

Understand the role of small headwater streams ('zero order' streams) in urbanizing catchments for supporting waterway health

Project D1: Headwaters

This project will deliver a new hydrologic foundation which will facilitate Melbourne Water's understanding of the ecology and water quality benefits of headwater streams.

Headwater streams, where catchment runoff first accumulates sufficiently to create overland flow paths, are dominant parts of the riverscape. The smallest streams of catchments are primary sources of streamflow, important sources of organic matter and invertebrates to downstream waters, and act as 'hot spots' for retention and transformation of nutrients such as nitrogen and carbon.

While small headwater streams are likely to be extremely important for maintaining downstream river and bay health, they are particularly vulnerable to degradation or loss in rapidly urbanizing cities such as Melbourne.

If catchment managers continue to adopt conventional urban drainage infrastructure, we are likely to continue losing these critical ecosystems and the values and services they provide.

This research seeks to investigate and quantify the magnitude of the values and services provided by headwater streams across the MW management region; and ultimately facilitate their effective management and protection in areas of rapid urban growth.

Methods

The project will combine desktop and field-based work to firstly develop a clear understanding of existing knowledge regarding the hydrology, water quality treatment, and ecology of headwater streams. This literature review will also include identification of potential sam-

pling and monitoring methods as well as approaches used overseas to identify and conserve headwater streams in urbanizing environments.

Secondarily, the project will undertake a rapid desktop GIS analysis to quantify the scale of the 'headwater stream problem' in MW's management area i.e. how many have we already lost?, how many are we likely to lose under future urban growth and climate change? and what are the likely implications for regional biodiversity and the health of downstream waterways and bays?

By combining the newly developed stream network layer with existing layers including forest cover, hydrologic disturbance, number of farm dams, existing catchment urbanization, proposed future catchment urbanization, and available biodiversity data, this work will facilitate the communication of present/future headwater stream condition and risk by stream length across the MW management region.

Outcomes

An improved understanding of headwater streams, in particular:

- 1) their ecological structure and function,
- 2) hydrologic and water quality behaviour, and
- 3) management opportunities to protect them in the face of future urban growth and climate change.

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