MACKAY-WHITSUNDAY-ISAAC HEALTHY RIVERS TO REEF PARTNERSHIP









PROJECT SUMMARY:

HISTORICAL CONTEXT AND CAUSES OF WATER QUALITY DECLINE IN THE WHITSUNDAY REGION 2019

Project Partners: CSIRO/Australian Institute of Marine Science (AIMS)
Project funder: Department of Environment and Energy (DoEE)
Project timing: 2018 – 2019 (final report published June 2019)

AIMS:

- To provide a greater understanding of the factors affecting water quality in the Whitsundays;
- Provide greater understanding of the contribution of different pollutant sources such as urban runoff, dredging and disposal activities to the regional sediment budget; and
- Provide greater understanding of the priority management responses needed to sustain GBR tourism through actions that build resilience of the Reef.

METHODOLOGY:

- Analysis of remotely sensed ocean colour observations (8 years of data through eReefs modelling platform);
- Analysis of in situ sensor readings and water quality sampling (2002 – 2010 and 2011– 2017); and
- Analysis of coral cores using luminescence and element ratio (7 reef sites analysing the period 1853 – 2017).

Full report can be downloaded here: https://healthyriverstoreef.org.au/whitsundaywaterquality/

CONCLUSIONS:

To address anecdotal reports that water quality has been declining since 2011, water quality data comprising remotely sensed ocean colour observations (data), water quality observations from sampled data and coral core data was analysed. Remotely sensed ocean colour data analysed between 2002-2010 and 2011-2017 and water quality data collected from Marine Monitoring Program sites showed no large changes in water quality since 2011. The small changes in water quality detected from the remotely sensed dataset are likely due to greater river flow from a wetter climatic period. Coral coring data confirms that greater rainfall between 2011-2017 resulted in more land-based influence within the inshore environment, however these data also concluded that terrestrial influences are no more significant from 2011-2017 than earlier periods with similar rainfall patterns.

No large changes were observed in the water quality or coral core datasets to support anecdotal reports that water quality in the Whitsundays has declined since 2011. Small changes were likely due to the floods in 2011/2012.

> A second anecdotal observation was provided from local stakeholders that water quality in the Wet Tropics improved faster after the wet years of 2011-2012 as compared to the Whitsundays. CSIRO ran the eReefs model to find out if there was anything specific about the Whitsundays which would cause this to be the case. Fine, catchment-derived sediments were shown to be suspended near the seabed (forming a "fluffy layer") that has persisted for a number of years since the 2011 floods. Fine sediments, like those in the "fluffy layer", circulate for a longer time in the Whitsundays than the reef areas of the Wet Tropics. Reducing fine sediments from rivers impacting the Whitsunday region is likely to result in an improvement in water clarity in the long-term.

> Catchment-derived fine sediments and long residence times in the Whitsundays are likely causing poor water clarity. Reducing fine sediments from rivers impacting the Whitsundays will help improve water clarity over the long term.

eReefs modelling scenarios revealed that the Fitzroy, especially in wetter years and on the midshelf reefs, has a significant influence on water quality in the Whitsundays. Land management practices in the Fitzroy should be considered to improve water quality in the Whitsundays.

Sediment reduction efforts should be focussed on the ultrafine sediments on rivers impacting the Whitsundays (Fitzroy, Pioneer and O'Connell).

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CONCLUSIONS:

Boulder coral (porities sp.) from South Molle and Shaw Islands showed annual flood plumes as lines and anomalies in element ratios which match major river flow events through time from the Pioneer and Fitzroy Rivers. Elemental ratios showed certain years were responsible for more sediment where the corals were located (2007- 2011, 2017, 1991 and 1974). Coring data along with eReefs model simulations suggest the Fitzroy River plumes are impacting the Whitsundays. The influence of the Pioneer and O'Connell Rivers are generally inshore of Whitsunday Island, with offshore of Whitsunday Island being impacted primarily by the Fitzroy River.

Major flood events in the last two decades have been shown to impact the Whitsundays. The area's complex hydrodynamics indicate all 7 coral coring sites except South Molle Island appear to be more strongly influenced by marine resuspension (wind, tide, currents etc) than direct flood plume events.

> Monitoring recommendations were given using an Observation System Simulation Experiment. The two most important monitoring sites for the Mackay-Whitsunday region are Double Cone Island and Mackay (in general) as they capture large and significantly different regions (GBR lagoon and Broad Sound/Repulse Bay inshore). The full results of this experiment were shared with the Reef Integrated Monitoring, Modelling and Reporting Program.



If you are interested in finding out more about the Partnership head to our website: www.healthyriverstoreef.org.au