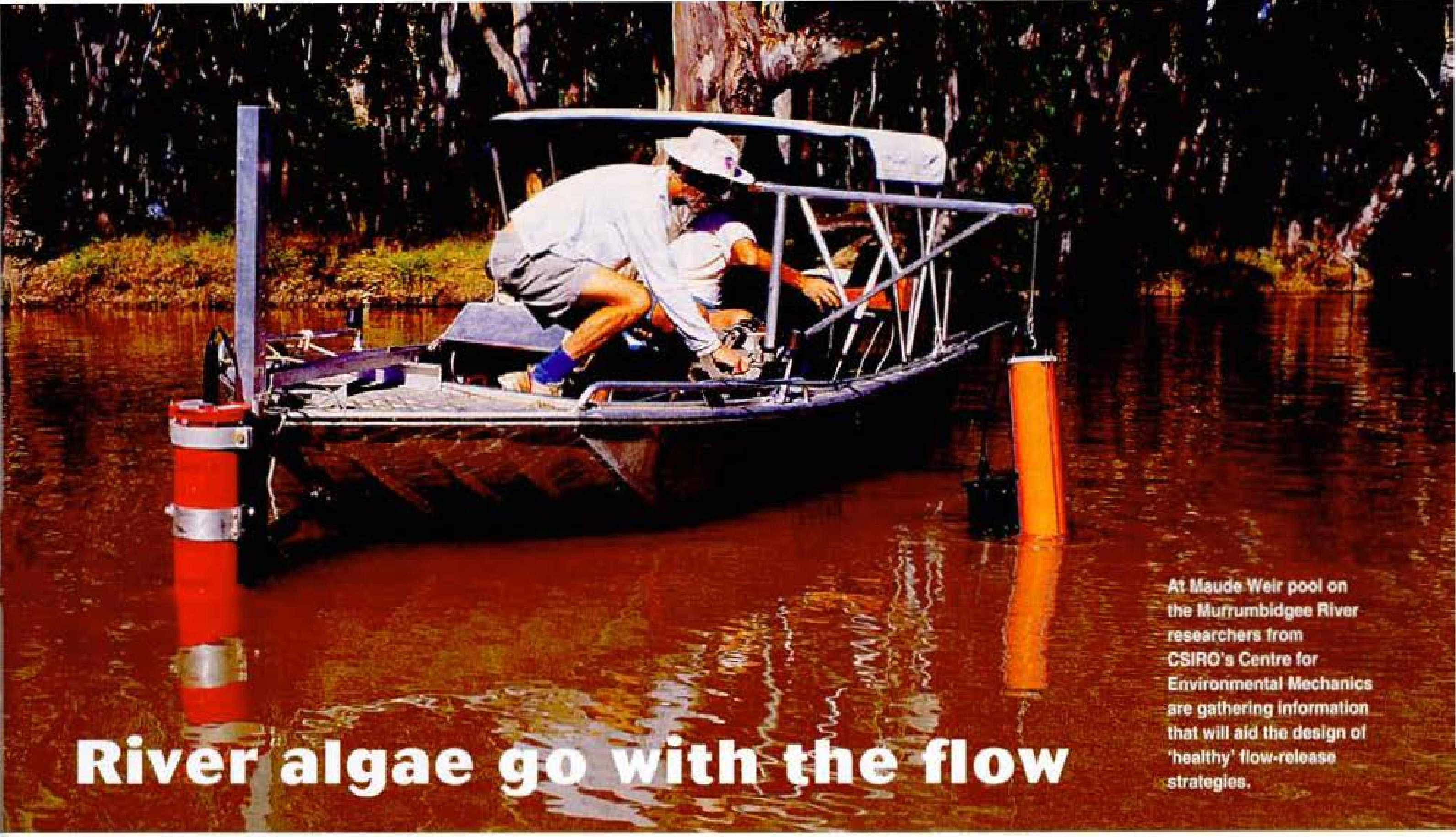


River algae go with the flow

At Maude Weir pool on the Murrumbidgee River researchers from CSIRO's Centre for Environmental Mechanics are gathering information that will aid the design of 'healthy' flow-release strategies.

One of the biggest questions facing water managers is how much water they should allocate for 'environmental flows'. These are water releases earmarked not for irrigation, but to conserve the natural ecological and physical processes that keep rivers healthy. For example, one way to control blue-green algae (or cyanobacteria) blooms is to increase river flows.

A CSIRO team led by Dr Ian Webster from the Centre for Environmental Mechanics has been studying how river flow affects algal blooms. The team has been measuring and modelling physical processes in the Maude Weir pool, a 30-kilometre-long stretch of the Murrumbidgee River which is regulated by Maude Weir on the Hay Plain in New South Wales.

Competition for light is the most important factor affecting which type of algae dominates the weir pool. Top-to-bottom mixing of the pool drives toxic blue-green algae down out of the light while at the same time lifting other species from the bottom layer up into the light. These other species can then out-compete the blue-green algae.

But top-to-bottom mixing of the weir pool occurs only when turbulence generated by water flow at the bottom of the river is sufficiently strong. This means there is a certain threshold level of flow which must be exceeded for the weir pool to mix completely.

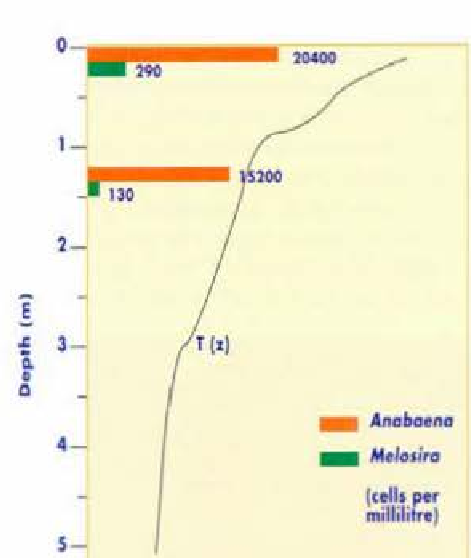
When the flow drops below the threshold value for longer than a fortnight, dominance of the algal bloom population switches from a diatom, Melosira, to the toxic cyanobacteria, *Anabaena circinalis*. Melosira require the river turbulence to keep them suspended in the illuminated part of the water column. Because *Anabaena* can float, low flow allows them to rise into the illuminated region while heavy species sink out.

To maintain flows at or above threshold levels may require the release of more water than is available, or more than is economically feasible. An alternative flow release strategy being investigated is to minimise cyanobacterial growth by pulsing the flow releases. A short period of elevated flow is sufficient to mix the *Anabaena* from the surface to the bottom. If the pulses are repeated before the cyanobacteria have the opportunity to float back into the surface layer then their growth advantage will be reduced.

In the long-term, Webster says, it might be possible to calculate threshold levels for all water storages. This would enable water authorities to cause the most disruption possible to impending blooms with the least amount of water.

Contact: Ian Webster, CSIRO Centre for Environmental Mechanics, GPO Box 821, Canberra, ACT 2601, (06) 246 5646, fax (06) 246 5560, email: webster@python.enmech.csiro.au.

David Mussared



When water flow at the bottom of the river drops below a certain level (or threshold value) for longer than a fortnight, dominance of the algal bloom population switches from a diatom, Melosira, to the toxic cyanobacteria, *Anabaena circinalis* (blue-green algae).

A short period of elevated flow is sufficient to mix the *Anabaena* from the surface to the bottom. If the pulses are repeated before the cyanobacteria float back into the surface layer then their growth advantage will be reduced, thus minimising the likelihood of a toxic bloom.