



# STEM Community Partnerships Program

## Penrith local scenario

### Water – Flooding & Access

We are entering into an unknown future with shrinking natural resources and a growing population. The global population is projected to increase from 7 billion to over 9 billion by 2050, and our national water use is expected to double in the same time period.

Of all the water in the world approximately 97% is salt water and 2% is located in our glaciers on the North and South Poles. This leaves approximately 1% as fresh and usable.<sup>1</sup> This small percentage is used for human consumption, households, agriculture, transportation and energy production. In many countries water scarcity is already a problem with 1 in 9 people worldwide not having access to safe and clean drinking water and 1 out of every 5 deaths of children under the age of 5 is due to a water-related illness.<sup>2</sup> Water scarcity threatens to become a large problem for Australia's future too.

Across Australia, the driest populated continent on earth, consumers use on average 100,000 litres of freshwater per person, per year. Aside from domestic uses, the agricultural industry is by far the largest consumer of water, accounting for over half of Australia's water use, primarily for sheep, beef, and grain farming.<sup>3</sup> Water taken out of the system for domestic, agricultural or energy production is water that is not available for the environment. Maintaining the health of local water bodies is imperative for their future preservation.

The Penrith area faces a unique challenge called the 'bath-tub effect', which relates to the flooding of the Hawkesbury-Nepean Valley. This valley has the highest flood risk exposure in New South Wales due to its unique landscape and large population. Penrith is dominated by rivers, creeks, waterways and wide floodplains, so the risk of flood is real and serious for the region, as seen in the events of March 2021. Flooding leads to a multiple of community challenges including damage to property, personal safety as well as road access issues because floodwater can damage roads and make causeways impassable.

Dam capacity in Penrith is also an issue as was seen in the Warragamba Dam overflow that occurred in March 2021.

Managing dam capacity is a challenge for WaterNSW as there are consequences for releasing water from the dam to respond to forecast weather.

How your Council tackles the complexity of this issue will impact you and your community, now and in the future.



Picture of Nepean-Hawkesbury waterways  
<https://www.ses.nsw.gov.au/hawkesbury-nepean-floods>

<sup>1</sup>Hajkowicz, Stefan 2015, Global megatrends: seven patterns of change shaping our future, CSIRO Publishing, Victoria, Australia

<sup>2</sup>Australian Bureau of Statistics: Water Account, Australia, 2014-15 <http://www.abs.gov.au/AUSSTATS/abs@.nsf/mf/4610.0>

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## Your task

Your task is to use the information above and resources provided below as a start to identify a local problem and design a STEM-focussed solution.

(Question, Design, Explore, Communicate)

## Resources

### CSIRO research

- CSIRO Global Megatrends Report Overview, 2012 <https://publications.csiro.au/rpr/download?pid=csiro:EP126135&dsid=DS2>
- Assessing Australia's Water Resources <http://www.csiro.au/en/Research/Environment/Water>
- Squeezing more water out of our cities, October 2015, <https://ecos.csiro.au/squeezing-more-water-out-of-our-cities/>
- MAR for sustainable cities: Managed Aquifer Recharge and Stormwater Use Options. <https://research.csiro.au/mar/csiros-role-in-mar-research/research-to-develop-mar-for-liveable-sustainable-resilient-cities/>

### Reports

- Penrith Development Control Plan 2014 - Water Management [https://www.penrithcity.nsw.gov.au/images/documents/building-development/planning-zoning/planning-controls/c3\\_water\\_management.pdf](https://www.penrithcity.nsw.gov.au/images/documents/building-development/planning-zoning/planning-controls/c3_water_management.pdf)
- Water supply system schematic (Warragamba system) <https://www.waternsw.com.au/supply/Greater-Sydney/schematic>
- Penrith CBD Flood Study Factsheet April 2018 <https://www.yoursaypenrith.com.au/33957/documents/74577>
- Hawkesbury-Nepean Valley Regional Flood Study Final Report, Infrastructure NSW, July 2019 <http://www.insw.com/media/2166/hnv-regional-flood-study-final-jul19-vol1-main-report.pdf>

### Articles and other resources

- Hawkesbury-Nepean Valley Flood Risk Management Strategy <https://www.infrastructure.nsw.gov.au/expert-advice/hawkesbury-nepean-flood-risk-management-strategy/>
- If you live or work in the Hawkesbury-Nepean Valley you are at risk of flood <https://www.ses.nsw.gov.au/hawkesbury-nepean-floods>
- Major spill event at Warragamba Dam as extreme rainfall hits NSW, Nine News, March 2021 <https://www.9news.com.au/national/nsw-rain-warragamba-dam-major-spill-event-to-alleviate-water-capacity/dddf9396-78c7-40a8-84e6-05ef2fb2c38b>
- WaterNSW Dam and rainfall level <https://www.waternsw.com.au/supply/Greater-Sydney/greater-sydney-dam-levels>