Perth's mysterious red Swan

In late summer a red tide of algal blooms began to mar the beauty of Perth's Swan River. For unknown reasons, however, the blooms have not been of the blue-green species, nor have they been highly toxic.

This presents a classic problem for science to solve. Future blooms cannot be predicted until the mechanisms that regulate algae growth in the Swan are understood.

Perth might be unlucky enough to experience a toxic bloom serious enough to close the river. On the other hand, it's possible that some factor, perhaps unique to the Swan, is inhibiting the growth of toxic species of 'blue-greens'. If such an inhibiting factor (or set of factors) could be found, such a discovery may be the salvation of other rivers and estuaries, including the Peel-Harvey, south of Perth. Research is tackling the problem from several angles.

Dr Munna Sharma, from CSIRO's Division of Water Resources, is investigating the source of nutrients entering the Swan from Ellen Brook. He is also studying how nutrients, especially nitrates from septic tanks and fertiliser, move through the groundwater system. His data will provide a basis for catchment management strategies to stop excessive levels of nutrients reaching the river.

Nutrient behaviour

Work on algal ecology by Dr Peter Thompson and Dr Hugh Kirkman of the Division of Fisheries aims to provide new information on the biological environment of the Swan River, relevant to algae growth.

Dr Robert Gerritse and Dr Grant Douglas (Water Resources) are attempting to identify the trigger mechanisms causing algal blooms and the connection between the bioavailability of nutrients and the growth of algae. They are also studying the relative proportions of nutrients supplied from the bottom sediments and suspended particles.

Essential to all projects is information gathered in the Swan River Wedgewatch program and physical modelling data gathered by Dr David Hamilton of the Centre for Water Research, University of Western Australia and The Swan River Trust.

Wedgewatch, begun by the trust in 1992, monitors changes in water chemistry caused by influxes of ocean water up the Swan River channel. The name of the program stems from the behaviour of fresh and salt water in the lower reaches of the Swan.

In winter, plenty of fresh water flows downstream to the Swan River channel. During the low-rainfall summer months, however, salt water enters the river mouth from the sea, travelling more than 30 kilometres inland. The dense, nutrient-rich salt water flows in underneath the fresh water as a wedge. Wedgewatch data indicates that the salt water increases nutrient levels in the river. The task for Gerritse and Douglas is to find out why.

Scientists cannot yet predict the likelihood of future algal blooms in Perth's Swan river.

They have discovered that the dense salt water accumulates in deep (five to six metre) holes in the river bed, often remaining resident even after the winter rains. It is thought that the increased demand for biological oxygen from the sediment in these sites causes the salt water in the holes to become anoxic, (oxygen depleted), causing a nutrient release from the bottom sediments. These higher nutrient levels increase the possibility of algal blooms.

The Wedgewatch program is integrated with a remote sensing project run by the Division of Fisheries and the Division of Exploration and Mining. Remote sensing is being developed as a potential management tool to identify algal blooms. Detailed knowledge of bloom behaviour may also be used to create a predictive model, in order to avert potential blooms.

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Spreading the biodiversity message

Representatives of a dozen Commonwealth countries met in London during January to discuss an international education and training program for promoting the concept of biodiversity.

The training program will target people involved in extension, education or training, mainly in the developing countries, where two-thirds of the earth's biodiversity exists. It will help them communicate sound biodiversity principles to those who manage the earth's resources, both at a policy-making and practical level.

Australia was represented at the London meeting by Nicholas Alexander of CSIRO's Communication Services. He says the participants recognised that communication and learning is a two-way process.

It was noted that small farmers and indigenous people often have considerable skills in crop variety preservation and ecological prudence, Alexander says. The Iwokrama Rain Forest Program in Guyana was mentioned as an example. Here, 360 000 hectares of rainforest in central Guyana has been set aside to demonstrate methods for conserving and sustainably utilising tropical forest resources and biodiversity in partnership with the indigenous people.

Alexander says the meeting faced a daunting task. If extension workers were to be targeted, a general package would not suffice. It must be specific. One communication technology may not be suitable for all groups. Plans should not be overambitious, but practical. Materials should also be packaged for policy makers, so that they understand basic principles.

All participants in the meeting pledged support for the project and resolved to collaborate in the development of the training program. The meeting was sponsored by the Commonwealth Science Council and the Commonwealth of Learning, based in Vancouver, Canada.