



Darwin's Water Supply - Teacher's Notes

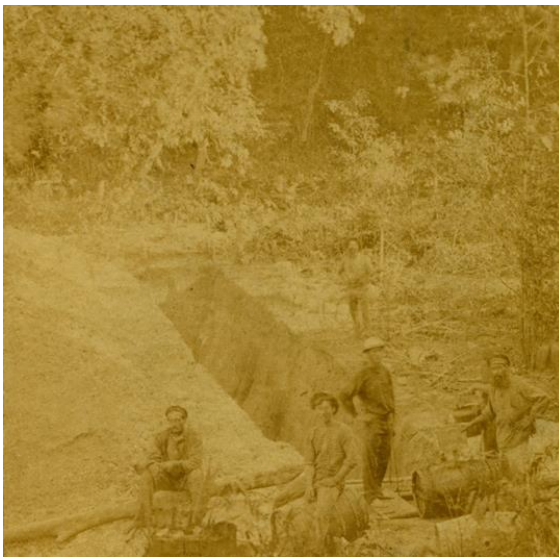
History of Darwin's water supply

The source of Darwin's water supply has changed many times as its population increased.

The traditional owners of the Darwin region, the Larrakia people, utilised many small springs. These springs can still be found today at Doctors Gully, Duke Street Rainforest in Stuart Park, Holmes Jungle and near the base of many of our coastal cliffs.



Photo 1: Small spring at the base of a coastal cliff issuing fresh water



*Photo 2: Men digging a trench searching for water at Doctors Gully in 1869
(Image: Brooks, Joseph. (1869) Doctor's Gully : cutting for water. Retrieved 2022, November 23, from <https://hdl.handle.net/10070/717664>.)*

Early European settlers sunk a well in Doctors Gully in 1869. This was later supplemented by bores around the Darwin peninsula and surrounding areas.



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The above-mentioned springs, Doctors Gully Well and the bores were all sourcing water from the same aquifer. This aquifer is called a perched aquifer because it occurs above the regional water table.

At Doctors Gully, the cliffs are a claystone which has reasonably high porosity and permeability. This means rainwater can seep through the claystone. The claystone sits on top of a shale which is near waterproof and causes the groundwater to pool in its perched position above sea level. Between the two layers is a thin band of gravel that allows water to trickle out at springs.

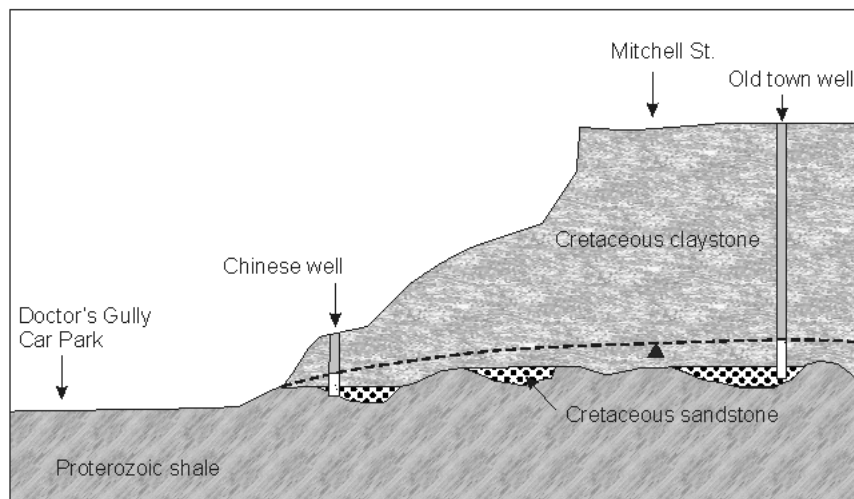


Figure 1: SW-NE geological cross section from the Doctors Gully carpark to Smith Street. Dashed black line represents height of water table (adapted from NT Waterwatch Education Kit)

The huge Vestey's Meatworks, located where Darwin High School is now, was built in 1914. The bores around Darwin were unable to supply enough water so a weir was built at Howard Springs. Water from the weir was pumped to two huge tanks at the meatworks. These tanks still exist today at Darwin High School but have been repurposed into an airconditioned gymnasium called 'The Tank' and an open-air auditorium. You can find out



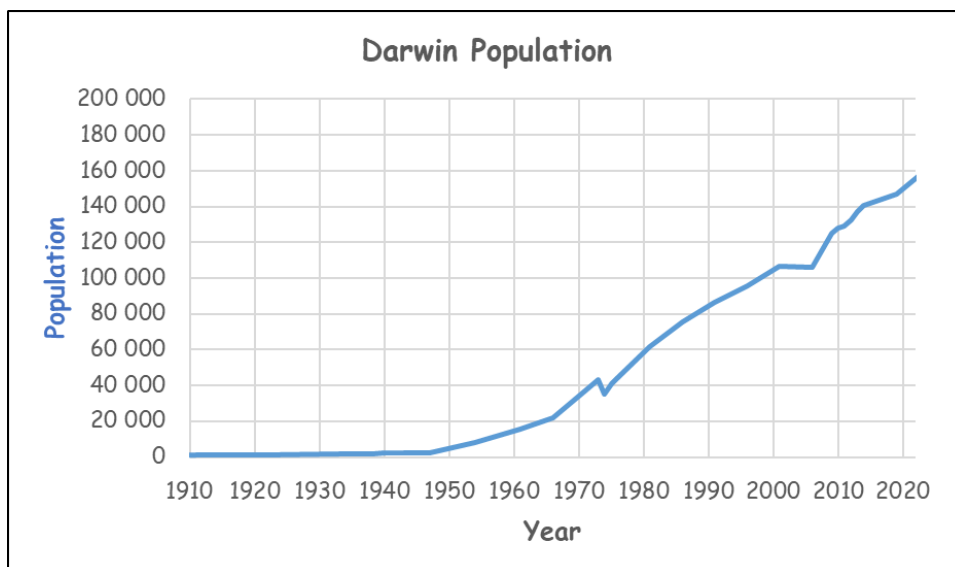
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more about the history of the Vestey's Water Tank in this PALMS Resource: [Vestey's Water Tank](#)

The military build-up during World War II nearly doubled Darwin's population, requiring the rapid construction of Manton Dam. This increase in water supply enabled most residents to have a plumbed water supply and led to the demise of the long drop toilet as there was now enough water for a plumbed sewage system.



Photo 3: 'The Tank' at Darwin High School, July 2019



Darwin's population continued to increase, placing greater demand on existing fresh water supplies.



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In 1964, water from Manton Dam was supplemented by the drilling of the McMinns Borefield near Girraween Primary School. The bores were drilled through 50 m of Koolpinyah Dolostone. Rainwater has been slowly dissolving the dolostone over millions of years, creating small cavities and caves.

Some of these caves grew big enough for the overlying rock to collapse, creating sinkholes. These sinkholes have now become lagoons and include the Knuckey, Marlows, McMinn and Girraween lagoons.



Photo 4: Pump at Howard East borefield, May 2021

The cavities in the Koolpinyah Dolostone make an excellent aquifer able to hold large water volumes and allow it to migrate through the rock. The diagram below illustrates how water gets trapped in the cavities to form an aquifer then the bores are drilled into this area of rock to extract the water for use. This borefield currently provides up to 15% of Darwin's water supply.



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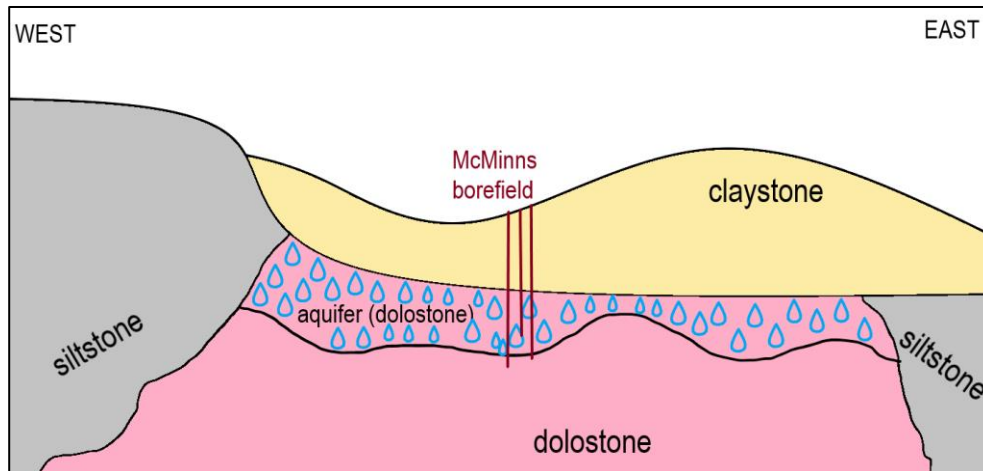


Figure 2: Cross section diagram of McMinn's Borefield with the Koolpinyah Dolostone shown in pink with the cavities storing water shown in blue (adapted from NT Waterwatch Education Kit).

When the Darwin River Dam was built in 1972, Manton Dam was decommissioned as a freshwater supply and opened to the public for recreational use. Darwin River Dam is eleven times bigger than Manton Dam and holds 259,000 megalitres of water (half the volume of Sydney Harbour).



Photo 5: Darwin River Dam (Image: Wikipedia Commons)

Darwin River Dam currently contributes 85% of Darwin's water supply. It is an embankment-type dam where a large volume of concrete-

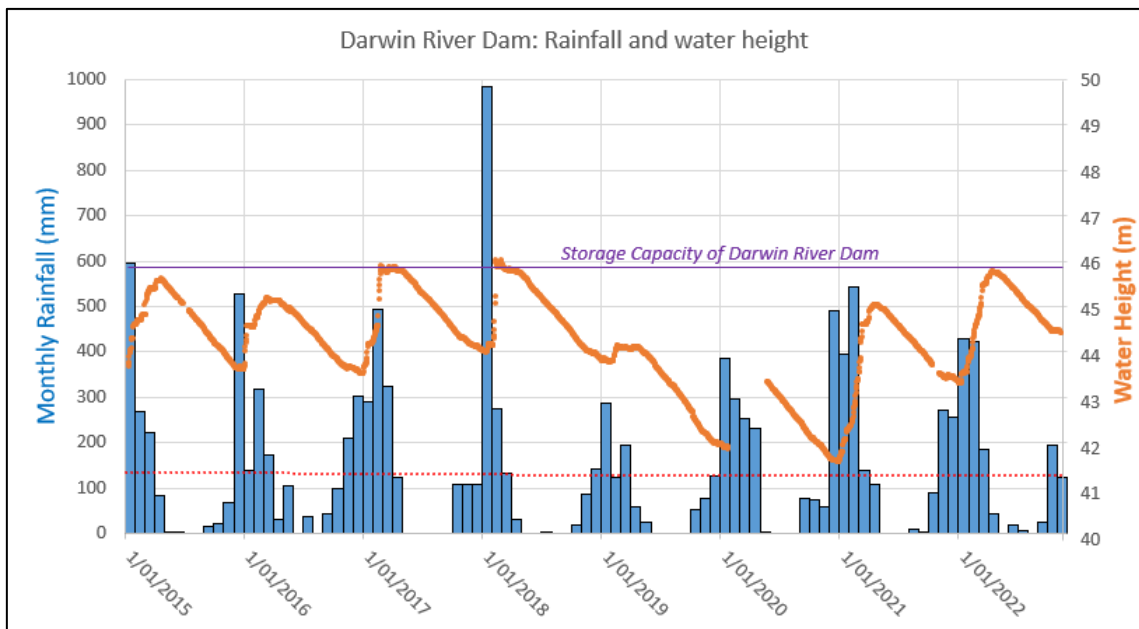


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capped rock fill blocks the Darwin River as it passes through a gap in a low range of hills.

The dam does not have gates that can be opened or closed. When the dam reaches capacity, it overflows at its spillway. This occurred in March 2022 for the first time since 2018. Depending on the rainfall, this overflow can last from days to weeks. Declining wet season rainfall and increased demand means the dam does not overflow as frequently and water levels can get quite low if we have two poor wet seasons in a row.

The chart below demonstrates how periods of lower rainfall greatly reduce the amount of water available to use from the Darwin River Dam. Monthly rainfall is shown by the blue columns and the water height in the dam is shown by the orange dots.





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Darwin water use

Residents in Darwin are large water consumers. Some data shows that Darwin households use almost three times as much water as the national average! The good news is that this trend is now declining as people are changing their water use habits.

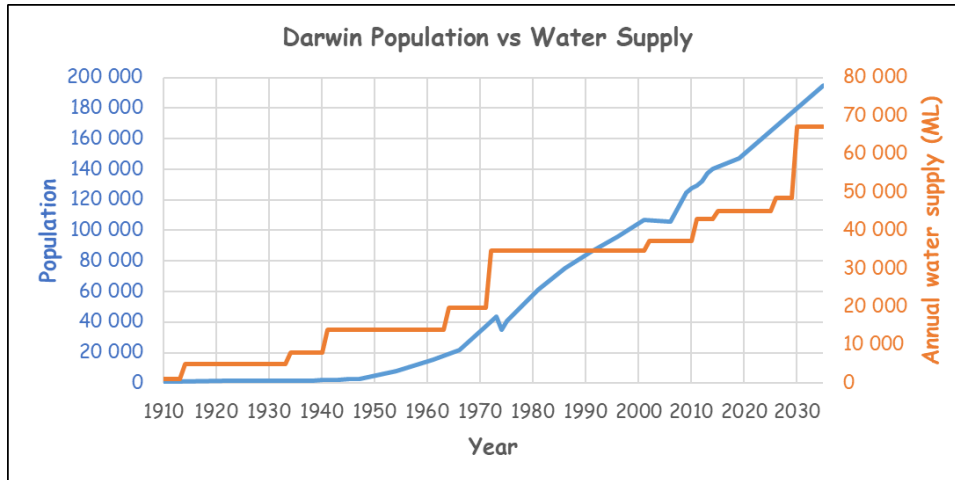
PowerWater are currently the Northern Territory's only network service provider for drinking water and wastewater treatment. PowerWater's community education programs such as Living Water Smart (<https://www.livingwatersmart.com.au/>) and the school program 'That's My Water!' (<https://www.powerwater.com.au/about/community/thats-my-nt-water-story>) are working to increase residents' knowledge and provide strategies for using water more wisely.

This video from the Living Water Smart You Tube channel shows that up to 12% of water is wasted through leaks but the largest amount of water (57%) is used on gardens (Video: <https://youtu.be/I067Wmt0gck>). Perhaps we should all be examining our water use and saving water by checking for leaks and planting more water-friendly gardens.

The chart below shows how the population of Darwin (in blue) has continued to increase however the amount of water supplied by current sources each year (in orange) is not keeping pace. This means we are very close to demand for water by consumers in Darwin outstripping available supply. In other cities around Australia, measures such as water restrictions during summer months have been implemented to try and alleviate this issue. Darwin residents have not had to face this problem before.



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(Graph is projected forward to 2035 assuming proposed water projects go ahead as planned)

The future

It is evident that Darwin River Dam (along with the other smaller sources mentioned) is no longer sufficient to meet Darwin's water supply needs. It is estimated that an additional 11 million litres of water will be needed per year to meet the growth in population approaching the year 2050.

Consequently, NT PowerWater started a project in 2022 to return Manton Dam to service. This will require a new pumping station, pipeline and a water treatment plant and will add approximately 7,300 megalitres of water per year to current supply levels. This project is expected to take 3-4 years to complete and millions of dollars of investment but will only provide a short-term solution. As Manton Dam is currently popular for recreational use, careful monitoring will be required to ensure strict drinking water quality standards can be met.

In the longer term, there are plans to build a new dam 7 km east of Manton Dam in a natural amphitheatre-shaped range of hills. It would be filled by pumping from the nearby Adelaide River during regular wet season floods.



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This dam would be called Adelaide River Off-stream Water Storage (AROWS) and could potentially boost water supply by 60,200 megalitres per year. It is expected to take between 7 and 10 years to complete the project.



Photo 6: Adelaide River (Image: Wikipedia Commons)

This project also requires significant funding and planning including assessment of environmental impacts of both the dam and associated infrastructure, consideration of the cultural significance of the land and also consultation with current users of the water in these areas. Plans for the AROWS project were still progressing at the time this resource was written (December 2022).

You can use the information contained in this resource to complement the fun, hands-on activities all about the precious resource of water found in the [PALMS Year 2 - Earth's Resources](#) booklet. There is a range of activities to try on topics such as where you can find water above and underground, water treatment and how to save water.

This information may also be used when discussing changes in the landscape through activities found in the [PALMS 1 - Local Environments & Patterns on Earth](#) booklet.



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References:

- General information on Darwin River Dam
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- History of Darwin water supply (archived page)
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- Media release on Darwin River Dam being at capacity
<https://www.powerwater.com.au/about/news-and-media/media-releases/2022/darwin-river-dam-is-at-full-capacity> (accessed 22/11/2022)
- Summary of Manton Dam return to service project
<https://www.powerwater.com.au/about/projects/current-projects/mantondam> (accessed 23/11/2022)
- 'The Darwin Water Story' by PowerWater
https://www.powerwater.com.au/_data/assets/pdf_file/0021/8445/2013-Power-and-Water-Corporation-The-Darwin-Water-Story.pdf (accessed 22/11/2022)
- Australian Bureau of Statistics population data
<https://www.abs.gov.au/statistics> (accessed 22/11/2022)
- Data on Darwin River Dam levels and rainfall from NT Department of Environment, Parks and Water Security
<https://ntg.aquaticinformatics.net/AQWebportal/Data> (accessed 23/11/2022)
- NT Waterwatch Education Kit. Part 7: Groundwater in the Northern Territory. Edited by Jennifer Harlock
https://denr.nt.gov.au/_data/assets/pdf_file/0008/269315/Part7-Groundwater-in-NT.pdf (accessed 22/11/2022)



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News articles of interest on this topic:

- <https://www.abc.net.au/news/2019-09-04/adelaide-river-dam-water-crisis-funding-plans-politics/11474892>
- <https://www.abc.net.au/news/2019-07-29/rural-water-bores-running-dry-northern-territory/11354680>
- <https://www.abc.net.au/news/rural/2019-03-01/wet-season-missing-in-action-for-nt-cattle-country/10854824>
- <https://www.abc.net.au/news/2022-02-01/arows-recommended-for-long-term-darwin-water-security/100795498>