March of the Molokai Mangrove: The Socio-Economic and Ecological Impacts of Introduced Red Mangrove (Rhizophora mangle) on Molokai, Hawaiian Islands

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Proceeding introduction to Hawai'i in 1902, Red Mangrove (Rhizophora mangle) has established itself along the south shore of Molokai colonizing tidal mud flats, shallow bodies of water, coastal wetlands, historical fishponds, and is now encroaching upon our coral reefs. This study explores a twofold question: 1. Does mangrove have the potential to reach Molokai's fringing reef, thereby establishing a cultivating population? 2. What are the impending socio-economic and ecological impacts of mangrove on Molokai's fringing reef? Baseline data collection suggests mangrove has adapted to Hawaii's unique nutrient rich environments allowing morphological adaptions, record size, increased water salinity, decreased dissolved oxygen, increased turbidity, mud deposition, and has become a harbor for invasive organisms. Geographic Information Systems (GIS) techniques were used to interpret satellite data, aerial imagery, historical maps, and coastal surveys in order to map mangroves seaward migration, analyze its ecological effects, and predict its future impact on Molokai's south shore. Benthic habitat modeling was used to determine the progradation rate of mangrove and its maximum area of seaward expansion. The Simple Coral Reef Ecological and Economic Model (SCREEM) was applied to conclude an economic value of Molokai's fringing reef. Analysis of SCREEM will provide a cost value essential to local and state budgetary processes needed to implement a management plan. Within the next century, GIS mapping suggests that mangrove will likely establish itself upon the fringing reef, consuming a total area of 46 km2. If no management plan for Red Mangrove is adopted, this invasive species will overtake 35.67% of Molokai's fringing reef.

Awards Won:
First Award of $5,000
Consortium for Ocean Leadership: First Award of $3,000