Opinion

Solutions to contain coastal erosion: analysis of technical-economic feasibility

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Coastal areas are sensitive environments,[1] considered valuable spaces because they have great socioeconomic potential and contain numerous attractions, which serve the most diverse purposes, such as tourism, recreation and housing.[2] Therefore, from a strategic point of view, they are of great importance to the economic, environmental, social and cultural purposes of the population.[3,4]

In areas with greater population density, coastal erosion becomes a major concern, as these environments, by nature, are already considered fragile, and the increasing occupation of these spaces by man has accentuated degradation processes.[1] This has been confirmed by monitoring carried out between 2013 and 2018, by the Brazilian Ministry of the Environment, which found an increase in the erosion process in coastal areas from 40% to 60%.[3]

The main consequences of coastal erosion are damage to defense structures, in addition to the loss of habitable territory for commercial and/or housing properties and recreational spaces. These consequences have had severe impacts on the lives of residents of the Brazilian coast. In this scenario, integrated coastal management emerged, which is a continuous and dynamic process through decisions and actions aimed at the development, sustainable use and protection of coastal areas. Integrated coastal management consists of two protection measures, one being prevention, aimed at avoiding the impacts of coastal erosion, establishing a protective strip designed to absorb the retreat of the coastline, adapting residents to live with the specificities of the environment in which they live. who live. Mitigating measures include the construction of rigid structures in the beach area with the aim of stabilizing the coastline in an attempt to minimize the impacts of high-energy waves.[4]

To define the type of containment structure, it is necessary to take into account factors such as: soil characteristics, active loads, complexity of execution, cost analysis, among others. The fact is that no coastal protection measure can permanently stop erosion,[2] and it is only possible to minimize its effects through the execution of coastal defense works.[5] It is worth noting that it is essential to identify the factors to choose the best method of controlling coastal erosion: durability of the work, availability of materials for construction,[6] types of transport, costs and benefits, socio-environmental impacts, qualified labor and type of long-term maintenance term.[7]

The significant economic losses and impacts on the environment suffered over time have stimulated the formulation of different methodologies for identifying susceptibility to coastal erosion,[5] through this diagnosis, it is possible to propose efficient and appropriate solutions to the location of the intervention. Therefore, the present work aims to carry out a comparative analysis between the main coastal erosion containment structures, evaluating indicators and aspects linked to technical-economic viability, technically contributing to the process of choosing solutions to intervene in coastal areas.

Therefore, the present work aims to carry out a comparative analysis between the main containment structures, evaluating indicators and aspects linked to technical-economic viability. To this end, coastal erosion containment structures were evaluated: bagwall , big bag (with coconut trees), rockfill, groyne, beach fattening and concretebloc . Five (5) indicators linked to the technical and economic viability of coastal erosion containment structures were compiled, namely: construction process, efficiency of use, socio-environmental impacts, durability and cost. As results obtained, it was identified that the big bag has the lowest cost per linear meter lower than the others (2,400.00 m/R$), however, in terms of durability, rockfill, groyne and concrete block have lower maintenance costs, long term for carrying out preventive maintenance and long service life. Finally, this research presents the particularities of each existing solution, constituting material that facilitates the decision-making process of managers and designers.

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Conflicts of interest

There are no conflicts of interest.

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