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Evaluation of Methods to Enhance Reef Restoration

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THE USE OF ECOSYSTEM-BASED MODELS TO SELECT AREAS FOR THE CONSERVATION OF MARINE BIODIVERSITY IN FACE OF OFFSHORE GAS EXPLOITATION IN VENEZUELA

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Offshore oil and gas exploitation in Venezuela represents a major threat to the marine biodiversity, considering the potential impacts derived from it at each of the stages of a major hydrocarbon exploitation program. In a joint effort between INTECMAR, The Nature Conservancy and Petróleos de Venezuela PDVSA, we used an ecosystem based modeling approach to select a portfolio of conservation areas that include ecosystems with high conservation health status at a minimal conservation cost. After selecting 21 conservation targets in a ecoregional configuration, their conservation status was evaluated and the major threats identified. The conservation goals were established between 30% and 100% of their total cover area (assigned by expert consultation). Major threats to the marine biodiversity such as river inputs to the sea, coastal development, maritime routes, ports, aquaculture farms, oil industry complexes and trawling areas, were mapped and evaluated. We combined the conservation costs (threats) and conservation targets in MARXAN, a simulated annealing algorithm that selects conservation units constrained to a parametrized boundary length of the areas, the penalty costs for non selection of targets and the clustering of the units. The results produced a portfolio of 20 areas adding 4.4 millions of hectares, representing 37.8% of the marine areas above 200 m depth. The selected areas were mapped in a GIS and intersected with the locations of future offshore developments. A set of specific conservation strategies were designed for the selected conservation targets as well as a set of best environmental practices for the oil industry.

Keywords: EBM, Marxan, MPA, offshore oil exploitation

EVALUATION OF METHODS TO ENHANCE REEF RESTORATION

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The coral reefs of southeast Florida are offshore a highly urbanized area with a population exceeding 5 million people and three major shipping ports with over 6000 ships calling on an annual basis. Reef injury events are common and have been caused by ship groundings and marine construction activities such as channel dredging and cable placement. Restoration activities generally only include the reattachment of dislodged stony corals, removal of rubble, and boulder stabilization. The Florida Department of Environmental Protection has recognized these limited activities and is collaborating with Nova Southeastern University's Oceanographic Center to study ways to accelerate coral reef succession in damaged reef areas. The goal of this study is two-fold: 1) to examine the potential for natural recovery by examining coral recruitment to both damaged and control sites, and 2) to test several reef restoration enhancement methods. Baseline surveys indicate that juvenile coral density is higher at damaged reef sites than control sites, but rates of coral recruitment, growth, and mortality are being monitored. Comparison of materials commonly used in reef restoration indicates that concrete and limestone initially attract more coral recruits than other materials tested. Finally, the efficacy of transplanting gorgonians and sponges through fragmentation and of corals through relocation of juveniles are being assessed. Information gained from these studies will provide resource agencies with improved methods to promote reef restoration.

Keywords: coral, restoration, recruitment, transplantation