



National Environmental Science Programme

Project 3.2.5 Testing and implementation of the water quality metric for the 2017 and 2018 reef report cards

Project Summary

The Reef Water Quality Protection Plan is a joint Australian and Queensland government commitment seeking to improve the quality of freshwater entering the GBR and is nested within the Reef 2050 Plan. The effectiveness of this plan is assessed through the annual Reef Report Card, based on a range of monitoring programs summarising improvements in land management practices, progress towards pollutant targets, and the condition of the GBR and its catchments.

In Reef Report Card, marine water quality is reported using a metric, developed in 2009, based on satellite remote sensing of near surface concentrations of chlorophyll and suspended solids. While this provides appropriate spatial and temporal coverage, the metric presents some limitations and this project aims to address these by improving metric calculation methods and integrating a wider range of data, including outputs from the eReefs biogeochemical model.

Problem

The current metric relies on only two water quality indicators and solely on remote sensing-derived data. Obtaining accurate estimates from inshore and optically complex waters is challenging and there are limited valid satellite observations in the wet season due to cloud cover. In addition the current metric calculation method (binary assessment of compliance relative to guidelines and aggregation over large spatial and temporal scales) is relatively insensitive to land-based inputs.

How Research Addresses Problem

The project moves away from binary assessment to consider magnitude, frequency and duration of exceedance and evaluates options to aggregate data between measures and across the spatial and temporal domain. The eReefs biogeochemical model is being improved by assimilation of remote-sensing reflectance and its outputs integrated for the first time into a revised metric which also includes a light indicator. Sensitivity will be tested before recommending an appropriate revised metric.



Photo: Gary Cranitch, Queensland Museum

This project is consistent and aligned with the objectives of the broader Reef Integrated Monitoring and Reporting Program (RIMReP) and as such project outputs will directly contribute to RIMReP.

Based on current water quality indicators, we will test a range of scoring approaches (eg. binary vs modified amplitude; magnitude, frequency and duration of exceedance). We will also evaluate options to combine data-layers between measures (eg. turbidity, chlorophyll-a, light) and different sources (eg. satellite, in situ sampling and eReefs biogeochemical model) into a single indicator layer across spatial and temporal domains. New techniques to aggregate to different spatial sub-domains will build on previous research by AIMS as part of previous monitoring programs and report cards.

The existing eReefs marine biogeochemical 4 km model developed by CSIRO will be improved by assimilating remote-sensing reflectance data to provide input to the metric for 2015 – 2016. The model performance will be assessed, including the simulation of sub-surface light variables, through a skill assessment against existing independent in-situ observations.

We will aim to develop criteria for describing uncertainty into the metric scores and test the sensitivity of the metric to changes in relevant pressures (e.g., do scores reflect major flood events or cyclones). The performance of the above methods will be compared and an optimal method recommended for Reef Report Cards 2017 and 2018.



Photo: Gary Cranitch, Queensland Museum

Further information

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This project is supported through funding from the Australian Government's National Environmental Science Programme