

SHORT COMMUNICATION

## Finding a balance between the marine economy and submarine landslides

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The marine economy and submarine landslides represent two critical and seemingly disparate areas of concern within oceanic studies. The marine economy encompasses industries and activities such as fishing, shipping, and tourism that rely on the health and accessibility of marine environments. In contrast, submarine landslides, which are significant geological hazards, can impact marine infrastructure, disrupt economic activities, and pose risks to coastal communities. This article explores the balance between advancing marine economic interests and mitigating the risks associated with submarine landslides. It examines current research, technological advancements, and policy measures aimed at addressing these challenges. Strategies for enhancing economic sustainability while safeguarding against geological hazards are discussed, emphasizing the need for integrated approaches that consider both economic and environmental factors.

**Keywords:** Marine Economy, Submarine Landslides, Economic Sustainability, Geological Hazards, Marine Infrastructure, Coastal Risks, Integrated Approaches, Oceanic Studies.

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### Introduction

The marine economy is a significant driver of global economic growth, encompassing activities such as fishing, shipping, offshore drilling, and marine tourism. This sector contributes substantially to national revenues and employment, especially in coastal regions. However, the increasing exploitation of marine resources and expansion of maritime infrastructure can exacerbate the risks associated with submarine landslides—submarine landslides are underwater geological events that can cause massive disruptions to the marine environment and pose substantial threats to human activities. Balancing the benefits of a robust marine economy with the need to manage and mitigate the risks of submarine landslides is crucial for sustainable development and resilience. Submarine landslides are large-scale movements of sediment and rock on the ocean floor (Goldfinger, C. 2011). They can be triggered by various factors, including earthquakes, volcanic activity, and human-induced changes such as coastal construction and offshore drilling. The impacts of these landslides are profound, potentially leading to tsunamis, damage to underwater infrastructure, and disruption of marine ecosystems. Understanding the causes and consequences of submarine landslides is essential for developing effective mitigation strategies.

### Description

The marine economy supports a wide range of industries that are vital for economic growth. Fishing provides essential protein sources, shipping connects global trade routes, and tourism promotes cultural exchange and generates significant revenue. However, these activities can also increase the likelihood of submarine landslides through the alteration of natural sediment flows

and the destabilization of the seabed. Additionally, marine infrastructure such as pipelines, cables, and platforms can be vulnerable to damage from landslides, leading to economic losses and safety hazards. To mitigate the risks associated with submarine

landslides, it is essential to employ a combination of technological innovations and strategic planning. Advances in remote sensing and underwater monitoring technologies, such as sonar and satellite imagery, allow for the early detection and assessment of potential landslide-prone areas. Additionally, improved geological surveys and risk assessments can inform the design and placement of marine infrastructure to minimize vulnerability. Implementing stricter regulations and standards for marine activities can also help reduce the risk of landslide-triggering activities (Anderson, D. M., et al., 2021).

Effective management of the marine economy and submarine landslides requires a holistic approach that integrates economic, environmental, and safety considerations. Policymakers must develop regulations that balance economic development with the protection of marine environments (Santos, M. M., et al., 2018). Collaborative efforts between governments, industries, and scientific communities are essential for creating and enforcing policies that address both economic and geological risks. Public awareness and education on the risks of submarine landslides and the importance of sustainable marine practices are also crucial components of a comprehensive strategy. Finding a balance between fostering a vibrant marine economy and managing the risks of submarine landslides is a complex but necessary endeavor. Through a combination of technological advancements, strategic planning, and integrated policy measures, it is possible to advance economic interests while mitigating the impacts of geological hazards. Continued research and collaboration will be key to developing sustainable solutions that protect both marine environments and economic livelihoods (Rabone, M., et al., 2023).

Current models for assessing the risk of submarine landslides need refinement. Integrating more precise geophysical data, such as high-resolution seismic surveys and underwater sensors, can improve the accuracy of these models. Additionally, incorporating climate change impacts and their influence on sediment dynamics will be crucial for developing robust risk assessments. Developing new engineering solutions to protect marine infrastructure from landslides is essential. Research into advanced materials and construction techniques that can withstand underwater landslides will help reduce damage and enhance the resilience of critical infrastructure like pipelines and offshore platforms. Understanding the impact of climate change on submarine landslides is a critical area of research. Melting polar ice, sea level rise, and increased frequency of extreme weather events can alter sediment stability and increase the risk of landslides. Research that connects these climate factors to landslide activity is necessary to adapt mitigation strategies accordingly. Developing integrated management frameworks that combine economic, environmental, and geological data will facilitate better decision-making. These frameworks should involve stakeholders from various sectors, including government, industry, and academia, to ensure comprehensive and balanced approaches (Koschinsky, A., et al., 2018).

## **Conclusion**

Striking a balance between the economic benefits of marine activities and the risks posed by submarine landslides requires a multifaceted approach. By leveraging technological advancements, enhancing risk assessment models, and fostering international collaboration, we can create a more resilient and sustainable marine environment. The integration of economic, environmental, and geological considerations will be key to achieving this balance, ensuring that both the marine economy and coastal communities can thrive in the face of geological hazards.

## **Acknowledgement**

None.

## **Conflict of Interest**

The authors declare no conflict of interest.


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