Declining water quality in the catchments near the Great Barrier Reef (GBR) has been identified as a national priority that threatens the long term health of the reef. In response, the federal and Queensland governments have developed a Reef Water Quality Protection Plan (2003) to improve the quality of water entering the reef by 2013.

eWater is working in the Barron, Burdekin, Pioneer and Fitzroy catchments near the reef. The Barron catchment (2900 km²) comprises the Atherton Tableland and the coastal plain near Cairns. This high-rainfall region is home to nearly 500 km² of Wet Tropics World Heritage Area. Other land uses include state forest, grazing, sugarcane cropping and horticulture. The Burdekin catchment (133,000 km²) has high natural diversity, with arid drylands, mountainous rainforests and coastal wetlands. The main land uses are cattle grazing, mining and intensive sugarcane cropping. The Pioneer catchment (1570 km²) lies between Eungella and Mackay, and includes national park, sugarcane, grazing and the Mackay urban centre. In the Fitzroy catchment (142,000 km²), extending from the Carnarvon Ranges in the West to Rockhampton near the river mouth at Keppel Bay, cattle production is the main land use followed by intensive cropping, irrigation and coalmining.

For the waterways of the GBR catchments the key values and priorities for the future are to:
- Halt and reverse the decline in water quality entering the reef within ten years (Reef Plan), and
- Rehabilitate and conserve areas so they can have a role in removing water-borne pollutants.

The challenges are being tackled by identifying hotspots in the catchments that are sources for sediment (TSS), nitrogen (TN) and phosphorus (TP), and developing management scenarios in consultation with local landholders and catchment groups.

In these catchments, eWater’s activities are focusing on modelling land-use and the effects of changes in land management on runoff and water quality. Runoff is the single largest threat to water quality, introducing contaminants such as sediment, nutrients and agri-chemicals into the Great Barrier Reef lagoon.

eWater CRC’s next-generation whole-of-catchment software framework “WaterCAST” is on trial here, for its accuracy in simulating the issues and for its help in developing effective solutions.
eWATER’S INPUT

eWater CRC’s catchment-modelling framework has been specifically set up using data for each catchment. In the Burdekin area, for instance, it is calibrated as a hydrology model, simulating wet and dry weather concentrations of sediment, TN and TP in relation to erosion hazard indices.

In the Fitzroy catchment, the eWater catchment-modelling framework is coupled with process-based erosion models. Sediment generation is being simulated for cropping and grazing, incorporating values for ground-cover variations based on bare-ground index satellite imagery. The modelling framework is also being tailored for the local hydrology. eWater research is exploring sediment generation in more detail and for increasingly wide areas, and this will be built into the model progressively.

In the Barron and Pioneer catchments, the software has been identifying potential hotspot sources of TSS, TN and TP in relation to time and terrain, and simulating their movement in relation to flow. The model is being calibrated using measured water-quality data.

On the ground, implementation of the Reef Plan is being helped by a growing understanding of processes, and ongoing consultation with local communities and landholders. ‘WaterCAST’ can potentially provide additional support, particularly with future model development extending its capacity to simulate movement of dissolved nutrients and gully erosion.

OUTCOMES

This application is demonstrating that eWater’s catchment-modelling framework is capable of helping the Department of Environment & Resource Management monitor and model (with load uncertainty estimates) the contaminants entering the GBR lagoon.

The ‘WaterCAST’ models for the four catchments are being developed using consistent methodology so that the approach can potentially be applied across all other reef catchments into the future.

All eWater tools demonstrated in focus catchments are part of our integrated modelling suite.

PARTNERS INVOLVED

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