



# **WATER STRESS: A GLOBAL PROBLEM THAT'S GETTING WORSE**

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# ABSTRACT

Billions of people around the world lack adequate access to one of the essential elements of life: clean water. Although governments and aid groups have helped many living in water-stressed regions gain access in recent years, the problem is projected to get worse due to global warming and population growth. Meanwhile, a paucity of international coordination on water security has slowed the search for solutions.

# INTRODUCTION

Water stress can differ dramatically from one place to another, in some cases causing wide-reaching damage, including to public health, economic development, and global trade. It can also drive mass migrations and spark conflict. Now, pressure is mounting on countries to implement more sustainable and innovative practices and to improve international cooperation on water management.

## I. Water in Australia?

As the driest inhabited continent in the world, Australia has unique challenges and opportunities when it comes to water.

Water is one of our most important resources and we must make sure it is sustainable, reliable, and resilient to drought and a changing climate.



Australia has a strong record of water management and investment. This is supported by a national and collaborative approach through the National Water Grid Fund (NWGF).

Together with states and territory governments, we are working to ensure we have clean and reliable water for all Australians.

## Caring for the environment

The NWGF supports responsible investment decisions that promote nature positive outcomes, such as supporting biodiversity, helping to restore natural ecosystems and the development of sustainable construction that minimises negative impacts on the environment.

There are many innovations taking place across our range of projects which contribute to nature positive outcomes. These include:

- design elements that focus on carbon and energy savings
- reductions in extracted earth from construction sites
- reducing the amount of cement required for infrastructure projects
- innovations that will help wildlife safely navigate our water ways (e.g. fish ladders and turtle passages).

Our projects also help farmers access a more constant supply of water, which eases the pressure on our natural surface and ground water systems. This allows ecosystems that rely on these systems to flourish.

## Supporting regional Australia

Effective water infrastructure underpins the livelihoods of regional Australia and supports and sustains communities around the nation. It helps to grow the food, livestock and crops essential to our everyday living. It also generates jobs and injects billions of dollars into regions and the broader Australian economy each year.

The NWGF plays an important role in supporting regional Australia through funding projects to increase water security, improve water efficiency and help build greater long term resilience to droughts and water scarcity.

Through our Science Program and regional analysis work, we identify priority water resource areas and new and emerging technology to ensure water infrastructure investment decisions are based on the best available evidence, connect future water needs with future water availability, and drive long term benefits for local farmers and communities.

## Australia's water challenges

Australia's variable rainfall, streamflow and landscape conditions create water supply challenges. This, along with the demands of agriculture and growing urban populations, and climate change means we face frequent water challenges.

Drought, heat and increasing extreme weather events have an impact on all of us. These are felt hard by our regional and remote communities.

Setbacks to agricultural production due to water supply issues can affect many areas of a community and its economy.



There are First Nations and remote communities who still need access to clean and reliable drinking water. Ensuring these communities have access to essential water is a priority for the Australian Government.

## Water opportunities in Australia

There is no one-size-fits-all solution to increasing Australia's water security but there are opportunities to develop unique and more effective solutions for how water is managed and accessed in Australia.

Opportunities are presented through:

- natural means such as Australia's complex surface and groundwater resources
- investing in options to use the water we have more efficiently

- developing new local water supply sources – particularly those that rely less on rainfall, such as recycled water, desalinated water and greywater
- providing essential town water infrastructure to support to First Nations and remote communities to improve water quality and supply
- working with states and territories to deliver a national water infrastructure approach that recognises each region’s natural environment, climate, geography, and existing water infrastructure and source
- a sound Science Program to secure our water supply into the future and ensure investment decisions are evidence-based
- drawing on the knowledge of our First Nations communities to help inform our water projects.

## Water and cultural values

The cultural and spiritual values of water are important for First Nations culture and identity. Improved water security and reliability is also linked to First Nations water interests and has the potential to support First Nations economic development opportunities. First Nations land interests and associated First Nations water interests are an important consideration for water infrastructure opportunities in Australia.

## II. What is water stress?



According to the FAO, the gradually increasing trend in global water stress over the last twenty years reflects increasing stress in several areas of the world, with decreases in other areas of the planet that cannot compensate for the increases.

Water scarcity, both natural and of human origin, is the lack of sufficient available water resources to meet the demands within a region. Water is unequally distributed over time and space. Much of it is wasted, polluted and unsustainably managed.

There is no global water scarcity as such, but a number of places and regions are chronically short of water because its use at the global level has increased more than twice as fast as the population over the last century.

Pressure on water resources is increasing in several parts of the world, especially in China, India, Pakistan, in the Middle East and many countries and regions of Africa.

## 1 . Definition of water stress

We talk about water stress when water demand is higher than the amount available during a certain period of time, or when use is restricted because of low quality.

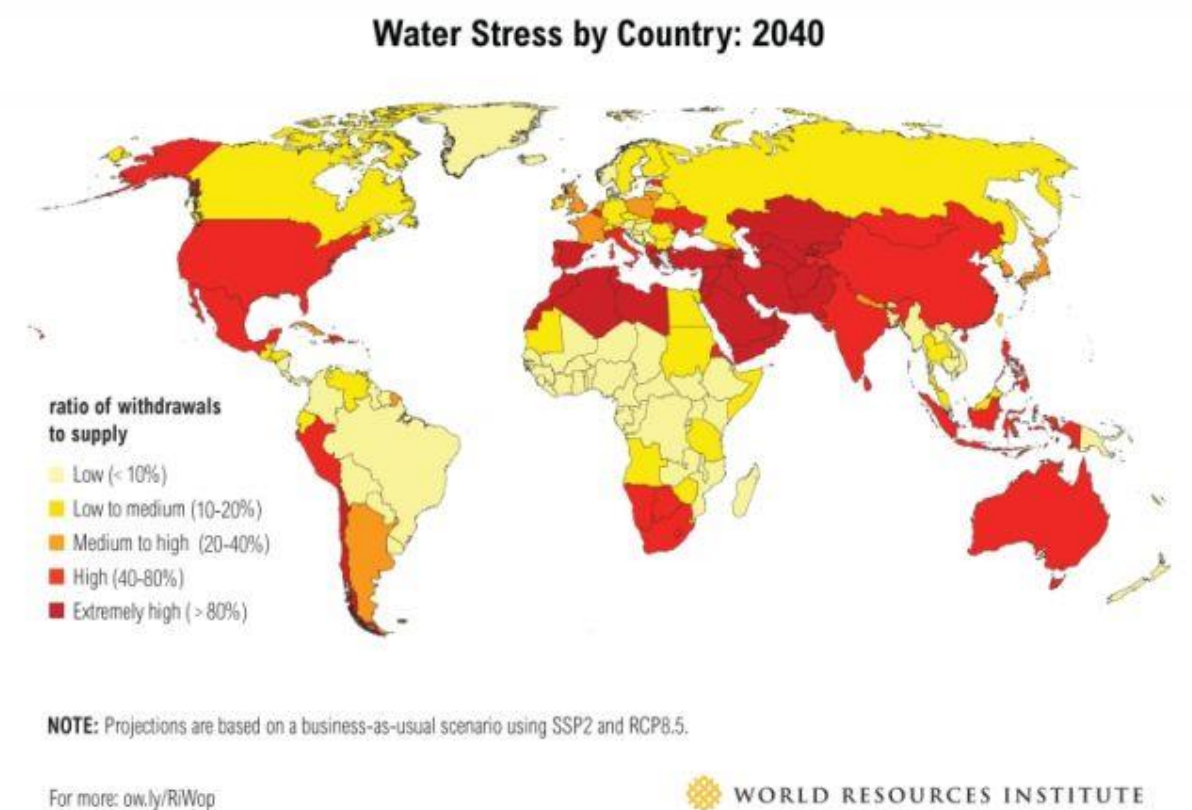
## 2 . Level of water stress

Indicator 6.4.2. of the Sustainable Development Goals refers to the level of water stress, which is freshwater withdrawal as a proportion of available freshwater resources, that is, the ratio between the total amount of freshwater withdrawn by all economic activities and the total renewable freshwater resources available, taking into account environmental flow requirements.



Specifically, target 6.4. proposes “By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity”.

The Aqueduct tool of the World Resources Institute provides a ranking of the most water-stressed countries projected for 2030 and 2040. The eleven most water-stressed countries in 2040 are expected to be Bahrain, Kuwait, Palestine, Qatar, San Marino, Singapore, United Arab Emirates, Israel, Saudi Arabia, Oman and Lebanon. In addition, Chile, Estonia, Namibia and Botswana could experience a particularly significant increase in water stress by 2040.



*Water stress by country (Source: World Resources Institute).*

### 3 . Impacts of water stress

The gradually increasing trend in global water stress over the last twenty years reflects, according to the FAO, increasing stress in several areas of the world, with decreases in other areas of the planet that cannot compensate for the increases, with climate change playing an important role. Thus, by 2025, 1.9 billion people are

expected to live in countries or regions facing absolute water scarcity, and two-thirds of the world's population could be in a situation of water stress.

In terms of its impacts, water stress leads to a deterioration of freshwater resources in terms of quantity, (overexploited aquifers, dry rivers, etc.) and quality (eutrophication, organic matter pollution saline intrusion, etc.).

### **III. Water Shortage: Causes and Effects**



Climate change, coupled with water mismanagement and overconsumption, is causing droughts and water shortages across many parts of the globe. Aside from the obvious threat to public health, the subsequent effects of water shortage can vary from food insecurity to increased human conflicts, highlighting the importance of protecting global water resources and using them sustainably. Here are the main causes and effects of water shortage and what we can do about it.

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It is increasingly evident that droughts around the world are becoming more frequent and intense, as well as are occurring at progressively prolonged periods of time. This is most demonstrable by the ongoing megadrought in the western regions of the , where it is in the midst of its driest conditions in history.



No continent on Earth has been untouched by water scarcity, and an increasing number of regions are reaching the limit at which they can provide water services sustainably, especially in arid regions. Nearly two-thirds of the world's population is predicted to face water shortages by 2025. This worrying trend is causing many to pose the question: "are we running out of water"?

The short answer is yes, primarily driven by climate change and global population growth. We explore what other causes are there and the major effects of it around the world.

## Causes of Water Shortage



## Droughts and Climate Change

Water shortages occur due to a number of factors; one of the biggest drivers of water scarcity is drought. Drought is a natural phenomenon in which dry conditions and lack of precipitation – whether it is rain, snow or sleet – occur over certain areas for a period of time.

While the amount of rainfall can naturally vary between different regions and times of year, climate change and rising global temperatures are altering rainfall patterns, which in turn, impact the quality and spatial distribution of global water resources. Warmer temperatures mean that moisture in soil evaporates at faster rates, and

more frequent and severe heat waves exacerbate drought conditions and contribute towards water shortages.

These conditions also create the perfect breeding ground for wildfires, further fuelling drought season and water stress. In the 2018 Intergovernmental Panel on Climate Change (IPCC) report, climate scientists say that groundwater stored in aquifers, which provides 36% of the world's domestic water supply for over 2 billion people, is highly sensitive to future climate change. They also concluded that wet regions are expected to get wetter while dry regions will get drier.

In China for example, the Yangtze and Yellow Rivers are two major water resources that support the country. They rely on the glacial meltwater from the Qinghai-Tibetan Plateau. Global warming, where temperatures in the glacial region rose by 3- 3.5C over the past half-century, has produced less snow and ice mass, causing glacial run-off into the Yangtze to be reduced by 13.9% since the 1990s.

## Poor Water Management and Growing Demand

Today, the world's population is just short of eight billion people, which translates to a growing demand for water amid water stress from climate change. Urbanisation and an exponential increase in freshwater demand for households are both driving factors behind water shortages, especially in regions with a precarious water supply.

For example in 2018, Cape Town, South Africa experienced a water crisis and became the first modern city to effectively run out of drinking water as a result of extreme drought, poor water resource management and overconsumption.

Likewise, China is also at risk of running out of water due to poor water management. Each year, total renewable water resources per inhabitant is estimated at about 2,018 cubic metres, which is 75% less than the global average, according to the World Bank.

## Water Pollution

Contaminated and unsafe water is another contributing factor of water shortages. Water pollution already kills more people each year than war and all other forms of violence combined. As we only have less than 1% of the Earth's freshwater accessible to us, human activity is actively threatening our own water resources. Water pollution can come from a number of sources, including sewage and wastewater – more than 80% of the world's wastewater flows back into the environment without being treated, and agricultural and industrial runoff, where pesticides and toxic chemicals leach into the groundwater and nearby freshwater systems. Consequently, precious water resources get contaminated, resulting in less freshwater and drinking water available.

## Effects of Water Shortage

The United Nations states that having free access to freshwater is a basic human right. And losing that access to drinking water can be detrimental to human health and lives, as we all need water to survive. However, water scarcity and shortage can lead to other serious impacts on the environment and threaten global peace and security as well.



## Food Insecurity

We need water to produce food that we eat. Today, around 70% of freshwater withdrawals go into agriculture, from irrigation and pesticide to fertiliser application and sustaining livestock. As the global population continues to grow, agricultural production is required to expand by another 70% by 2050 to keep up with demand, thereby redirecting even more freshwater resources.

In February 2021, the UN World Food Program reported that severe drought caused by record dry conditions has left an estimated 13 million people facing hunger in the Horn of Africa. Intense and prolonged droughts have decimated food crops and caused high rates of livestock deaths, causing food prices to soar. Families are struggling to buy and secure food as a result, while high malnutrition rates are occurring across the region. The UN warns should the situation worsens, it will spark a humanitarian crisis.

## Increased Human Conflicts

One of the biggest effects of water shortage is that it prompts increased competition between water users, thus potentially sparking conflicts, which could potentially put millions of lives at risk.

In India, drought has triggered serious conflict between water users at the local level, many of whom depend on water for their livelihoods. At a broader level, India has been in conflict with its neighbouring country of Pakistan over water disputes, among other political issues.

The two nations have clashed over the control of upstream water barrages and infrastructure projects for decades, which regulated water flow into Pakistan. Water mismanagement and climate change are exacerbating these diplomatic tensions; The Himalayan Glaciers, which feed the Indus Basin, are predicted to diminish further in the coming year and deplete groundwater recharge in the long run.

Similarly, in Egypt, its water supply is being threatened by the development of the Grand Ethiopian Renaissance Dam on the upstream stretch of the Nile River. Though the dam brings huge economic and social benefits for Ethiopia and generate energy to two-thirds of the population, Egypt could potentially lose as much as 36% of the total water supply as the dam reduces water flowing downstream. Egypt could resort to military action to protect its water resources.

## Water Is Now Traded as a Commodity

Water has recently joined gold, oil and other commodities that can be traded on Wall Street, prompting fears that the market could dramatically further exacerbate the effects of water shortage and increase competition.

## **IV. Cleaning Hacks When You Don't Have Running Water**

Do you know Australia is the world's driest inhabitant continent in terms of rainfall? Water scarcity is one of the most persistent issues nationwide because the amount of rainwater entering rivers is very low (only 12 per cent).

Despite this, households in Canberra take water for granted. It effortlessly runs from taps, meeting a variety of purposes, such as house cleaning, laundry, cooking and hydration. But there are scenarios when this basic resource becomes unavailable or scarce. The reason could be anything, ranging from natural disasters to water scarcity, or infrastructure problems.

This can lead to numerous hurdles on a daily basis, and one of them is cleaning an entire house with minimal water. It will become difficult to tackle stains, grime, and grease using traditional cleaning methods, such as lathering carpets, washing the couch, etc.

**Luckily, we have enlisted some of the best cleaning hacks to help maintain a clean and shiny home when you don't have running water.** You can make the most of adaptability, new-age products, and smart techniques that require less water for cleaning.

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### 1. A Revolutionary Hack: Use Waterless Cleaning Products

Ditch your conventional cleaning products and use foaming cleaners and dry carpet cleaning products to reduce water consumption.

Foaming cleansers can do wonders in removing accumulated dirt and caked-on grime without water. You can spray or apply to the surfaces, scrub it gently and wipe away with a clean cloth.



Similarly, dry carpet cleaning powders can remove stains, grime and mould from the delicate floor coverings quickly. Sprinkle it, spread it onto your surface, let it sit for a while, and vacuum up no need for water.

You can also ask professionals to bring waterless products for an expert end of lease cleaning Canberra and retrieve your bond money at the end of your tenancy.

## 2. Clean Your Home With Homemade Cleaning Agents

According to cleaning experts, organic cleaning agents require less water as compared to traditional or chemically-laden cleaners. Add white vinegar, baking soda, lemon, hydrogen peroxide and salt into your cleaning caddy. They can remove stubborn stains, grime, mould and bad odours when you don't have running as they don't contain ammonia, bleach and other toxic elements. The best part is that you can have fun cleaning your home using these natural products.

- Spray white vinegar solution on dirt-laden surfaces, gently scrub the area and rinse or wipe the area using limited water.
- Sprinkle a generous amount of baking soda to freshen up your carpets and mattress.
- You can also make a paste of water and baking soda to de-grease the oven and countertops and wipe down with a damp cloth or sponge.
- Rub a slice of lemon on surfaces like metal taps, cutting boards, countertops, etc., and wipe down with a damp cloth.

This can help you maintain a clean and hygienic indoor environment when you don't have access to running water.

### 3. Dry Dusting To Prevent Stubborn Buildup

Believe it or not, dusting hard surfaces can minimise the buildup of dirt, stains, and grime, which reduces the requirement for comprehensive, water-based cleaning later on.

Moreover, microfiber cloth is one of the essential tools that can help you save water. It is super-absorbent and can trap dust and grime more efficiently.

### 4. Incorporate Efficient Sweeping Methods

Having a high-quality broom can help sweep floors more efficiently, reducing the amount of buildup in the nooks and crannies. A properly bristled broom can also help remove accumulated dirt from tight spaces.



Make sure you use a dustpan to fetch loose debris and dirt with ease. Capturing more visible contaminants makes mopping with less water more efficient and effective.

### 5. Spot Cleaning To Tackle Spills & Splatters

It brings a lot of challenge of a DIY home cleaning when you don't have running water. Professional end of lease cleaning Canberra experts recommend using the spot cleaning hack when removing stains from floors, walls and other large surfaces. Apply the cleaning product on the specific or stained area and scrub it gently.

After that, rinse or wipe the surface using minimal water. This can be a life-saving hack when you don't have running water.

## 6. Mop Floors With Less Water

You can try a two-bucket approach to mop your dirty floors with limited water.

- First bucket: It is for the soap-based water
- Second Bucket: It is for rinsing

This will reduce the water required for rinsing the mop.

You can also consider investing in a spray mop or a robotic vacuum cleaner and mop to keep your house clean and shiny.

## 7. Use Disinfecting Wipes For High-Touch Areas

Are you running out of water when preparing a rental property for the final inspection? Use disinfecting wipes to clean and disinfect high-touch or contaminated spots.

Store-bought disinfecting wipes are pre-moistened and can tackle dirt, dust and grime while killing lurking germs from surfaces like:

- Door handles and knobs
- Chair handles
- Light fixtures and fittings
- Light switches
- Pet toys and bowls
- Faucets
- Bathroom surfaces, etc

You can also hire professionals for a budget end of lease cleaning Canberra, and they will spruce up your home using minimal water. They bring smart tools and products to help them clean a property without complications.

There is no denying that water is one of the key ingredients when sprucing up a house. However, with the right approach, resourcefulness and these hacks, you can tackle dirt, grime and grease from all surfaces when you don't have running water. These cleaning tips can help you maintain a healthy, hygienic and sparkling living environment.

## **V. How to prevent water shortages?**



## Water scarcity prevention

There are ways to save water and prevent water scarcity:



### 1. Sustainable water management

Improving water infrastructure must be a priority, as water conservation and efficiency are key components of sustainable water management. Solar desalination and smart irrigation systems are great examples of clean technology for water efficiency and control. That obviously applies even more to the agriculture and farming sector - the largest consumer of water.



### 2. Reclaimed water

Rainwater harvesting and recycled wastewater also allow to reduce scarcity and ease pressures on groundwater and other natural water bodies. Groundwater recharge, that allows water moving from surface water to groundwater, is a well-known process to prevent water scarcity.



### 3. Pollution control & better sewage treatment

Without proper sanitation, the water becomes full of diseases and unsafe to drink. That is why addressing pollution, measuring and monitoring water quality is essential. Besides, improving the sewage systems in specific areas is another way to prevent water scarcity from becoming any worse.



#### 4. Awareness & Education

Education is critical to solve the water crisis. In fact, in order to cope with future water scarcity, it is necessary to radically reform all forms of consumption, from individual use to the supply chains of large companies.

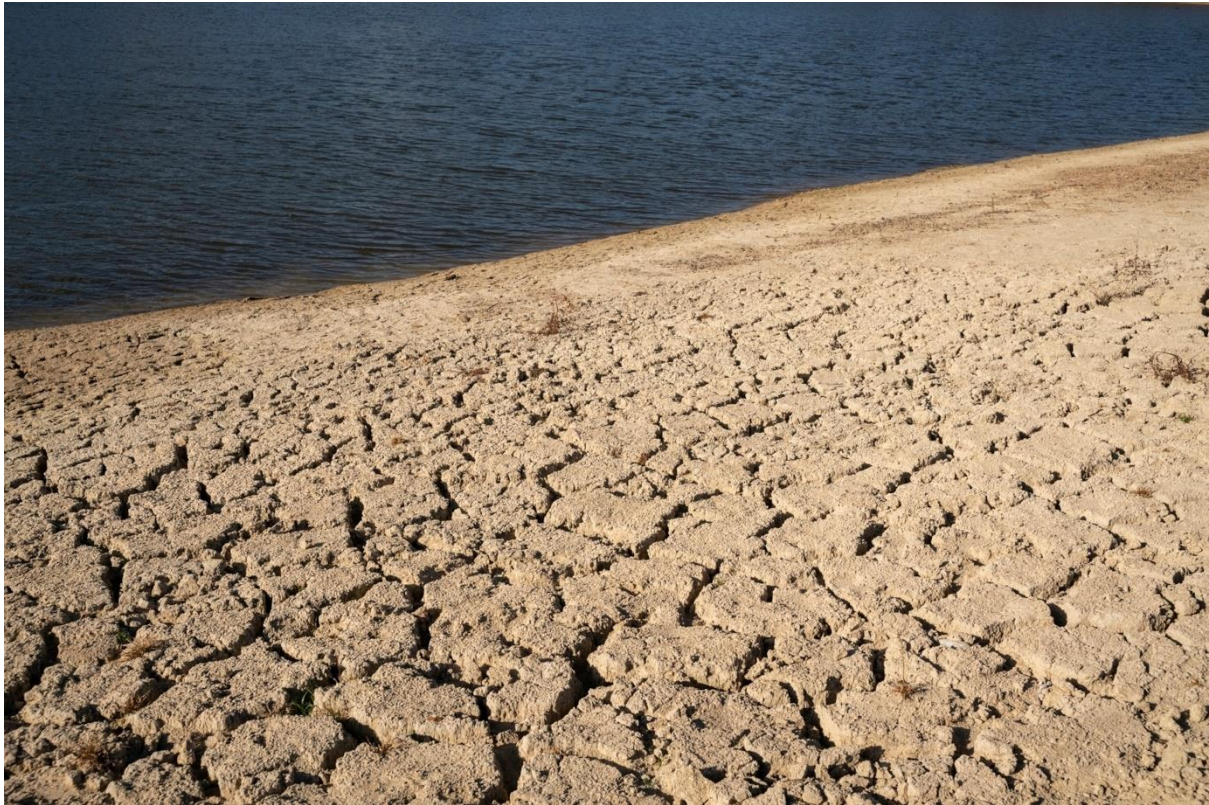
## **VI. Making Every Drop Count: How Australia is Securing its Water Future**

Australia has long had a precarious relationship with water, but the extreme weather events of recent decades have forced it to adopt a renewed respect for this precious and finite resource.

Of all earth's continents, only Antarctica gets less precipitation than Australia. Its average annual rainfall of just 470mm is also unevenly distributed: in the Northern Territory, Darwin receives around 1,700mm, while Adelaide in South Australia gets less than one-third of this—some inland towns survive on less than 200mm.

Australia's limited and unpredictable rainfall is being exacerbated by climate change with the continent one degree warmer than a hundred years ago and receiving significantly less rain. In 2018, every state except for Tasmania and Western Australia received less than average rainfall while persistent high temperatures in Queensland contributed to record rates of evaporation.

From 1996-2010 the Millennium Drought brought long-term water restrictions to the country's highly populated southeast and southwest. It was a catalyst for change. Driven by the twin challenges of declining water supply and growing demand, Australia has stepped up its efforts to secure its water future.



In 2018, the town of Murrurundi received just 500mm of rainfall, around half of its historic levels. As the town's dam dried up, Australia's tightest Level 6 water restrictions were imposed. They remain in place over a year later.

Despite the continent's vast size, nearly the entire population lives in cities. These are predicted to grow by an additional 20 million people in the next 30 years, with water consumption in larger cities expected to rise by 73% to more than 2,650 giganlitres.

To meet this demand Australia is looking beyond its traditional rain-fed dams and reservoirs. Instead, it is turning to technology with all the mainland states investing in large desalination plants, each producing up to 674 giganlitres of additional freshwater to cushion city-dwellers against growth and drought.

However, desalination is costly and controversial, using so much energy that its water is nicknamed 'bottled electricity'; Sydney's plant costs A\$500,000 a day to run—even standing idle. This January it was switched on for the first time since 2012 and is expected to contribute 15% of the city's drinking water, staving off severe restrictions.

In Western Australia, dwindling rains have decreased runoff into Perth's reservoirs by 91% since the 1970s, forcing an increased reliance on groundwater. Australia's aquifers are being drained at unsustainable rates, but Perth is now actively

replenishing them by pumping 10% of its treated wastewater into shallow aquifers that naturally filter and store the water until it is needed again.

This process of augmenting freshwater supplies with treated wastewater, called Indirect Potable Reuse, could be crucial to futureproofing urban water supplies. In 2018 recycled water use increased in most urban centers and although no city directly uses treated wastewater as tap water, Perth has considered it. With the right technology and safeguards it could bring cities and homes close to self-sufficiency.

As well as increasing the availability of water, Australia is getting better at using less. Many products are rated and labelled for water efficiency, with homes increasingly adopting water-saving features from showerheads that regulate flow to dishwashers that use just 12 liters of water a load, a mere 10% of traditional rinsing and washing. More than a quarter of Australian homes collect and store rainwater for domestic use, contributing around 177 billion liters to residential water supplies.



Together with domestic wastewater systems that treat and reuse greywater from sinks and showers, these integrated water management systems take pressure off municipal supplies for non-potable functions such as flushing toilets, washing clothes, and watering gardens.

With around 40%-50% of Australia's domestic consumption used outdoors, most cities restrict garden hosepipes and irrigation systems through voluntary Water Wise Measures. In Victoria, the city of Melbourne has gone even further, putting permanent rules in place that have almost reduced daily water consumption to a target of 155 liters per person—well below the national average of 340 liters.

Careful use of water is even more important when it comes to rural homes and communities as these often rely entirely on declining rains and diminishing groundwater. Securing water for these isolated locations can be expensive and complicated, currently involving trucking in emergency supplies or laying lengthy pipelines from distant reservoirs.

Along with increasing water capture, conservation, and reuse at both the domestic and municipal levels, technological innovations may offer solutions. In Murrurundi, New South Wales, an array of ten innovative hydro panels extract enough moisture from the air to supply a school with 1,500 liters of drinking water a month. It's estimated that a family could live off three panels and a whole town off 400 panels in what could prove a viable option for isolated rural areas.

Working with a hostile climate and poor soils, agriculture consumes around 70% of Australia's water footprint. However, the 2004 National Water Initiative committed state governments to more efficient and sustainable water management that included reversing widespread overuse by agriculture.

A key initiative is the Murray-Darling Basin Plan covering the region responsible for most of Australia's food production. Across Queensland, New South Wales, Victoria, South Australia, and the Australian Capital Territory, water entitlements were bought from landholders to keep around 60% of the basin's water for the benefit of the environment and the long-term sustainability of supply.

Meanwhile, billions of federal dollars have supported farm improvements such as more efficient drip irrigation, lining ditches to reduce water loss, and switching production to less thirsty crops. The plan has cut water use by one-third while managing the competing demands of consumers across five states and prioritizing the environment.

Since the late 1980s, an innovative water trading scheme has allowed landowners to loan or sell their water entitlements on an open market worth billions of dollars. This helps redistribute water to where it is needed most, including the environment itself.

The widespread acceptance that environmental sustainability is a crucial goal of water management is arguably Australia's most important change in water policy. A growing public awareness, together with investment in infrastructure, innovation, and conservation, has seen Australia praised for improving its water security. Even so, this year has seen many areas suffering again.

Low rainfall and high temperatures in Queensland, New South Wales, and Victoria, mean that Brisbane, Sydney, and Melbourne are facing water restrictions: low inflows to Sydney's dams have led to its desalination plant being switched on. This could be a major test of the plans, projects, and technologies put in place to mitigate

the effects of drought; the question on everyone's lips is 'has Australia done enough?'

## CONCLUSION

Water scarcity happens when communities can't fulfill their water needs, either because supplies are insufficient or infrastructure is inadequate. Today, billions of people face some form of water stress. Climate change will likely exacerbate water stress worldwide, as rising temperatures lead to more unpredictable weather and extreme weather events, including floods and droughts.

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