

# Corals reveal impact of land use

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Using the corals on the Great Barrier Reef (GBR) as a history book, researchers have linked land use along the coast to decades of declining water quality and poor coral health.

Their work is pioneering the development of new tools for better management of the quality of Australia's coastal waters by the communities that depend on them.

The study by researchers from the ARC Centre of Excellence for Coral Reef Studies (CoECRS) focuses on the hundred-year history of coastal development around the Queensland town of Mackay and its impact on nearby coral reefs which have been gradually disappearing.

According to the study there a history of land clearing, agriculture and flooding is linked to nutrient rich waters flowing out of the Pioneer River catchment.

These excess nutrients are directly taken up by coastal corals, affecting their survival and ability to recover from adverse conditions.

“We found that the nitrogen isotopes from particles in water samples collected all along the catchment area were highly enriched, especially in the lower reaches of the river. This reflects nitrogen from fertilisers,” said Dr Guy Marion of The University of Queensland and CoECRS.

Dr Stacy Jupiter, a postdoctoral fellow at the Australian National University (ANU) and CoECRS said inshore reefs were covered in

widespread stands of algae, a condition that may reflect chronic nutrient excess.

"The reef condition didn't improve until 50 kilometres offshore," Dr Jupiter said.

Dr Jupiter said while the study is local, its findings have national and even global significance.

The study also uses coral skeletons to reveal the history of nutrient and sediment runoff into the river and coastal waters from human activities in the catchment dating back to European settlement of the Mackay area.

Using coral skeletons more than a century old, the team was able to analyse chemicals and sediments taken up by the corals and link them geochemically to their place and time of origin.

"We observed a large increase in the delivery of land-based sediments after the surrounding areas were cleared for farming in the late 19th century," said Dr Marion.

"After World War II, when fertilisers were used to increase sugar cane production, the coral records reveal substantial accumulations of fertilizer-derived nutrients in near-shore GBR waters."

"This is a global issue because development is taking place in coastal areas all over Australia and around the world.

"This is the first time corals have been used to trace the history and origin of nutrients in the marine environment and link changes in water quality back to changes taking place on the land."

The study's findings will be presented at the Mackay Linkage Grant

Workshop meeting held at the Mackay Botanical Gardens on the Friday, June 1.

The meeting, which is open to the public and media, will feature leading researchers from CoECSR, the University of Queensland and the ANU, as well as representatives from local, regional and federal management agencies.

“We hope we have increased the available information for assisting in the better management of coastal land as well as identifying significant environmental risks for the Great Barrier Reef,” said UQ’s Professor Ove Hoegh-Guldberg, who was one of the project’s chief investigators.

“The changes indicate that this is something that we should all be paying serious attention to.

“We hope to create discussion between the stakeholders, the scientists and the public so these results can be used to better manage the area.”

The meeting will highlight the “four-pronged” approach taken in the investigation into the history of changes in the land and the decline in water quality.

These comprise the history of development and clearing since pioneer settlement in the area; the chemical composition of water from points along the river and out to sea; the chemical composition of coral skeletons dating back before European settlement; and the varying health of coral communities extending from the mouth of the river to far out to sea.

This approach can easily be replicated in other coastal environments in Australian and around the world,” Professor Hoegh-Guldberg said.

“There is potential to use these tools to manage our coastal environments and water quality right round Australia and even worldwide,” said Dr Jupiter.

“The impact on our long-term understanding of change in Australia's coastal areas is highly significant.”

Source: The University of Queensland

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