From images to insight: democratising coral reef monitoring for global impact

ICRI #ForCoral webinar series

Dr Emma Kennedy | ReefCloud

Webinar: Harnessing AI to monitor coral reefs

Thursday 2nd October 2025

Australian Institute of Marine Science

AUSTRALIAN INSTITUTE OF MARINE SCIENCE

Australian Government
Department of Foreign Affairs and Trade

ACKNOWLEDGEMENT

**We acknowledge the Traditional Custodians and First Nations People
of the land where we meet today,
and pay our respects to elders past, present and future.**

We honour their continuing culture, knowledge, beliefs
and spiritual relationship and connection to Country.

We also recognise Aboriginal and Torres Strait Islander peoples as
the Traditional Owners of the land and sea country on which
AIMS works, and as Australia's first scientists.

Through collaboration and two-way knowledge sharing, we can learn from each other.

Australian Government

AUSTRALIAN INSTITUTE
OF MARINE SCIENCE

Reefs around the planet are degrading faster than we can track

14% of the world's coral has been lost since 2009

Understanding the ocean from a drop of water

~35,754 monitoring sites

~300,000 km², shallow water reef extent

0.0006% of reef surveyed

GCRMN Status of the Worlds Reefs 2025
Allen Coral Atlas

Central challenges in coral reef monitoring

1.
We can't manage what we don't measure

2.
Access to information is limited

3.
Science advice is delayed

Monitoring is expensive

Inconsistency in methods

Data access is limited

Unequal capabilities worldwide
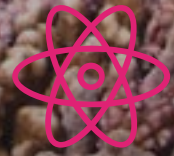
High-level of expertise exclude participation

ReefCloud

Technology to broaden participation

Collect → Analyse → Synthesise → Guide

Photo-quadrats

WISDOM — Understanding, actionable, informed decision-making

KNOWLEDGE — e.g, Regional and global synthesis
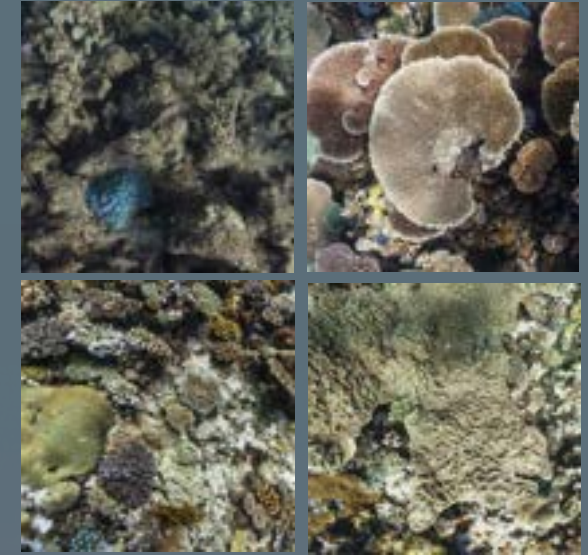
INFORMATION — e.g., Species cover

DATA — e.g., Benthic images

+ insight

+ meaning

+ context

- Standard data format
- Contain a wealth of information
- Quick method for collecting data
- No high-specialised training
- Permanent record of reef condition

Introducing ReefCloud

How it works

Management and storage of photo data

Cloud-based computing

Analyse with manual and AI tagging

Machine Learning algorithms
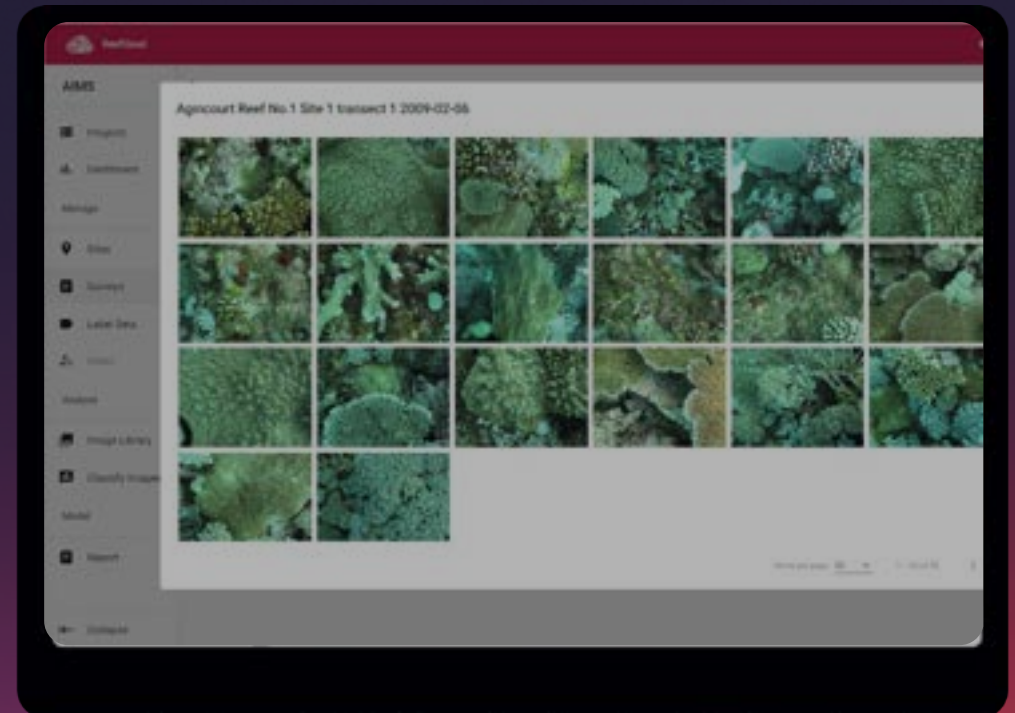
Automated analysis and reporting

Statistical modelling

A secure global repository for our reef data

- AIMS long term monitoring program
- Local research institutions
- Indigenous Rangers
- Tourism Operators

Management and storage of photo data

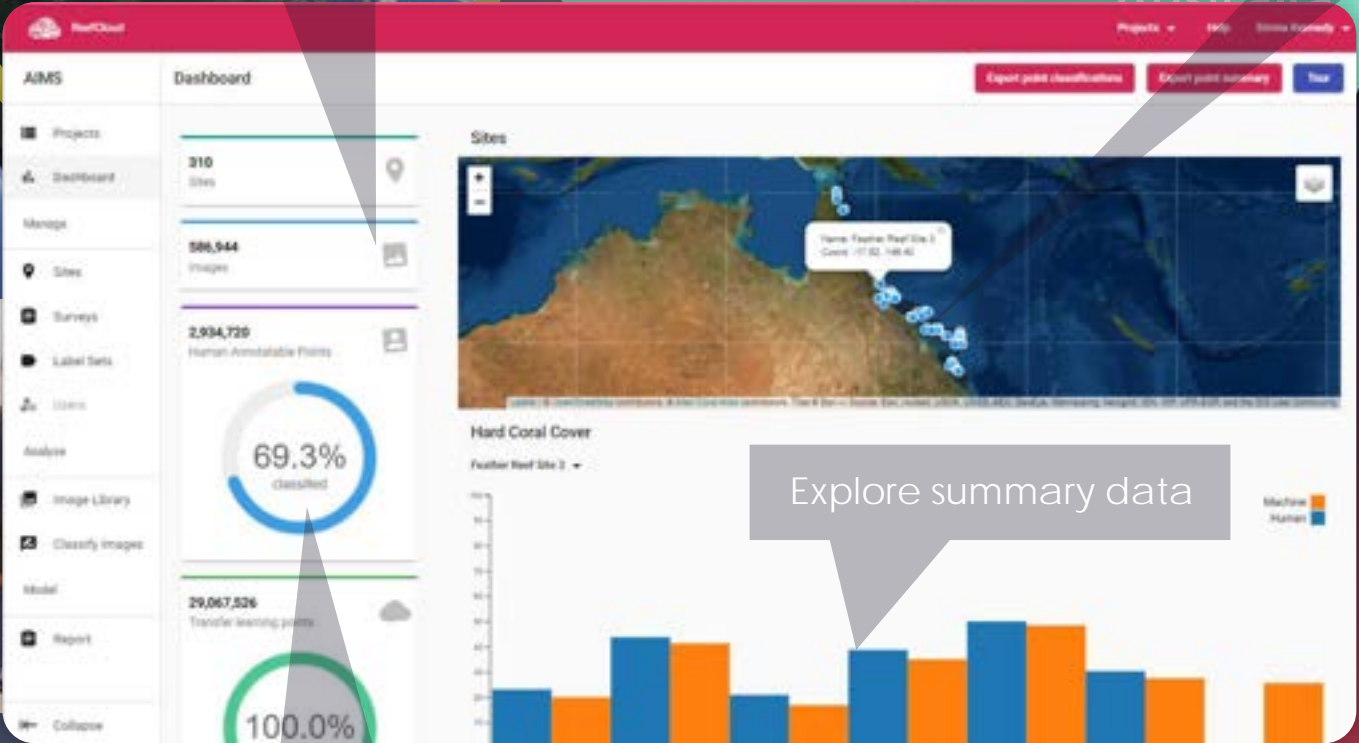# Indigenous Scientists
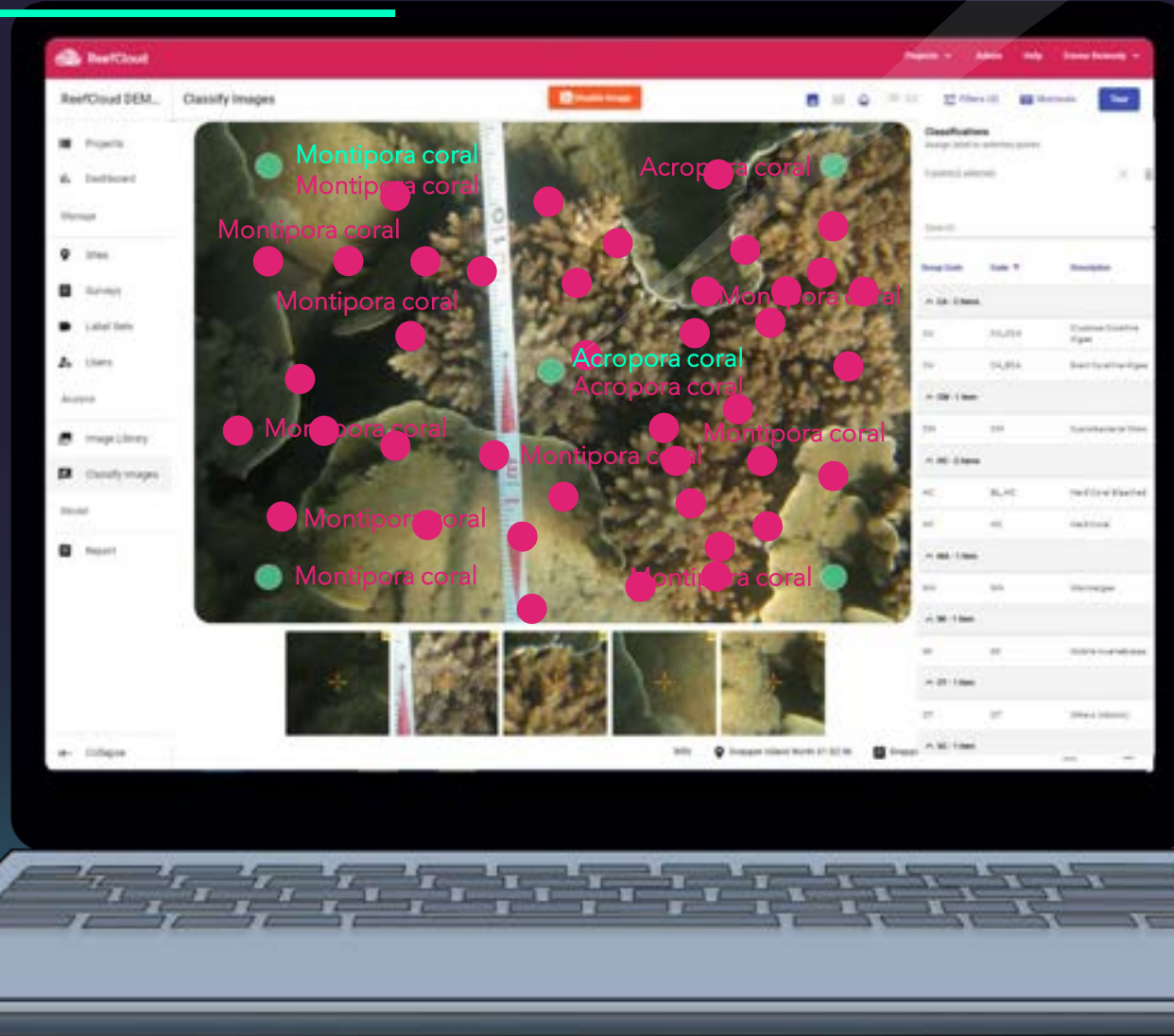## Bardi Jawi Sea Rangers

Bardi Jawi

Torres Strait

Anindilyakwa

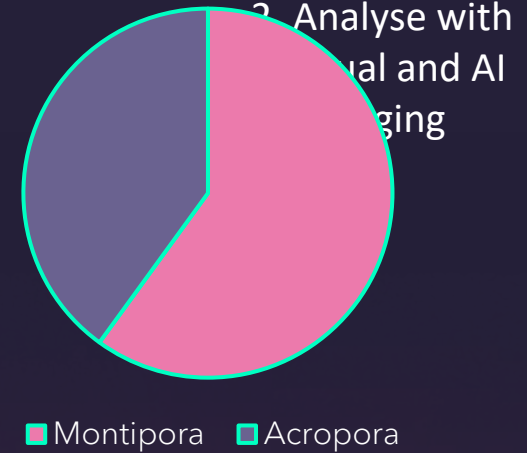Upload monitoring photos

View reef sites on the map

Explore summary data

Train AI machine

AI to speed up workflows

Annotation points

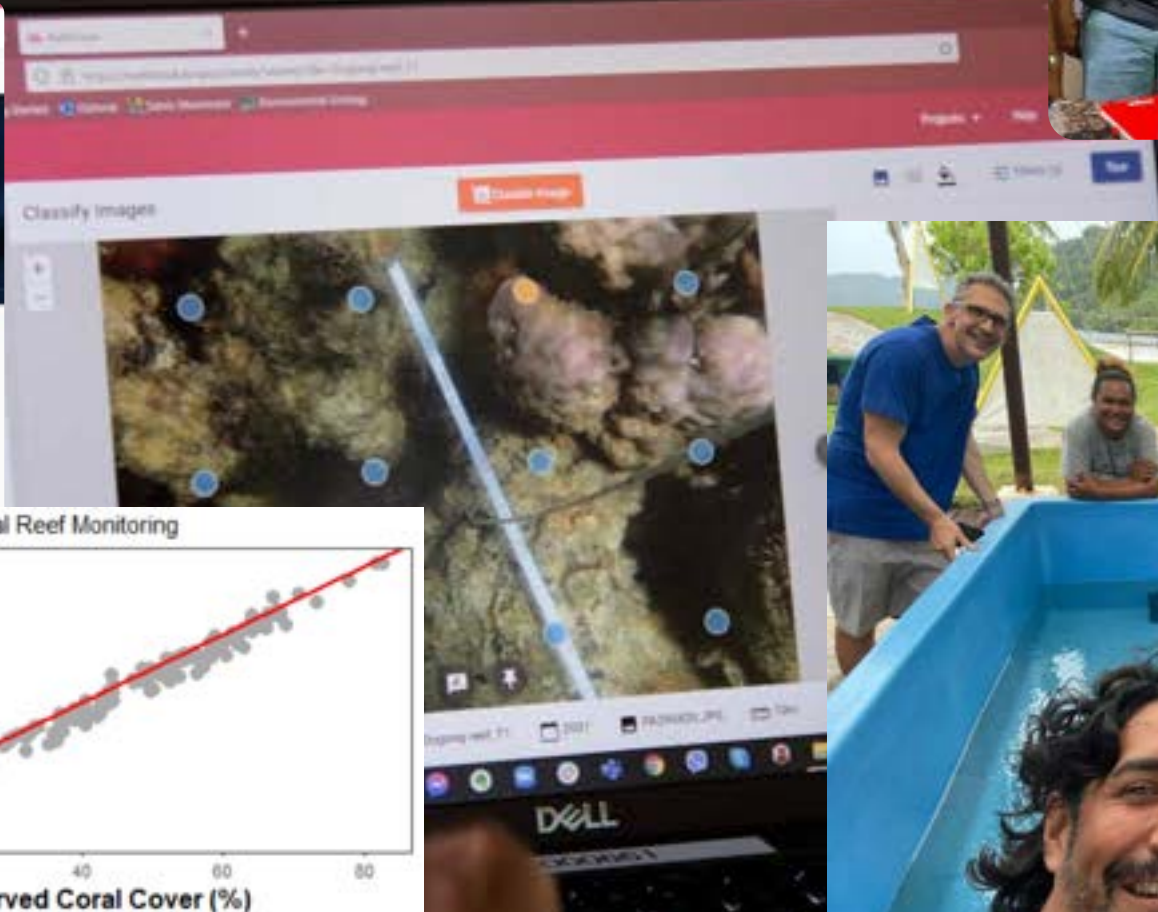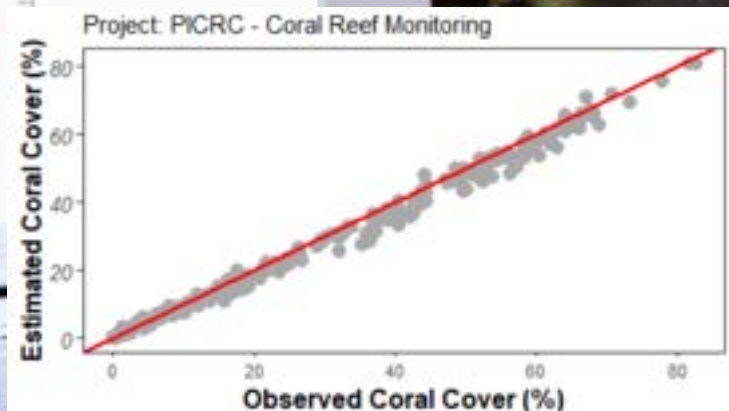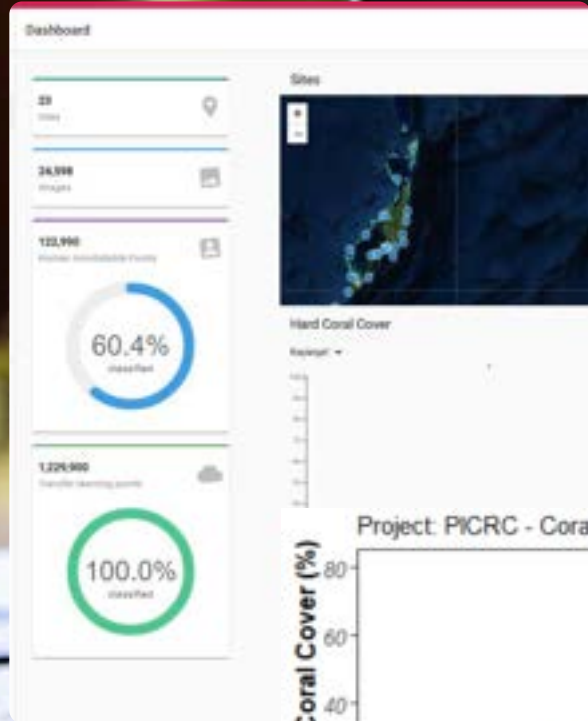2. Analyse with visual and AI tagging

Montipora   Acropora

REPORT
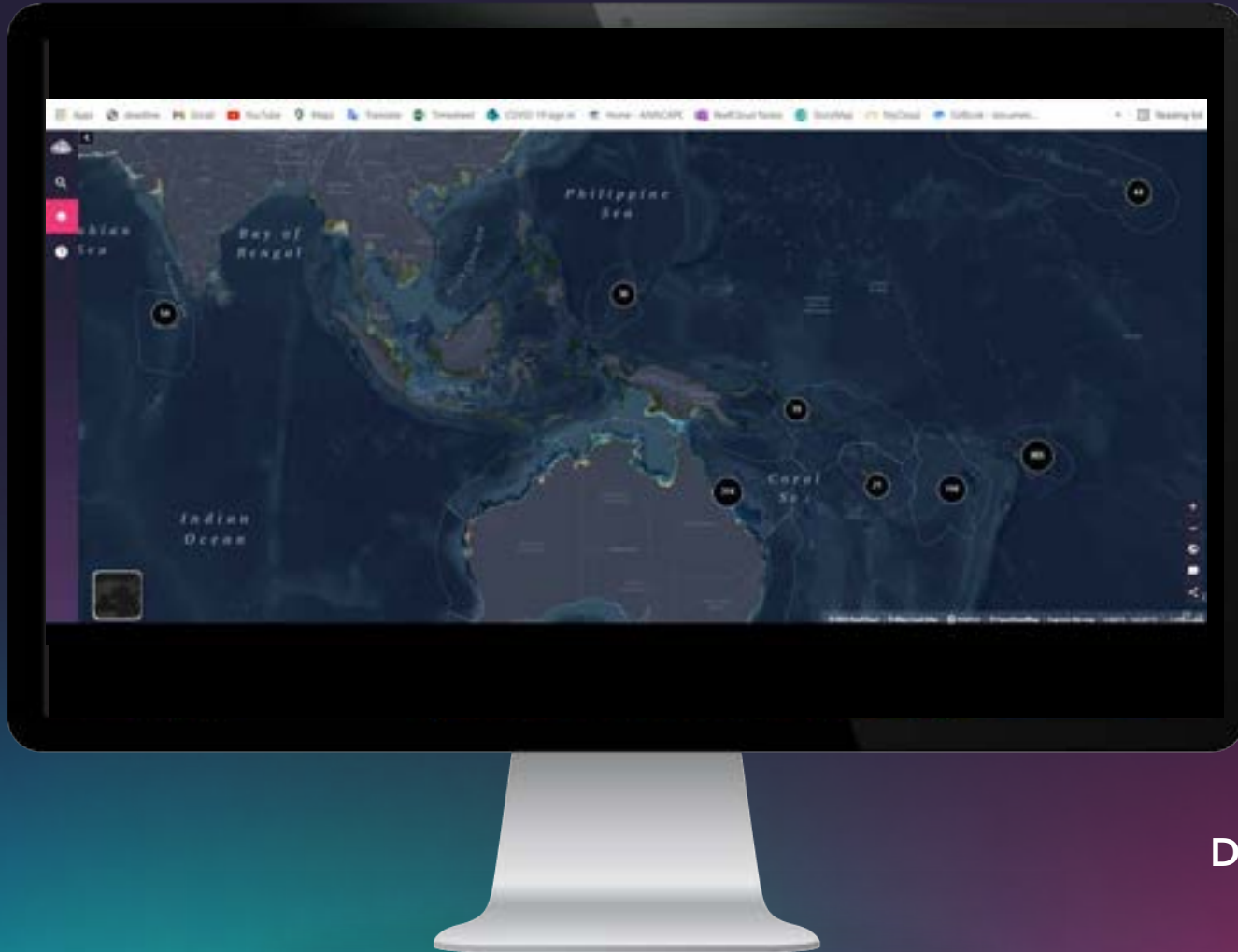
Pacific Partnerships
Palau International Coral Reef Centre

Tech to support integration and deliver insights

3. Automated analysis and reporting

Mapped monitoring locations

Temporal trends

Coral cover summaries

Benthic cover breakdown

Cyclone data

Thermal heat stress

Dive in – it's all free to explore at reefcloud.ai/dashboard

ReefCloud

Pacific Coral Reef Action Plan

Hard coral cover

Hard coral cover measures the general health of a reef and serves as a measure of the proportion of reef surface covered by live hard coral.

Hard coral cover map legend

| 0 - 1 % | 1 - 10 % | 10 - 30 % |
| 30 - 50 % | 50 - 75 % | 75 - 100 % |

Hard coral cover trend

In 2021, the average hard coral cover for Fiji Islands was estimated at 33.8%, ranging from 15.37% to 55.76%.

Shows the location of everyone's data

ReefCheck

Shows trends in reef health in context of environmental drivers

Pacific Coral Reef Actions 2020 - 2030

Data synthesis

MERI

AI advances
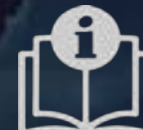
Manuals

Tutorials

Training

ReefCloud
Hard coral cover distribution by year

Still evolving

- Scalable and inclusive monitoring of reefs

- Democratisation of knowledge

- Faster and more efficient delivery of science

Management and storage of photo data

Analyse with manual and AI tagging

Automated analysis and reporting

"We're trying to use AI not just to making monitoring more efficient—we're making it more equitable."

Join us!
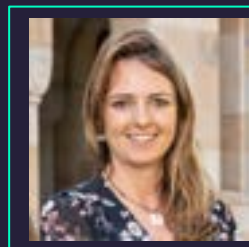
www.reefcloud.ai

Manuel Gonzalez-Rivero
Project Lead

m.gonazlezrivero@aims.gov.au
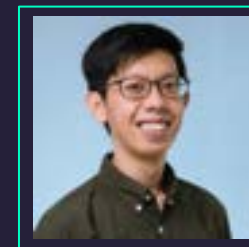support@reefcloud.ai

ReefCloud Science Team

Emma Kennedy

Ashton Gainsford

Yashika Nand

Samuel Chan

ReefCloud

AUSTRALIAN INSTITUTE of MARINE SCIENCE

An ongoing team effort...

We are grateful to our collaborators and invite you to come and join us!

Collaborations

We partner with organizations that **enhance ReefCloud's capabilities and reach**. These partners include:

- Scientific Partners to test and modify ReefCloud's field utility
- Collaborators for communications and connections
- Technical Partners for scaling ReefCloud's functionality
- Funding Partners to sustain efforts to popularize and enhance ReefCloud

Our partners