



Geospatial Analysis for Integrating Human Knowledge Systems in Climate Change Adaptation Plans

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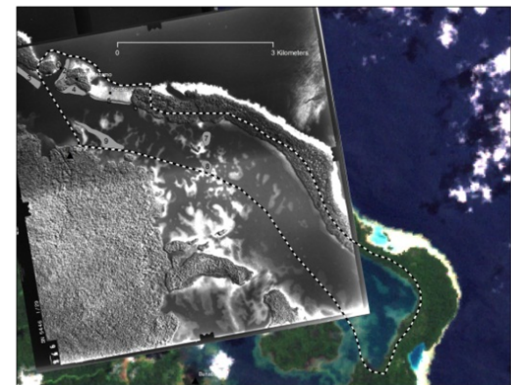
South Africa

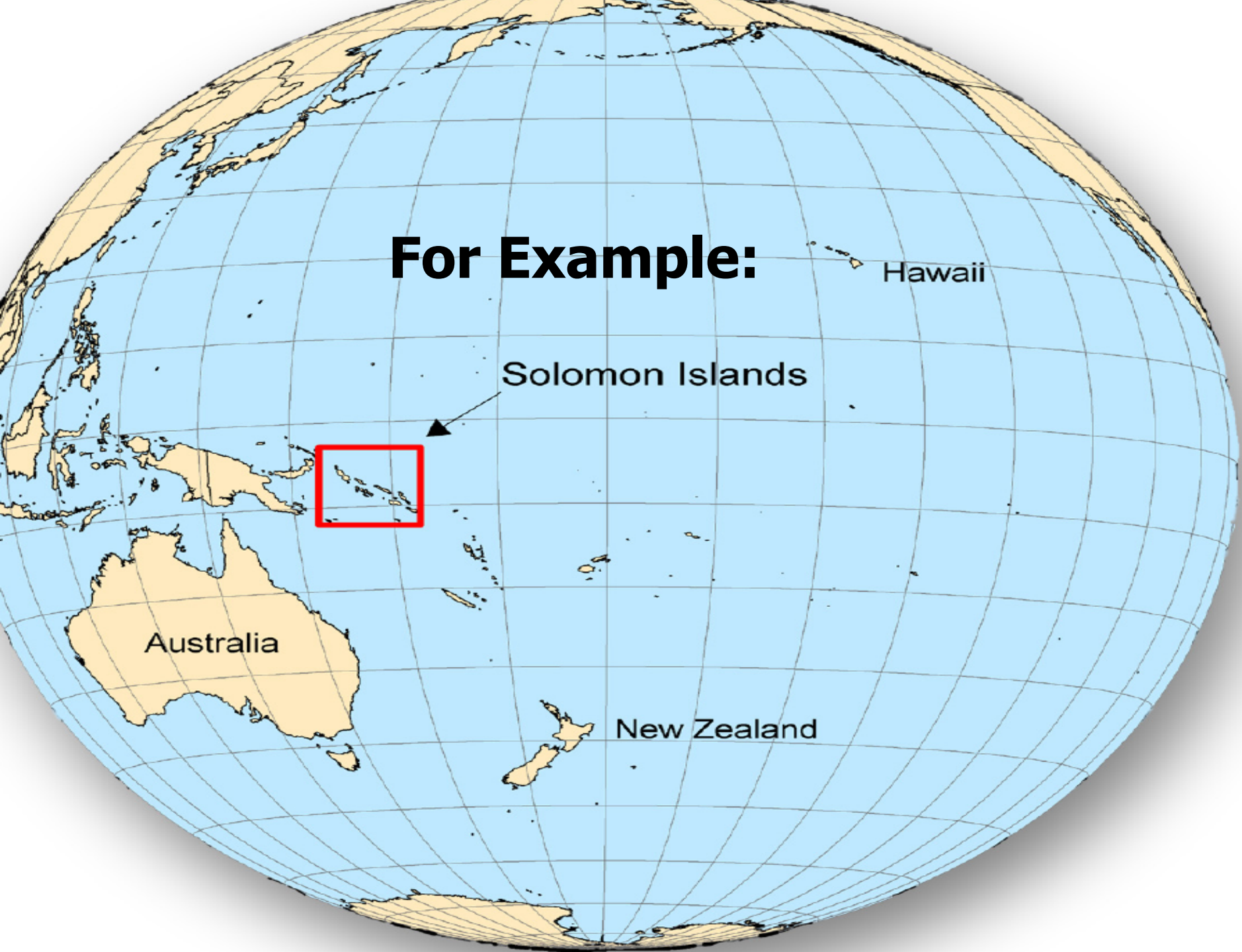


- What is the role of *Geospatial Analysis* for understanding human-coastal interactions under CC at the local scale?



- And what kinds of approaches and methods can we use to better understand human-environmental interactions in coastal areas for adaptation/management purposes? (e.g., *Participatory GIS/Remote Sensing*)





For Example:

Hawaii

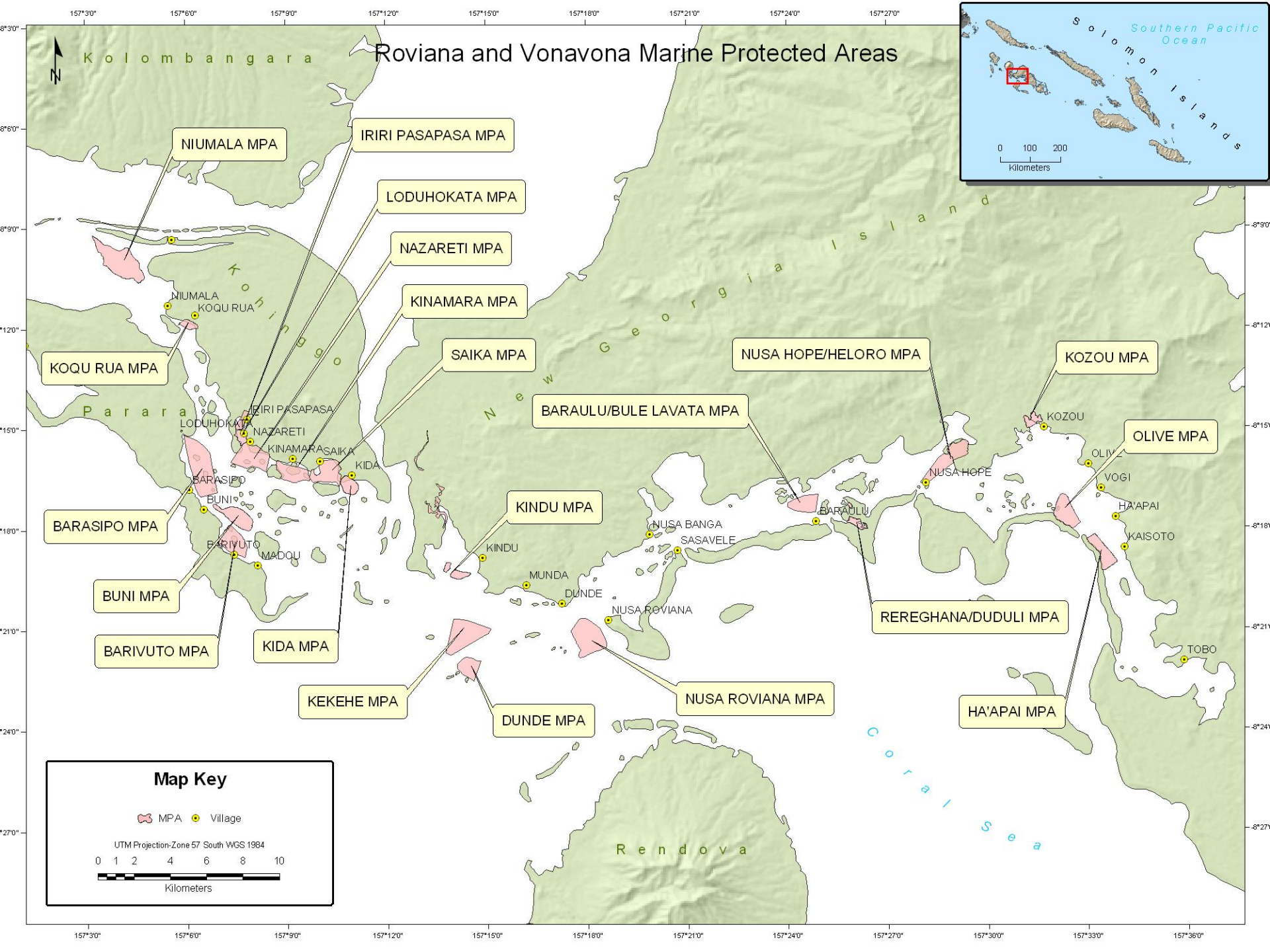
Solomon Islands

Australia

New Zealand

Geospatial Analysis in Action in the Solomon Islands:

We have created a permanent system of MPAs across the Western Solomon Islands marine eco-region as a strategy for CC adaptation and livelihood provisioning as marine environments change. The projects has heavily relied on ***Participatory GIS and P. remote sensing***



Research Dimensions in which Geospatial Analysis (e.g., Participatory GIS) has been used in the Solomons program (and Very applicable to the Madagascar context):

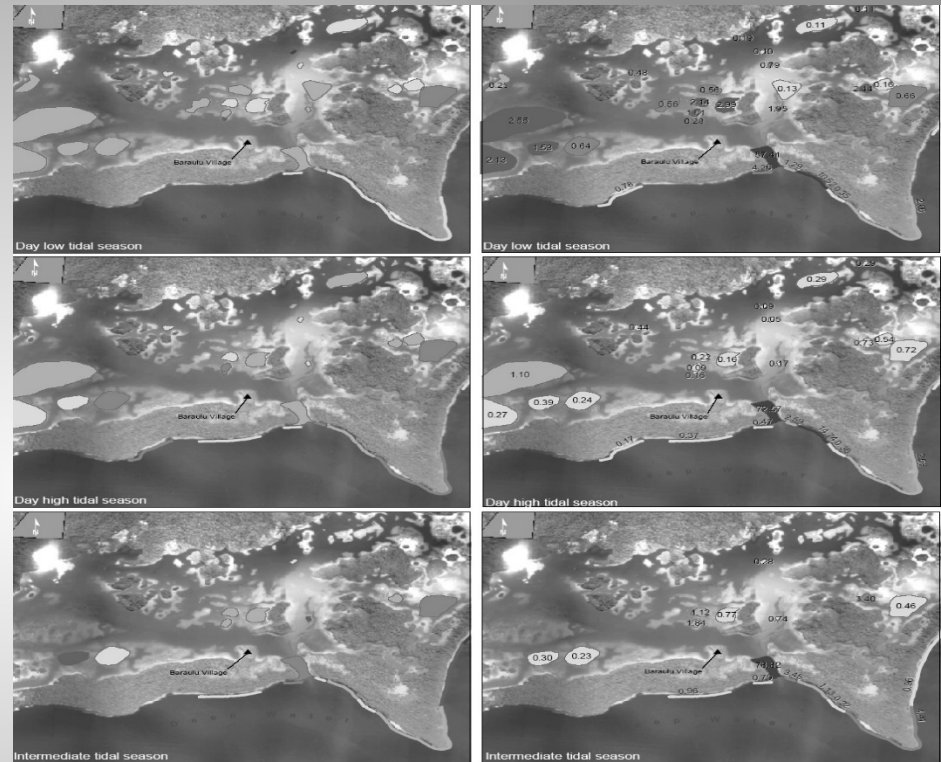
- ❖ **Ethno-history and Genealogical Demography**
- ❖ **Spatial Settlement Dynamics across time**
- ❖ **Socioeconomics Transformations and Coping Strategies**
- ❖ **Institutional Cognition and Governance**
- ❖ **Institutional Governance and Ecological Impacts**
- ❖ **Human Foraging Strategies and Potential Impacts**
- ❖ **Indigenous/Local Ecological Knowledge Systems**
- ❖ **Rapid Ecological Change and Socio-ecological Analysis**
- ❖ **Climate Change and Socio-ecological Research**
- ❖ **Eco-tourism Development and conflict**

Human Foraging Strategies and Potential Impacts

- Spatio-temporal human resource exploitation patterns
- Human responses to variability in inter- and intra-habitat relative productivity
- Human threats to particular marine habitats

Practical Contribution: Georeferenced spatial information on foraging can help in the design of permanent and seasonal closures modeled in accordance to human seasonal foraging patterns.

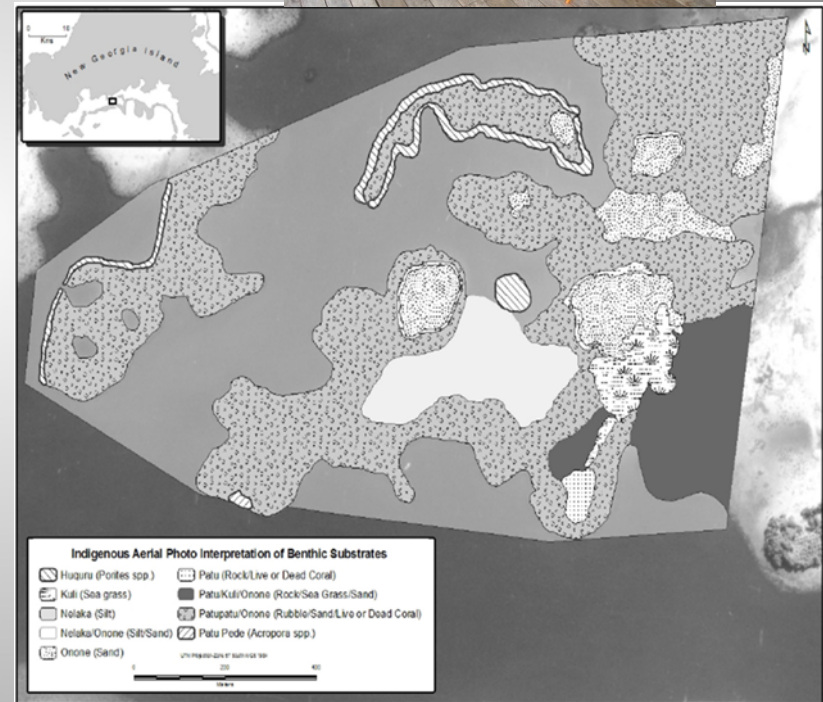
Integrating fishing behavioral patterns into program design simply enhances peoples' compliance with conservation.



- ❖ **GIS: Focal Forays**
- ❖ **GIS: Self-reporting diaries**
- ❖ **GIS: Creel Surveys**
- ❖ **GIS: Fishing Patterns**

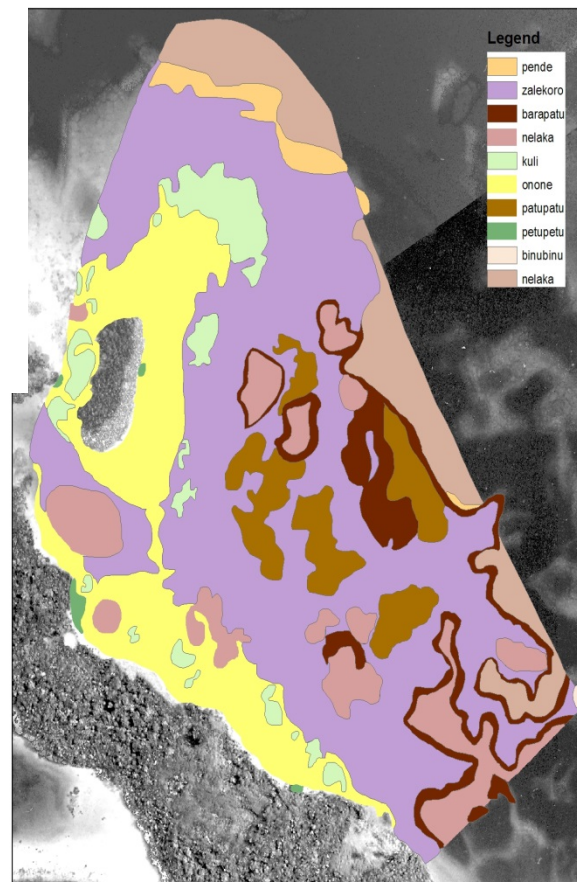
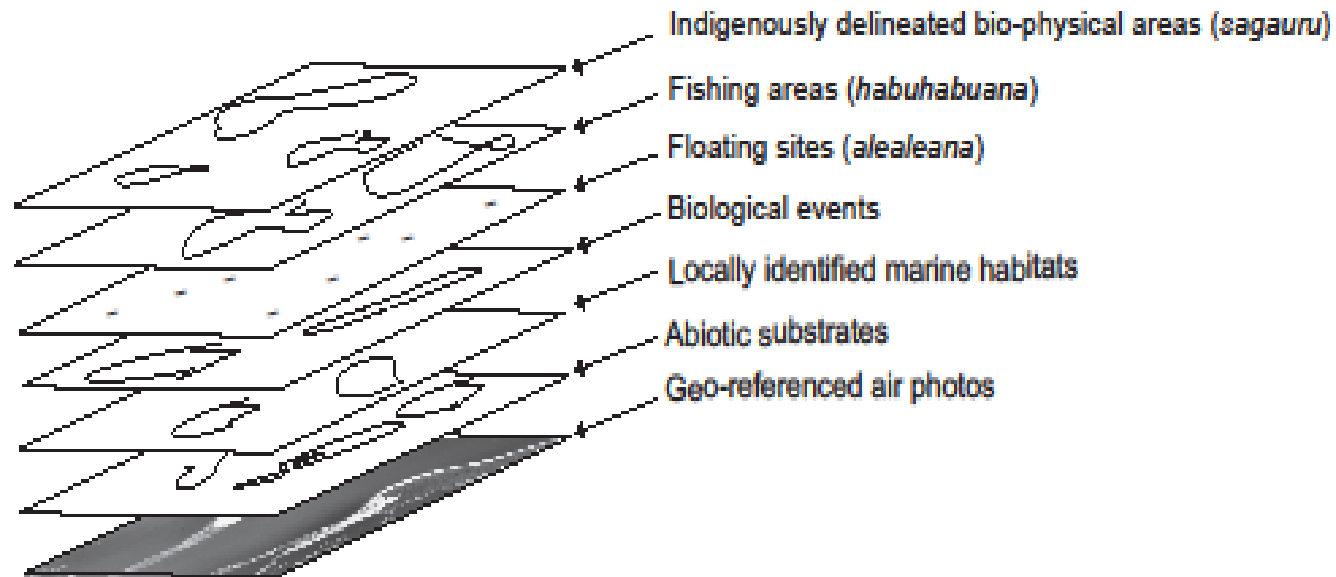
Indigenous/Local Ecological Knowledge Systems

- ❖ Indigenous Ecological Knowledge and GIS (interviewing, participatory mapping, etc.)
- ❖ Indigenous Ecological Knowledge and Marine Science (Creel surveys, UVCs, interconnectivity studies, etc.)
- ❖ Incorporating georeferenced IEK into inshore fisheries management is crucial for conservation



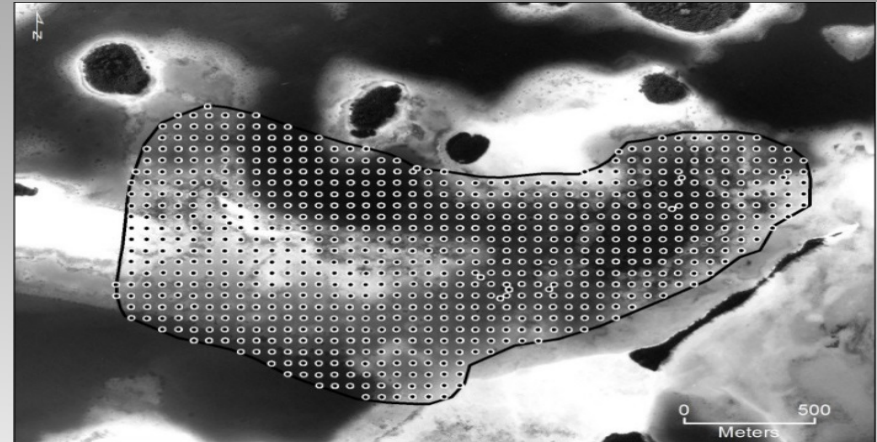
Practical Contribution: Geospatial analysis allowed us to understand the spatial distribution of habitats and species across Roviana, Vonavona, and Marovo lagoons for designing MPAs in a participatory conservation effort.

Example of LEK themes/layers in our GIS Database

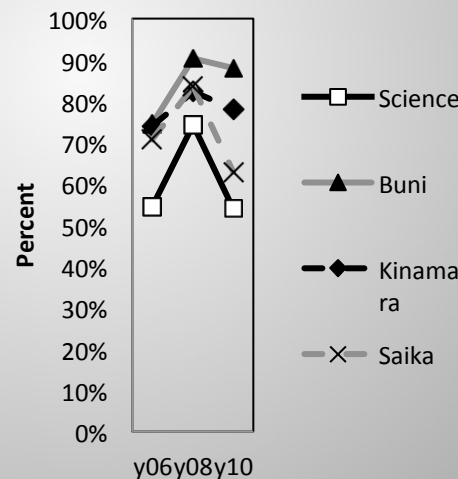


Rapid Ecological (Natural Hazards) Change and Socio-ecological Geospatial Analysis

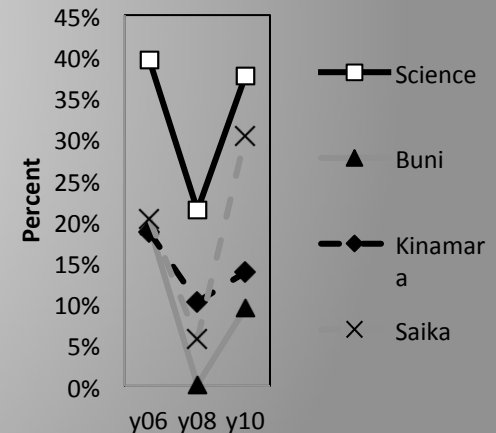
- How do people capture biophysical changes in the environment before and after catastrophic events such as earthquakes and tsunamis?
- Can people detect ecological changes in short time scales or longer time scales are need for recognition?
- ❖ **Before and After (*tsunami*) participatory image interpretation (GIS)**
- ❖ **Ground-truthing Marine science survey** (abiotic and biotic benthic substrate data import into GIS)



Sand/Silt

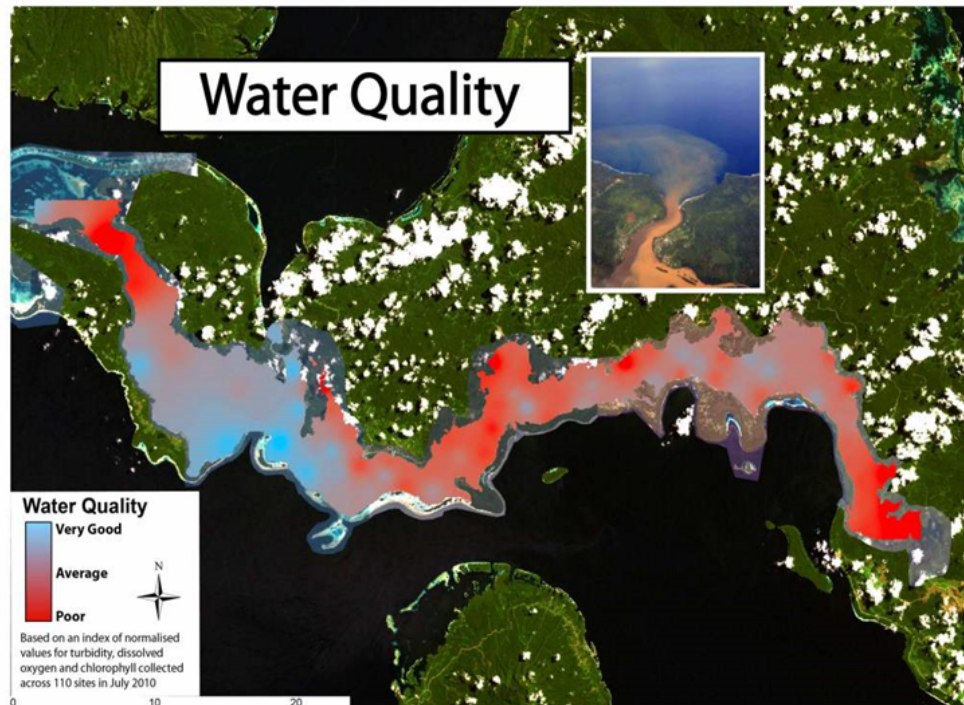
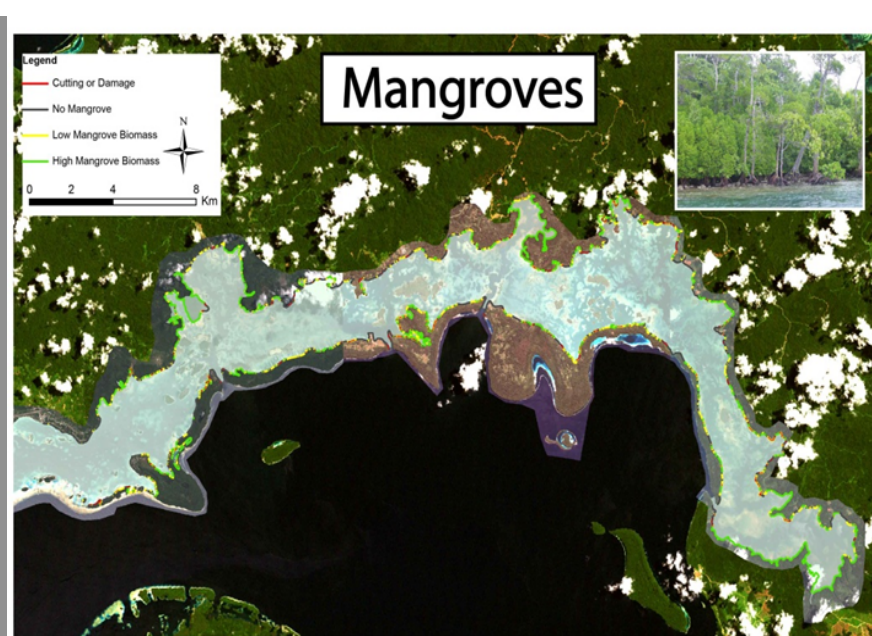
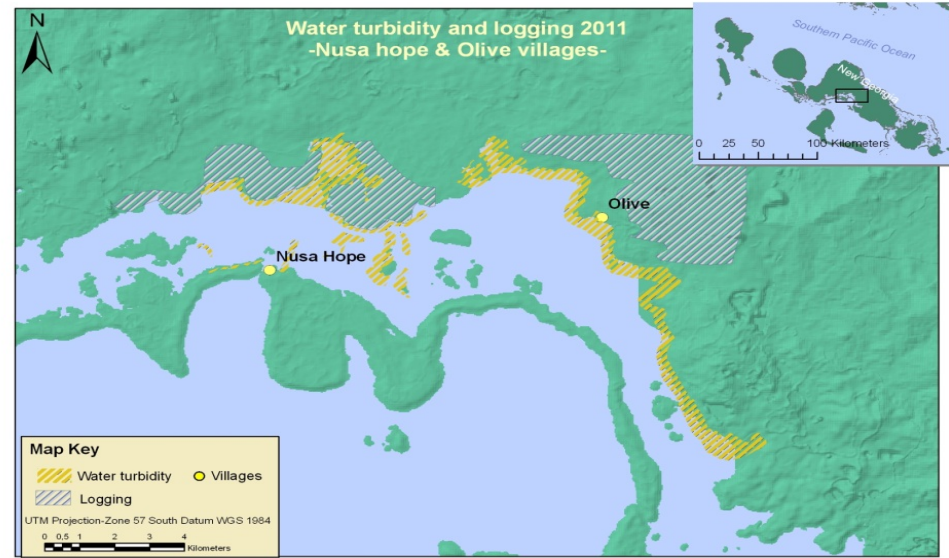
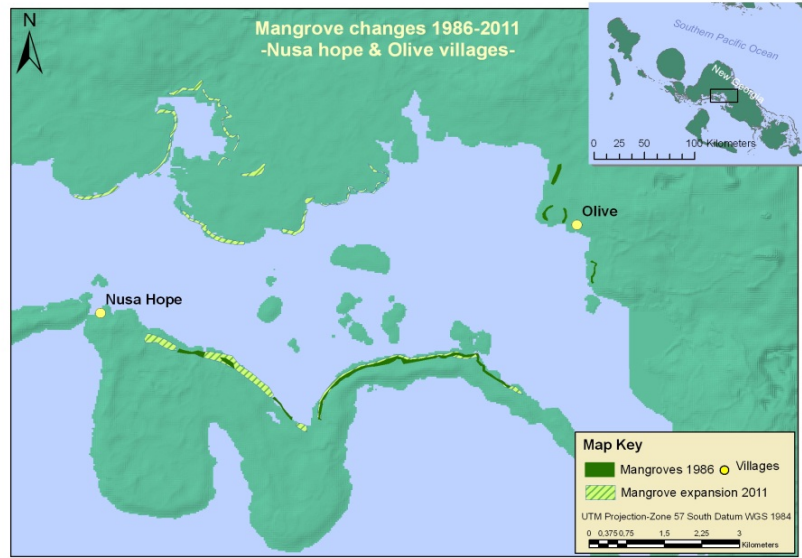


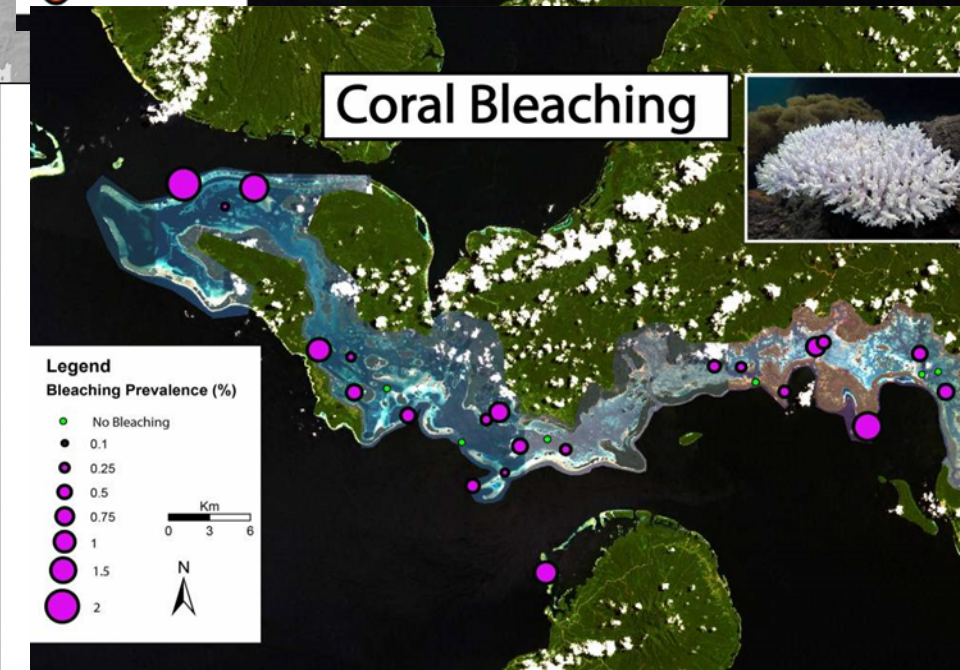
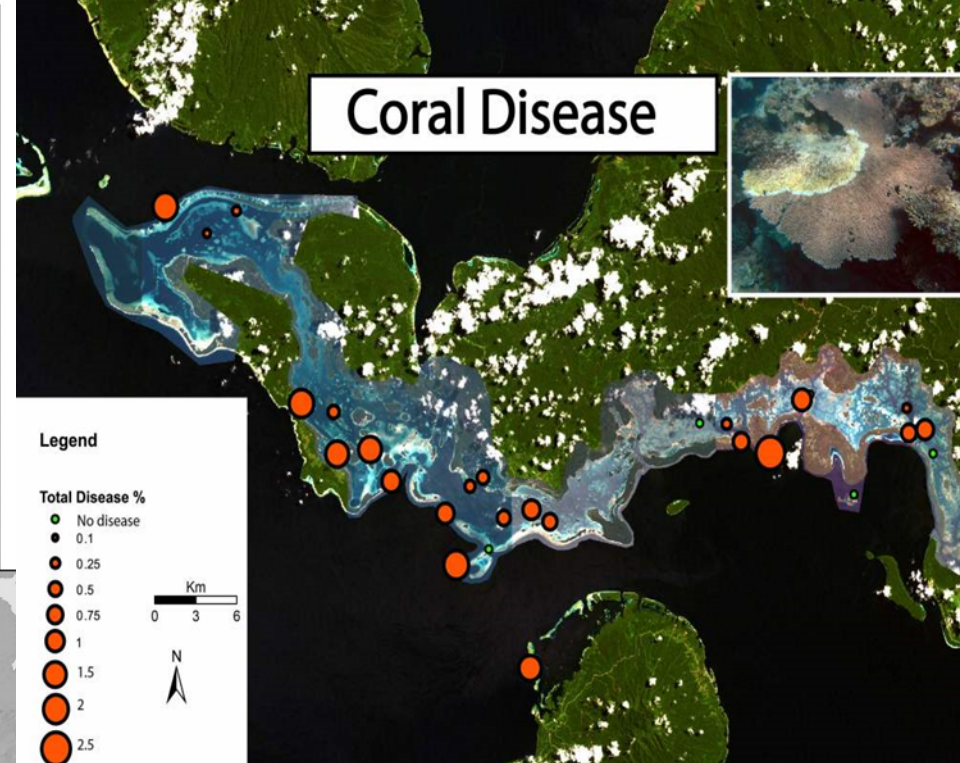
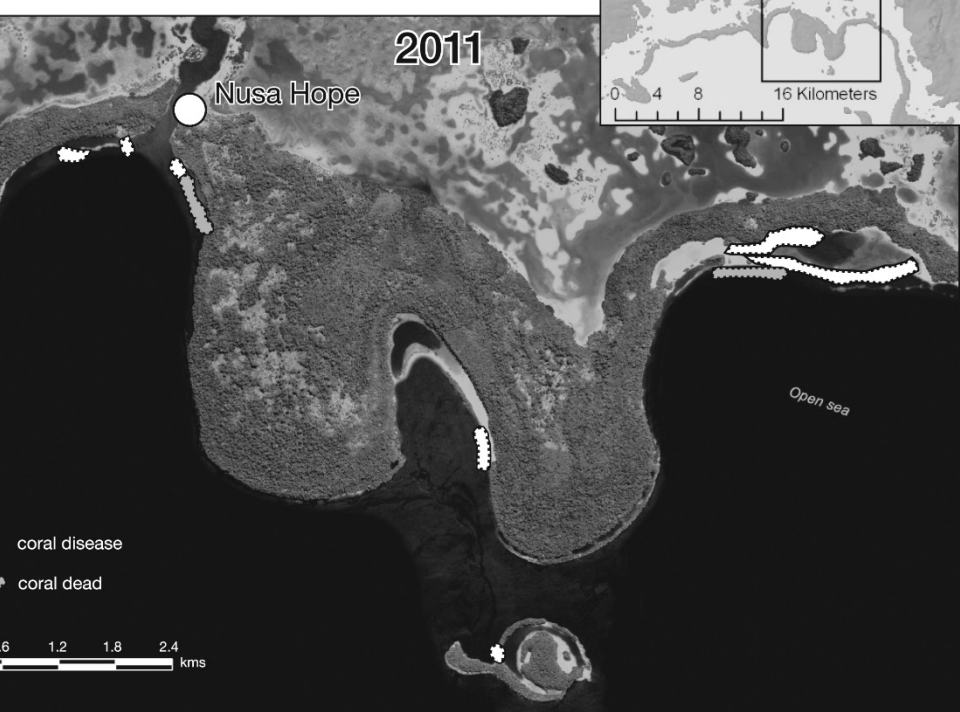
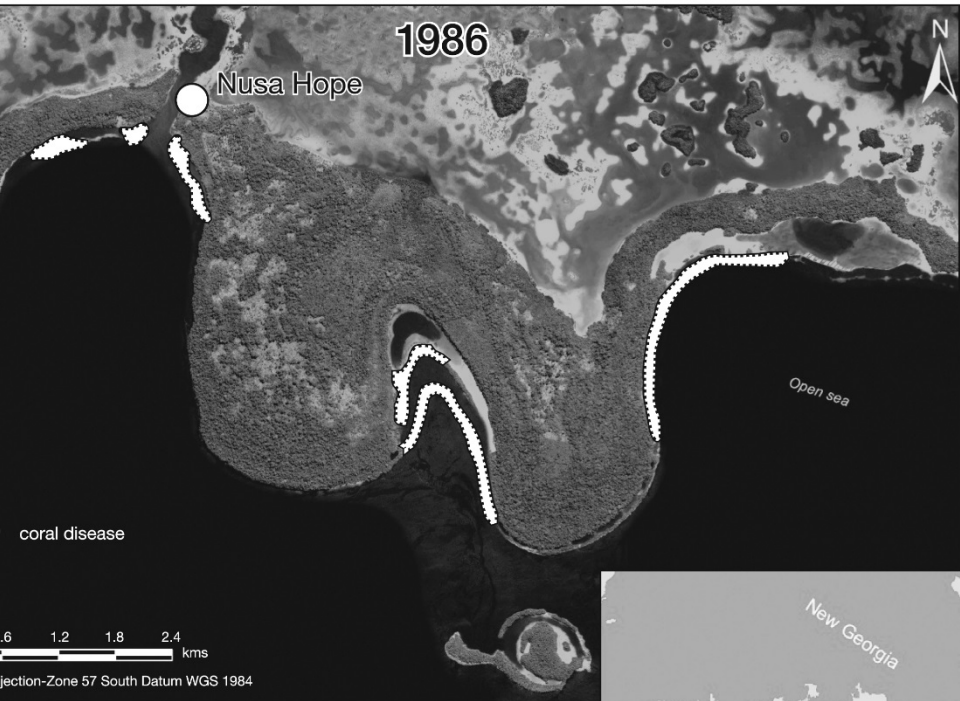
Sea grass



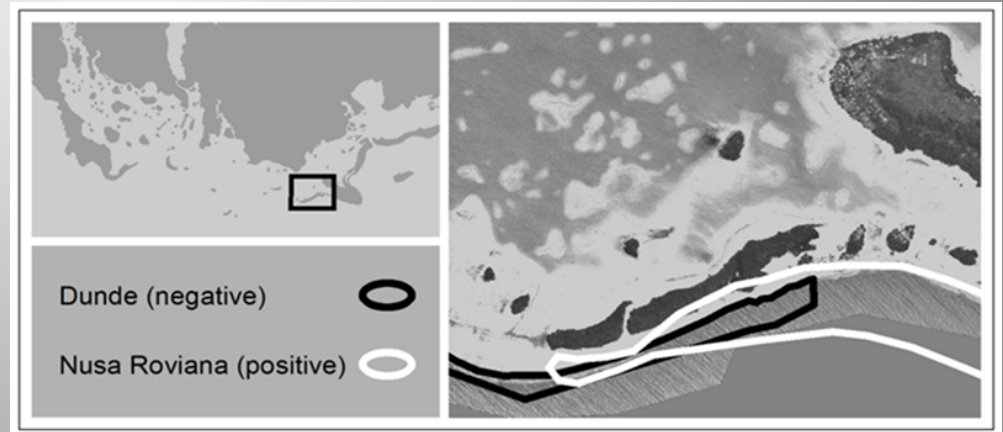
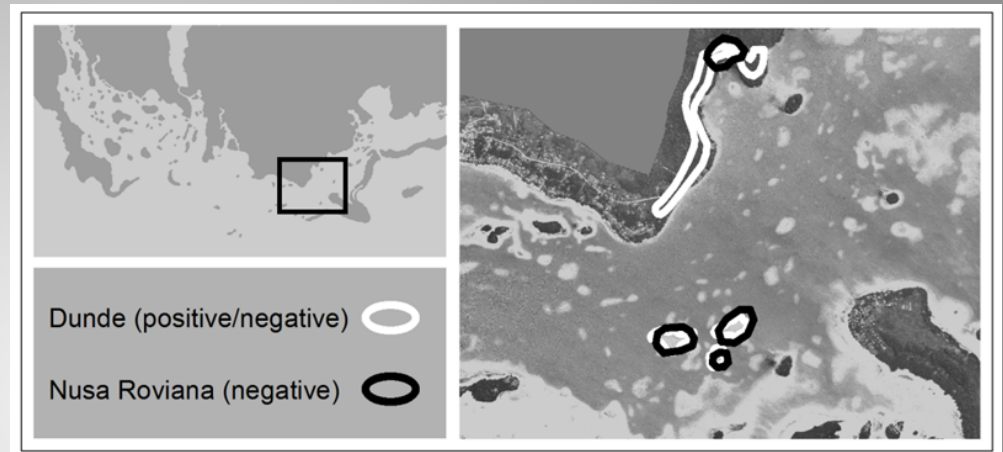
Practical contribution: Vital for building resilience in coastal socio-ecological systems is the capacity for learning, which in turn, enhances the adaptive responses and capacity of communities for reacting to ecological change

Participatory GIS and Climate Change





Mapping Anticipated Environmental and Social impacts in a Nascent Tourism



Example of conflicting opinions for different mangrove and reef areas resulting from existing land/sea disputes (Digitized drawings shown on a Quickbird image.)

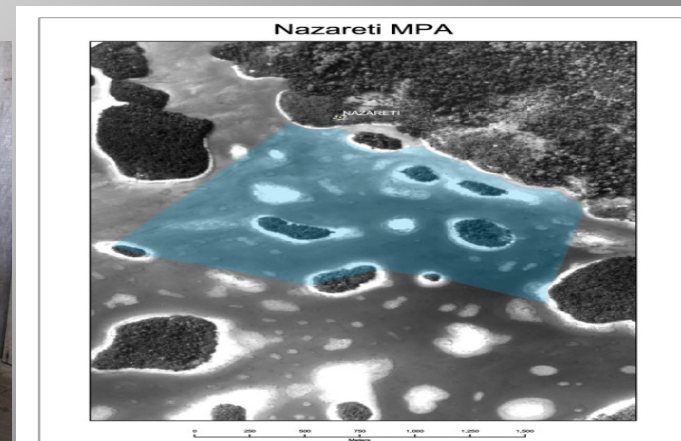


Tourism Impacts in one location

Example of mixed projections within a village: Madou participants projected both positive and negative impacts within the same areas

Some Conclusions

- *The use of Geospatial analysis (Participatory GIS/ Remote sensing)* can help in the analysis of various dimensions of human behavior and impact in the natural environment
- Spatial research can contribute towards theory building, as we test on the ground hypotheses of human-ecological interaction (e.g., hypotheses on resilience/vulnerability).
- Geospatial analysis is a successful platform for integrating ***natural*** and ***social*** science for **problem-solving integrated science**
- Results of Geospatial analysis approaches like Participatory GIS/ Remote sensing can help in environmental management and sustainability to address environmental challenges in the 21st century.





Thank You