Wendy Pyper

Environmental planning Officer in the Pine Rivers Shire Council, Dan Clowes, at the Brendale Sewage Treatment Plant which services some 28 000 residents of the Pine Rivers Shire. The plant has been upgraded to incorporate a biological nutrient removal treatment.

Managing Pine Rivers

On their journey to Moreton Bay, the north and south arms of Pine River traverse an 808-square-kilometre catchment supporting a variety of land uses. These include national parks, managed forests, agricultural and urban developments, industry and internationally-important wetlands.

In 2001, the upstream section of these rivers achieved an ecological health and water quality rating of 'C' or 'fair', based on preliminary freshwater monitoring information. An ecological health report card noted that while headwater streams were in good condition, there was little riparian vegetation in the lower reaches, and the water was brown due to high sediment levels.

Further downstream, however, the Pine River estuary did not fare as well, with a rating of 'poor' or D+, based on information obtained through the marine Ecosystem Health Monitoring Program (see story on page 15). Sewage and stormwater inputs, and high levels of sediment, nutrient and phytoplankton contributed to this unhealthy rating.

High turbidity resulting from stormwater runoff in Four Mile Creek at Bray Park.

Pine Rivers Shire Council

Worse news was to come at Bramble Bay, where water from the Pine and Brisbane rivers merge. Large nutrient plumes, phytoplankton blooms, and a complete loss of seagrass, resulted in a 'fail' or 'F'.

Pine Rivers Shire Council is optimistic about its ability to turn these ratings around, however, and restore or enhance the environmental values of its waterways. Already the council has improved the Pine River estuary rating from a D (in 1999) to a D+, after a $40 million upgrade of its sewage treatment plants.

Further improvements in ecosystem health are expected in the next 5–10 years through community and government management plans addressing such issues as natural resource management, riparian revegetation, and stormwater and sewerage management. These initiatives will be coordinated with those of other councils through the Waterways Partnership.

'The Regional Water Quality Management Strategy, and now the Waterways Partnership, provide a vehicle to collaborate with other councils and decide what needs to be done regionally,' Pine Rivers Shire environmental planning officer, Daniel Clowes, says. 'Environmental problems don't respect political or judicial boundaries, so the only way to solve them is to work with our partners toward common goals.'

Values and goals

Through the Waterways Partnership, 19 councils whose catchments impact on Moreton Bay have drawn up a list of environmental values, including wildlife habitat, aquatic ecosystems, recreation, aquaculture, seagrass and irrigation. To maintain or restore these values a list of water quality goals, such as acceptable nutrient and sediment loads, has been drafted for freshwater, tidal and oceanic areas.

Each council must now assess the technical feasibility of management actions to achieve these goals, and the economic and social impacts of these actions.

If the feasibility and impacts are acceptable, each local government will develop its own management plans, to be implemented within an agreed time frame, and facilitated through the partnership.

The Pine Rivers Shire Council is relatively advanced in this process, having been involved in the Moreton Bay Study and the Regional Water Quality Management Strategy since their inception.

With the help of catchment water quality models such as 'AQUALM-XP' (see boxed story), the council has developed a series of catchment management plans for most of the creeks, rivers and lakes in the area. These plans address issues such as stormwater quality, management infrastructure, flooding, hydrology, and riparian values.

'The catchment management plans were based on the results of two scenarios modelled using AQUALM,' Clowes says.

'The first scenario was of current land use in the catchment, and pollutant export loadings from those land uses. From that we received an idea of the status quo with respect to pollution.

'The second scenario was of future land use, based on the council's town planning scheme. This gave us an idea of the impacts future development would have on water quality.'

The council then modelled a series of management measures, mostly in the form of stormwater infrastructure such as trash racks, sedimentation basins and, more recently, riparian vegetation. These measures sought to manage water quality in order to achieve the environmental values and water quality goals set out in the strategy.

Clowes says the cost of achieving these values and goals is in the order of $400 million for Pine Rivers alone. This cost will be borne by contributions from future developers and the community, and will require federal and state-government subsidies.

Community involvement

The council is also working closely with the Pine Rivers Shire Catchment Association, a voluntary group of individuals from the shire. The association has developed a strategy to deal with issues such as weeds, water quality, erosion, land use planning and feral animals, which they see as priority issues.

To keep track of improvements in ecosystem health, the council spends more than $800 000 a year on monitoring programs. Some of the money funds the regional Ecosystem Health Monitoring Program.

The council also conducts its own 'impact' monitoring upstream and downstream of sewage treatment plants, and monitoring of physical/chemical indicators at 50 freshwater sites. These indicators include some of those identified in the freshwater Design and Implementation of Baseline Monitoring task (story page on page 20). Macroinvertebrates are monitored at 70 sites when funds are available.

'A lot of indicators which have traditionally been chosen for monitoring have a poor relationship with land use,' Clowes says.

'But the EHMP and report cards use indicators that are biologically meaningful and that can be acted upon. So we can be confident that our management actions will eventually make a difference.'

More about Pine Rivers Shire Council

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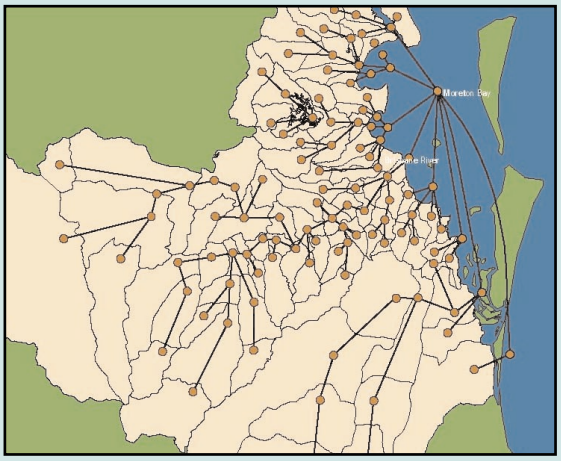

Each of the 95 nodes in the AQUALM-XP model describes the hydrological characteristics of a sub-catchment. (Image courtesy of the Moreton Bay Study 1999.)

Pollutants: seeing how they run

TO MODEL freshwater runoff and pollutant concentrations in a catchment, some councils involved in the Regional Water Quality Management Strategy have turned to modelling programs such as AQUALM-XP.

AQUALM-XP allows councils to estimate current and future catchment runoff and pollutant loads – total nitrogen, total phosphorus and total suspended sediments – based on land use and hydrology data (rainfall, evaporation, infiltration and so on).

To develop the model, the Moreton Bay catchment was divided into 95 sub-catchments and six land-use categories. A series of 'nodes' describing the characteristics of each sub-catchment – in 'parameters' such as evapotranspiration and pollutant export coefficients – were then connected to each other via 'channels'. These channels represent the transport of water and pollutants from the sub-catchments to the waterways, and a final storage point, such as the ocean or a lake.

'The parameters define how much rainfall will end up in ground storage or as runoff, and the pollutant concentration of that runoff,' says Dr Simon Bell, from the Queensland Environmental Protection Agency. 'The runoff loads are then passed into the channels where they combine to generate an ultimate flow and pollutant concentration at a point of interest.'

The model can be used at the scale of whole catchment, sub-catchment, or even a small paddock. The model's estimates of freshwater flows and pollutant concentrations entering Moreton Bay are also used as input to the Receiving Water Quality Model (see story on page 24).