Engineering options in the Wheatbelt–greater risk or opportunities for biodiversity?

By John Ruprecht(1), Viv Read(2), Tim Sparks(1) and Shawan Dogramaci(1)
(1) Salinity and Land Use Impacts Branch, Water and Rivers Commission (2) NRM consultant, Perth

Key messages

Engineering options, such as groundwater pumping, deep open drains and the diversion of surface water flows, have been used to mitigate salinity in Australia for more than 25 years.

Approximately 10 000 km of drains have been installed in the broad valleys of the Wheatbelt. Many farmers and rural town managers are planning to install deep bores to discharge saline groundwater to lower the watertable.

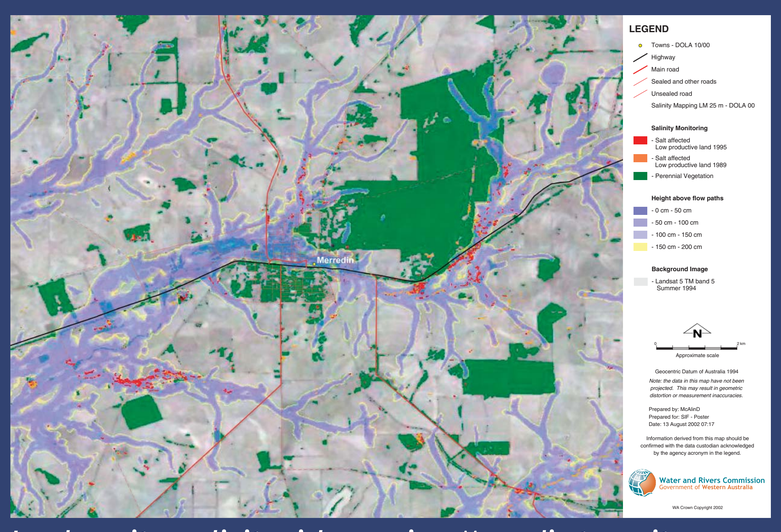
The long-term impacts of these options on the lakes and waterways and their biodiversity are still uncertain.

Are we taking full advantage of the opportunities presented by the new hydrological regimes they create?

Askew's Lake - Wheatbelt wetland affected by salinity (T Sparks, Water and Rivers Commission)

The Wheatbelt landscape

- Catchments in the Wheatbelt of Western Australia are characterised by semi-arid climate and flat landscape.
- Most of the landscape was covered by perennial woody vegetation that used 99% of the rainfall.
- The catchments vary significantly in hydrological, hydrochemical and ecological characteristics.
- The distinctive and diverse biota has evolved over millions of years to endure extended periods of drought and episodic floods.
- Wheatbelt lakes typically have large storage volumes compared to average inflows which means they can have extended dry periods followed by large flood events (such as January 2000).
- Salinity resulting from extensive clearing of the vegetation may eventually affect up to 30% of some catchments degrading agricultural land, bush, infrastructure, rivers, lakes and wetlands.
- The remaining fragmented and often small remnant areas of vegetation are internationally renowned biodiversity 'hot spots' and urgently need protection.



Land monitor salinity risk mapping-Merredin townsite

Engineered management options

- Many farmers have installed drains and pumps to combat salinity. Many more schemes are proposed–some at regional scale. Preliminary evaluation of some drains has indicated significant improvements in agricultural production.
- Drains and pumps are being used or trialed to protect biodiversity (e.g. Lake Toolibin), rural towns (e.g. Merredin) and water resources (e.g. Collie River Recovery Catchment).
- Detention pondage, limestone beds and other designed works are also available to attenuate the impacts of salinity and acidification although they have had limited use in Western Australia to date.

Culvert near Narembeen shows the effects of acid attack on concrete. This suggests that acidic water periodically drained from the area prior to the construction of the current drains. (S Appleyard, Water and Rivers Commission)

Risks

- Understanding the effectiveness of drains and pumps in lowering watertable is increasing but the downstream impacts of discharge water on biodiversity are not well known.
- The remaining Wheatbelt biodiversity may be threatened by:
  - Increased streamflow and resultant increased lake water levels
  - Increased lake and stream salinity
  - Increased sedimentation of lakes and waterbodies
  - Increased acidity (down to pH 3) from enhanced groundwater discharge into receiving water bodies
- A three-fold increase in flood impacts is predicted once catchments reach their new hydrological equilibrium (affecting up to 30% of some catchments)
- These threats are likely to occur without constructing engineering options. The additional impact of enhanced groundwater discharge from engineering options is unclear and needs further investigation.

Gwambygine river pool (V Read)

Value-adding opportunities

Successful engineering works may also provide opportunities like the following to enhance biodiversity values or deliver economic returns:

- Revegetation or enhanced natural regeneration of riparian vegetation in the improved soil/water conditions (also good for faunal habitat).
- Construction of sediment detention traps and nutrient filters (for off-site benefits to fish, macroinvertebrates and birds from the reduced filling of river pools)
- Detention ponds or evaporation basins used as artificial wetlands to provide summer or drought refuge for fauna.
- Aquaculture (salt-water trout are providing economic returns).

For more information contact John Ruprecht on (08) 9278 0461

Tree regeneration as a result of drain construction (T Sparks, Water and Rivers Commission)

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October 2002