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Human Activity's Potential Causing Environmental Damage in Aquatic Habitats

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Abstract

Ecosystems in water are under a lot of stress. Numerous stresses are introduced by human activity that have an effect on eco-systems and the parts of them. The aquatic habitats of fresh, coastal, and marine waters including rivers, lakes, and riparian habitats as well as transitional, coastal, shelf, and oceanic environments are the main emphasis of this study. We discovered effect chains connecting 45 human activities through 31 pressures to 82 ecosystem components using an environmental risk assessment approach. Seven European case studies using N22, 000 activity-pressure-ecosystem component connections were included in this linking architecture. We initially classified the interactions based on five criteria: regional extent, dispersal potential, frequency of contact, persistence of pressure, and severity of the interaction in order to identify the environmental impact risk posed by each impact chain where extent, dispersal, frequency, and persistence account for the risk exposure (spatial and temporal), and the se- verity account for the risk consequence. We arrived at an overall environmental effect risk score for each impact chain after giving each risk criterion a numerical number. The activities and pressures that pose the greatest risk to European aquatic domains as well as the aquatic ecosystem components and realms that are most at risk from human activity were both included in the analysis of this risk score. Across all aquatic domains were relevant in terms of productivity. In freshwater environments, fishing was very important to marine and environmental engineering. The biggest risk was introduced to the aquatic worlds by chemical and physical stresses.

Keywords: Ecosystem; Environmental; Aquatic; Frequency; Pressure

Introduction

High impact risk existed for ecosystem elements that can be viewed as ecotones between several ecosystems. We demonstrate how management of trade-offs in the utilisation of freshwater, coastal, and marine resources can be aided by this information. Because people depend on aquatic ecosystems for a variety of human activities, including the provision of food and raw materials, transportation, waste treatment, and recreation, these ecosystems are vulnerable to challenges from freshwater, transitional, and marine habitats. More so than in terrestrial ecosystems, this constant human activity puts pressure on aquatic ecosystems, causing a continuous, severe decline in their biodiversity. Stopping biodiversity loss requires an integrated Ecosystem-Based Management (EBM) strategy that enables a better understanding of the trade-offs between ecosystem integrity, biodiversity conservation, and human activities. For a fully integrated management, interactions between pressures and human activities must be detected and prioritized in EBM techniques. The full range of human activities across all varieties of aquatic ecosystems must be taken into account if the objective is to find potential improvements at the scale of entire ecosystems. Environmental (or Ecological) Risk Assessments (ERAs) are essential for putting EBM strategies into practise. Risk assessments are extremely helpful for the establishment of a comprehensive understanding of the relationships between social ecological systems because they link ecologically important features, such species or habitats, to the likely consequences of pressures. They must discover indications, quantify reference circumstances, and assess management options in subsequent steps. Assessments of the effects of specific pressures, like the effects of toxic compounds, on species or habitats have a long history in the field of environmental risk management. Environmental risk assessment frequently makes use of the Driver-Pressure-State-Impact-Response (DPSIR) framework (EEA, 1999), which takes a single chain of causal relationships into account. Explicitly taking into account human activities as a representation of human wants and their drivers, as well as incorporating human wellbeing into the DPSIR idea, recent innovations have sought to broaden this approach from a single chain to numerous chains. The intricate interactions of numerous activities and their forces, as well as the depiction of drivers through human activities, are still not fully addressed. Additionally, mismanaged demands and activities may go unnoticed even if they could have an important effect on ecosystem. As a result, when hazards to the ecosystem are connected to components of the socioeconomic system like human demands and activities, a comprehensive assessment is required [1].

Though conceptually it is only a minor step from isolated chains to an integrated network of activities, pressures, and ecosystem components, the practical assessment of risks is a difficult task. In order to create a comprehensive assessment of how these chains may impact the ecosystem, a number of distinct chains must first be identified. Such methods have been created and put to use in maritime systems, where as sessments have widened their scope to include other taxonomic groupings, stressors, and economic sectors. Despite the linkages between freshwater and marine eco- systems, such as the flow of water from rivers into seas and the migration of species from seas to rivers, the various systems are mainly evaluated in isolation from one another, creating some sort of functional silos. Furthermore, Europe's main environmental laws covering freshwater and marine ecosystems are distinct from one another. Both the Marine Strategy Framework

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Directive (MSFD) (EC, 2008) and the Water Framework Directive (WFD), which target fresh, transitional, and coastal waters, call for healthy aquatic ecosystems. The methods used to achieve the goals do, however, vary somewhat. Through the activities that introduce stresses on maritime habitats, the MSFD seeks to regulate those forces [2, 3].

Direct identification and prioritization by the WFD the primary forces driving the development of mitigation and restoration strategies that affect taxa and habitats. We contend that by acknowledging the social and biological links between these systems, a method might be used to harmonise management of freshwater and marine environments. So, using seven case studies from throughout Europe, we broaden a risk assessment approach, such as that used by Knights to assess the danger to marine ecosystems, to include freshwater and transitional habitats. The methodology employed here is based on Robinson allinkage's framework, which consists of a collection of connected matrices that characterise the intricate connections between human activities influenced by the socio-economic system and ecological elements. We respond to two research queries: How do the levels of danger from human activities and pressures vary across (or differ between) aquatic realms? What human activities and pressures pose the most risk to aquatic realms? We investigate the potential benefits of this strategy for achieving integrated EBM throughout aquatic habitats [4, 5].

Method

We developed a typology of human activities, a typology of pressures such activities impose to aquatic ecosystems, and a typology of aquatic ecosystems influenced by those pressures, applicable for seven European case studies, in order to meet the research issues of this study (CSs). The numerous ecosystem types found in fresh, coastal, and marine waterways, as well as the transitions between them, are covered by the CSs. The CSs, on the other hand, were picked to span a range of social and environmental circumstances. The CSs cover a wide geographic region with a variety of climatic and economic situations, as seen in. Human activities are specific economic activities focused on the co-production and delivery of commodities and services from natural capital combined with human labour and capital to the social system. A single pressure can have several sources, including human activity, and multiple sources can contribute to various pressures. In addition to the statistical classification of economic activities and earlier typologies applied to marine systems, we adopted the activity and pressure typologies from the EU Habitats Directive, EU WFD, and EU MSFD. Case study experts defined activities as any human activity placing a persistent stress on the aquatic ecology in their CS area. 45 different activities total across all CSs According to the European Commission, these were organised into key activity kinds. We excluded pressures resulting from climate change and other causes outside of the CSs since we only included activities that we judged manageable in the CS zones. We defined pressures as "the process by which an action has an impact on any component of an ecosystem". Within the general: pressures, 31 pressures in five categories were found. Physical and chemical properties (e.g., Synthetic Com-kilos, biological (such as the introduction of microbial pathogens), and energetic pressure types [6].

Discussion

The typology of aquatic ecosystems used here includes three hierarchical layers, from narrowly defined habitats to general categories of water. The habitats listed in the EUNIS habitat classification, as provided by the European Environment Agency, served as the foundation for the typology. All sorts of habitats are covered by the pan-European hierarchical system known as EUNIS. We considered riparian habitats, totally aquatic habitats, and habitats that directly sustain aquatic biodiversity. In order to depict broad ecosystem types within the categories of fresh, coastal, and marine waters, the ecosystem components were then combined into realms (e.g. rivers, lakes, wetlands and riparian habitats for freshwater ecosystems). Finally, these domains combine to form the fresh, coastal, and marine water bodies. In addition, we provided Fish and cephalopods, birds, amphibians, reptiles, mammals, and adult insects are the five mobile biotic groups. Due to their mobility and ability to travel across habitats, these biotic groups were not assigned to particular habitats within the realms. Sessile or sedentary biota, which include small passive planktonic species and those closely connected with benthic substrates, were thought to be adequately represented in their habitats. The data base on the EUNIS maps from a GIS study, and subject-matter expertise were used to confirm the existence or absence of habitats within the CSs (see Teixeira et al., this issue). Up to EUNIS level 3, the highest level of detail allowed, habitats were identified. Depending on the information at hand, different EUNIS levels were determined [7, 8].

Conclusion

We pinpointed the precise processes through which activity impacts pressure and pressure impacts ecosystem components. A thorough list of impact chains for each CS was provided by the identified activity-pressure-EC chains. Then, weights were assigned to each individual impact chain according to the following five factors: I extent, (ii) distribution, (iii) frequency, (iv) persistence, and (v) severity. By taking into account the spatial distribution of human activities and ECs in the CS area and how much spatial overlap there is in these (for example, forestry activities with riparian habitats), the extent, or overlap, of each activity with each EC was assessed. The overlap is based on the area that the EC in issue occupies inside the CS area. The exact pressure locations and impact paths were while determining the geographical extent (e.g. accounting for the fact that not all pressures are introduced across the whole operating area of an activity; for example, abrasion is only introduced where fishing vessels are trawling or anchoring, while noise is introduced while also steaming). Dispersal assessed the likelihood that an activity-pressure influence would expand and enhance its spatial overlap with an EC beyond that of the original overlap area. The number of times an activity interacts with an EC's average square kilometer in a typical year was described as the frequency of interactions, where they overlap in space [9, 10].

Conflict of Interest

The authors declare no conflict of interest.

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None

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