Seagrass health

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EPA 768/09: This information sheet is part of a series of Fact Sheets on the Adelaide coastal waters and the findings of the Adelaide Coastal Waters Study (ACWS).

Introduction

In southern Australia, seagrasses are adapted to naturally low nutrient environments and as such they are sensitive to any increases in nutrient levels. Seagrasses are also sensitive to increases in turbidity as they require sunlight in order to grow. As seagrasses are sensitive to both increased nutrient and turbidity levels, they are often considered as indicators for the health of the marine environment.

Pollution of coastal waters from industrial discharges, stormwater runoff, treated effluent discharge and oil spills can put the health of shallow nearshore habitats and seagrass communities at risk. This is exacerbated by the coastal processes in operation along the Adelaide metropolitan coastline which limit the off shore movement of these various inputs. Refer to Adelaide Coastal Waters Information Sheet 4 *Physical Processes* (2009) for more detailed information on the distribution of suspended matter in Adelaide's coastal waters.

Disturbance from anchors and propellers, mooring, dredging and land reclamation works can also cause long-term damage to seagrass beds. Once destroyed, seagrass can take up to 50 years to recover.

Nutrients and seagrasses

High nutrient levels (mainly nitrogen) are a major cause of seagrass loss as they promote the rapid growth of epiphytes in a process called eutrophication. These epiphytes grow upon or attach themselves to the seagrass leaves and have contributed to the loss of seagrass. The rapid growth of epiphytes with increases in nutrients can also prevent adequate light reaching the seagrasses, particularly in the deeper regions, which also contributes to seagrass loss. A reduced oxygen level in the water is another impact resulting from eutrophication. Refer to Adelaide Coastal Waters Information Sheet 8 *Nutrients and coastal water quality* (2009) and Adelaide Coastal Waters Information Sheet 9 *Reducing the impacts of nutrients* (2009) for more detailed information.

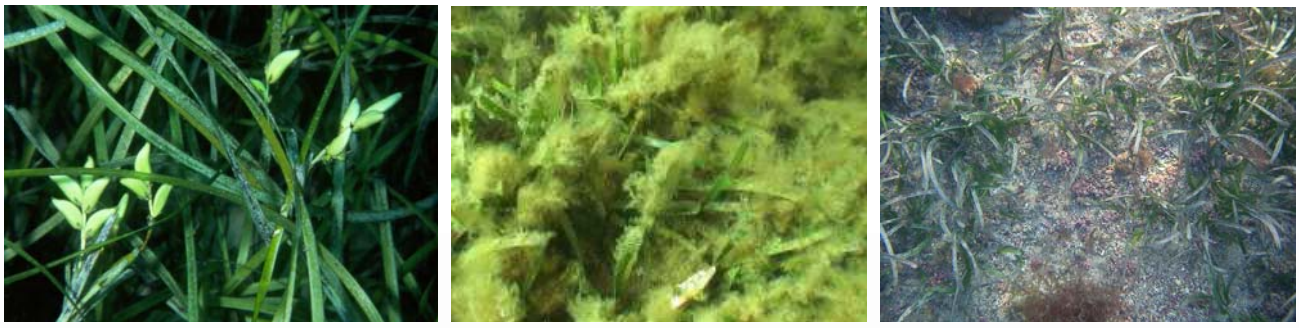

Image 1 Healthy *Posidonia* seagrass (left), with epiphyte growth (centre) and seagrass loss (right)

Turbidity and seagrasses

Seagrass loss can be caused by high turbidity levels. Turbidity is a measure of how light is scattered through the water. Turbidity levels are determined by the volume of fine particles which remain suspended in the water and is measured visually by looking at how cloudy or murky the water is. Suspended sediments can smother seagrasses and reduce the amount of sunlight reaching their leaves which results in a decrease in photosynthetic activity and an increase in stress on the plant. Refer to Adelaide Coastal Waters Information Sheet 6 *Sediments and the seabed* (2009) for more detailed information on issues with suspended sediments.

Image 2 Turbid water entering Gulf St Vincent from the Torrens River

Seagrass loss along the Adelaide coastline

Prior to the Adelaide Coastal Waters Study (ACWS) it was found that over 5,000 hectares of seagrass has been lost from the Adelaide metropolitan coastline since 1935. This has been a result of excessive nutrient and suspended sediment levels in water outflows from industrial sources, sewage treatment works and stormwater. Much of the seagrass loss from Glenelg to Largs Bay occurred between 1970 and 1977 following a period of more rapid population growth. This growth led to greater volumes of stormwater from new roads and buildings as well as greater volumes of treated effluent discharge from the Glenelg sewage treatment works and Pt Adelaide sludge pipeline. In some instances seagrass loss at specific locations can be attributed to dredging activities that smother seagrass with sediments or involve the removal of seagrass.

Recent aerial photography indicates that seagrass loss is still happening today. Findings from the ACWS confirm that high volumes of nutrients entering Adelaide's coastal waters via industrial discharges, treated effluent discharges and stormwater have been and continue to be the main cause of this seagrass loss along the Adelaide coastline.

Impacts of losing seagrass

The loss of seagrass can be devastating for the health of the marine environment. Seagrasses provide habitat for a large variety of marine animals including fish and crustaceans. Seagrasses also capture and stabilise sediment which reduces erosion. Seagrass beds also reduce wave energy, which can help stop beach and foreshore erosion during storms. Refer to Adelaide Coastal Waters Information Sheet 1 *Importance of Seagrass* (2009) for more detailed information on the importance of seagrass.

Findings from the ACWS indicate nutrient-rich inputs from industrial sources and waste water treatment plant discharges need to be reduced to about 600 tonnes of nitrogen per annum (from the 2003 total of 2,400 tonnes). This is likely to prevent further seagrass loss and allow for recovery.

Prevention of seagrass loss through appropriate planning and action is the best approach to ensuring their conservation. An integrated approach to the management of stormwater run-off, coastal development and reuse of treated effluent discharges will help to control seagrass loss and maintain the coverage of the remaining seagrass systems. The improved water quality gained through this process is hoped to create the conditions suitable for re-establishing seagrass meadows.

Seagrass rehabilitation

Natural seagrass restoration has proved to be a slow or even unsuccessful process due to slow vegetative growth rates and the unsheltered environment of the nearshore coastal waters. This unsheltered environment is represented by bare sand or damaged seabeds which resulted from the seagrass loss to begin with.

Attempts have been made to restore seagrass restoration through a range of transplanting programs. However high mortality rates were experienced due to factors such as excessive water motion, high levels of epiphytes, insufficient anchoring and/or sediment instability.

There has been encouraging results recently using a range of different types of hessian substrate which catch naturally released seedlings. The *Amphibolis* species has a 'grappling hook' found at the base of the seedling which snags on the hessian to hold the seedling in place whilst a root system develops. The most successful method has been a hessian sandbag wrapped in a layer of coarse weave hessian. While there has been much variability in recruitment success using this method in recent years, more than half of the sandbags across all study locations supported some *Amphibolis* after 12 months. Although successful, this method is not a universal remedy. Seagrass restoration will require a range of methods, targeting different species, in conjunction with the appropriate management of inputs to the coastal environment.

Image 3 Seedlings of *Amphibolis antarctica*, hooked on to a hessian sand bag

What can we do?

To improve Adelaide's coastal water quality, prevent further seagrass loss and assist in the seagrass rehabilitation process we can each take action around our homes to improve the quality of wastewater and stormwater.

- To improve the quality of our wastewater we must be mindful of what goes down our drains. Items such as solvents, oils, paints, varnish, thinners, paint strippers, pesticides, poisons, fertilisers and acids should be disposed of responsibly.
- To improve the quality of wastewater avoid unnecessary use of cleaning products and ensure compostable material such as food scraps do not go down the kitchen sink.
- To improve stormwater quality we must be mindful of our own garden activities. Fertilisers, pesticides and herbicides should be used sparingly as rainfall can carry these chemicals into the stormwater drain or your local waterway. Be sure to clean up lawn clippings and leaf litter around the yard as well to prevent them entering stormwater drains.
- Washing cars with bucket water on grassy areas instead of the driveway will also help to reduce stormwater pollution. Installing rain water tanks will help by reducing the volume of stormwater entering Adelaide's coastal waters.

References

Bryars S, Collings G and Wear R 2008, 'Seagrasses of Gulf St Vincent and Investigator Strait', Chapter 11 in *Natural History of Gulf St Vincent*, Royal Society of South Australia Inc, pp 132−147.

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EPA 1998, *Changes in Seagrass Coverage and Links to Water Quality off the Adelaide Metropolitan Coastline*, Environment Protection Authority, Adelaide.

-- 2008, 'Coasts and Seas', *The State of the Environment Report 2008*, EPA, Adelaide.

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Moore T and Westphalen G 2007, *Australian seagrass meadows as potential carbon sinks: focus on Gulf St Vincent, South Australia*. A report for the Environment Protection Authority, Adelaide.

Acknowledgments

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Useful websites

Environment Protection Authority Water Quality pages <www.epa.sa.gov.au/water_quality.html>

Queensland Environment Protection Authority, *Environment and Resource Management: Caring for our Water* <www.epa.qld.gov.au/environmental_management/water/caring_for_our_water>

Coast and Marine website <www.environment.sa.gov.au/coasts/index.html>

CSIRO Adelaide Coastal Waters Study pages <www.clw.csiro.au/acws/.html>

State of the Environment Report 2008 for South Australia <www.epa.sa.gov.au/soe>

Images

1 Healthy Posidonia Seagrass (left), with epiphyte growth (centre) and seagrass loss (right) courtesy of Greg Collings, SARDI Aquatic Sciences.

2 Turbid water entering Gulf St Vincent from the Torrens River courtesy Simon Bryars, DEH.

3 Seedlings of Amphibolis antarctica, hooked onto hessian sand bag courtesy of Rachel Wear, SARDI Aquatic Sciences.

Disclaimer

Further information

Legislation

Legislation may be viewed at: <www.legislation.sa.gov.au>

Copies of legislation are available for purchase from:

Service SA Government Legislation Outlet
Adelaide Service SA Centre
108 North Terrace
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Fax: (08) 8204 1909
Internet: <shop.service.sa.gov.au>

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