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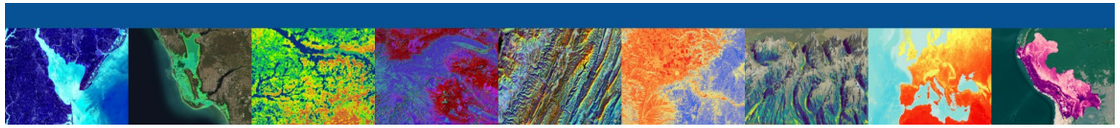

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NATIONAL PROGRAM

Operating under NASA Earth Action, DEVELOP conducts feasibility studies that bridge the gap between Earth science information and society. DEVELOP works with communities and organizations to address environmental and policy concerns through 10-week projects that help both participants and partners learn about using NASA Earth observations.

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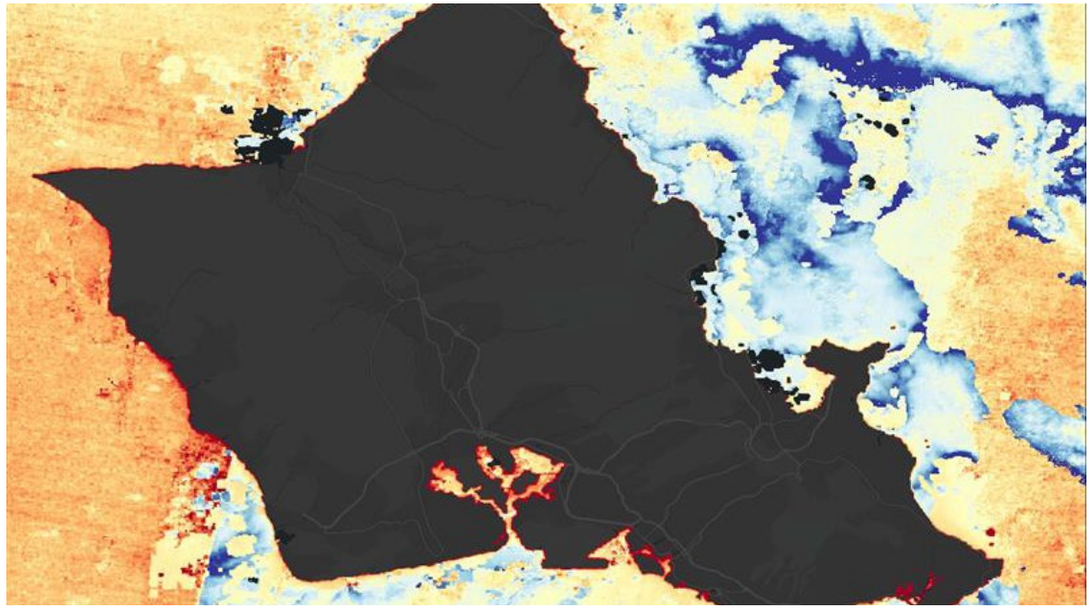
National Aeronautics and Space Administration



Utilizing Satellite Imagery To Assess Water Quality Impacts On Coastal Hawaiian Fishponds

Hawai'i Climate

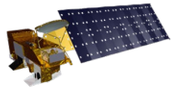
Hawai'i Climate

Loko i'a, traditional Hawaiian aquaculture systems, date back over 1500 years. They cultivate prized fish species and support coastal health by simulating estuary habitats, essential for fish reproduction. Though colonization-driven shifts in land management have diminished the quantity of active loko i'a, restoration projects hold promise for community managed food security and cultural revitalization.

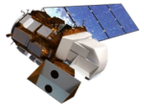
Prior data for the following water quality parameters within loko i'a are scarce or absent.

- Water temperature
- Chlorophyll a
- Turbidity

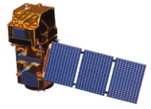
Remote sensing via satellite technology provides an efficient method of extracting historical water quality metrics in localized regions. However, we can only study larger fishponds with satellites such as Landsat 8 TIRS and Sentinel-2 MSI due to resolution capabilities. Regional temperature can be assessed using Aqua MODIS and combined with higher resolution imagery for future loko i'a research. To our knowledge, this is the first study utilizing satellite observations to examine the health of coastal aquaculture systems



Aqua MODIS
4.6 kilometers

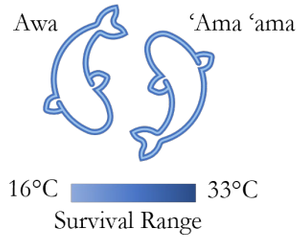


Landsat 8 TIRS
100 meters

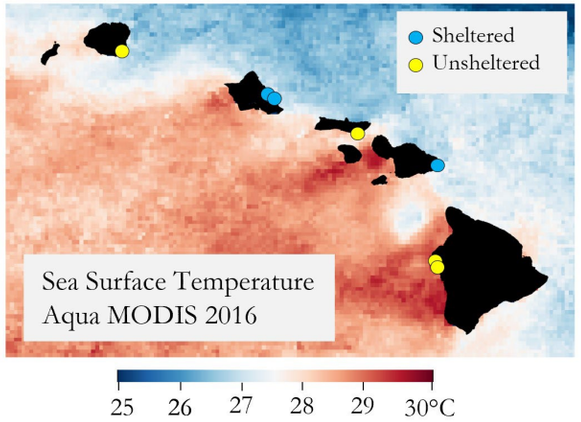


Sentinel-2 MSI
10 meters

Warming climate trends threaten loko i'a directly and indirectly by altering algal and plankton growth, intensifying storms and runoff, all which impact fish health and behavior. Our goal was to assess the thermal impacts, especially during historical marine heatwaves (2015 – 2017; 2019), allowing us to pinpoint specific ponds most likely to sustain habitability for common species like awa and ʻama ama in the future.



- Ocean circulation and wind patterns are responsible for cooler temperatures to the northeast of the islands, and warmer temperatures in the southwest.
- Loko i'a located on the northeast side of the islands are better sheltered, (more protected) from ocean warming and better suited for fish temperature thresholds.



Future Work With Loko i'a

Satellite-derived data paired with ground measurements can become a resource to guide decision-making in future restoration efforts. It's vital to strengthen community engagement and respect loko i'a as protected grounds in order to uphold cultural value.

"Take care of ponds, ponds take care of you"
Ua Ritte, kiaʻi loko (fishpond caretaker) at Keawanui

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