

Case Study: Water Quality in Lake Albert

The lake is an important resource for the people of Wagga Wagga. It is used for recreational purposes including fishing, water skiing, sailing and swimming. Housing estates and schools surround it and a golf course is on the western shore. During recent years the lake has been occasionally closed to use because of the presence of blue-green algae and a CSIRO study predicted the large amount of sediment entering the lake would eventually return it to being a swamp which it was originally before creeks in the catchment were diverted into it.

Lake Albert has high phosphorus and turbidity levels.

The Hach phosphorus test has two test tubes of lake water, one with a chemical added which turns any phosphorus present blue. This is then compared to a colour wheel to determine the amount of phosphorus, in this case 1.2 mg/L. This is a problem because levels above 0.05 mg/L can cause the nuisance growth of algae and the lake has been closed to recreational use on occasions due to blue-green algae.

Turbidity (muddiness caused by suspended solids such as clay particles) is measured by pouring water down the turbidity tube until the black lines on the base cannot be seen. The lake water sampled here has a turbidity level of 43 NTU's which is fairly muddy, although the Lake has had levels as high as 200 NTU's after rain. Turbid water is unpleasant for recreational use, the lake's main use and the suspended clay particles causing the turbidity have phosphorous attached to them.



Identification of the key biophysical processes

Surface water flows from the catchment to the lake via creeks. During storms eroded soil from the catchment is washed into the creeks and the flowing water of the creeks have energy which erodes the creek banks as well. The creeks then transport this eroded material to the lake. The coarser sand size particles are filling the lake with sediment, while the clay size particles cause the lake to be turbid.

Phosphorus is an ion in solution with a positive charge. Clay particles have negative charges and opposite charges attract. The phosphorus usually enters the lake attached to clay particles.

The lake rarely overflows it's spillway so most phosphorus, clay and sand which enters the lake is trapped there and levels are gradually building up. A CSIRO study predicted the lake would be totally full of sediment in under 400 years.

Scale of Operation

The Lake Albert catchment is at a local scale. The catchment has an area of 7690 ha and the lake an area of 1.5 km². When the lake does overflow it's spillway, the water enters the Murrumbidgee River which is part of a much larger catchment and would be on a regional scale.

Sensitivity of the biophysical environment to change.

In this case the biophysical environment has been very sensitive to change and the changes to the natural environment have also been massive. We started with a well forested catchment with a swamp at the lowest part which the major creeks by-passed. People cleared the catchment of most of its vegetation and introduced large numbers of grazing animals. We also built housing estates, roads, a rubbish tip, schools and shopping centres so the changes have been very great. To compound the problem we have a soil in the upper catchment which was naturally very erodible and hence very sensitive to changes in the biosphere.

The catchment had no real source of natural phosphorus so nearly all of the phosphorus entering the lake has a human source, either from the surrounding farmland or urban developments.

Importance of understanding key processes for effective management

For sustainable use of the lake for recreational and aesthetic purposes the whole of the catchment must be managed on a sustainable basis.

- Hill tops in the upper catchment have been revegetated to lower watertables in the lower catchment which will reduce the amount of dryland salinity.
- Summer storms are a major cause of soil erosion. Flood control dams have been built in the upper catchment to reduce creek flow and erosion during storms.
- The new cell at the rubbish tip in the lower catchment is lined with a plastic membrane to stop contamination of the groundwater.
- An artificial wetlands has been constructed where Stringybark Creek enters the lake. This traps sediment and phosphorus.
- Gullies in the upper catchment have been stabilised by planting them with trees and grasses and fencing them out to stop stock access.
- Rural properties, including hobby farms, must have a farm plan.
- Urban subdivisions have stormwater sediment traps to limit sediment entering the lake.