnes ends in the sea.
At sea and on shore under the influence of sunlight, wave action and mechanical abrasion these larger items slowly break up into very much smaller pieces called micro plastics. Thus bottles degrade from being a floating bottle to tiny plastic particles that are easily eaten by fish and other marine species or simply spread even further afield. It has been estimated that a single one-litre bottle could break down into enough small fragments to reach beaches across the globe.
An analysis of waters around Australia found on average there were around 4,000 micro plastic fragments per square kilometre, although some hotspots had concentrations of around 15,000 to 23,000. The vast majority of the micro plastic fragments came from plastic packaging such as cups, bottles, bags, as well as fragments of fishing gear.
This plastic pollution has a major impact on marine life. It is estimated around 90 per cent of seabirds are ingesting plastics. These plastics can cause blockages of the gut or perforation of the intestines. Ingestion of plastic can also cause toxic chemicals such as phthalate (a plasticiser that effects the hormone system) to leach into the animal.
44 percent of all seabird species, 22 percent of cetaceans, all sea turtle species and a growing list of fish species have been documented with plastic in or around their bodies. It is estimated that some one million sea birds and 100,000 marine mammals are killed annually from plastic in our oceans.
Scientists at Ghent University in Belgium recently calculated people who eat seafood ingest up to 11,000 tiny pieces of plastic every year. In August 2016, the results of a study by Plymouth University reported plastic was found in a third of United Kingdom-caught fish, including cod, haddock, mackerel and shellfish. Last year, the European Food Safety Authority called for urgent research, citing increasing concern for human health and food safety 'given the potential for micro plastic pollution in edible tissues of commercial fish'.

3. Manufacturing the bottles is a waste of resources
Opponents of bottled water note that the product is wasteful of resources. The plastic bottles, primarily made of polyethylene terephthalate (PET) plastics, are made from a hydrocarbon extracted from crude oil. A study published in Environmental Research Letters found that an estimated total of between 32 million to 54 million barrels of oil was required to generate the energy to produce the amount of bottled water consumed in the United States in 2007.
The energy use breaks down into roughly four parts of the production cycle: that used to make the plastic and turn it into bottles, to treat the water, to fill and cap the bottles, and finally to transport them.
A recent study conducted by the Pacific Institute determined that about one million tons of polyethylene terephthalate PET were used to make plastic bottles in the United States in 2007, with three million tons used globally; the energy used to produce that global amount of PET and the bottles it was turned into was equivalent to about 50 billion barrels of oil. This is the largest single component in the energy cost of bottled water production; however, every stage in the process contributes further to the cist.
The Pacific Institute concluded that the amount of energy required to produce, bottle and distribute bottled water is 2,000 times more than is required to make tap water.
A further indication of the waste of resources represented by bottled water is that it takes more water to produce a bottle of water than the bottle itself contains.
The International Bottled Water Association recently conducted an investigation into the amount of water it requires to produce a bottle of water. The results, released in October, 2013, found that for North American companies, it takes 1.39 litres to make one litre of water.
Critics claim that even this is a very conservative estimate as it refers only to the amount of water involved in packaging the water, it does not factor in the water cost associated with bottle manufacture or product transportation.

Italian studies have found that More than six litres are required to produce and cool 1.5 litres of bottled water.

4. The quality of bottled water may be suspect

Critics of bottled water argue that the product may not have the health benefits supporters claim for it. Instead, opponents suggest, water in plastic bottles may be damagingly contaminated. Recent United States studies have found that more than 90 per cent of bottled water products tested contain micro plastics (minuscule pieces of plastic). Micro plastic concentrations in one bottle of Nestl Pure Life were found to be as high as 10,000 plastic pieces per litre of water. The new evidence of plastic contamination in bottled water has led to an investigation by the World Health Organisation into the potential health risks to consumers.

A study by the State University of New York in Fredonia has suggested that those drinking a bottle of water every day could be consuming about 56,875 pieces of micro plastic in a year from that source alone.

The samples analysed were from 250 bottles of water produced in Brazil, China, India, Indonesia, Kenya, Lebanon, Mexico, Thailand and the United States and were contaminated with plastic including polypropylene, nylon, and polyethylene terephthalate (PET). The research found that the micro plastic in the water was coming from processes to do with bottling or from the cap itself.

Although the adverse effect of micro plastics on human beings is unknown, there have been ill effects observed in some other animal species. Jane Williamson, deputy director of Macquarie University's Marine Research Centre, has stated, 'Based on a study we did assessing plastic ingestion with a small animal called a beach hopper, we know that micro plastics can accumulate within the body. In beach hoppers this caused weight gain, reduced performance, and even death.'

Testing by the US-based Environmental Working Group (EWG) in 2008 revealed that every bottled water brand analysed contained at least eight different pollutants, including heavy metals, radioactive isotopes, caffeine, chlorine, pharmaceuticals, fertilizers, disinfection by-products, solvents, plasticizers and propellants. Researchers at the University of Missouri testing the water quality of commercial bottled waters found that one brand triggered a 78 per cent increase in the growth of breast cancer cells compared to the control samples used. Chemical contamination from the bottles is believed to be the culprit. The plastic used in single-use bottles (polyethylene terephthalate - PET or PETE) poses a cancer threat. If reused, these bottles can also leach chemicals such as DEHA and benzyl butyl phthalate (BBP), another potential endocrine disruptor implicated as a carcinogen.

It has further been noted that the quality control applied to water before it is bottled is less rigorous than that applied to tap water. Professor Stuart Khan, associate professor of Civil and Environmental Engineering at the University of New South Wales, has noted that tap water and bottled water are regulated differently. Tap water needs to meet much more stringent quality criteria and is monitored far more carefully than bottled water. Those bottling water have far less control over potential contaminants entering the water from the collection hinterland than do the authorities responsible for dams and reservoirs.

Dr Peter Cox, principal advisor on public health at Sydney Water, has observed that even with the cleanest water out of a spring, microorganisms will change the water quality. Professor Cox has stated, 'People like to believe bottled water is pure, straight from nature, with no human intervention, but it has to be treated.'

5. Harvesting spring water harms rural environments

There have been several disputes in regional Victoria surrounding water bottling companies harvesting underground water by contracting with local farmers who sell the bore water as part of their irrigation allocation.

Other farmers in these districts have complained that the permanent removal of this bottled water takes it from the watertable and potentially levels the region more exposed in times of

drought.
Indigo shire Mayor, Jenny O'Connor, whose council has recently blocked an application from a bottled water business to extract groundwater has stated, 'This is a finite, precious resource... As a councillor, I feel I need to take a stand on an issue of great concern to the community.'
Councillor Bernard Gaffney introduced the motion to block the proposed bore because he said it was on prime farming land, in a catchment supplying Beechworth and Yackandandah with water that could potentially run dry in a drought.
Stanley Regional Community Incorporated's legal moves began in 2014 when members voted to join Indigo Shire at the Victorian Civil and Administrative Tribunal to defend the council's rejection of Stanley Pastoral's planning application to collect, store and transport water from a small farm south of Stanley.
The local group has called on the Victorian Parliament to change the Water Act to ensure 'transparent community and environmental interest tests are considered during the regulatory process for the sale of groundwater'. They want the Water Act change to prioritise the use of water for agricultural purposes and to prevent water being permanently taken out of the area for bottling.
A spokesperson stated, 'It is the Act - and therefore parliament - which continues to fail farm-rich communities like ours, which depend on reliable groundwater supply to maintain our natural environment and way of life.'
Similar complaints have been made in Queensland where Coca-Cola has a lease to extract water from groundwater at Springbrook. Under the terms of the agreement, Coca-Cola are restricted to operating from 8.30am-5pm six days a week and can take two tanker loads each day - but there is no limit on how much water they are allowed to take per visit.
Local resident Ceris Ash stated, 'They are threatening the world heritage values of Springbrook National Park.
They are taking their water out of the ground, but that all still feeds into the creeks and streams that go through the national park and down to the coast. We have an incredibly sensitive ecosystem here with rare animals and trees found nowhere else on the planet.'

Arguments against banning bottled water
1. The product is convenient
One of the primary arguments offered in favour of bottled water is its convenience. An article published in The Economist of July 31, 2007, attempting to explaining the remarkable market success of bottled water, noted, 'Bottled water's success is about time and energy savings for consumers. Buying bottled water means not having to purchase and fill one's own container. The ability to purchase water readily means that consumers can obtain water when they want it, rather than carrying around a bulky container all day. And when one's thirst is slaked, disposal is just a trash can away; there's no need to bring the bottle home and wash it oneself.'
Arches Magazine published by Mount Mary University carried an article on November 7, 2011, which stressed the same priority. It noted, 'In today's throwaway society, convenience, rather than price, is key. Faucets aren't portable. Buying a bottle of water at the store is faster than washing, refilling and remembering to bring your own. Name brands are slowly creating a social status with every sip. And that is how a commodity was created. Despite environmental impact, the convenience and usefulness of water helped turn it into the valuable product on store shelves today.'
Other studies have revealed the same purchasing motivation in consumers of bottled water. In a study published in the free access journal of BMC (Biomed Central) Public Health in 2008, survey participants from the Munrow Sports Centre on the University of Birmingham Campus gave their reasons for buying bottled water. The most commonly given reason was convenience. Many participants said they drank tap water at home, but purchased bottled water when they were out and about.
An additional convenience factor for water in plastic bottles is its relative safety compared to glass in bottles. Broken remnants are the cause of thousands of serious injuries each year in

the United States, especially in poorer neighbourhoods, which is claimed to be the main reason they were largely replaced by plastic in the first place. mothers in particular were concerned that their children be able to carry water safely.
It has further been claimed that price comparisons with tap water are inappropriate. Consumers are buying the convenience of a portable, ready-bottled beverage and bottled water is cheaper than all other products in this category. The Australian Bottled Water Institute, representing Australia's water bottlers, has stated, 'Any comparison of bottled water to tap water is absurd. Bottled water doesn't compete with tap water and has never claimed to. Bottled water competes with every other beverage it shares shelf space with whether that be in a vending machine, supermarket isle or shop fridge. People willingly pay for the convenience of a zero kilojoule hydration option when they're out and about.'

2. The product promotes good hydration
The importance of maintaining hydration is one of the reasons consumers purchase bottled water.
It has been estimated that 75% of Americans are chronically dehydrated and that this applies to half the world's population. Specialists note that the condition has become so normative that in 37% of Americans, the thirst mechanism is so weak that it is mistaken for hunger.
Regular dehydration is a concern because drinking fluids is crucial to staying healthy and maintaining the function of every system in the human body, including heart, brain, and muscles. Fluids carry nutrients to cells, flush bacteria from the bladder, and prevent constipation. Under most circumstances unadulterated water is the recommended fluid to keep people hydrated.
Dr. Julian Seifter, a kidney specialist and associate professor of medicine at Harvard Medical School, has recommended that to ward off dehydration, Dr. Seifter, healthy people should drink between one and one and a half litres daily. Dr Seifer recommends drinking water or juices and eating water-rich foods such as salads and fruit.
Dehydration occurs when more water is being lost by the body than is being put in. In urine and sweat, and through respiration, water is constantly being lost. Even during sleep water passes out of the body with every breath exhaled.
While mild dehydration is the loss of 1.5 percent of a body's normal water volume, a level of hydration just one percent below optimal can affect mood, make it more difficult to concentrate, and produce a headache. The human heart and brain consist of more water than the rest of the body and appropriate hydration is important for their proper functioning.
The human brain is made up of about 75 percent water. Even mild dehydration results in reduced blood flow, which means less oxygen travelling to all parts of the body, including the brain.
Headaches and mood swings are an early warning of dehydration. As dehydration worsens, cognitive function is further impaired, leading to delirium. Severe dehydration can cause unconsciousness and even coma, finally leading to death.
Water becomes particularly important during exercise when the body's water requirements increase. Water rather than sports beverages are recommended as the best form of hydration after exercise. Sports Dieticians of Australia advise that drinking plain water is effective in replacing fluids for low intensity and short duration workouts. All sports drinks contain three basic ingredients - water, sugar and salt.
While water is essential for rehydration, sugar and salt are not always the best choices. In fact, they often just add unnecessary kilojoules. Sports Dieticians of Australia advise that sports drinks are really only beneficial for people participating in long endurance events, such as marathons or triathlons.
Australia's current dietary guidelines do not recommend a specific amount of water, but simply recommend we 'drink plenty of water'. The guidelines also encourage us to opt for water over juices, soft drinks, or cordials. There are Nutrient Reference Values advising that adult men should drink 2.6 litres of water per day (about 10 cups) and adult women should drink 2.1 litres per day (about eight cups).

The Australian Beverages Council carries recommendations on its Internet site regarding how to avoid dehydration especially on hot days and while travelling. These recommendations include the consumption of bottled water.

3. The product is healthier than other packaged alternatives

Consumption of bottled water in the United States has now overtaken consumption of soft drinks (referred to in America as 'soda'.) In 2016, according to research and consulting firm Beverage Marketing Corp, bottled water surpassed carbonated soft drinks to become the largest beverage category by volume in the United States. Bottled-water consumption in the United States reached 39.3 gallons per capita in 2016, while carbonated soft drinks slipped to 38.5 gallons, Beverage Marketing Corp has announced

Health authorities have welcomed this development as other commercially available alternatives, such as soft drink and fruit juice, carry a large number of health risks.

All soft drinks, whether caffeine-free or not, diet or regular, are harmful to health. Their consumption increases by 44 percent the risk of metabolic syndrome, especially for children. This syndrome is a cluster of risk factors that lead to high blood pressure, obesity, diabetes, heart attack and stroke. And obesity, in turn, increases the risks for cancer and Alzheimer's.

Studies show that children who consume soft drink on a regular basis are much more likely to obese as adults. Similar results occur even when the soft drink is artificially sweetened. Regular and diet sodas contain phosphates that accelerate aging in the body. A research, looking at 5300 individuals between 20-65, showed that those who drank a glass or can of soft drink a day had a 1.9 year increase of aging. Further, regular consumption of soft drink results in a much higher risk of heart disease, kidney damage, tooth decay, diabetes, heart burn, hypertension, digestion problems, many cancers and hormone imbalance.

Similar claims are made about so-called health drinks and sweetened hydration beverages which all contain large quantities of sugar. Fruit juices have benefits in terms of the vitamins they contain; however, as concentrated fruit, they contain a large amount of sugar and thus calories be glass.

Health authorities note that attempting to meet the body's hydration needs with any beverage other than water is both inefficient any carries significant health risks.

It has been observed that when bottled water is removed from sale, all that occurs is that consumers drink more of the unhealthy options that remain available.

Research has shown that when bottled water is not available, people choose other packaged beverages, which may contain sugar, caffeine and other additives. A new study, published in the American Journal of Public Health in July 2015,5 concluded that the bottled water sales ban at the University of Vermont resulted in a significant increase (25%) in the consumption of sugary drinks and an increase (8.5%) in the amount of plastic bottles entering the waste stream.

The data showed that per capita shipments of bottles, calories, sugars and added sugars increased significantly when bottled water was removed. Shipments of healthy beverages declined significantly, whereas shipments of less-healthy beverages increased significantly. As bottled water sales dropped to zero, sales of sugar-free beverages and sugar-sweetened beverages increased.

The purpose of the bottled water sales ban had been to encourage students to carry reusable water bottles that could be filled with tap water. That did not happen.

4. The quality of the water can be assured

Many of the negative claims made about the quality of bottled water have been disputed.

One of these claims is that contaminants leach into the water from the bottle itself.

Defenders of the product note that single-serve bottled water containers are packaged in PET plastic. They maintain there are no chemical phthalates or bisphenol A (BPA) in PET plastic, and therefore PET plastic does not leach these substances.

PET plastic is approved as safe for food and beverage contact by the United States Federal Drug Administration(FDA) and similar regulatory agencies throughout the world, and has been

for more than 30 years.
PET plastic is used in a variety of packaging for many foods, including everything from peanut butter, soft drinks and juices to beer, wine and spirits. Although BPA is not a chemical component of PET, the consensus among international regulatory agencies is that BPA is safe, and regulatory agencies in several countries and the FDA have ruled favourably on the safety of BPA.
It has further been noted that single-serve PET plastic bottles do not contain compounds capable of producing dangerous substances under conditions of normal use, including being subjected to hot cars or placed in a freezer. The Johns Hopkins Bloomberg School of Public Health has commented on the issue of freezing bottled water. Its website states: 'This is an urban legend. Freezing actually works against the release of chemicals...[freezing] would limit chemical release if there were dioxins in plastic, and we don't think there are.'
The accusation that many bottled waters are merely tap water has been disputed. Defenders note that even when the bottled water has come from standard, municipal water supplies it is treated additionally to ensure water quality.
Many different types of water are used for bottling: artesian, mineral, sparkling, spring and purified. Purified water is typically sourced from municipal water systems and is not just tap water in a bottle. Once this water enters the bottled water plant, several processes are employed to ensure that it meets purified water standard. These treatments may include one or more of the following: reverse osmosis, distillation, microfiltration, carbon filtration, ozonation and ultraviolet (UV) light. The finished water product is then bottled under sanitary conditions and sold to the consumer. Many bottled water drinkers say they prefer a certain type of bottled water because of the taste. Bottled water brands are required to show on their labels what type of water is used.
In emergency situations bottled water takes on a particular importance. When the local water supply has been contaminated due to a natural disaster or perhaps human action, then the value of clean bottled water becomes apparent.
During and after an emergency, the regular water supply may be cut off or contaminated. In the 1998 water crisis, Sydney Water Corporation put all Sydney residents on a 'boil water' alert. The ready availability of bottled water would have reduced the impact of the event. Some authorities recommend consumers stockpile an adequate amount of bottled water in the event of such an emergency. Similarly, after a natural disaster that interferes with the water supply, rescue agencies often supply bottled water.

5. Bottled water benefits the economy
Bottled water is a multibillion dollar industry which promotes trade as well as supply jobs in extraction, production of bottles, packing, transportation, distribution and retailing.
The International Bottled Water Association claims the United States bottled water industry is a critical component of America's economy and infrastructure. Companies that manufacture, distribute and sell bottled water products employed about 137,000 Americans, paying them $US6.3 billion in wages and benefits.
The Association further claims that not only does the manufacture and sale of bottled water products create jobs in the United States., but it also contributes to the national economy as a whole via the industry's economic ripple effect that benefits agriculture, manufacturing, construction, transportation and many other businesses whose livelihood depends on the bottled water industry.
In 2013 the bottled water industry accounted for about $102.3 billion in output, or just below 1 percent of GDP. Members of the industry and their employees paid $9.7 billion in direct federal, state and local taxes. In addition, the consumption of bottled water beverages throughout the country generated $2.7 billion in state sales taxes.
In Australia, the most commonly consumed non-dairy, non-alcoholic beverage is water, followed by sugar-sweetened soft drinks, fruit juice and low-kilojoule sweetened beverages. Today, nearly one in every two (42%) water-based beverages sold is a low kilojoule variety.

The contribution made by the retailing of beverages - soft drinks, bottled water and fruit juices - is $1.04 billion from the grocery and convenience retailing industry. $452 million comes from cafes, bars and restaurants. This sector generates 16,116 full time jobs.
As an example of the contribution bottled water makes to local economies the Australian Beverages Council cites Tim Carey, Managing Director of Black Mount Spring Water. Carey states, 'Our company is located in regional Victoria in a town called Millbrook and supplies bulk spring water and transport to bottlers throughout Australia. It was founded by my father, Brian, 25 years ago. He still plays a part and today it remains a family owned business. We employ around 70 people throughout the business including administration, truck drivers and maintenance.'
Australian Beverages, a subsidiary of Coca a-Cola Amatil, are the manufacturers of Mount Franklin and Pump bottled water as well as four Coca-Cola products, Sprite, Fanta, Lift, Kirks, Deep Spring, Powerade, Barista Bros, Zico Coconut Water, Fuze Tea and Goulburn Valley juices .
The company outlines its contribution to the Australian economy on its Internet page. ' We directly employ approximately 3,500 people across Australia, predominantly in manufacturing, distribution and sales. Our major manufacturing sites are located at Northmead (NSW), Richlands (Qld), Moorabbin (Vic), Thebarton (SA) and Kewdale (WA).
We also create indirect employment through our Australian supply chain. For every direct Australian job that we create there are up to four jobs generated elsewhere in the Australian economy, in producing and distributing our non-alcohol beverages range. 99% of our non-alcohol beverages are made in Australia. In 2016 we spent $1.3 billion on Australian-supplied intermediate goods and services, and contributed approximately $3 billion to the Australian economy.'

Further implications

One of the most obvious impacts of water sold in plastic bottles is what happens after the water has been consumed.
Despite recycling infrastructure that exists in order to facilitate the recycling of these bottles, according to the Container Recycling Institute, 86% of plastic water bottles used in the United States become garbage that ends up in landfills throughout the country. Considering that approximately 60 million plastic water bottles are used every day in the United States, we can assume that nearly 18,834,000,000 end up in the landfill each year. Each bottle can take up to 700 years to decompose.
Even more concerning, those bottles that do not end in landfill find their way into the world's rivers and oceans. Around 8 million tonnes of plastic went into the ocean in 2010, according to the most comprehensive study of plastic pollution so far. The international study calculated that 192 nations produced a total of 275 million tonnes of plastic waste. The largest amount of this waste was produced by China, at 1.32 to 3.52 million tonnes. This was followed by Indonesia, the Philippines, Sri Lanka and Vietnam. Australia added up to 13,888 tonnes of plastic litter per year, a quarter of which finds its way into waterways, according to study co-author Dr Chris Wilcox of CSIRO's Oceans and Atmosphere Flagship. Not all this plastic waste comes from discarded water bottles, however, they are a significant component.
It seems unlikely that the negative environmental impacts of increasing bottled water consumption are going to be solved by a ban. Where bans have occurred at universities and similar closed sites consumers have simply reverted to bottled soft drinks or similar products which pose the same disposal problems.
Biodegradable plastic water bottles and shopping bags are also regarded as a false solution to the ubiquitous problem of litter in the oceans. Most plastic is extremely durable, leading to large plastic debris and 'micro plastics' to spread via currents to oceans from the Arctic to the Antarctic, a recent United Nations report has found.
Greener plastics that breakdown in the environment have been marketed as a sustainable alternative that could reduce the vast amount of plastic waste that ends up in the sea after being

dumped. However, Jacqueline McGlade, chief scientist at the United Nations Environment Programme, has stated that these biodegradable plastics were not a simple solution.
McGlade has noted, 'It's well-intentioned but wrong. A lot of plastics labelled biodegradable, like shopping bags, will only break down in temperatures of 50C and that is not the ocean. They are also not buoyant, so they're going to sink, so they're not going to be exposed to UV and break down.'
In the short term, effective waste collection and waste management systems must be put in place where they are needed most, in developing nations such as China, Indonesia and the Philippines where fast economic growth accompanied by increased waste is outpacing the capacity of infrastructure to manage this waste.
In the longer term, we must rethink how we use plastics with respect to function and desired lifetime of products. At the end of its life, discarded plastic should be considered a resource for capture and reuse, rather than simply a disposable convenience.