

Diatoms help monitor the health of our rivers

The quality of Australia's rivers and streams are often taken for granted, with the result that many are rapidly becoming breeding grounds for pollution. Associate Professor Jacob John, who has been studying the changing quality of water bodies across Western Australia for nearly 25 years, has developed a system for predicting the water quality of urban and rural water systems using microscopic algae called diatoms. The research, which has received sponsorship under the National River Health Initiative, is expected to have implications for the management of river systems throughout Australia.

Associate Professor Jacob John, from Curtin's School of Environmental Biology, is one of only two researchers nationwide funded to monitor the health of Australia's rivers and streams using diatoms. A diatom is a tiny glass-walled alga, literally made of two lids. The glass skeletons are easily preserved, so they can be studied from sediment samples taken from chosen sites.

"The abundance and type of diatoms truly reflect water quality because they are very specific in their tolerance to different environments," Professor John said.

"Diatoms reflect the type of conditions that are fully conducive for healthy and diverse river systems."

Professor John has just completed a three-year study of the river systems in Western Australia's South-West region. He is also halfway through another project examining ways to assess and monitor the health of WA's urban water bodies feeding into the Canning and Swan rivers, using diatoms as the primary research tool.

Jointly, these projects have received \$250,000 funding from the Commonwealth Environmental Protection Agency (CEPA) and an equal sum 'in-kind' from the Waters and Rivers Commission of Western Australia.

Following the completion of his research into the South-West river systems, Professor John is in the final stages of putting together a report which will be presented to the National Land and Water Resource Research Development Corporation (LWRRDC) which is managing the project for CEPA.

From his extensive research, he has created a model to predict the water quality of any given river system using diatom assembly.

During the three-year study his research team took samples from 200 specific sites in 43 rivers and streams in the South-West region to determine and compare the differing degrees of water quality and habitats.

It was found that many pristine rivers and streams were still flowing through natural forest areas such as the Karri Forest, Margaret River and Donnelly River in the South-West. However, many inland areas such as the Blackwood River Catchment were seriously degraded with problems such as salinity, siltation, erosion and nutrient enrichment.

"Many rivers and streams were polluted due to forest clearing and excessive use of nutrients from farm run-off. When habitat and vegetation in a system is lost or degraded, that loss impacts on water quality," Professor John said.

"Historically, river systems have degraded at a rapid rate since European settlement and there is an urgent need to assist them to a healthy return."

Professor John is in the second year of the three-year project assessing the health of urban water bodies using similar techniques to those applied in the South-West.

Toxic algae blooms, which flourish in summer conditions and from nutrient-rich run-off from agricultural land, are causing problems in some of WA's urban rivers.

Professor John said the vast number of blooms, including those caused by diatoms, were quite harmless and in fact essential to sustaining a wide range of life forms in water bodies. However, some of the blue-green algal blooms and red tide blooms produced toxins which could cause gastrointestinal, neurological and paralytic illnesses or even death if contaminated shellfish or fish were consumed.

"Healthy rivers provide a niche for various groups of important organisms to live in a community.

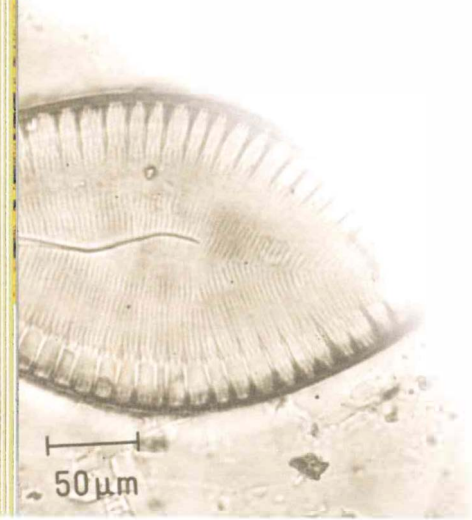
"We have to create an ecologically sustainable system to encourage a diverse group of organisms to flourish in an aquatic environment. This type of planning is being incorporated in water management strategies throughout the world. We need to create an umbrella for planning river management and to rectify these pollution problems."

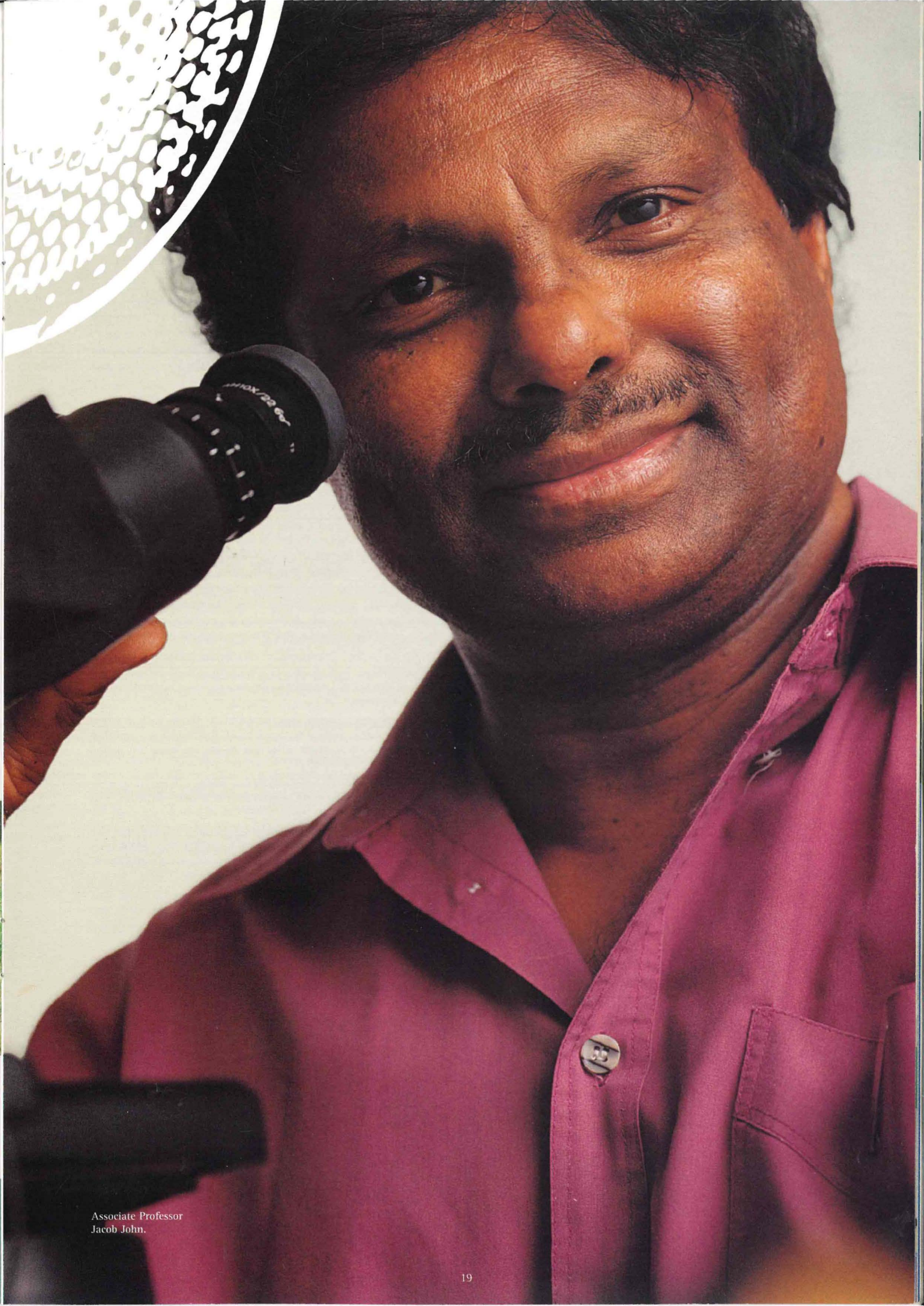
Professor John has produced a pictorial atlas on diatoms for technicians throughout Australia to assist bio-monitoring as part of the management of the health of river systems.

"From a research aspect, I wanted to ensure that my work was transferred into something tangible that could be put into practice by water managers," he said.



Above: Healthy river systems are home to a variety of organisms. The presence or absence of various diatoms (left) are an indicator of the health of the system.





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