

Coastal water quality, Western Australia's Peel-Harvey estuarine system

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Citation:

Department of the Environment and Heritage 2006, 'Coastal water quality, Western Australia's Peel-Harvey estuarine system', paper prepared for the 2006 Australian State of the Environment Committee, Department of the Environment and Heritage, Canberra, <<http://www.deh.gov.au/soe/2006/emerging/coastal-wq-peel-harvey/index.html>>

Background

The Peel-Harvey estuarine system, comprising the Peel-Inlet and the Harvey Estuary, is a single shallow estuary located approximately 70 km south of Perth in the south west of Western Australia. The Ramsar-listed Peel-Harvey Estuary is the receiving water body for three major river systems, the Serpentine, Murray and Harvey Rivers and their respective river catchments, as well as for extensive areas of land between the Murray and Harvey river systems that drain directly into the estuary system via natural and artificial drainage channels, with a total catchment area of approximately 11 900 square kilometres.

The coastal portion of the catchment area was traditionally dominated by agricultural land uses, predominantly grazing for cattle and dairy production. Over the past 20 years land use has become increasingly intensive and this has been driven, in part, by very rapid urban development; the Peel region is currently recognised as one of the fastest growing population areas in Australia.

The Peel-Harvey estuarine system has a long and well documented history associated with eutrophication and poor water quality culminating in the construction of the Dawesville Channel in 1994. The two kilometre long artificial channel, was constructed to provide a second opening to the Indian Ocean with the intention of increasing the tidal flushing of nutrient pollution, especially phosphorus, from the estuary and therefore alleviating the instances of massive algal blooms. The Dawesville Channel was one component of the full management strategy designed to "cap" the phosphorus loading of the estuary and return the system to be "visibly clean and healthy and ecologically healthy and resilient" (WAEPA 1985). Other components of the strategy included: the implementation of catchment management measures, preparation of an integrated catchment management plan, algal weed harvesting and appropriate water quality monitoring.

Although some of the management strategy has been implemented and a large community effort has been undertaken, the phosphorus input to the Peel-Harvey system has remained

almost static since the construction of the channel, well in excess of the targets set by the Environmental Protection Authority (EPA) in 1992. Many of the symptoms of excessive nutrients have been alleviated by the construction of the channel within the estuary itself although many symptoms of eutrophication, such as algal blooms, “cappuccino scums” and large-scale fish kills, are now evident in the lower reaches of the river systems.

Current efforts

In 2003 the Peel-Harvey coastal catchment was identified as a priority hotspot under the Australian Government’s Coastal Catchments Initiative (CCI) and the subsequent component projects were developed in partnership with the Government of Western Australia.

The resultant CCI programme consisted of seven coordinated projects whose outputs would contribute to and assist in the preparation of the Peel-Harvey Water Quality Improvement Plan (WQIP) being developed by the EPA with assistance and coordination provided by the Peel-Harvey Catchment Council.

The results of the component projects of the CCI programme indicate that:

- excessive nutrients predominantly emanate from diffuse sources
- the phosphorus load discharge from the three river systems is approximately 145 tonnes and a reduction of at least 48 per cent is required to meet the target set by the EPA in 1992
- nearly 70 per cent of the phosphorus discharges come from agricultural activities
- urban areas account for only 6 per cent of the land use by area but contribute more than 20 per cent of the phosphorus inputs – and this figure is rising, with gardens, lawns and on-site sewerage systems (septic tanks) being the source of this pollution.

Table 1: Current and target phosphorus loads to the Peel-Harvey estuarine system.

Pollutant source	Current P load (t/yr)	Target P load (t/yr)	Load reduction (%)
Serpentine River catchment			
– Soil store and atmospheric	23.87	9.56	60
– Grazing	25.63	10.27	60
– Residential	13.87	5.56	60
– Intensive horticulture	5.04	2.02	60
– Other industrial and agriculture	0.25	0.1	60
Total Serpentine	68.6	27.5	60
Murray River catchment			
– Soil store and atmospheric	6.53	6.53	0
– Grazing	0.90	0.90	0
– Residential	1.00	1.00	0
– Intensive horticulture	1.27	1.27	0
– Other industrial and agriculture	5.54	5.54	0
Total Murray	15.2	15.2	0
Harvey River catchment			
– Soil store and atmospheric	18.68	10.89	42
– Grazing	30.75	17.91	42
– Residential	11.09	6.46	42
– Intensive horticulture	0.06	0.04	42
– Other industrial and agriculture	0.27	0.16	42
Total Harvey	60.9	35.5	42

Other sources			
Dawesville and Mandurah Channel			
Internal loading (sediments)	NK	NK	NK
Groundwater			
Total current & target loads	145	78 ¹	46

Note: P = phosphorus. NK = not known. "other agriculture" includes cropping, forestry and non-intensive horticulture.

Source: Western Australia EPA Draft Water Quality Improvement Plan for the Peel-Harvey Estuarine System.

The Water Quality Improvement Plan aims to reduce phosphorus discharges from the Peel-Harvey coastal catchment through changes to agricultural and urban practices and land use planning. Key recommendations to achieve load reductions include:

1. Use slow-release, low water soluble fertilisers, applied after the break of season and at reduced rates, on sandy soils in rural areas. Reducing the solubility of phosphorus in fertilisers applied on agricultural areas will reduce phosphorus discharges to the estuary by 13 per cent. And in the Serpentine catchment this would result in an 18 per cent reduction.
2. Undertake soil amendment on sandy soils. Using soil additives or conditioners such as 'yellow sand' and 'red mud' to help absorb phosphorus is very effective in stopping it leaching into the Peel-Harvey waters. This includes soil remediation for new urban developments in areas with sandy soils.
3. Promoting the continued use of a low water soluble domestic fertiliser for domestic gardens, and designing low water and fertiliser use gardens.
4. Full connection of all current and future homes to reticulated sewerage or effective alternative onsite systems to replace existing septic tanks.
5. Eliminate phosphorus discharges from licensed agricultural premises, such as turf farms or intensive feedlots.
6. Apply other agricultural practices which reduce phosphorus discharges including a) replacing annual pastures with perennial pastures; b) effective effluent management, and c) better managing irrigation systems:
7. Strategic reforestation of some agricultural land or combining with agriculture to produce agroforestry.
8. Having local planning policies, strategies and planning conditions incorporate and implement Best Management Practices where applicable.

¹ In 1992 the EPA set a target of 75 tonnes. Given modelling approximations this is the same as the EPA figure.

9. All new developments to incorporate water and nutrient sensitive design according to local planning policies and the technical manual developed as one of the seven investigations.
10. Improve the agricultural and urban drainage system to enhance their ability to remove nutrients during flow.

The proposed actions are a mix of voluntary and regulatory measures. The mix selected may possibly change over time if, for instance, either land uses change following further development approvals or if longer term monitoring reveals that water quality is not improving. These commitments indicate that with full uptake the phosphorus targets can be achieved within 15 years.

Reference

Western Australia Environment Protection Authority 1985, Peel Inlet and Harvey Estuary Management Strategy: Report and Recommendations, Assessment of Stage 1 ERMP. Department of Conservation and Environment Bulletin No. 243. December 1985.