Habitat mapping of sardines in Philippine archipelagic waters

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Sardines (*Sardinella lemuru*) are highly migratory small pelagic fish that are very common in Philippine waters, hence, the most accessible source of animal protein in the country. The sardine fishery is an economic engine providing thousands of jobs and generating revenue at the individual, municipal, and national levels. In the Zamboanga Peninsula, the significant sardine fishery is supported by a very biologically productive monsoon-driven upwelling at the northern coast (Villanoy, et al., 2011) which results to the highest average annual landings in the Philippines. However, a drastic decline of the sardine population in 2009 led to the implementation of a three-month seasonal ban of commercial sardine fishing from 2011 to 2014 by the national fisheries bureau as a mitigating measure. Research initiatives are therefore geared more towards predictive-approaches to provide information and monitor the status quo of target species and their habitat.

This study focuses on the novel approach of habitat distribution modeling of pelagic small fishes through the involvement of fisher folk volunteers and stakeholders especially for data gathering. Sardine habitat preference models were implemented using satellite-derived parameters, current velocities of a global ocean model and presence locations provided by in situ catch data as model inputs. The in situ fishing effort made habitat modeling for sardines feasible. Continued monitoring with contributions by these key society members strengthened partnerships between the scientific and non-scientific communities.

Community involvement proved to be an efficient process to gather data for modeling habitat preference. The model was able to estimate potential sardine production that led to identification of environmental drivers that favor the increase of sardines in the different regions in the Philippines. These environmental drivers vary in different regions and will be discussed. The seasonal monsoon greatly influences environmental variables that drive the distribution patterns. Visual map outputs of habitat distribution from the model presented well-defined areas of both existing and potential fishing grounds to explore and manage. Habitat maps have been an important tool in communicating the study's results to different audiences. Fishing bans can be tailored to time periods and spatial extents with substantial motive and reasonable predictions.

Reaching out to the communities where the issue had the greatest impact was an invaluable step for the development of management tools for the sardine fisheries. Communication plans involving information dissemination and accessibility are yet to be established. The information and approach can be used for future predictions by policy-makers, academics, and stakeholders alike.

Reference

Villanoy, C., Cabrera, O., Yniguez, A., Camoying, M., De Guzman, A., David, L., & Flament, P. 2011. Monsoon-driven coastal upwelling off Zamboanga Peninsula, Philippines. Oceanography, 24: 156-165.