Context Document: Living Shoreline Ecosystem Service Logic Model

Project: GEMS
http://bit.ly/NI-GEMS

Ecosystem Service Logic Models (ESLMs) are conceptual models that summarize the effects of an intervention, such as a habitat restoration project, on the ecological and social systems. Each model links changes in biophysical systems caused by an intervention to measurable socioeconomic, human well-being, and ecological outcomes. ESLMs assume that the restoration is successful and include all potentially significant outcomes for the intervention; not all outcomes will be relevant to each individual project, depending on location and environmental conditions.

The direction of an outcome (whether the restoration will have a positive or negative influence) often depends on the specific situation or is unclear due to multiple links (arrows) leading into an outcome that may have opposite effects. Thus, language like "increased" or "decreased" is not included in the models. These models are often used to consider management with or without an intervention or to compare different interventions.

This context document includes additional information about the restoration approach and details about some of the relationships in the living shoreline ESLM. It also includes a list of the references used to develop the ESLM and names of experts with whom we spoke to refine the model.

Living Shoreline Description and Use in the Gulf of Mexico

Living shorelines are combinations of vegetation planted along a shoreline and a structure to help hold the vegetation in place. They are primarily installed to protect shorelines from erosion as an alternative to hardened infrastructure like bulkheads or riprap. In the Gulf of Mexico, the structural component of the living shoreline is usually a breakwater and can be made of a variety of materials, including bagged oyster shells, granite, eco-concrete, and reef balls or blocks. Living shorelines can be implemented at small scales by individual property owners, or as larger projects that are hundreds of meters to a kilometer long. Larger living shoreline projects are often aimed at protecting marsh or coastal infrastructure.

External Factors That Influence Restoration Success

Wave energy is thought to influence living shorelines' effectiveness at reducing shoreline erosion and project longevity, however, because living shorelines are a relatively new approach, there is little data available so far on project lifespan.

Permitting requirements for living shoreline vary by state and can influence how likely a living shoreline is to be used for shoreline protection compared with traditional armored shoreline approaches such as bulkheads.

Model Notes and Clarifications

Blue Carbon Storage and Sequestration: The vegetated component of living shorelines can sequester carbon in sediment and plant material. This pathway is shown as uncertain because the

vegetated area is highly variable by project, and there is a lack of data on carbon sequestration by living shorelines.

Shoreline Accessibility and Recreation: Living shorelines can make it difficult to access the shoreline for recreational activities such as swimming and kayaking. If maintaining recreational access is important in a particular area, this can be taken into account during the design of the living shoreline; features such as kayak gaps can be included to facilitate access.

Adjacent Habitats: Living shorelines can have effects on other types of habitat close to the project site. Changes to these habitats will have their own suite of ecological and socioeconomic effects. In the ESLM, these are referred to under the heading, "Outcomes related to adjacent habitat." If a project is expected to have substantial effects on other habitat types, we recommend referring to the separate ESLM for that habitat type.

Nutrition for Communities: This as an expected socioeconomic outcome of restoration projects can come from two sources: changes in fish and shellfish harvesting, and changes in land-based hunting on restoration areas. For this model, the source of nutrition is mainly from changes in fish and shellfish harvesting.

Disruption Due to Project Construction (Not Included in Model): Living shoreline projects are often small in scale or constructed from barges, so have limited impacts on traffic patterns or public access. Therefore, disruption due to project construction was not included in the model. There may be potential for disruption from large living shoreline projects constructed in specific areas, such as parks, where public access would be temporarily reduced.

Experts Consulted

Carter Smith, Duke University

Steven Scyphers, Northeastern University

References

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