Tropical Water Quality Hub

National Environmental Science Programme

Project 5.5 Measuring aesthetic and experience values using Big Data approaches

Project Summary

This project responds to the urgent need of understanding how ecological changes affect the aesthetic value and the user experience of the Great Barrier Reef (GBR), and how these could be measured and monitored in a cost-effective way. The research capitalises on two major trends, namely peoples' ability and willingness to share large amounts of information through various online platforms, and rapid development in computing technology to store, process and interpret these data.

Problem

The Australian Government is investing considerable resources into improving reef health and monitoring changes of the GBR. Monitoring however, is costly and the notion of citizen science is attracting attention. Involving people and understanding the human dimensions of the Reef, including natural beauty as an integral part of heritage value, is critical in enhancing support for conservation.

How Research Addresses Problem

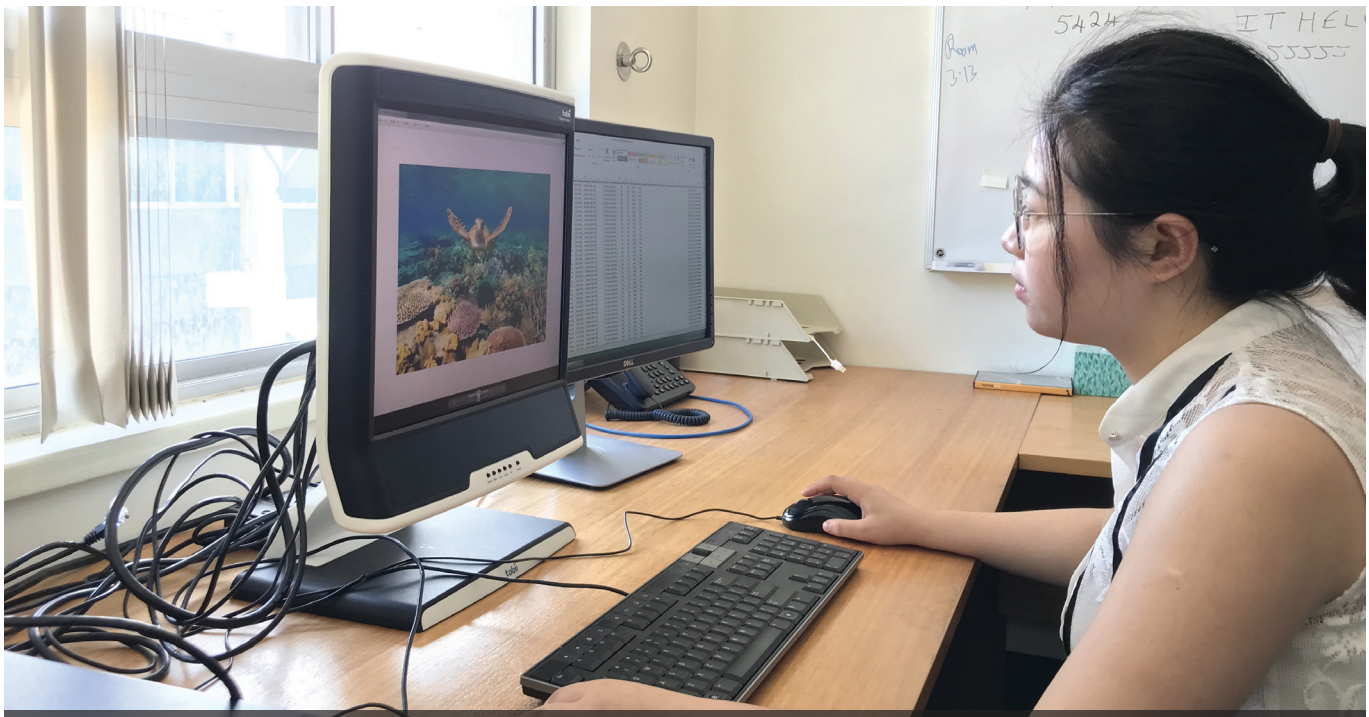
Two previously funded projects (2.3.2 and 3.2.3) used Big Data approaches to assess how unconventional data sources (e.g. Twitter, Facebook, Flickr) can help monitor environmental and aesthetic conditions of the Reef. This extension project focuses on understanding and measuring two key concepts relevant for ongoing Reef protection, namely the (underwater) aesthetic value and the experience value of the Reef.

The AI-based system will deliver a mechanism for monitoring aesthetic value at a large geographic scale, as it responds to images posted online or added manually to the database. Additionally, the development of a final tool, for example a real-time map that visualises beauty scores, can be undertaken and implemented as part of the Reef Integrated Monitoring and Reporting Program (RIMReP) program.



Photo: Griffith University

One of nine images tested in an online survey on perceived beauty of underwater landscapes. This image is of medium beauty, whereby the existence of a charismatic species (turtle) increases attractiveness, but the lack of colour (in particular 'dull colour' fish) detracts from the beauty score

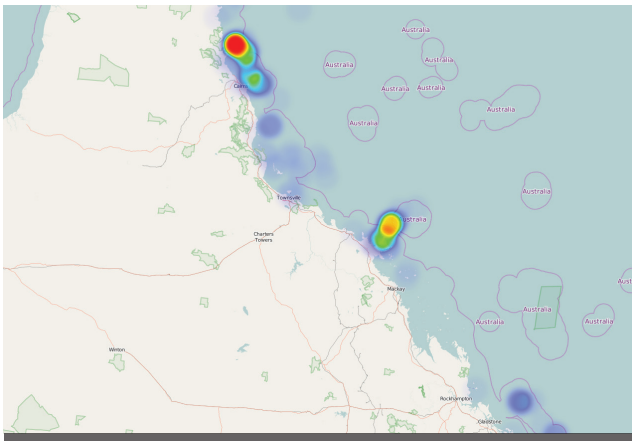


Eye tracking experiment to assess areas of interest in an image and their association with beauty (showing team member Emily Chen).

Photo: Griffith University

Tapping into user-supplied material, for example through social media, reflects an anthropocentric approach that accepts that both aesthetic and experiential values are concepts that arise from the interactions between nature and people. Building on existing citizen science programs (e.g. Great Barrier Reef Marine Park Authority's (GBRMPA) 'Eye on the Reef'), this research draws on information shared by over 2.7 million people who visit the GBR to extract insights into environmental and experiential attributes.

This project will finalise two key methods for measuring human dimensions of the Reef, namely aesthetic and experience values. It will deliver the capability to score large volumes of data to derive indicators of 'beauty' and sentiment. Ultimately, implementing these methods aims to deliver the following outcomes:



Heatmap of coral bleaching identified in Eye on the Reef Sightings provided by Reef visitors in 2016

Photo: Griffith University

- Identify declines in aesthetic value, which is informative in itself but may also provide indication of ecological decline due to the close relationship between aesthetic and ecological value.
- A database of rated images that could be available for additional monitoring goals (e.g. extract all geo-coded images that show bleaching and map them separately).
- Identify declines in sentiment and experience value and understand further details such as geographic area, key topic of concern, and difference amongst user groups. Remediating actions can be put in place accordingly.
- Develop Reef protection campaigns that connect with visitor experiences and perceptions of the Reef to maximise impact.

Further information

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