**ICRI Webinar:** Harnessing AI to monitor coral reefs

MERMAID

# A shared model, many contributors: co-creating better, simpler coral reef AI for all.

Alexandra Kler Lago
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WCS

# Introducing MERMAID

An initiative of the **Wildlife Conservation Society**, MERMAID is the first and only **end-to-end platform** for monitoring coral reefs that integrates **fish, benthic, bleaching,** and soon **macroinvertebrate data**.

# Introducing MERMAID

**94% of MERMAID users are from outside WCS** — forming a thriving, global community of NGOs, research institutes, academics, practitioners, and government agencies.

**>3,000 users**

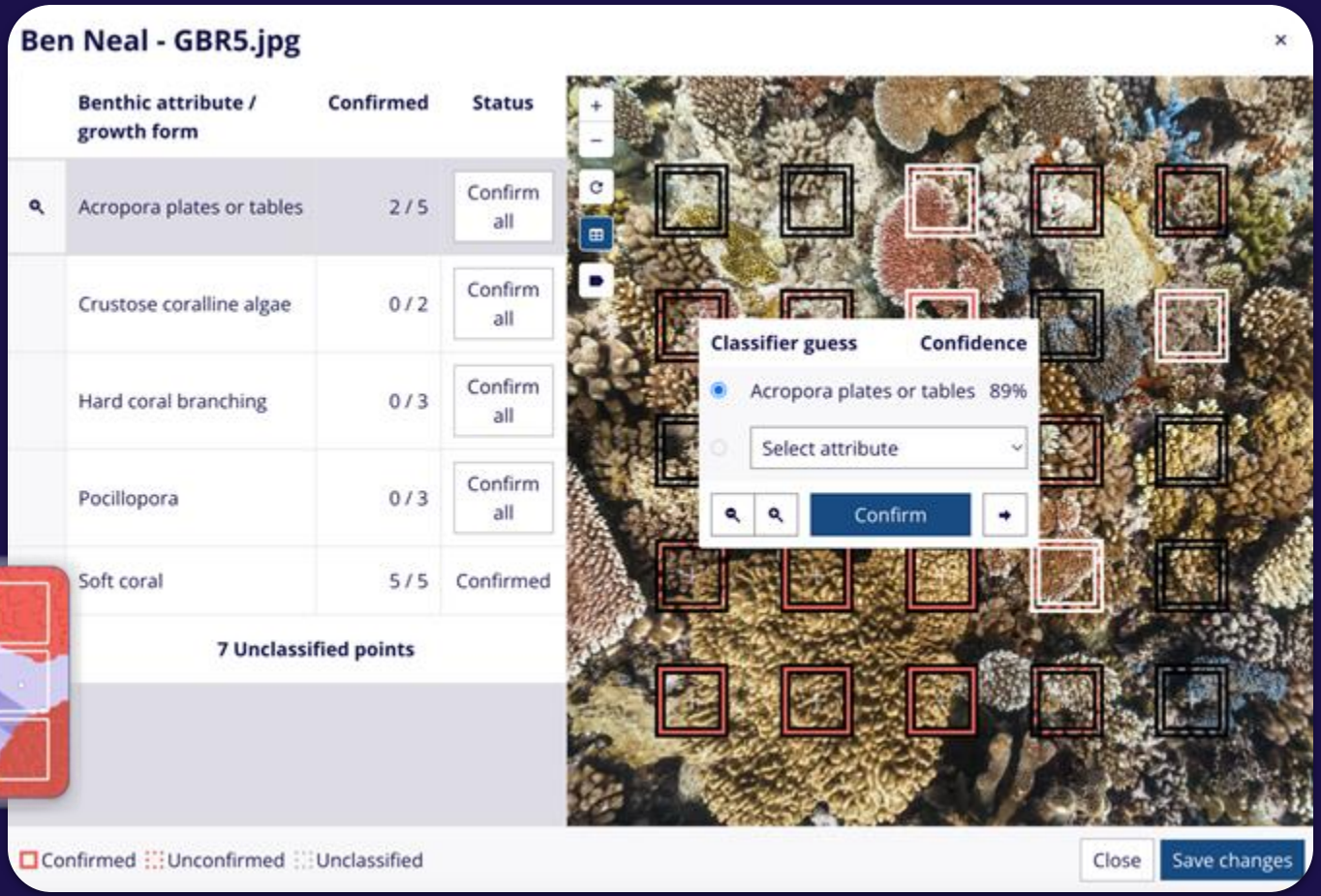
**>180 organizations**

**8,000 monitored sites**


MERMAID

# The first of the MERMAID AI suite of tools:

# Image Classification (Beta)



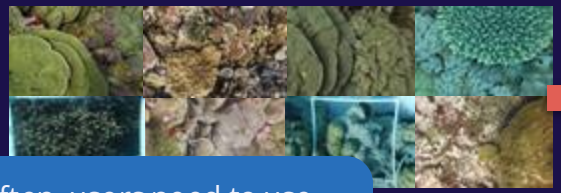

MERMAID

# Challenges in turning coral reef images into data

Monitoring coral reefs is essential — but it's hard.

Traditional approaches are very slow and labor-intensive


Current AI pipelines require model training and validation



Training AI model

Often, users need to use ~30% of photos in training before running model

CORALNET
A WEB SOLUTION FOR CORAL REEF ANALYSIS

Reef Cloud

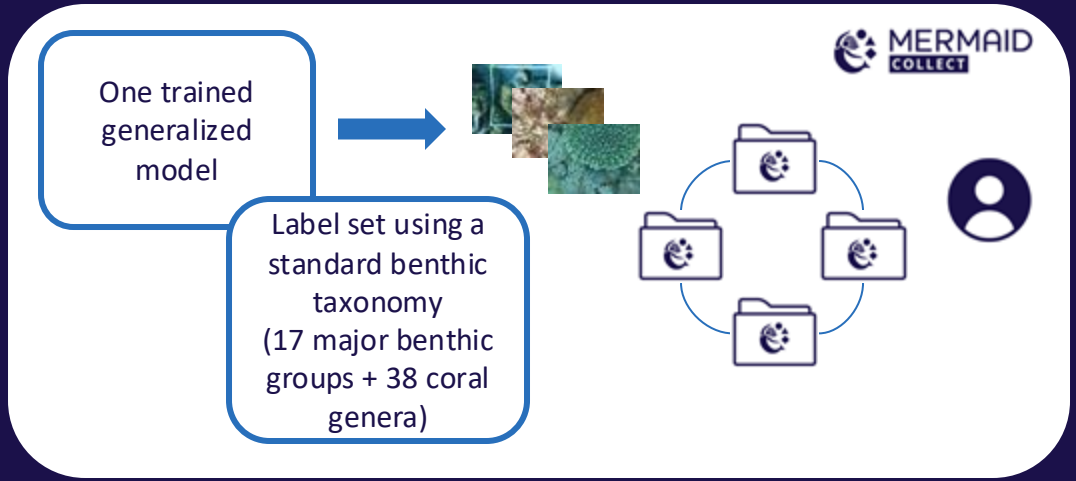
→ Harder adoption, limited model/labels standardization, coral reef images underutilized, and unaccessible

# Our approach to AI for coral reef images

Instead of having each team training and maintaining their own models, MERMAID developed a shared generalized model already trained and integrated into our platform.

With CoralNet

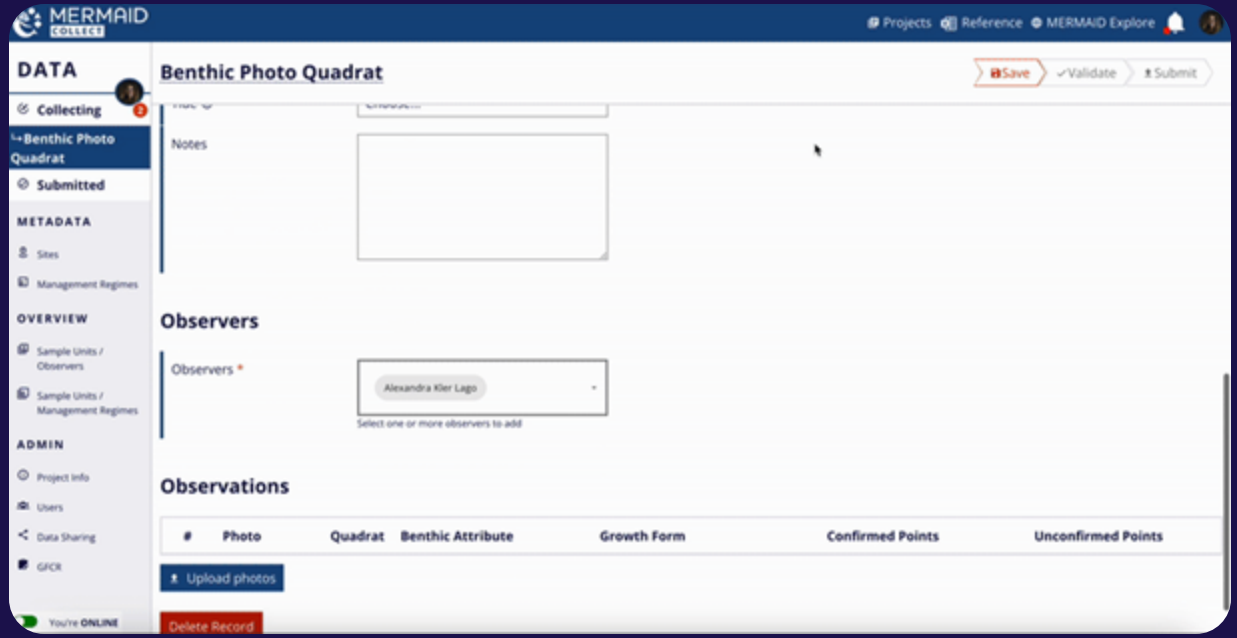
**>500,000 images** from **326 public sources** used in training




Shared across sites, projects and teams

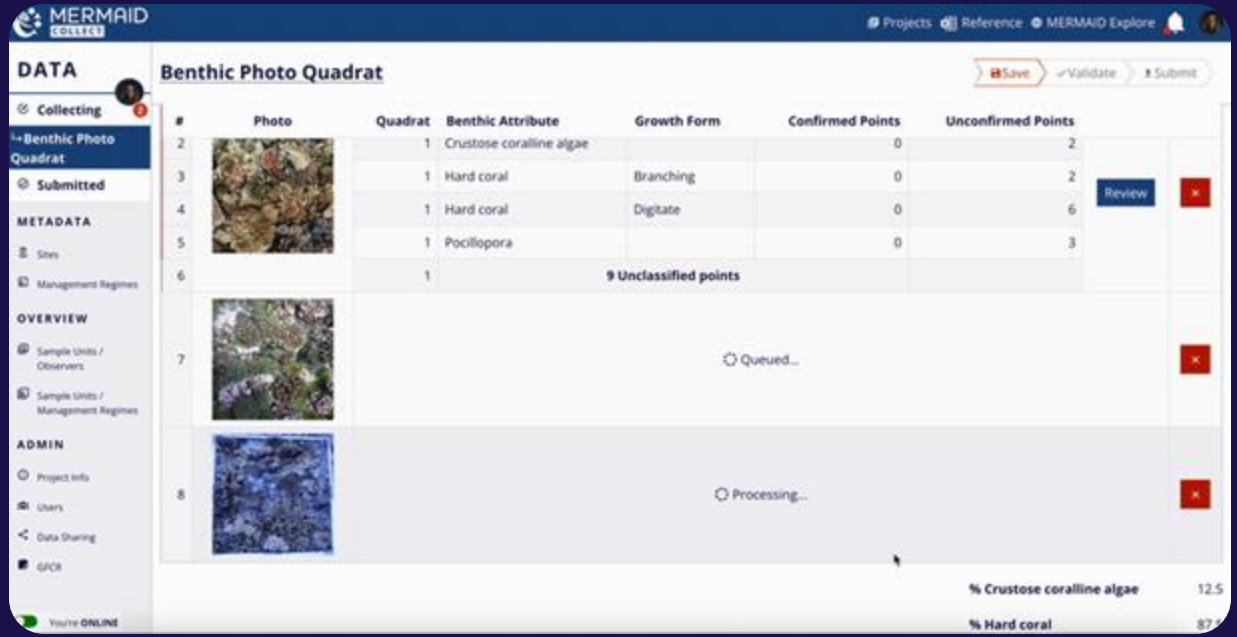
# A simple and easy image classification workflow

**Step 1:** Users drag-and-drop photos into MERMAID



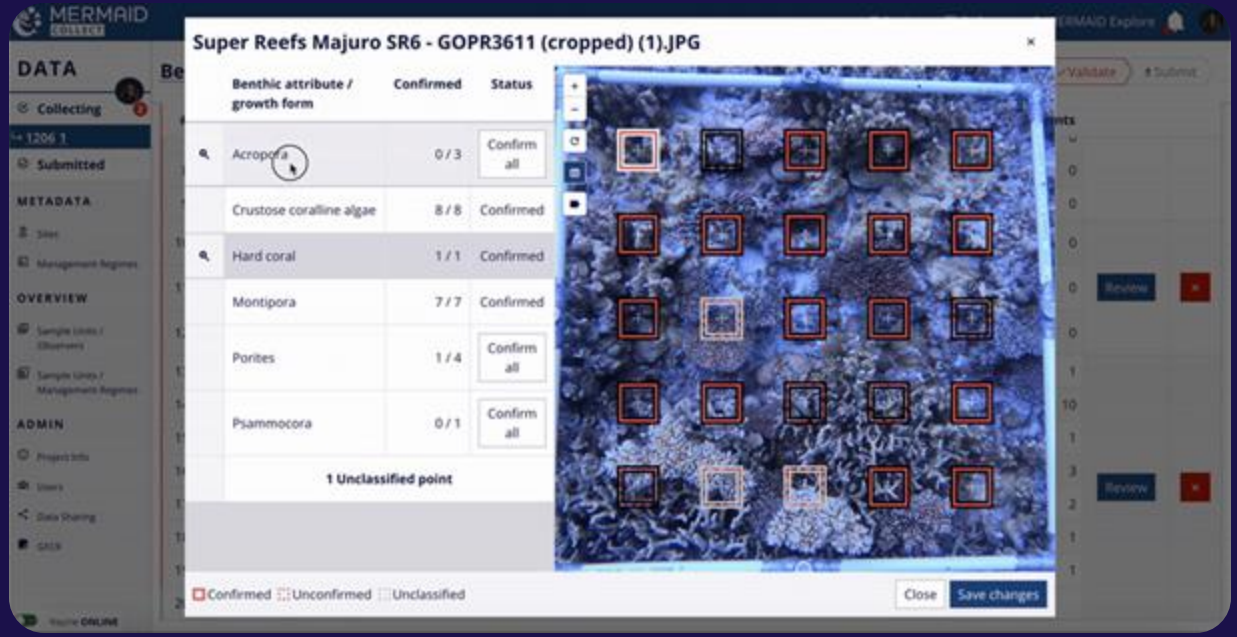
# A simple and easy image classification workflow

**Step 2:** MERMAID instantly makes predictions for 25 points in each photo



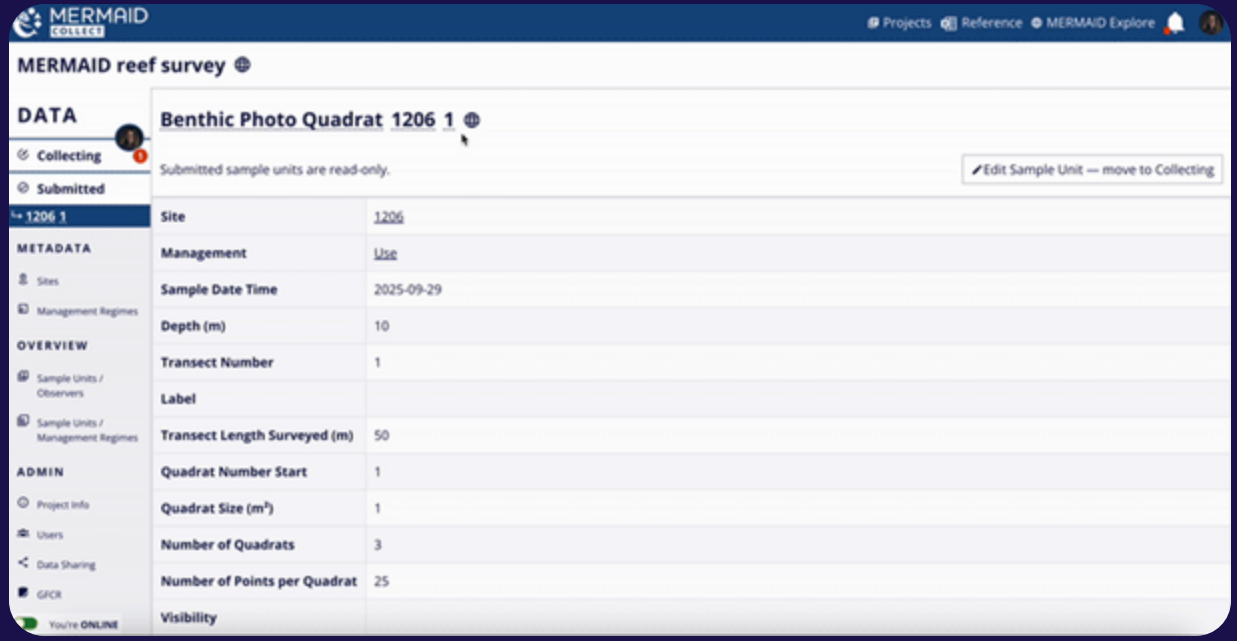
# A simple and easy image classification workflow

**Step 3:** Users review and confirm annotations, which are saved to build better future models



# A simple and easy image classification workflow

**Step 4:** Visualize instant results and download in MERMAID Explore and *mermaidr* R package




→ No training, validation, or advanced settings needed, which makes this approach accessible to any team

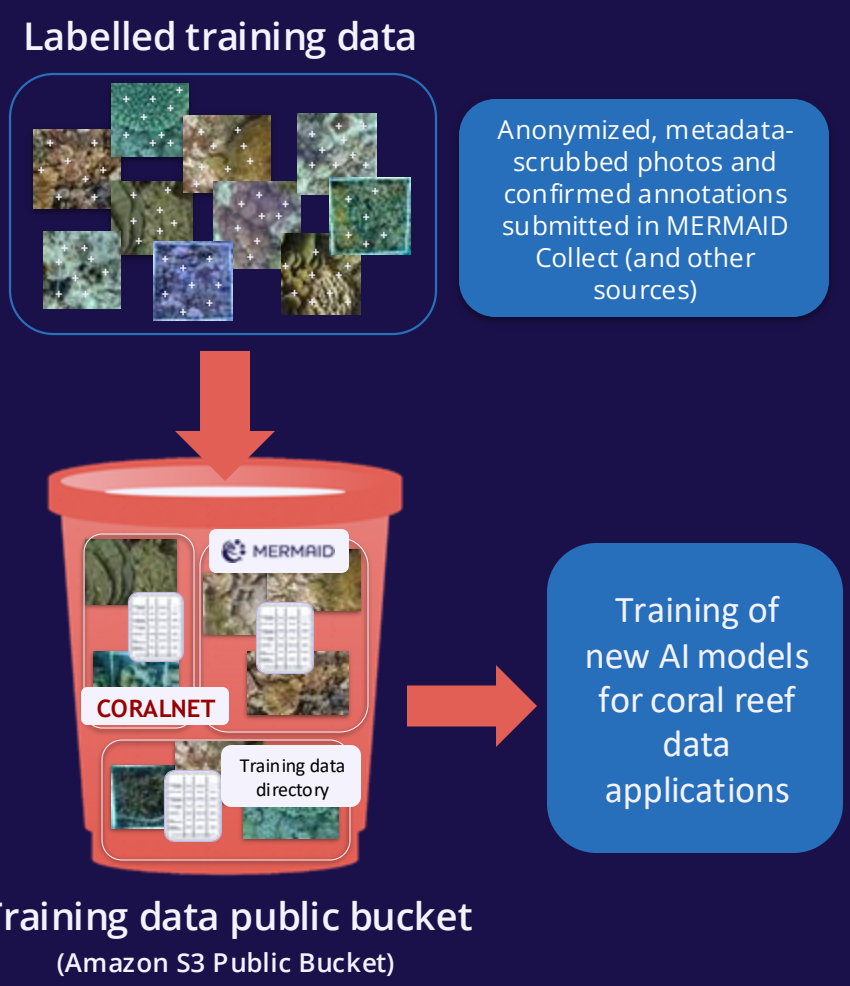
# Open training data in MERMAID

High-quality, open training data are essential for improving coral reef image classification.

Yet, most training datasets are closed or inaccessible, limiting progress and innovation.

With support from the AWS Imagine Grant, WCS is creating the first open, global repository of anonymized coral reef photos and annotations — a shared resource to build and test better models.

Every contribution counts: as MERMAID AI users upload photos, confirm annotations, and add new labels, they're collectively improving future coral reef AI models.



# Raw observation data remains secure in projects

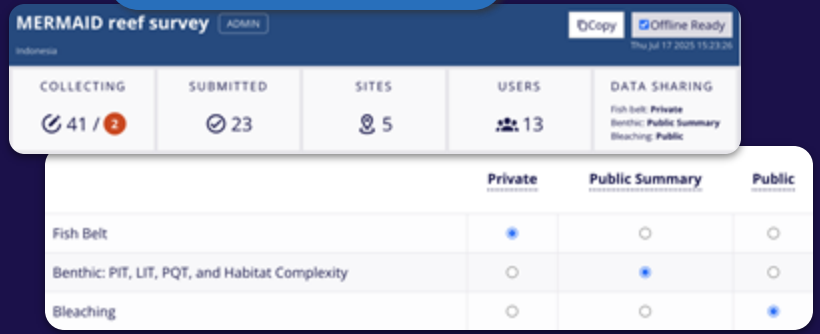
Users' original photos and benthic PQT data (observations and summaries) are securely stored in MERMAID.

**Users control data sharing** through their projects (Public, Public Summary, or Private).

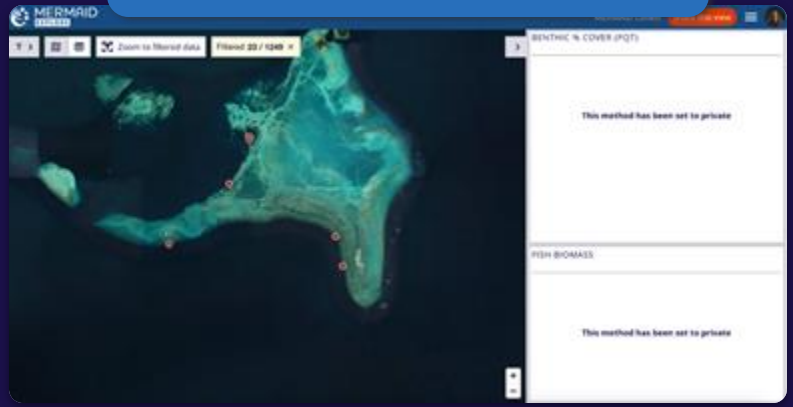
**Only project members can view** data unless made public, in which case it's accessible via MERMAID Explore or the R package.

Details available in MERMAID's Terms of Service: datamermaid.org/terms-of-service.

Benthic PQT data remains protected. Accessible to project users.




Only visible to others if data sharing is set to Public Summary / Public.

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# What's next for MERMAID AI?

MERMAID AI *beta* model is freely available to all MERMAID users. Next year, we'll be **actively training and releasing a better model (v1).**

Using MERMAID AI expands open training datasets and helps improve the classifier to more coral genera and better performance.

1,998 photos uploaded

Confirmed annotations:
Central Indo-Pacific 43,550
Western Indo-Pacific 6,400

Training AI model

More accurate models

Expanded genus list

Models tuned to specific reef regions

Hierarchical classifications (e.g., hard coral, Acropora)

The more photos uploaded and confirmed annotations, the faster we can release new models.

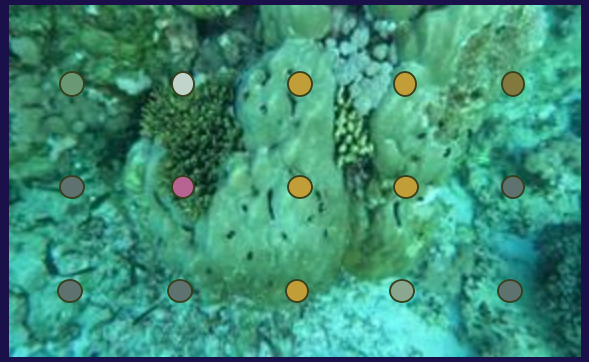
# Collaborating on R&D (Research & Development)

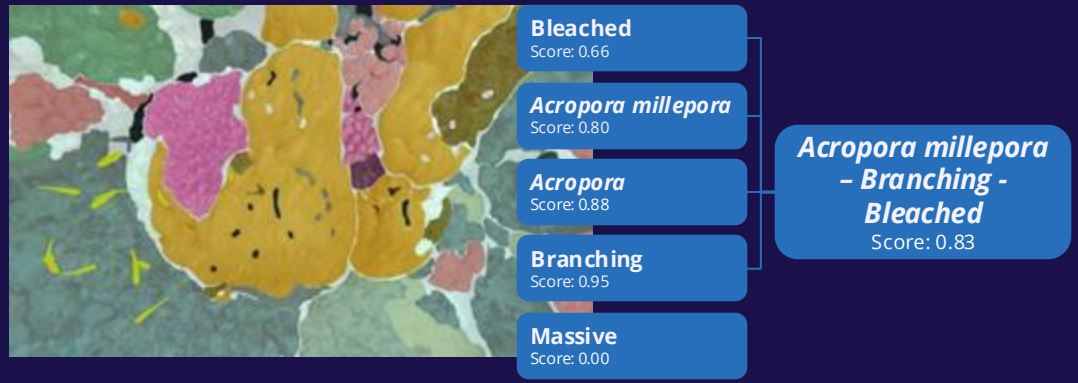
We're part in the R&D of new hierarchical segmentation models with Coralscapes, a project from Transnational Red Sea Center at EPFL (École Polytechnique fédéral in Lausanne).

Sparse to dense predictions

Hierarchical label set + orthogonal classes

Improves representation, accuracy, and completeness of benthic attributes with growth forms and health status, while providing more reliable and flexible benthic cover estimates.








josauder.github.io/coralscapes

# Join us!

We invite you to try the *beta* MERMAID AI model. Contribute your photos and annotations, so we can improve future models.

Join the public bucket if your platform/initiative has coral reef imagery and annotations.

**Open data. Shared AI. Stronger reef monitoring.**

We believe the future of coral reef monitoring depends on open, shared AI.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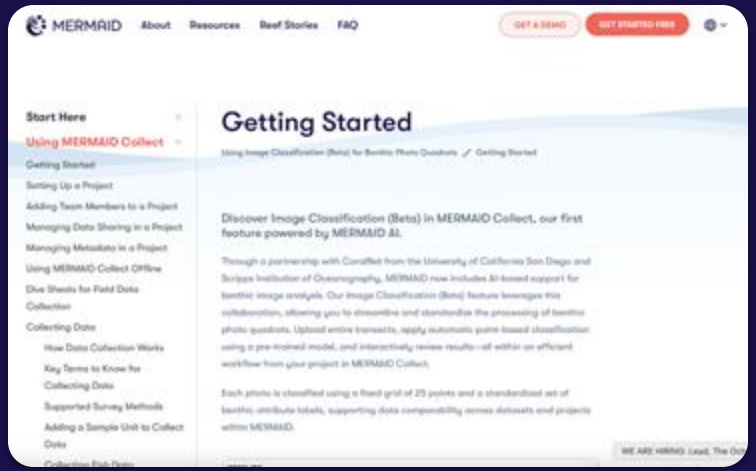
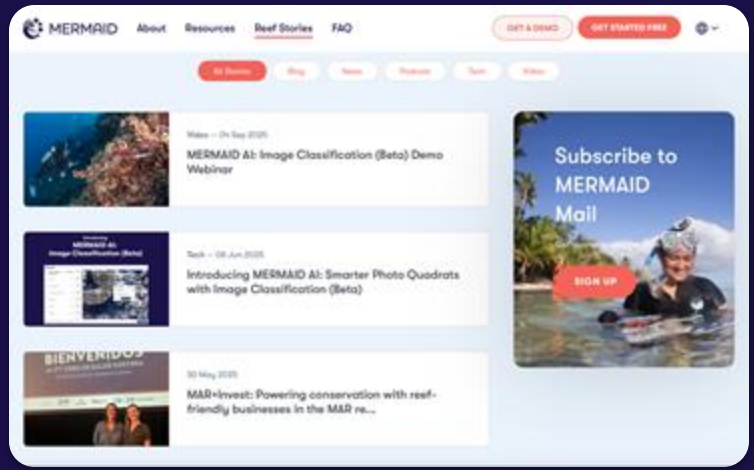
# Stay tuned for what's next in MERMAID




Explore our documentation for a step-by-step on how to use the *beta* MERMAID AI model.

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**Join our community! We'd love your feedback.**

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