Water facts 11

GOVERNMENT OF WESTERN AUSTRALIA

WATER AND RIVERS COMMISSION JUNE 2000

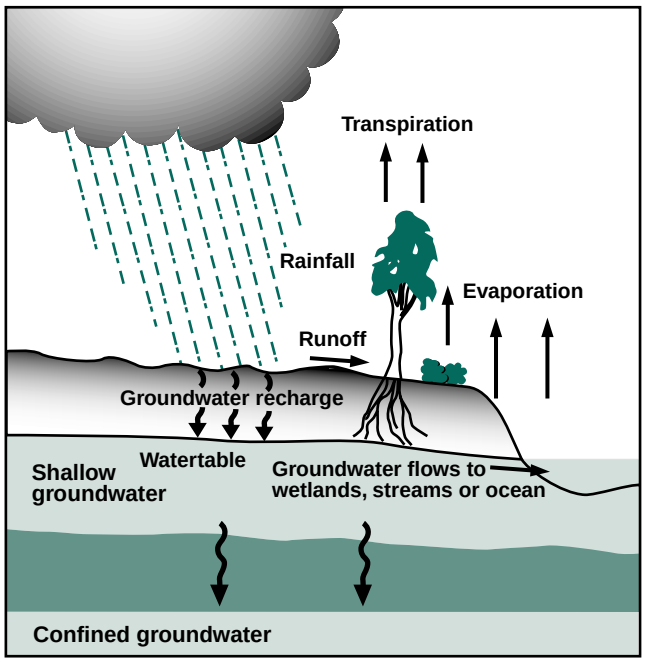
Managing groundwater use

Groundwater is a significant source of water supplies in Western Australia and is very important to the environment. This Fact Sheet explains how groundwater is used and why it is important to use it wisely to ensure future water supplies and the environment are protected.

Using groundwater

Groundwater is water that occupies the pores or crevices in sand, sandstone, limestone and other rocks.

Geological formations that store and yield significant quantities of groundwater are called aquifers. There may be a series of aquifers lying one on top of another, separated by impermeable layers which hinder the movement of water through them.

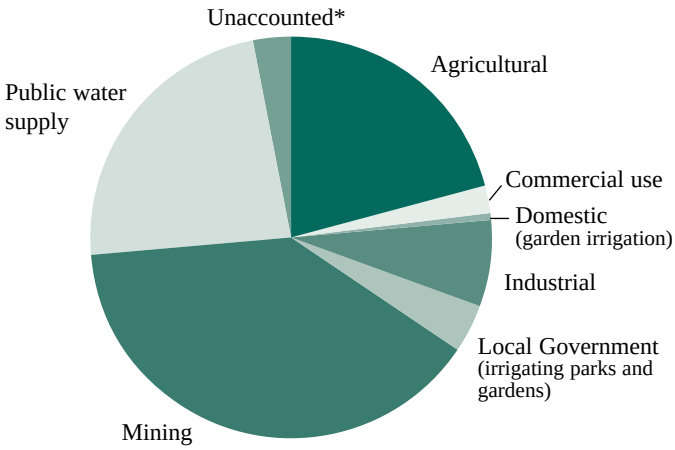


Groundwater is water that occupies the pores or crevices of soil or rock.

What do we use groundwater for?

Groundwater is Western Australia's most important source of water, providing two thirds of the State's water needs. It is an important source of scheme water supplies, privately-drawn supplies for agriculture, industry and pastoral use, and is tapped by household bores for watering gardens.

How the licensed groundwater is used.
(Source: water resources licensing data base, 1996)



* Stand pipe, treatment, fire fighting, leakage, unmetered

Pumping groundwater

Water is pumped (*extracted*) through *wells* or *bores*, which are drilled into aquifers. A group of wells or bores is called a *wellfield*. Garden bores are narrow lined holes and are a specific type of well.

Scheme water supplies

The Water Corporation and other water suppliers such as the Busselton Water Board operate wellfields that contribute to public water supplies. Some country towns, for example Bunbury, Busselton, Geraldton, Port Hedland and Broome are entirely dependent on groundwater, whereas other places like Perth use a combination of groundwater and surface water from dams.

Water that is pumped from very deep bores (over 1000 metres) generally does not require treatment other than chlorination (a health requirement for all public drinking water) and cooling. After chlorination, the water is pumped into tanks or surface reservoirs.

Groundwater pumped from shallower sources requires further treatment to remove natural impurities such as sediment and iron to meet community standards. The water is treated in a Groundwater Treatment Plant. Treatment may involve aeration, coagulation to bind particulate matter, filtration, adjustment of pH, disinfection (chlorine) and fluoridation.

Private water supplies

People extract groundwater from private bores to irrigate vegetables, flowers and turf farms, to water stock, and to water playing fields. This water is usually used untreated. Local Government authorities test any water supplied to the public as drinking water (for example at a country roadhouse).

The mining industry is one of the largest users of groundwater in Western Australia, principally for ore concentration and mineral processing.

Garden bores

Many backyard bores pump groundwater for garden watering. For example, in Perth there are about 145 000 garden bores pumping about 90 million kilolitres of groundwater each year. The water from private bores is generally unsuitable for drinking without prior treatment.

Environmental values depend on groundwater

Environmental values

Western Australia is blessed with some of the most extensive and unique wetland systems in the world. The Swan Coastal Plain has over 10 000 wetlands between Moore River and Busselton. A similar number can be found along the south coast from Augusta to Esperance. The Pilbara and Kimberley regions also have important wetland systems. The values we place on these environmental features are referred to as environmental values. Most of these wetlands are maintained by groundwater. Many areas of vegetation, such as banksia woodlands in Wanneroo, also depend on shallow groundwater. It is important to understand these dependencies to enable protection of important environmental values.

Social values

In some areas social values such as recreation and Aboriginal cultural associations are dependent on groundwater. These also need to be taken into account when planning how the groundwater should be used. For example, in the semi-arid environment of the La Grange region near Broome, most of the groundwater-dependent wetlands may have some cultural significance. They are all named, many have creation narratives and most of the permanent water sources are believed to be inhabited by powerful spirit beings.

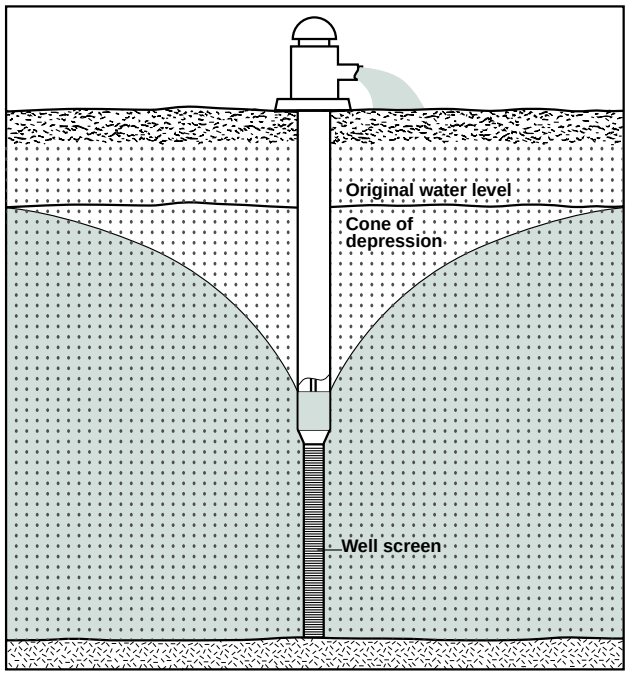
'Panyjin' reeds at Yaralya

It is necessary to maintain a balance in the watertable to protect the environmental and social values that depend on water. To do this many factors need to be considered. To manage the resource effectively for the long term, we must understand the effects of pumping and the interrelationships of the geology, climate, and ecosystem.

Impacts of groundwater use

Watertable levels

Pumping groundwater can lower the watertable in the immediate vicinity of the bore. One bore will cause a localised '*cone of depression*' around it. Many private or public bores in a region can lower the regional watertable and some bores may dry up unless they are deepened.



Cone of depression

Over-pumping can also damage sensitive wetland environments and vegetation. Consequently it is very important to manage how much groundwater is pumped.

Another impact of over-pumping can be *saltwater intrusion* into aquifers. If bores near the sea or an estuary are used to pump too much water, the pressure of groundwater flowing out to the sea is reduced and saltwater may move inland and contaminate bores. Such contamination may take a long time to reverse.

Land clearing and the watertable

In urban areas, where trees have been cleared, hard surfaces like roads, roofs and car parks channel more water into the groundwater and wetlands resulting in watertable rises. Previously seasonal swamps may become semi-permanent lakes and vegetation that was adapted to seasonal drying may be killed by higher water levels. Drainage systems are often installed to remove excess water and prevent flooding.

Sometimes pumping from bores can be a useful way to balance the rising watertable in urban areas.

Managing groundwater use

Sustainable use of groundwater

"Sustainable development is using, conserving and enhancing the community's resources so that ecological processes on which life depends are maintained and the total quality of life now and in the future can be increased." (from Australia's National Strategy for Ecologically Sustainable Development).

Sustainable use means setting a limit (called the *sustainable yield*) on how much water we draw from a particular resource, so that water extraction does not cause any unacceptable impacts. This includes impacts on the environment, watertable levels or saline water movement.

In most circumstances, groundwater is managed in a way that allows for continued use in the long term, while ensuring that any environmental impact is acceptable. However in some areas of the State such as in the Goldfields, over-pumping is allowed to take place. In these areas the groundwater is very saline and does not support any significant environmental values. It is used to support the local mining industry, creating jobs and wealth for the State.

Dealing with the demand for water

Increasing population growth leads to increasing demands for water. The pressures vary from place to place depending on the demands and the water available. The areas with highest levels of utilisation are Perth and the Goldfields.

In some areas such as Perth, there is a tendency for water use per person to gradually increase. If left unchecked, this would significantly increase the need for additional water sources to be exploited in the future. It is important for all sectors of the community to strive for efficient water use to minimise pressures on our groundwater resources.

The role of the Water and Rivers Commission

The Water and Rivers Commission manages Western Australia's water resources to enable sustainable development and maintain environmental and social values. The Commission manages *use of groundwater resources* to balance the needs of people and the environment by:

- Investigating groundwater resources.
- Allocation planning (how water is shared).
- Managing use.

Resource investigation involves:

- Understanding the distribution of aquifers and how groundwater systems work.

Allocation planning involves:

- Determining water-dependent environmental values.
- Setting ecologically sustainable limits on use of the aquifers (sustainable yield).
- Setting rules by which the available groundwater is shared between users (allocation).
- Formally documenting plans that set out sustainable limits and allocation rules for specific areas.

Managing use involves:

- Ensuring that pumping does not exceed the sustainable yield through licensing and other mechanisms.
- Monitoring water levels regularly to make sure that the groundwater resource and its dependent environment are healthy.
- Regular checking of water use to ensure compliance with licence conditions and overall use is within sustainable limits.
- Education and training on efficient use of water, and encouraging the development of water-efficient technology.

The Commission establishes management committees to **involve the community** in water resource management.

The Commission also has an important role in **protecting water quality** (see Water Facts 10).

Further reading

What is groundwater? Water Facts 8, Water and Rivers Commission, 1998.

Western Australia's groundwater resources, Water Facts 9, Water and Rivers Commission, 1998.

Groundwater pollution, Water Facts 10, Water and Rivers Commission, 1998.

The Water and Rivers Commission produces a range of reports including the *Water Resource Allocation and Planning series*, *Water Resource Protection series*, and *Hydrogeological Maps and Records*. A complete list is available from the Commission or on the website at www.wrc.wa.gov.au/public

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