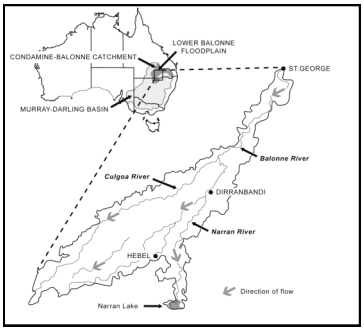
LA TROBE UNIVERSITY

Centre for Freshwater Ecosystems

Fact Sheet

EWKR
Environmental Water Knowledge & Research



Improving the understanding of water availability and use by vegetation of the Lower-Balonne Floodplain

Background

The Lower–Balonne floodplain system was identified as a priority in the Northern Basin Review process and it was recognised that region-specific knowledge on floodplain vegetation was limited. Consequently a commitment was made to undertake research aimed at improving the understanding of the water availability and use by four key floodplain vegetation species (three trees; Coolabah, River red gum and Black box, and a shrub; Lignum) which are common in the Lower–Balonne.

This research was done as part of the Australian Government's Murray-Darling Basin Environmental Water Knowledge and Research (EWKR) project and was conducted by Queensland's Department of Natural Resources, Mines and Energy (formerly DNRM) and Department of Environment and Science (formerly DSITI).

The Lower-Balonne floodplain

The Lower-Balonne floodplain is a distributary river network within the Condamine-Balonne catchment located between the town of St George in southern Queensland and the Barwon River in northern New South Wales. It is comprised of a complex series of braided channels, floodplains and waterholes. Floodplain vegetation is a key ecosystem component of the Lower-Balonne and relies on permanent and periodic flooding, to a greater or lesser extent, depending upon its type and position in the landscape.

Contact

Bill Senior
Department of Environment and Science
Queensland Government
E: bill.senior@des.qld.gov.au

Dr Nikki Thurgate
Project Coordinator
Centre for Freshwater Ecosystems
La Trobe University
P: + 61 2 60 249690
E: n.thurgate@latrobe.edu.au
W: latrobe.edu.au/freshwater-ecosystems

Australian Government
Department of the Environment

Queensland Government

Approach

The approach of the project was to combine multiple lines of evidence to address specific research questions in relation to plant water availability and use on the floodplain. It utilised analyses of long-term time series of satellite images, interpretation of patterns of water availability from floods, rainfall and groundwater and mapped landscape characteristics. This interpretation was validated by detailed field measurements of water source availability, landscape and soil attributes and vegetation physiology and morphology.

Summary of key learnings

Results confirmed that vegetation on this floodplain utilise water from all available sources with a complex spatial and temporal dynamic related to landscape and concluded that flooding is not the dominant water source. In summary, the species studied were categorised into four eco-hydrological units, with individuals of the same species potentially belonging to different units at different places and times in response to variability in water sources and availability:

- Fringing (dependent on access to river water),
- Meander/paleo-channel (in-channel flow dependent),
- Floodplain (rainfall and/or flooding dependent) and
- Groundwater dependent ecosystems (true shallow aquifer dependent)

Trees in the fringing zone were both taller and in persistently better condition than those in other areas because of constant access to in-channel or associated water, and are therefore classified as 'flow dependent'.

On meander bends trees accessed shallow aquifers formed in paleo-channels and connected to the river during flow events. Whilst the recharge mechanisms of the aquifers still need further clarification, these communities can also be considered 'flow dependent'.

On the floodplain beyond the riparian zone, condition of mature Coolabah trees was found to be mostly influenced by rainfall and evaporation, with response to flooding not pronounced.

River red gum and Coolabah used groundwater when it was available to them, in which case they are Groundwater Dependent Ecosystems (GDEs). GDEs were widespread but patchy on the floodplain, likely in response to spatial variability in aquifer depth, quality and recharge potential. The recharge processes of shallow aquifers were different in clay and sandy soils, with sand ridges potentially representing important recharge conduits via both rainfall and flooding, but with considerable spatial variability according to local topography.

While this research did not detect a strong relationship between floodplain vegetation responses and overbank flooding, the correlation between flooding and tree recruitment processes was outside of the scope of the work conducted. It may be that flooding is vital to multiple stages of the tree recruitment process, which maintains whole communities through time. Tree recruitment and population regeneration dynamics remain poorly understood and this is seen as a key area for future research.