

Groundwater Preservation

The main source of water in the north western region is groundwater. It is responsible for the preservation of World Heritage habitat and provides water for the local towns and industries. There are two aquifers that provide access to groundwater, an upper unconfined aquifer and a lower confined aquifer. Both provide high quality water.

What Is Groundwater?

Groundwater is water that has permeated through soil until it reaches a porous area or geographic fault. The top level of the groundwater is known as the water table. The water table usually follows the profile of the ground. Groundwater can be visible as wetlands or in springs, or it may be well below the surface and not easily identifiable. In the north western region, it is available to around three quarters of the area through springs and bores.

Groundwater In The North West

Groundwater can vary in quantity and quality. While salinity and the depth of the aquifer can provide some problems, the majority of the North West has access to clean, drinking quality groundwater (see Water Quality Classifications For 2011). In the North East, groundwater is used for irrigation and town water.

Groundwater Issues In The North West

Due to the lack of rainfall over the last few decades, groundwater access has become even more important. Even when rain does fall, there is little run off due to the parched nature of the ground. This means that aquifers are not being replenished and will mean that strict usage measures must be introduced to ensure the long term viability of groundwater. Even now, there are areas of groundwater that have been polluted by inadequate land management practices, unsuitable waste disposal and the spillage of toxic materials. Legislation means that best practice water management is now in place, but the early damage has been done.

The majority of streams and rivers in the North West rely heavily on rainfall and springs. Degradation of groundwater will lead to untold damage of ecosystems in this region and significantly threaten agriculture. Naturally, the flow on from this is pollution of town water sources and potential health hazards for the local population^A.

^A Up to 75% of the water needs of the area are satisfied via aquifers

How Can Groundwater Be Protected?

Alpheius Global Enterprises (AGE^B), as one of the major employers in the area, is providing its vast resources to help manage and respond to groundwater issues. They have initiated widespread monitoring programs and have developed education programs to ensure that that Environment Legislation is understood and adhered to. In partnership with the North Western University, they have developed best practice methods that can be adopted by the farming and city communities alike.

Water in the upper unconfined aquifer can be as deep as 70m in places and spreads across much of the North West region. It is the primary source of drinking water for the area and provides much needed respite from the heat where it comes to the surface in the Northern plains area.

Water in the lower confined aquifer varies between 40m and 280m in depth. It is not present in all of the North West but extends as far south as Middleton. Middleton is famous for its hot springs – caused by the lower aquifer being under pressure in that region. Temperatures can reach as high as 40°C near Middleton and up to 30°C at the North West Cape. There has been significant tourist activity near Middleton as result of these springs. Further north, there is a booming aquaculture industry concentrating on Trout, Salmon and other well known species.

What Problems Do The Aquifers Have?

One of the major threats to the use of aquifers is the salinity, which can vary from around 375mg/L in the south to the equivalent of sea water, or 32,000 mg/L of salt, in specific areas of the north. Plans for a Desalination Plant for Northwood are in the approval phase.

The other main issue is one of pollution from historical farming and industry methods. While legislation now protects the aquifer and prevents dumping of waste and toxic chemicals, there are residual problems from past practises¹.

How Can The North West Groundwater Be Improved?

Alpheius Global Enterprises has a Research Facility in the North West, located at Northwood. One of its functions is to manage the aquifers. AGE's key strategies for supervising aquifer usage include:

- groundwater monitoring programs
- risk assessment of groundwater contamination in relation to copper-chrome-arsenate timber treatment plants
- risk assessment of pollution threats to the three lakes in the region
- presence on regional management boards
- community and industry involvement
- development of codes of practice for runoff management
- development of codes of practice for lake management
- monitoring programs targeting key aquifer units
- investigations into long-term trends in phosphates and nitrates.

^B AGE is a registered trademark

Groundwater quantity, quality and supply are interdependent in the North West. To understand this relationship, Alpheius Global Enterprises is conducting extensive research in the region and is investing millions to ensure that the water supply to the North West is preserved for future generations.

Lakes Catchment Area

Groundwater in the Lakes Catchment Area in the area surrounding Green Lake, Lake Lisbon and Lake Wentworth is part of the aquifer system that is present throughout the North West. The groundwater is a source of water for the lakes that provide drinking water for Northwood and other local populations.

The groundwater flowing into the lakes comes from the unconfined aquifer (85%) and the confined aquifer (15%). AGE monitors water quality in the unconfined aquifer and some bores in the confined aquifer. The unconfined aquifer is as close as 5 metres from the surface in places and is therefore at most risk of being polluted. It is also susceptible to contamination from past and present agriculture and industry. The main pollutant found in the groundwater in the Lakes Catchment Area is nitrates.

Assessment Of Water Quality

Water chemistry data is regularly analysed to determine water quality with regard to impact on the drinking water, irrigation, livestock and local habitat. National Standards require that AGE check nitrogen, phosphorus, heavy metals, pesticides and salinity on a regular basis. Water quality is assessed as being acceptable, passable or unacceptable by interpreting this data. Groundwater samples are collected annually from 45 bores in the Lakes Catchment Area.

Water Quality Classifications For 2011

| Indicator | Drinking Water | Irrigation | Livestock | Habitat |
|------------|----------------|--------------|------------|--------------|
| Nitrate | Unacceptable | | | |
| Nitrite | Acceptable | | | |
| Phosphorus | | Unacceptable | | Unacceptable |
| Metals | Unacceptable | Passable | Acceptable | Unacceptable |
| Pesticides | Acceptable | Acceptable | Acceptable | Acceptable |
| Salinity | Acceptable | | Acceptable | |

Overall, the groundwater quality in the Lakes Catchment Area is considered poor for the local habitat due to the high level of phosphates and metals¹¹. The elevated phosphorus is most likely due

to current and historical improper agricultural and waste disposal practices. Water taken from the aquifers in this region should not be used for human or animal consumption without testing or filtering due to the increased risk of infant mortality.

On a positive note, while pesticides have been detected in the Lakes Catchment Area in previous testing periods, they have been absent for the past three years indicating greatly improved agricultural practices in the region.

ⁱ Hartley, W. (2006) Long-term Effects of Toxic Materials on Water Quality, CSIRO, Melbourne.

ⁱⁱ Green, J.W. (2007) Local Census of Water Quality, Department of Agriculture, Maintown.