The cost of Algal Blooms

A report commissioned by the Land and Water Resources Research and Development Corporation and the Murray-Darling Basin Commission as part of the National Eutrophication Management Program.

March 2000

The cost of researching the causes, effects and control of algal blooms is considerable and the government and community have already invested heavily in understanding this significant environmental and water quality issue that affects most of Australia.

The National Eutrophication Management Program (NEMP) commissioned a report to identify the principal water users affected by freshwater algal blooms and to quantify the direct and indirect costs of these blooms.

Freshwater algal blooms are estimated to cost the Australian community between $180 and $240 million a year. When estuarine blooms that affect fisheries, aquaculture and tourism are included, the full cost of algal blooms will be much higher.

Importantly, these costs are incurred by urban water users, dryland farmers and irrigators in roughly equal amounts. In other words, algal blooms are a problem that affects the whole community.

NEMP was established in 1995 to further develop our understanding of the sources of nutrients and other factors contributing to the development of algal blooms.

The Program has contributed significantly to our knowledge of this complex issue. Importantly, implications for management are already being developed from the results of the research and management guidelines will continue to emerge as further projects are completed.

By quantifying the actual costs of these blooms to the community we can better judge the importance of this issue for Australia and the need to invest in better management of the problem

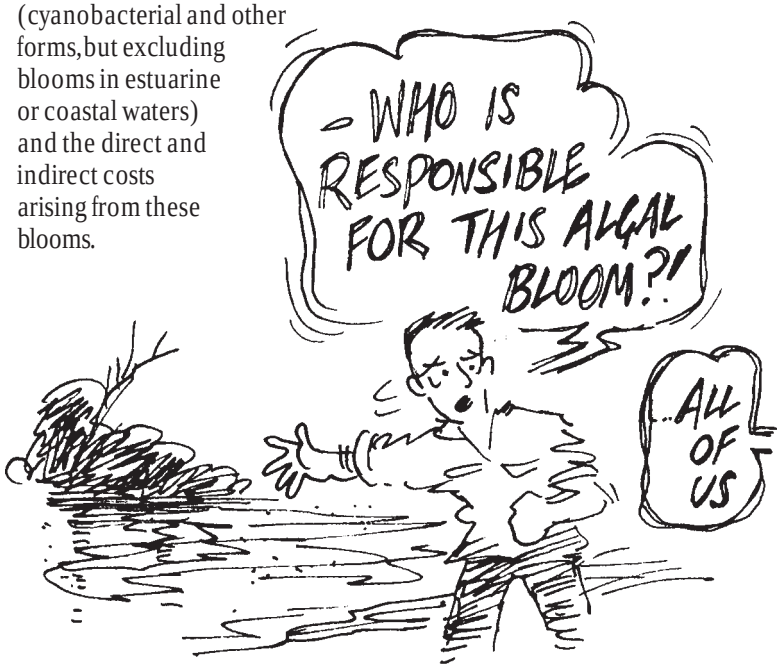
The report was prepared by the Atech Group, Canberra.

Recreational water use can be affected by algal blooms.

P.McWaters

The objectives of the project were to:

- Identify the principal water user groups affected by freshwater algal blooms (cyanobacterial and other forms, but excluding blooms in estuarine or coastal waters) and the direct and indirect costs arising from these blooms.
- Quantify the direct and, as far as possible, the indirect costs of algal blooms to these water user groups.



Cost of freshwater algal blooms by user group
(Australia, late 1990s)

Type of cost		$m/year
Joint management costs		**9**
Cost to extractive users		**95**
• Urban water supplies		35
• Rural water supplies		60
Stock and domestic water from farm dams	30	
Stock and domestic water from rivers, storages and irrigation channels	15	
Irrigation water supply	15	
Cost to non-extractive users		**76-136**
Total		**180-240**

Algal blooms are a significant environmental issue for all states and territories other than Tasmania and the Northern Territory.

Principal water uses affected by algal blooms

Water use was divided into two broad categories: extractive, where the water is actually removed and non-extractive where the water is used on site.

The non-extractive uses that may be adversely affected by algal blooms include the recreational use of waterbodies by local residents and tourists (for swimming, boating and fishing), amenity uses by residents and tourists (water views and riverside walks), commercial fishing, and the so-called 'non-use' values.

Non-use values include the value the community puts on the continued existence of waterbodies in their natural state and the existence of the flora and fauna that they support. The interests of non-extractive users can sometimes be cost-effectively protected by use of algicides, but it is generally not feasible to engage in instream 'water treatment' on the scale that would be required. These users rely mainly on environment protection activities to address their interests, for example, sewage treatment to reduce the quantities of algae-supporting nutrients that are discharged to rivers from point sources.

The extractive uses are defined as drinking water, water for commercial and industrial enterprises, and water extracted for aquaculture, stock watering and the irrigation of pastures and crops. These users are more likely to have cost-effective options for treating water that has been affected by algal blooms, whether it be a simple filtering process for protecting irrigation equipment or the use of activated carbon to deal with toxins in urban water supplies; however, their interests are also protected by investments in appropriate environment protection measures.

P.McWaters

P.McWaters

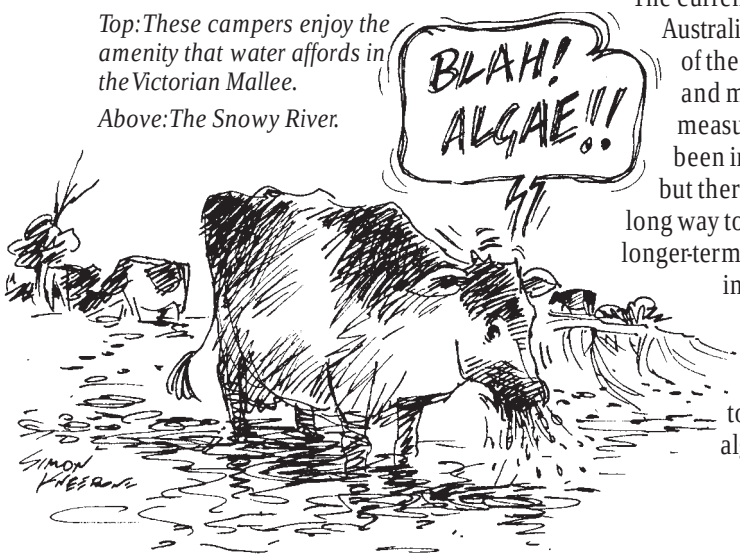
Top: These campers enjoy the amenity that water affords in the Victorian Mallee.

Above: The Snowy River.

Order of magnitude estimate of the total costs currently incurred

An indirect method was used to estimate costs because of the extreme difficulty of directly measuring many significant costs (particularly damage to non-use values and other costs incurred by non-extractive users) that are currently being incurred. To understand the method, consider that the response to algal blooms consists of short, medium and long-term measures.

Short-term measures include importing drinking water, erecting warning signs and treating farm dams with algicide. Medium-term measures include developing ground water resources, improving water treatment and relocating production. Long-term measures include restoring river flows, effluent reuse schemes and rehabilitating riparian land.



The current situation in Australia is that many of the short-term and medium-term measures have been implemented but there is still a long way to go for the longer-term investments in environment protection. We should expect the total costs of algal blooms to fall significantly over time as the longer-term measures are adopted. For example:

- the costs of water treatment will fall as raw water sources improve;
- tourists will return to preferred recreational sites; and
- non-use values will be restored as the incidence of algal blooms declines.

Importantly, the benefits of future investments in environment protection take the form of reductions in costs that are currently being incurred. Current costs can be estimated in two steps.

P.McWaters

Intensive agriculture depends on clean, accessible water.

DNRE

Identifying the direct costs of algal blooms is extremely difficult due to estimating non-use values and other costs incurred by non-extractive users.

Nevertheless, the authors conservatively estimated these costs at $120m a year which includes additional cost of sewerage and stormwater management ($43m a year), additional cost of agricultural and industrial waste water management ($33m a year) and additional costs of rehabilitating land and water resources ($45m a year).

Some of these measures have been implemented and will have delivered some benefits already, that is, reductions in costs that would otherwise have been incurred. For the most part, however, these expenditures lie in the future or have yet to deliver substantial benefits.

The estimate also takes into account that the costs that are currently being incurred are much larger than the anticipated costs of environmental protection.

DNRE

A storm water pipeline, Wareena Wetlands, Wangaratta.

This is because there will be no investment in environment protection unless there is the prospect of reducing costs that are currently being incurred, and the anticipated investments in environment protection will not eliminate algal blooms. Some of the costs will still remain when those measures have been implemented.

The total costs of algal blooms can be reasonably put at twice the anticipated costs of environment protection. Having put the anticipated cost of environment protection at $120 million per year, we therefore put the current total cost of algal blooms at $180 million to $240 million per year.

This as a conservative order of magnitude estimate. It is difficult to make sense of planned environment protection activities unless algal blooms currently impose costs of this order of magnitude on the Australian community.

Cost of algal blooms to principal water users

The table summarises the costs of algal blooms that are currently incurred by specific users.

- The joint management costs are incurred by resource management agencies through contingency planning, monitoring water quality and implementation of contingency management actions. The cost estimates are based primarily on information collected by phone interviews with staff of resource management agencies.
- The cost to urban water supplies was collected by an exhaustive survey of urban water authorities. The figure includes the additional costs of investigations and assessments of algal problems, catchment monitoring and assessment, storage monitoring and assessment, water treatment and distribution, customer relations and administrative and training overheads. A substantial part of the total cost to urban supplies is an estimate ($20 million per year) of the cost of interruptions to the potable water supplies due to algal blooms.
- Each component of the costs to rural water supplies has been separately estimated, often drawing heavily on work done in recent years for a number of Victorian catchments.

Some of these costs will fall as appropriate investments in environment protection are undertaken.

EWS

Monitoring algal blooms is a major cost to the community

The cost to non-extractive users has not been separately estimated. The estimate is simply a residual, being the difference between the order of magnitude estimate of total cost and the sum of the joint management costs and the costs to extractive users. It is commensurate with partial estimates of cost to non-extractive users that have been made for certain Victorian catchments.

'Cost of Algal Blooms', LWRRDC Occasional Paper 26/99

Available from the AFFA Shopfront in Canberra.
Ph 1800 020 157
Cost: $20.

Also available on the LWRRDC Web site at www.lwrrdc.gov.au

Front cover photos, L to R:

Monitoring and research are important in developing our understanding of algal blooms. (MD Burch)

A typical algal bloom.

The Snowy River. (P McWaters)