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case study 21: the geographe bay region

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executive summary

The Geographe Bay region, like many other Western Australian coastal areas, is facing the stress of excess nutrient loading to the coastal waterways and the adjacent marine ecosystem. Also like several other regions, the symptoms of this are the highly damaging toxic algal blooms that occur frequently in the fresh and estuarine waters of the region, and the major impacts for agriculture, tourism, public health and biodiversity.

These issues were first recognised in the Geographe Bay region in the 1990s, and a community-led process was initiated to develop and implement an integrated catchment management plan designed to reduce nutrient inputs and restore environmental values to their former levels. The catchment management plan is now implemented by Geographe Catchment Council (GeoCatch), a small community-based organisation established for this purpose. The catchment management plan is a voluntary instrument designed to re-orient rural and urban management practices towards more desirable objectives through education and awareness raising, through demonstrated examples of best practice, and through promotion of specific measures for adoption by local and state government agencies. A large number of important strategies have been developed and implemented, and new strategies are being developed. However, although the catchment management plan provides for monitoring and evaluation to be conducted, there appear to be very few examples that demonstrate the success of the plan in facilitating improved catchment health (such as by reducing nutrient loading to rivers or the bay).

While changes in catchment health may take some time to be able to be assessed, the strategies continue to be developed and implemented in accordance with best practice principles. The pace at which improved catchment management is implemented in Geographe Bay is related to the rate at which the community can recognise and assimilate reform. This in turn depends heavily on the institutional arrangements supporting GeoCatch and the depth of commitment of community, private sector and government support for the catchment management plan and the imperative to resolve the issues that the plan has been established to resolve.

introduction

Geographe Bay is situated approximately 250 kilometres south of Perth in the south west of Western Australia. Its catchment area covers approximately 2,000 square kilometres and lies within the boundaries of four local government authorities (LGAs), mainly the Busselton and Capel Shires, with small parts also within the Donnybrook-Balingup and Augusta-Margaret River Shires.

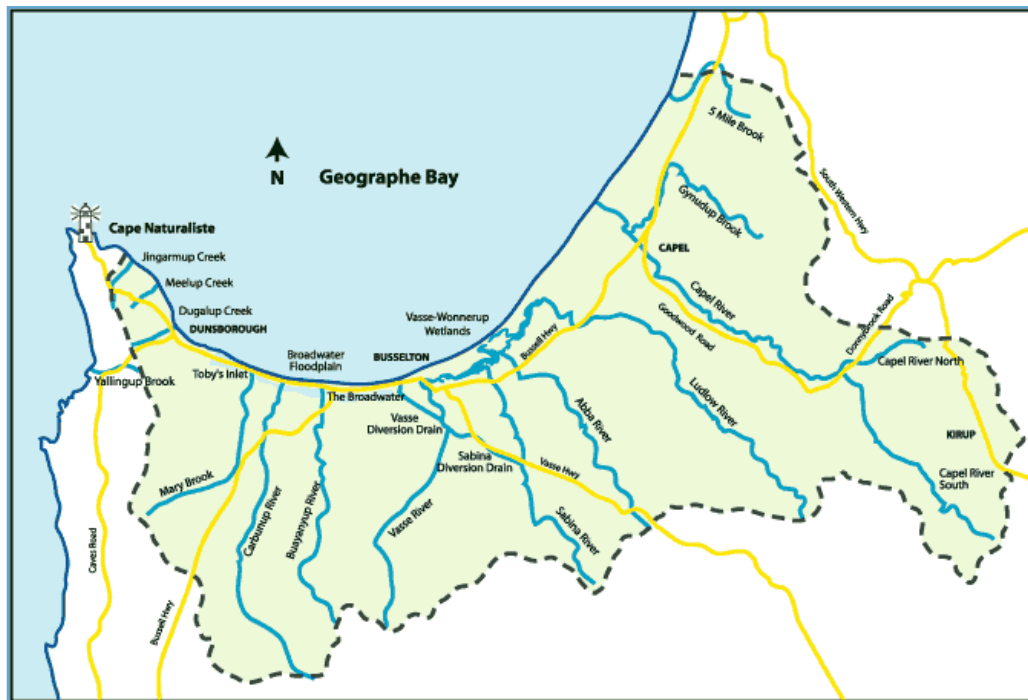
Geographe Bay is a north-facing embayment that marks the southern end of the Swan Coastal Plain. The Geographe Bay seabed is a shelf that slopes gently seaward, reaching 18 metres in depth at a distance of nine kilometres offshore. The seabed is dominated by seagrasses, sand and rock substrates, with the deeper areas mostly sandplain. Ocean currents vary throughout the year, but in summer the Leeuwin Current flows southwards off the coast outside the catchment boundary and creates an inshore counter-current that flows northward near the Leeuwin-Naturaliste coast and sweeps into Geographe Bay.

Geographe Bay is an open marine system, with a freshwater catchment derived from the escarpment formed by the Darling and Whicher Ranges and the Leeuwin-Naturaliste Ridge. The escarpment overlooks the southern Swan Coastal Plain, wetlands and watercourses, and the shoreline between Rocky Point in the south and the Five Mile Brook Diversion to the north.

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The Geographe Bay catchment (see [Figure 1](#)) is divided into three sub-catchments: the *Capel River*, which incorporates Gynudup and Five Mile Brooks as well as the Capel River; the *Sussex*, which incorporates Eagle Bay Creek, Carburnup and Buayanyup Rivers and Meelup Brook; and the *Vasse-Wonnerup*, which incorporates Vasse, Sabina, Abba and Ludlow Rivers. Apart from these natural stream systems the area is also crossed by a series of artificial watercourses draining from the high land to the east and south down to the coast. These drainage works are important for agricultural productivity of the plain and for flood protection of urban areas.

Figure 1: Geographe Bay Catchment Vasse-Wonnerup Wetlands



The Ramsar-listed wetlands of the Vasse-Wonnerup system are some of many wetlands in the catchment. This wetland system is unique to Western Australia as an example of a system of formerly estuarine basins now functioning as seasonal brackish lakes that provide significant habitat for waterbirds with high species diversity.

The Geographe Bay catchment is in high demand for residential, recreational, agricultural, industrial and commercial activities. The catchment has been extensively cleared for agriculture — rural land comprises 63 per cent of the catchment with an additional 30 per cent being Crown land managed for conservation and forestry. These uses, combined with a rapidly increasing population, are adversely affecting the natural environment.

Over many years concerns have been expressed by community groups about issues such as overfishing in Geographe Bay and about the instances of fish kills (such as in the Vasse-Wonnerup estuary in 1987). As a result, an integrated catchment management plan has been developed as the major strategy to reduce the input of pollutants to the Bay. The management plan has been developed with the involvement of a number of community groups and government agencies, commencing in 1992, but is now managed and implemented by the GeoCatch, a sub-committee of the former Western Australian Waters and Rivers Commission now contained within the Western Australian Department of Water. The Catchment Management Plan addresses 13 core issues, including the primary issue of eutrophication of the waterways.

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pollution issues

The main issues in the Geographe Bay catchment relate to eutrophication and input of nutrients:

- Accelerated weed and algal growth causing deoxygenation of waterways and fish deaths.
- Loss of seagrasses in the marine environment due to increased algal growth from the availability of nutrients in marine waters. This potentially leads to increased shoreline erosion due to lack of seagrass buffer, and reduced fish numbers due to reduction in breeding areas.
- Accumulation of black organic ooze and bad odours.
- Loss of bird habitat, and impacts on wetland health and public health.

The major nutrient sources, in order of magnitude, are considered to be surface waters from rivers and drains; groundwater discharges; and wastewater treatment plants and un-sewered urban areas adjacent to the coast. For example, the Vasse Diversion Drain is estimated to have contributed, in 1996, 300 tonnes of phosphorus, more than an earlier estimate for all nutrient sources to the bay. In March 2006, a blue-green algal bloom in the Lower Vasse River was reported, with concentrations of toxic algae more than ten times the recommended limit for recreational waters.

While Geographe Bay itself does not appear to be degraded by nutrient enrichment at present, the waterways and wetlands of the catchment are some of the most heavily nutrient-loaded systems in Western Australia. A primary goal of the Catchment Management Plan is therefore to prevent excess nutrients from entering waterways.

management context

The implementation of the Catchment Management Plan is vested in GeoCatch. Such a dedicated peak management organisation was considered to be essential because of the complexity of the human and natural resource problems that needed to be resolved.

The mission of GeoCatch is '*To work with the community and management agencies to manage the catchment of Geographe Bay and its marine environment so that natural systems, people and their activities co-exist in a healthy, productive and sustainable way*'.

GeoCatch seeks to be:

- *Proactive* by preventing environmental degradation, addressing the causes of environmental problems, and dealing with the symptoms of degradation in a strategic and integrated manner;
- *Adaptive* by recognising that the natural environment is constantly changing, that managers must respond by evolving, reassessing and adapting management decisions to suit new situations, and 'learning together' with the local community;
- *Consultative* by encouraging individuals, community groups, shires and state agencies to participate in decisions;
- *Balanced* by balancing economic development with the need to protect biological diversity and satisfy the community's cultural and social needs; and
- *Holistic* by directing attention towards both natural and human systems within which people live, and the interrelationships between those parts.

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In relation to the eutrophication issues, the main strategies being implemented by GeoCatch to achieve an integrated set of effective solutions involve co-ordination, liaison, awareness-raising activities and research.

co-ordination

1. Identify nutrient loads on a catchment-by-catchment basis and promote nutrient reduction strategies.
2. Identify nutrient hot spots and promote reduction strategies.
3. Support the land holders and government agencies in implementing strategies to reduce nutrients from all sources.

liaison

4. Support and promote the government's codes of practice covering rural point sources of nutrient such as dairies, piggeries and intensive horticulture.

awareness raising activities

5. Assist in the promotion and distribution of public information for residents to encourage significant reduction of nutrient loss from their properties.
6. Encourage the government agencies to adopt and promote water sensitive urban design guidelines.
7. Use the Vasse River to demonstrate to local communities how river rehabilitation techniques and integrated catchment management practices can be used to address the symptoms and causes of eutrophication.

research

8. Co-ordinate an overall monitoring program to measure nutrient inputs into the Geographe Bay.

implementation

GeoCatch is a community-based group that works through voluntary processes and arrangements with community groups, the private sector, local government and state government agencies to seek to develop and implement strategies that will achieve reduced nutrient loading to the Bay, consistent with the other objectives covered above. The work of GeoCatch is delivered through a small full-time secretariat group working closely with a large number of supporting volunteers from community groups and with officers from a range of government agencies.

The main strategies have the force of regulation when they are adopted for implementation by the (mainly) state government agencies. The main resources are allocated for various activities including on-ground works, research, and monitoring. Many of the required improvements can be implemented through the day-to-day activities of government in the region, and given the force of regulation working within a context of community co-operation and support. However, the pace of reform depends heavily on the capacity of GeoCatch to influence on-ground practices, and to organise and demonstrate a strong base of community and government support for the reforms encapsulated in the management plan.

To achieve such changes takes considerable time, because there are many practices to be changed, and many are embedded within established and traditional farming and urban practices. The implementation of the plan, and the reform of practices are likely to be decadal in nature, and so improvements in catchment health may also be recognisable only in the medium to long term.

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These approaches are also supported by specific strategies developed and implemented within the private sector. A key strategy is *DairyCatch*, a project directed at promoting more environmentally responsible dairy farming practices. It is conducted by Western Dairy and is a major development program for the dairy industry in the region.

monitoring and evaluation

The outcomes of the management plan are being monitored through a specific performance assessment system that evaluates three key aspects of the plan: business activity, implementation of the strategies, and catchment health. Each of these is intended to be evaluated using a set of key indicators within a regular evaluation and reporting system.

An evaluation of water quality in 2001 established a baseline for a number of water quality parameters over the previous four year period, and confirmed that the catchment is under stress from excessive nutrient inputs.

The limited analysis of the success of the catchment plan, in catchment health terms, reflects the availability of resources for monitoring, the evolutionary process of catchment planning and the medium-long term nature of the impacts of improved practices in the catchment. As the focus for improving practices shifts from controlling end-of-pipe inputs to diffuse sources of pollutants, the limited GeoCatch resources available to implement the plan are likely to shift from controlling inputs to the rivers and streams to monitoring improvements in estuaries and marine waters.