frontiers | Frontiers in Marine Science

TYPE Editorial
PUBLISHED 17 May 2023
DOI 10.3389/fmars.2023.1213689

OPEN ACCESS

EDITED AND REVIEWED BY
Marta Marcos,
University of the Balearic Islands, Spain

*CORRESPONDENCE
J. Benavente
javier.benavente@uca.es

RECEIVED 28 April 2023
ACCEPTED 04 May 2023
PUBLISHED 17 May 2023

CITATION
Benavente J, Ruiz de Alegría-Arzaburu A, Plomaritis TA, Sedrati M and Ariffin EH (2023) Editorial: Coastal environment in a changing world.
Front. Mar. Sci. 10:1213689.
doi: 10.3389/fmars.2023.1213689

Editorial: Coastal environment in a changing world

J. Benavente[1]*, A. Ruiz de Alegría-Arzaburu[2], T. A. Plomaritis[3], M. Sedrati[4] and E. H. Ariffin[5,6]

[1]Faculty of Marine and Environmental Sciences, Earth Science Department, University of Cádiz, Puerto Real, Spain, [2]Universidad Autónoma de Baja California, Instituto de Investigaciones Oceanológicas, Ensenada, Mexico, [3]Faculty of Marine and Environmental Sciences, Applied Physic Department, University of Cádiz, Puerto Real, Spain, [4]Geo-Ocean, Univ Bretagne Sud, Univ Brest, CNRS, Ifremer, UMR6538, Vannes, France, [5]Institute of Oceanography and Environment, Universiti Malaysia Terengganu, Kuala Nerus, Terengganu, Malaysia, [6]Faculty of Science and Marine Environment, Universiti Malaysia Terengganu, Kuala Nerus, Terengganu, Malaysia

KEYWORDS

coastal evolution, coastal erosion, coastal risks, climate change, anthropogenic impact, coastal management, coastal adaptation

Editorial on the Research Topic
Coastal environment in a changing world

Coastal areas are among the most dynamic environments on Earth, affected by diverse continental and marine forcings, such as waves, tides, ocean currents, wind, and river discharges, interacting at different temporal and spatial scales. These areas also host 13% of the global urban population (McGranahan et al., 2007) and a large proportion of human activities, including industry, transport, tourism, and recreation. Overpopulation and an increase in intensive exploitation activities are currently disrupting the evolution of coasts worldwide and undermining their future resilience (Kombiadou et al., 2019). Moreover, the effects of climate change, associated with sea-level rise and changes in the magnitude and/or frequency of storms, may further contribute to altering the dynamics of these environments.

The aim of this Research Topic was to provide insights into some of the most prevalent processes that currently endanger our coasts and to assist in improving coastal management in the future. To achieve a comprehensive understanding of these problems, it is essential to conduct sustainable coastal monitoring activities and research that provide continuous information. This Research Topic consists of 10 papers that underscore the importance of addressing multiscale issues using a multidisciplinary approach that highlights crucial physical and environmental factors. The papers can be classified into four groups based on their themes.

Two of the contributions focus on the issues arising from ecosystem changes. Uribe-Martinez et al. address the growing problem of sargassum seaweed reaching tourist beaches. They provide valuable information that could assist the tourism industry and decision-makers in planning and prioritizing monitoring, collection, and restoration efforts. This would enable them to be prepared for unexpected arrivals of sargassum throughout the year, given the high variability of its distribution. On a different subject, Leichter et al. describe long-term patterns of giant kelp sea surface canopy area along with recent patterns of water column nitrate

exposure inferred from temperature measurements at different sites on the southern California coast. They contribute to the understanding of the potential roles of seasonal and higher frequency nutrient dynamics for giant kelp persistence, under continuing ocean surface warming and an increasing frequency and intensity of marine heatwaves.

Coastal management is a topic that has also received attention due to the impact of climate change on coastal areas, with four articles addressing various management aspects. Fontán-Bouzas et al. emphasize the importance of identifying vulnerable sectors of beach-dune systems to support coastal management and propose an operational framework to construct a beach-dune system vulnerability map. In the same vein, Fernández-Montblanc et al. present a new methodology for assessing the risk to underwater cultural heritage sites in coastal areas due to wave-induced hazards. They provide a stepping stone toward a sustainable blue economy by ensuring the preservation of coastal environments and cultural heritage sites in the face of climate change. From a coastal development perspective, Saengsupavanich et al. examine the effectiveness of sand bypassing as a solution to jetty-induced coastal erosion in Thailand and identified the amount of sediment deposition that can inform sand bypassing budgets and implementation plans. Authorities build these coastal structures to protect the coast and improve living conditions. However, these structures can have significant environmental impacts, such as altering wave movement, seabed formation, and shoreline erosion. Therefore, it is crucial to understand and estimate sediment movement to ensure sustainable coastal management. Understanding littoral drift, the process by which natural forces move sediment along the shoreline, is essential for sustainable coastal development.

Tenebruso et al. discuss the significance of barrier islands and associated backbarrier environments in protecting populations and infrastructure from storm impacts and provide a morphodynamic model to describe their evolution. They also emphasize the need to understand the response of these environments to sea-level rise and anthropogenic effects to inform future management efforts. Additionally, two other contributions focus on wetlands and cohesive sediment processes at the microscale and mesoscale, respectively. Chen et al. (2022) examine erosion processes in cohesive sediments through the development of a new formula for the critical shear stress of the surface erosion of cohesive sediments, which are composed of fractal aggregates and based on the balance analysis of momentums acting on an aggregate in the bed surface. From a medium-term perspective, Jin et al. provide new insights into the dynamics of marshes through field observations from the central Jiang coast and numerical simulations, with the aim of improving predictions of the overall evolution of tidal flats. They contribute to the understanding of the morphological evolution of tidal flats in relation to the salt marsh edge and provide a formidable dataset for testing models of biomorphodynamics. Figure 1 summarizes the insights into coastal processes provided by this Research Topic and their relevance to coastal management practice. Hence, this Research Topic can be summarized by the notion that for any potential coastal management practice, the positive and negative impacts need to be considered in detail before implementation. To confirm these impacts, coastal management managers need to undertake a comprehensive study of the aerial imagery and simulate the impacts through a modeling approach.

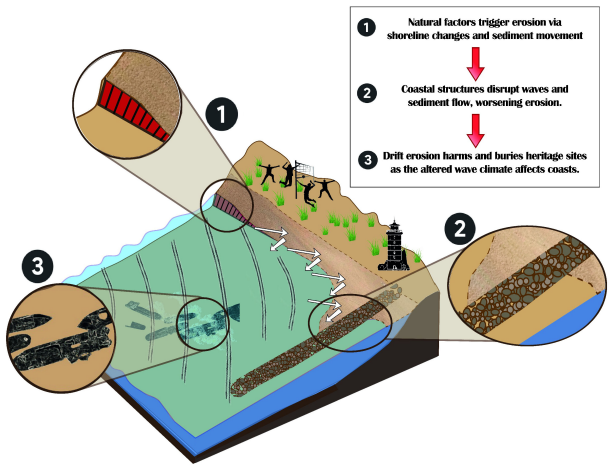

FIGURE 1
Insights into coastal processes provided by this Research Topic and their relevance to coastal management practice.

The final group comprises two contributions focusing on the use of satellite imagery to forecast future flood issues and anticipate changes in the coastline. Cisse et al. assess the vulnerability of the densely populated city of Saint Louis in Senegal to potential coastal flooding by combining satellite-derived data with sea-level observations and reanalyses. The results indicate an increased flood risk due primarily to rising sea levels, underscoring the urgent need for countermeasures to protect communities and infrastructure. The last paper by Ibaceta et al. proposes a new shoreline modeling approach that uses time-varying model parameters and tests it with multidecadal satellite-derived shorelines, thereby reducing the uncertainty associated with the misspecification of physical processes driving shoreline change.

Author contributions

All the authors have contributed to the review of the submitted articles as well as to the writing of this editorial. AEH has made the figure.

Funding

This special issue has been promoted within the project CRUNCJ (FEDER-UCA18-107062) founded by the European Union under the 2014-2020 ERDF Operational Programme and by the Department of Economi Transformation, Industry, Knowledge, and Universities of the Regional Government of Andalusia and the the project CRISIS (PID2019-109143RB-I00) funded by the Ministry of Science and Innovation and the European Union. AEH greatly supported on this research under the funding by the Malaysian Ministry of Education under the Fundamental Research Grants Scheme (FRGS) [FRGS/1/2022/WAB02/UMT/02/1].

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Kombiadou, K., Costas, S., Rita Carrasco, A., Plomaritis, T. A., Ferreira, O., and Matias, A. (2019). Bridging the gap between resilience and geomorphology of complex coastal systems. *Earth-Science Rev.* 198. doi: 10.1016/j.earscirev.2019.102934

McGranahan, G., Balk, D., and Anderson, B. (2007). The rising tide assessing the risks of climate change and human settlements in low elevation coastal zones. *Environ. Urban.* 19 (1), 17–37. doi: 10.1177/0956247807076960