Journal of Oceanography and Marine Research

OPEN ACCESS Freely available online

Commentary

A Framework for Untangling the Effects of Human Activity on Marine Ecosystem Services

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DESCRIPTION

The structure and operation of many marine ecosystems across the world have been significantly changed by human usage of marine waters and resources. Fishery declines, biodiversity loss, eutrophication, hazardous levels of harmful pollutants, litter, and the destruction of significant ecosystems have all been identified as negative environmental repercussions. Therefore, human activities also have an effect on the benefits that people and society obtain from marine ecosystems, which also serve as prerequisites for a number of human activities involving the ocean. In coastal locations, which hold some of the most important ecosystem services in the world while frequently coming under intense pressure from human activity, the relationship between ecosystem services and human activity is particularly obvious.

Importantly, the dynamic and complex interaction between social and ecological systems is where ecosystem services are produced. The foundation of ecosystem functions is comprised of ecosystem components including species and habitats, which support ecosystem services and may have a positive influence on human well-being. Therefore, improved long-term societal and environmental results can be anticipated when ecosystem services are explicitly taken into account in environmental management and spatial planning. In this context, it is crucial for management to take into account how various human activities may alter species and habitats, the functions they supply, and consequently the flow of ecosystem services. Given that ecosystem services have significant societal values (both financial and non-financial), taking into account these connections may also help to bridge disparate management viewpoints and reduce or eliminate tensions between environmental protection and development.

Environmental management is increasingly incorporating analyses of ecosystem services, though historically to a far lesser level for marine systems than for terrestrial areas. Fishing was cited as the primary cause of reductions in ecosystem services among marine examples in the Millennium Ecosystem Assessment. Emphasized eutrophication and hypoxia caused by an excessive anthropogenic nutrient load as a key factor in the functioning and services provided by marine ecosystems. Coastal nutrient management discovered a variety of effects on ecosystem services depending on whatever human activity was looked at.

Two coastal lagoons in the Baltic Sea were assessed using an evaluation tool for marine ecosystem services, and the results showed significant differences between the lagoons. Additionally, non-linear responses are frequent, and there may be a significant regional mismatch between human influences, ecosystem functioning, and marine ecosystem services. Determining how human activities affect ecosystem services internationally is crucial, and requires performing assessments that are bound to face significant data and assessment challenges as well as a high standard of site- and context-specificity.

It could be difficult for managers, policymakers, and other stakeholders to comprehend and present ecosystem services and related studies from an integrated perspective. This work discusses about an assessment approach for examining, contrasting, and conveying dependencies and consequences of human activities on marine ecosystem services across several sectors at a broad policy level in order to solve these issues.

The assessment model answers three key questions: (1) How are different human activities affecting marine ecosystem services?(2) How dependent are different human activities on particular marine ecosystem services? (3) How do these relationships compare to the economic performance of various sea use sectors? Regarding the EU Marine Strategy Framework Directive, where addressing the condition of the environment in relation to our use of marine waters and impacts on ecosystem services and human well-being is a crucial aspect, the assessment model ties to common policy practice. But it also applies to other circumstances where it's necessary to handle the multifaceted relationships between economic and environmental factors.

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Received: 24-Feb-2022, Manuscript No. OCN-22-18132; **Editor assigned:** 28-Feb-2022, PreQC No. OCN-22-18132 (PQ); **Reviewed:** 18-Mar-2022, QC No.OCN-22-18132; **Revised:** 28-Mar-2022, Manuscript No. OCN-22-18132(R); **Published:** 05-Apr-2022, DOI: 10.35248/2572-3103-22.10.246

Citation: Sharma P (2022) A Framework for Untangling the Effects of Human Activity on Marine Ecosystem Services. J Oceanogr Mar Res. 10:246.