A Collaboration with Bren Students to Create an Interactive Web-based Application to Visualize MCR Data

Visualizing Spatial and Temporal Patterns of Coral Reef Stressors Surrounding Moorea, French Polynesia

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Moorea Coral Reef LTER

Background – MEDS Capstone Project

- The Master of Environmental Data Science (MEDS) program through the Bren School of Environmental Science and Management gives teams of students an opportunity to design, conduct, and present a data science project proposal.
- Capstone projects allow students to build real world experience by tackling current environmental problems using data science. Students collaborate with clients from industry, academia, government, or non-government organizations.
- Bren students collaborated with MCR researchers to create an interactive web-based application that uses MCR's time-series data to quickly visualize and analyze data.
- The application will be used as an educational tool for UCSB undergraduate courses and MCR outreach activities. It will also serve as a tool for the local community in Moorea to visualize spatial data that can help inform local management decisions.

Software and Tools Used

Data was accessed from the MCR data catalog, and from the EDI data repository.

- MCR data catalog
- EDI data portal

R/RStudio was used to access, wrangle, and clean data downloaded from the MCR data portal.

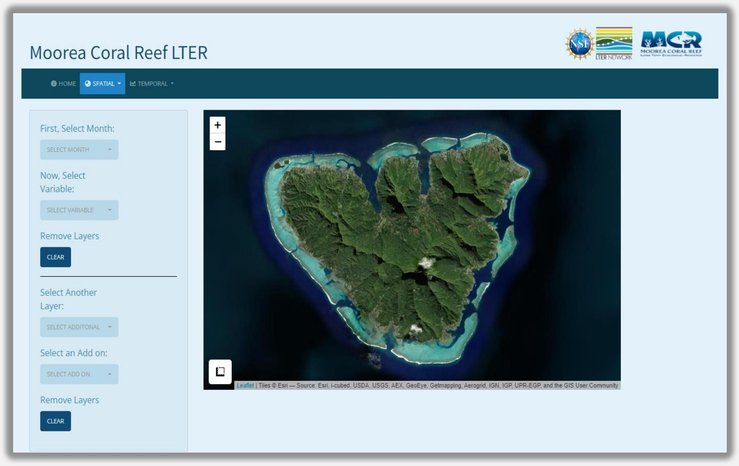
The Shiny R package was used to create interactive data visualizations of temporal data.

Interpolated spatial data was rasterized for leaflet integration to create data maps.

All code, files, and an accompanying user guide can be found on the MCR LTER GitHub organization repository.

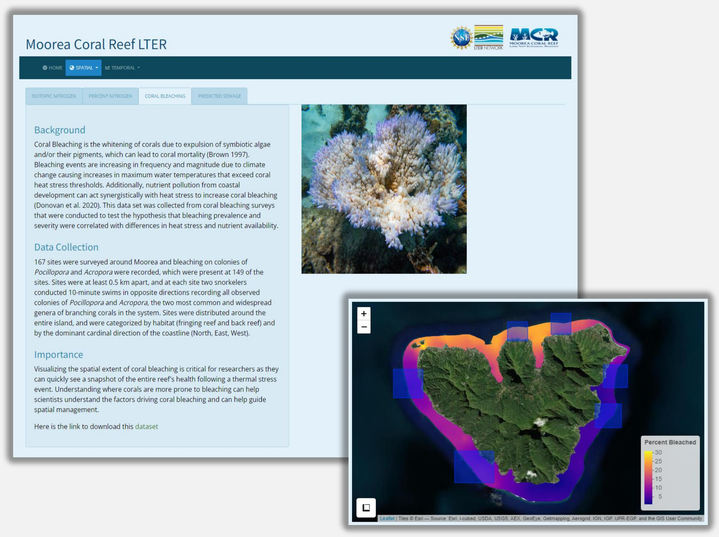
Visualizing Spatial Data

Through the spatial tab researchers can toggle between different time periods, and look at the corresponding levels of nitrogen, coral bleaching, and bathymetry.



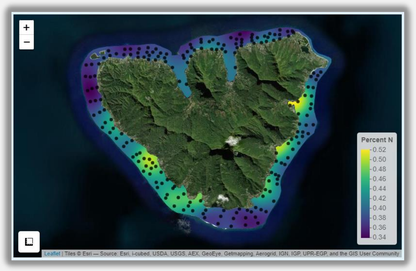
The landing page after navigating to the Spatial tab

A Heatmap Looking at Coral Bleaching



Each variable has a corresponding metadata tab (shown above) that gives background information and a description of how data is collected.

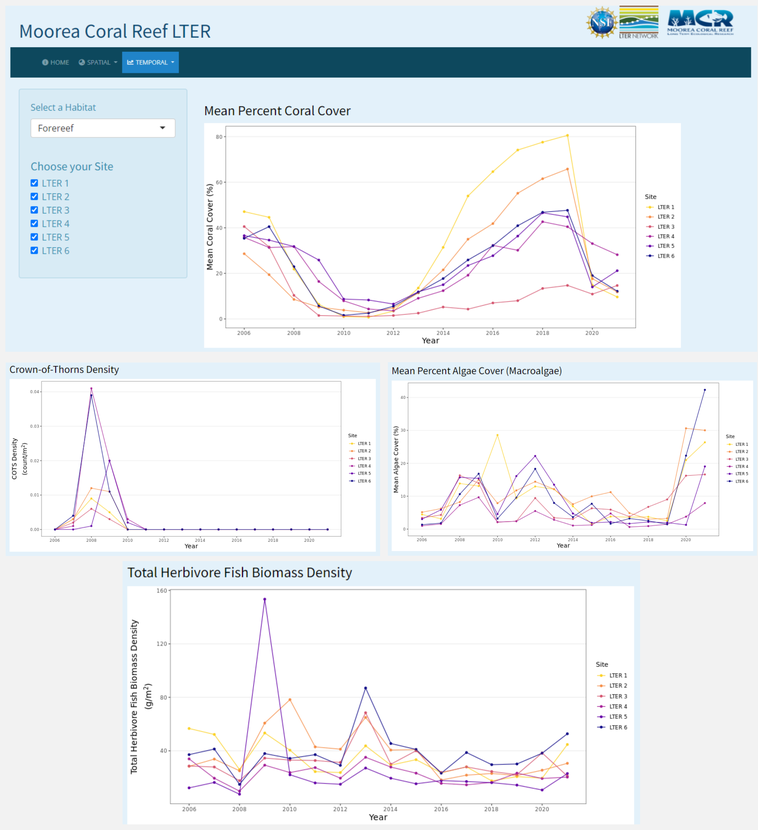
A View of Nitrogen Levels



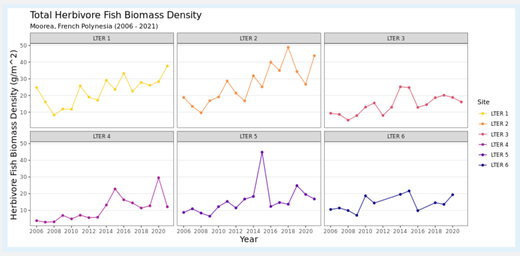
A map view when toggling to the month of January, choosing the variable percent nitrogen, and selecting the additional layer "observations".

Visualizing Temporal Data

The temporal tab allows researchers to track trends of fish biomass, crown of thorns density, mean percent coral cover, and mean percent algae cover. There are two options for organizing visualizations: by variable or by site.



Figures by site



Figures by variable

Next Steps and Future Deliverables

- As new temporal data is collected, code will be updated to incorporate the most recent years' data.
- Future iterations would include the ability to display additional ecological and environmental time series data streams, such as oceanographic data.
- Translating the content of the application to French and Tahitian, so the information can be easily communicated with local groups.

Please visit the interactive web application here! https://shinyapps.bren.ucsb.edu/ShinyAppMooreaViz/