Sea Level Rise and March of the Molokai Mangrove: The Socioeconomic and Environmental Impacts of Sea Level Rise and Introduced Red Mangrove (Rhizophora mangle) on Molokai, Hawaiian Islands

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Red Mangrove (Rhizophora mangle), introduced to Moloka?i from Florida in 1902, has invaded the southern coastline, threatening the long-term sustainability of nearshore ocean resources utilized by the island's residents. The progradation rate of mangrove was calculated and mapped to determine the time frame and extent mangrove will establish itself on Moloka?i's fringing reef. Sea level rise may further impact this area and encroach terrestrial landmass, thereby increasing the current mangrove infestation. This study explores 1) Does Red Mangrove have the potential to reach Moloka?i's fringing reef? If so, how long will it take to establish a cultivating population? 2) To what extent will sea level rise affect the mangrove population both seaward and terrestrially? and 3) How will sea level rise and mangrove expansion affect Moloka?i residents economically, culturally, and socially? Geographic Information System (GIS) modeling utilizing terrestrial and bathymetric LiDAR datasets revealed mangrove will overtake 35.67% of the fringing reef within 75 years, regardless of the projection of sea level rise up to a five foot inundation which was projected to occur in 2105. A progradation model conveyed the southern shoreline is expanding at an average rate of 15 meters a year. A five foot sea level rise on Moloka?i will inundate 16,916 square hectares of landmass along the 2015 mapped coastline. The longest fringing reef in the U.S.A. comprises the south shore of the island of Moloka?i. Surveys of visitors, Moloka?i residents, property and business owners determined an annual economic loss value of $150 million due to the destruction of area by Red Mangrove, and a $30 million property value loss due to inundation from sea level rise.

Awards Won:
First Award of $5,000