

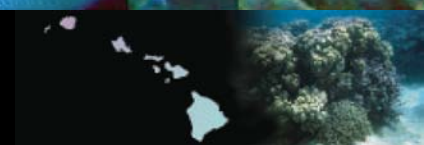
The Coral Reef of South Moloka'i, Hawai'i

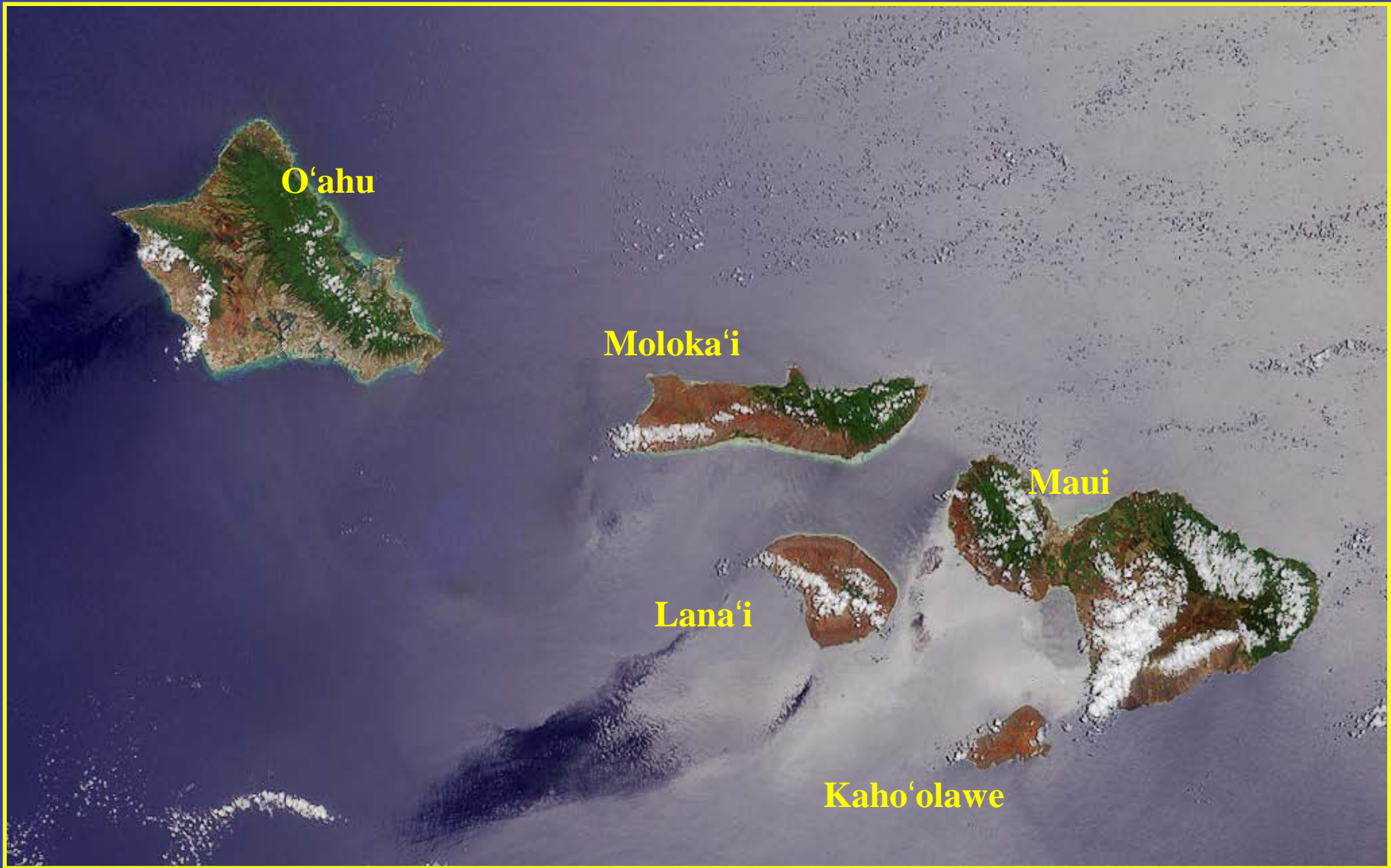
Portrait of a Sediment-Threatened Fringing Reef

Scientific Investigations Report 2007-5101

U.S. Department of the Interior
U.S. Geological Survey

Mike Field
USGS





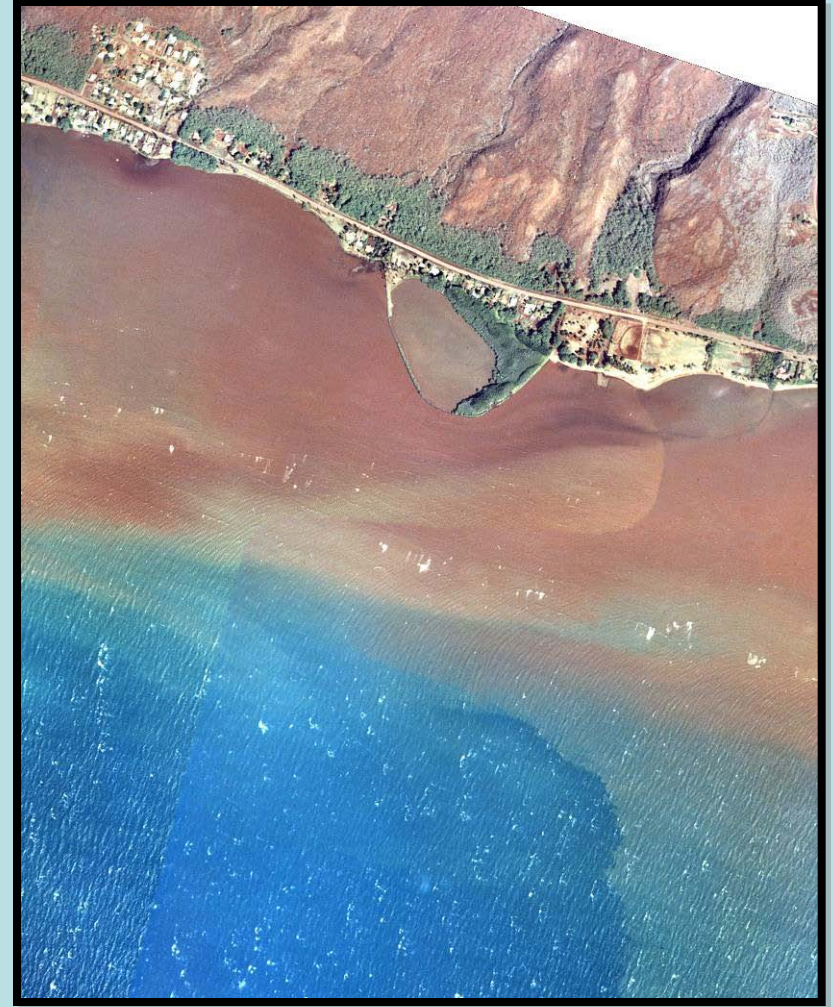
Linked Problems

- Watershed degradation
- Alien species
- Erosion & loss of habitat
- Threatened and endangered species
- Ecosystem sustainability
- Coastal sedimentation
- Reef degradation
- Fisheries collapse



No surprises for local stakeholders...

- Mud flows downhill...
- It used to be reef but now it's mud...
- There used to be plants but now it's rock...
- We get sick after heavy rains...
- It's not good to fish near the dead pigs...



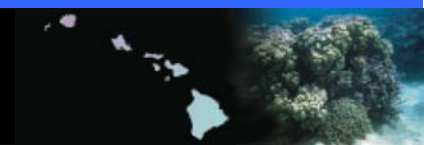
Sediment Stresses to Reefs

Turbidity

- Reduced photosynthesis
- Interferes with feeding

Direct sedimentation

- Physiologic stress
- Inhibits recruitment
- Promotes diseases



So we get this ...



Instead of this ...



HOW TO MAKE A DESERT:



1. TAKE ANY PIECE OF LAND,
2. ADD GOATS



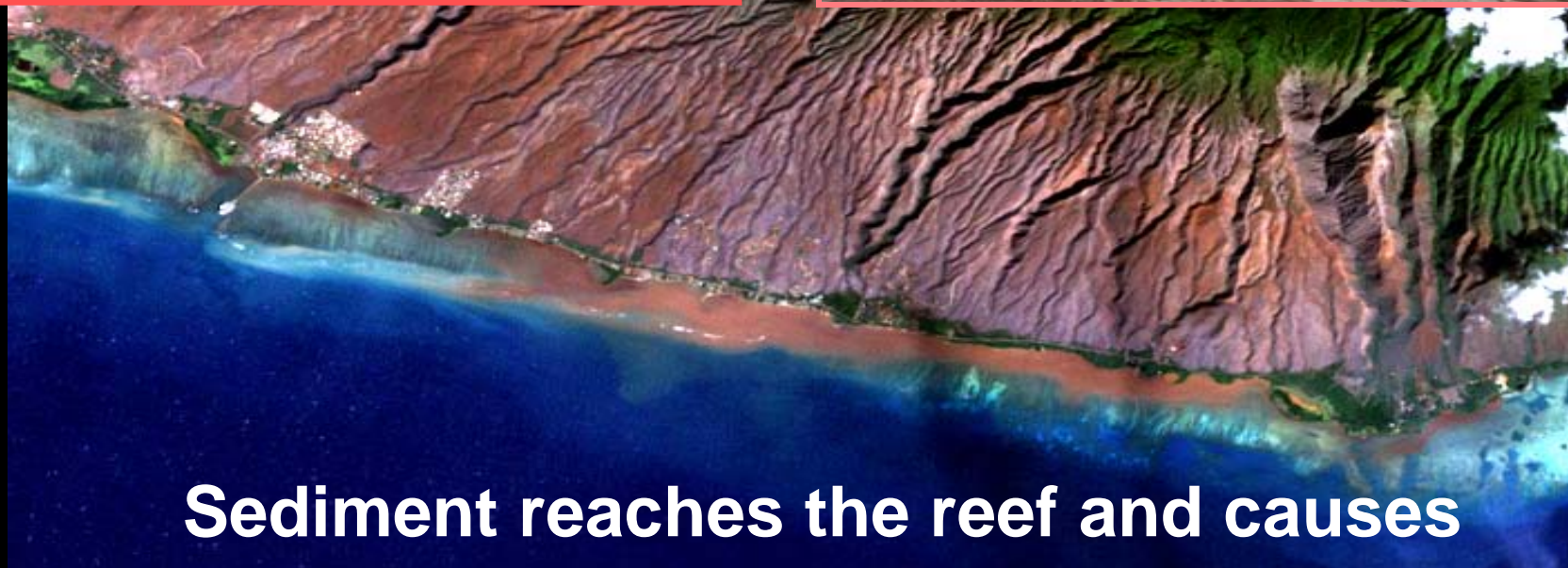
South Moloka'i



Overgrazing and invasive species reduce watershed services

Native species, cultural uses and economic opportunities are impaired





Sediment reaches the reef and causes ecologic damage and reduces marine resources

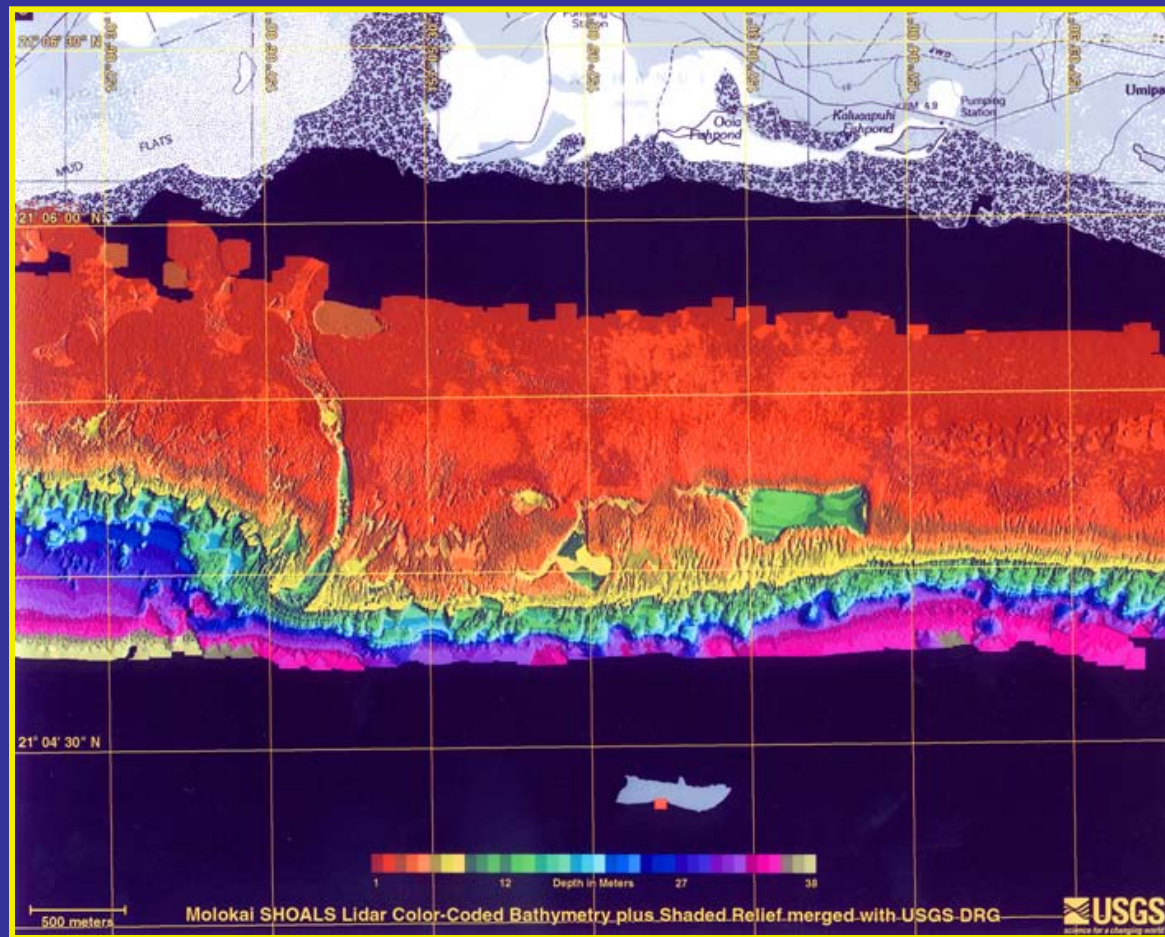


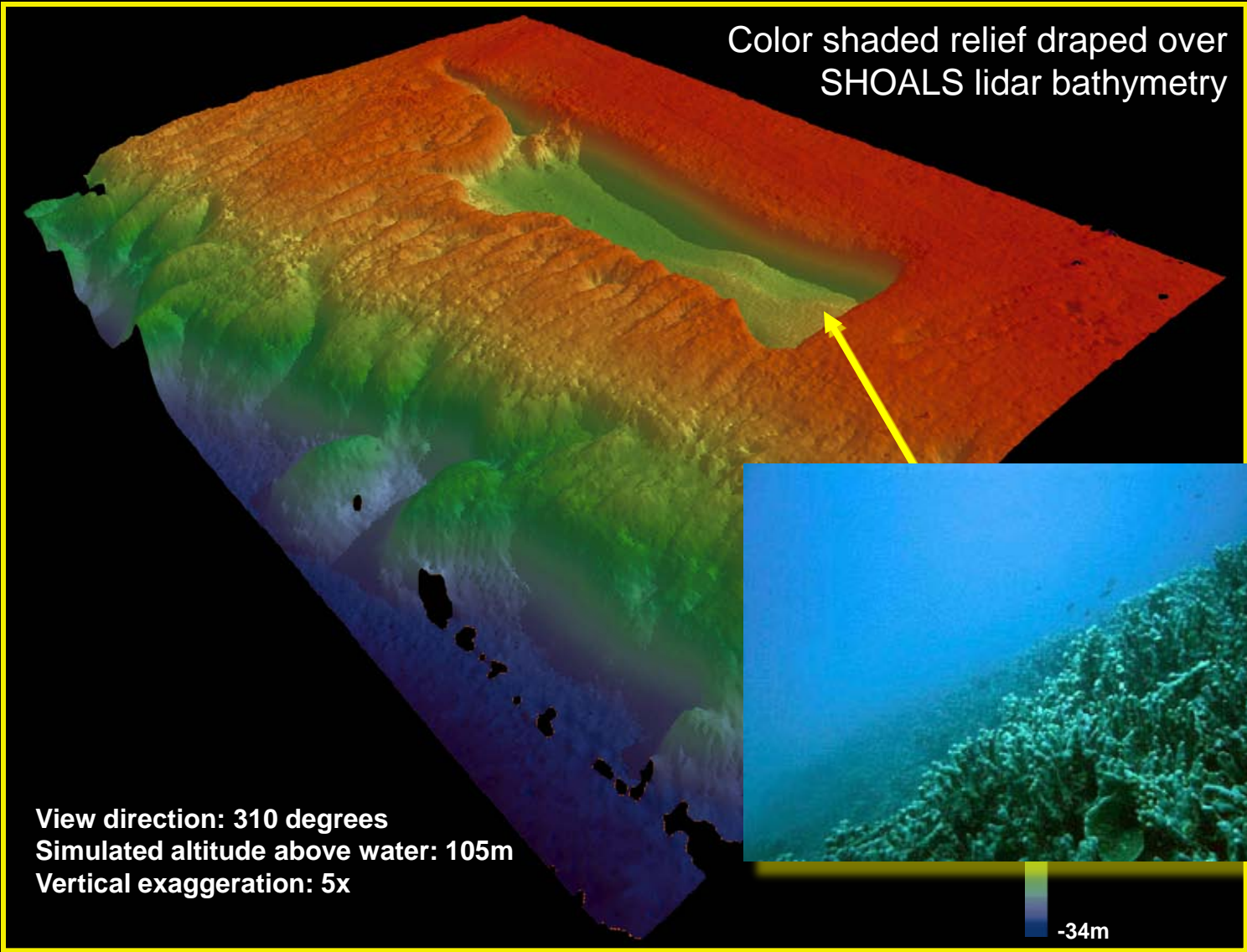
Remote sensing and mapping on the Moloka'i coral reef

Photography



LiDAR





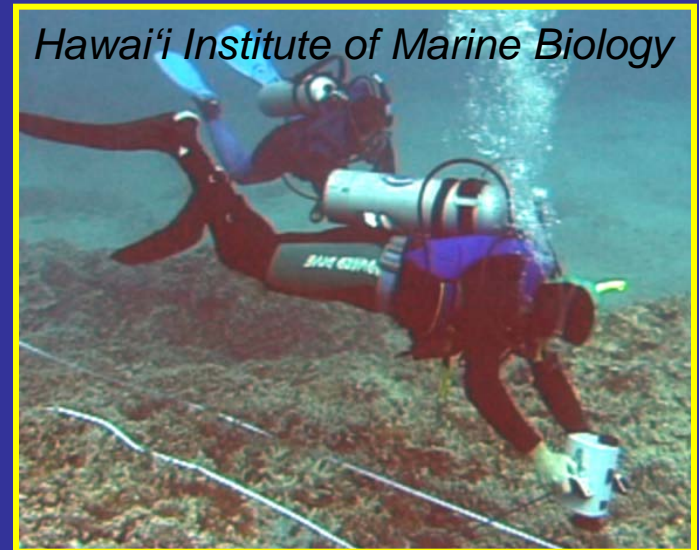
Standard techniques...



Sediment sampling



Suspended sediment



Monitoring



...and graduate students
(UH, UW, UCSC)

...and post-docs



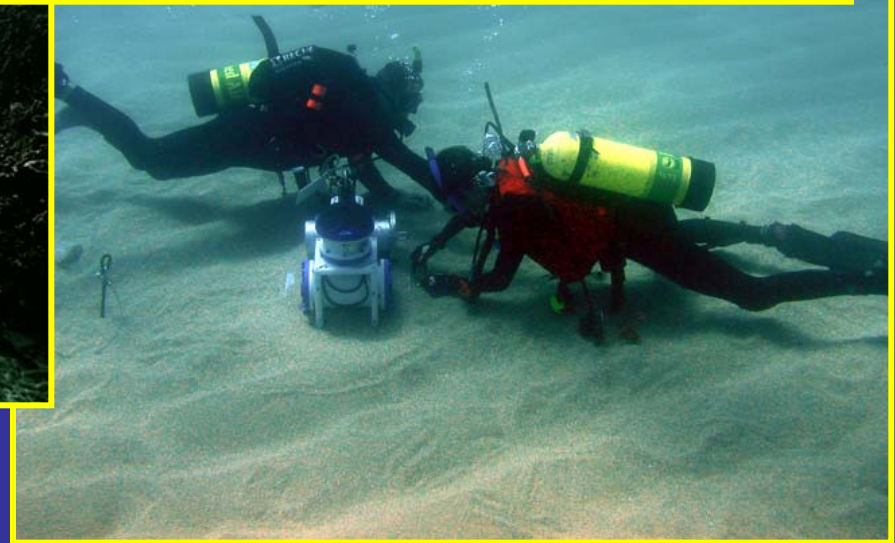
...and adaptation

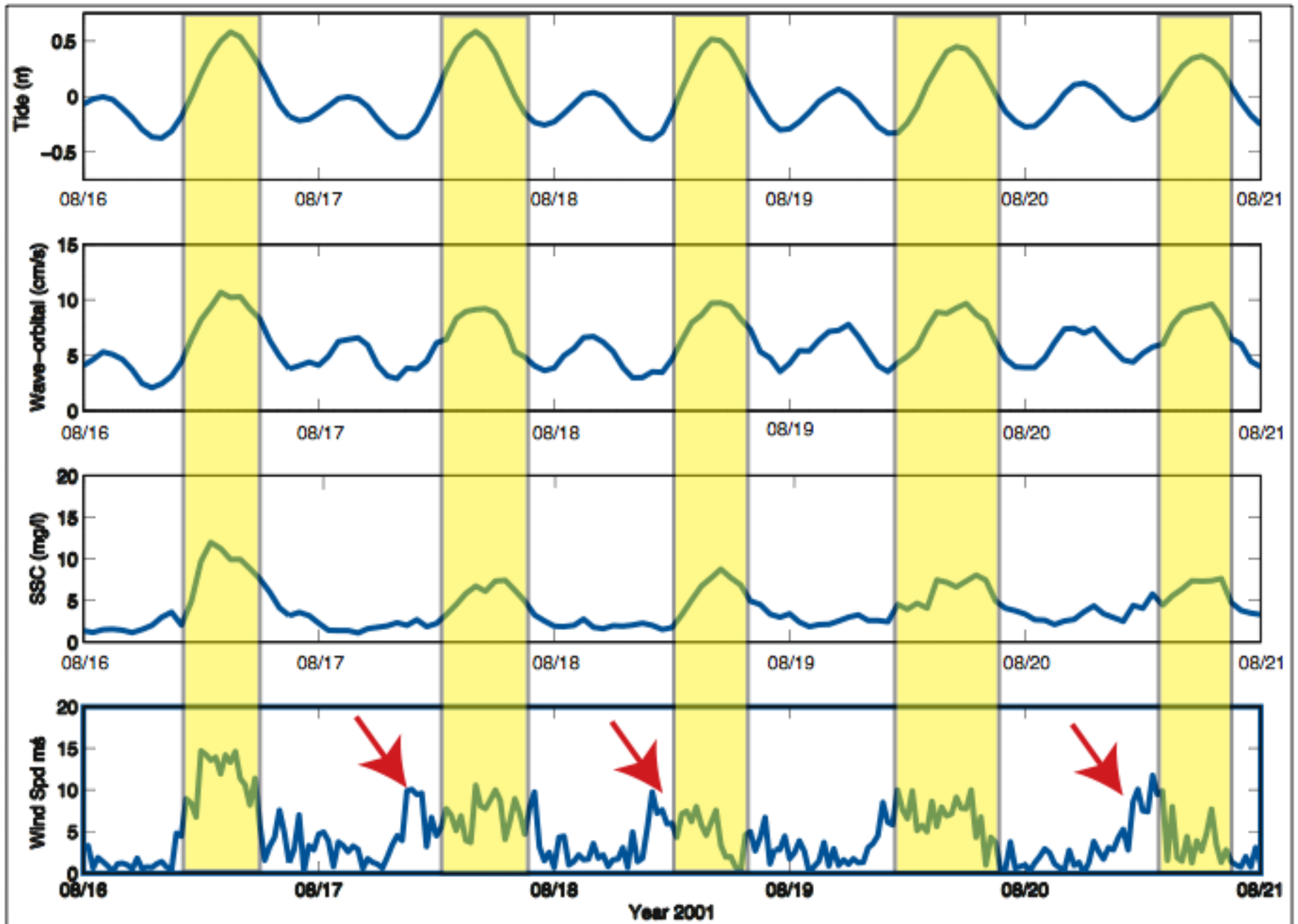


Relying on local skills and knowledge



...and innovation







SWIM SURVEY TRANSECTS





TNC and USGS

ON THE RIDGE



Coral reef

Stream &
Sediment Gage

Flume, Sampler &
Rain Gage

LIDAR

GPS
base
station

Flow
sensors

ON THE RIDGE



Jacobi vegetation map

- <all other values>
- Type
 - Grass / Ilima
 - Guava / Hau??
 - Ilima (Lantana)
 - Kiawe (Pukiawe) [Problem in upper area]
 - Koa Haole
 - Kukui
 - Lantana (Lantana 2)
 - Not Vegetated
 - Ohia [Problem in lower area = Monkeypod?]
 - Olapa

16 mm/a from Hotspots, 1.3% area (~2600 t)
+
2.1 mm/a overland flow, 13.5% area (~3600 t)
+
0.1 mm/a remainder, 85.2% (~100 t)

at this is at upper elev]
au?

6272 t/a

6429 t/a



The Watershed:

~1 % of the area = 50 % of the sediment;

15 % of the area = ~ *all* of the sediment!

The Reef:

What lands on the reef stays on the reef
(And is resuspended over and over and over!)



Communicating the science

Watershed Advisory Group



K.I.R.C. Director
Sol Kaho'ohalahala



COMMUNICATING THE SCIENCE

- Briefings --

 - Hawai'i Local Action Strategy

 - Moloka'i Watershed Advisory Group

 - Hawai'i DAR

 - local media

- Field Work --

 - The Nature Conservancy staff

 - Hawaii scientists and managers

- Chats/ Discussions --

 - Homeowners Assoc., etc.

 - One-on-one with anyone!





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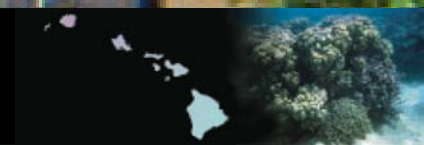
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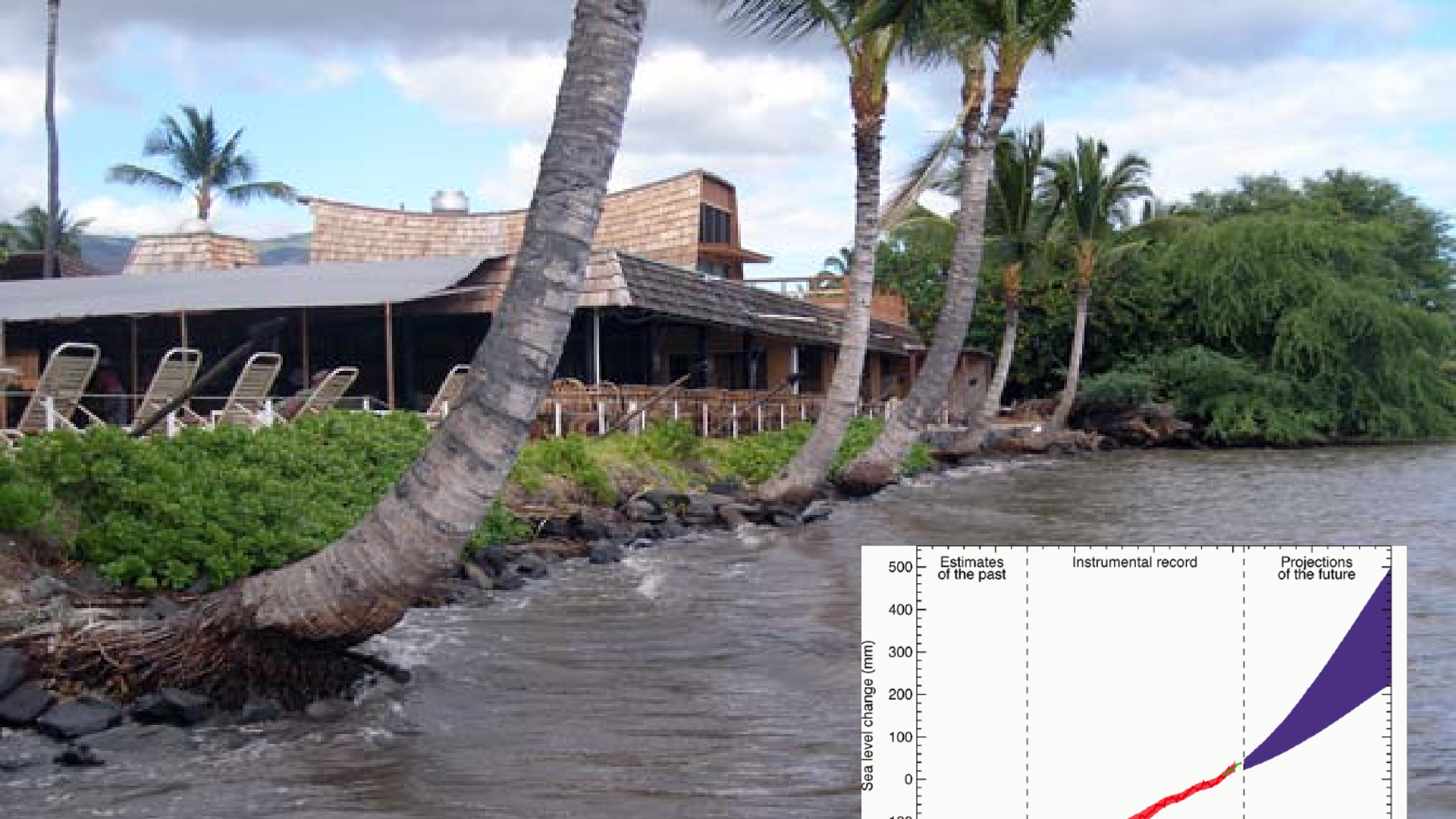
LOCAL IMPACT:

“We all knew that the mud was killing the reef, but your report provided the scientific documentation that was essential for us to make changes.”

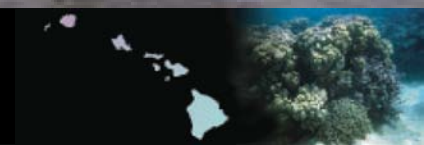
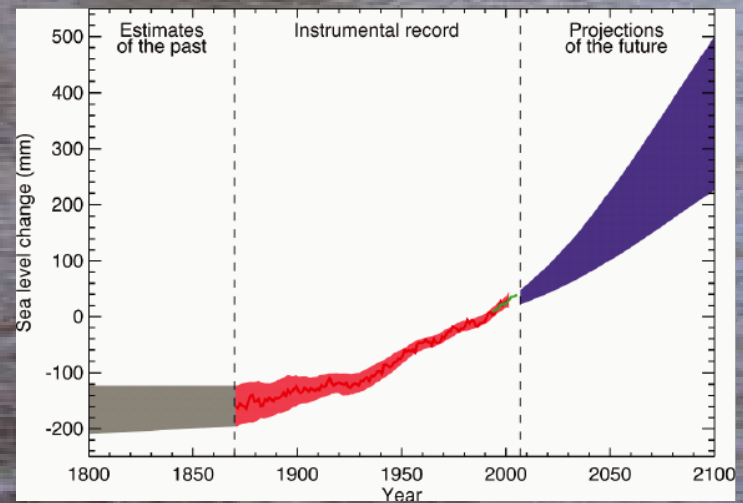
Karen Holt
Executive Director,
Molokaʻi Community Service Council

January, 2009





Sea level is rising...



A probable result is more days like this, starting earlier and ending later.



With focused research, effective management, and allied partnerships, we can restore this...

To this:

