4ª EDIÇÃO Science & Business Connection by colmeia

TSUNAMIS IN THE GALÁPAGOS: RISKS, MONITORING, AND ALIGNMENT WITH THE SDGS

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Abstract: The Galápagos Islands, located in the eastern Pacific Ocean, constitute an archipelago of great ecological, scientific, and heritage significance. Recognized worldwide for their unique biodiversity and endemic species, the islands also present vulnerabilities to natural threats associated with the tectonic dynamics of the Pacific Ocean. Among these threats are tsunamis, oceanic phenomena generated mainly by submarine earthquakes, seafloor landslides, or volcanic activity. Historically, several tsunamis originating in Pacific subduction zones, especially along the coasts of Chile and Peru, have been detected in the archipelago. Although the waves recorded in Galápagos generally show smaller amplitudes compared to those observed in continental regions, the risk remains due to the presence of coastal populations, tourism infrastructure, and sensitive ecosystems. Thus, it becomes necessary to integrate scientific knowledge about tsunamis with public policies, environmental legislation, and risk management strategies in island territories. In this context, there is also the challenge of aligning prevention and mitigation actions with the Sustainable Development Goals (SDGs), particularly those related to resilient communities, environmental protection, and disaster risk reduction. The objective of this study was to analyze, through a bibliographic and documentary review, the existing scientific knowledge on tsunamis that may affect the Galápagos archipelago, as well as to examine legal frameworks, technological advances in ocean monitoring, and their relationship with sustainable development strategies. The methodology corresponds to a systematic literature review of a comparative and analytical nature, in which scientific articles, technical reports from international organizations, Ecuadorian governmental documents related to risk management and environmental legislation, as well as studies on tsunami numerical modeling and ocean monitoring technologies were analyzed. Documents related to sustainability policies and disaster reduction in the context of the SDGs were also reviewed. The results indicate that Galápagos has been mainly affected by tsunamis generated at great distances, whose waves travel across the Pacific Ocean, and that the submarine morphology and geographic configuration of the archipelago influence the propagation and attenuation of these waves. In addition, the archipelago is integrated into international tsunami monitoring networks that use tide gauges, ocean buoys, and satellite-based systems to detect variations in sea level. From an institutional perspective, Ecuador has developed legal frameworks focused on risk management and the protection of the natural heritage of Galápagos, contributing

to the implementation of policies aligned with the SDGs, especially SDG 11 (Sustainable Cities and Communities), SDG 13 (Climate Action), and SDG 14 (Life Below Water). It is concluded that, although tsunamis do not represent a highly recurrent phenomenon in Galápagos, their potential environmental and social impact justifies the continuation of scientific studies and the strengthening of prevention strategies. The analyzed literature shows advances in monitoring and regulation, but also highlights the need to expand community education, coastal planning, and the integration between science, technology, and public policies. The articulation between risk management and the Sustainable Development Goals (SDGs) can significantly contribute to sustainable development and to the resilience of the archipelago in the face of natural threats.

Keywords: Tsunamis; Galápagos Islands; Risk Management; Ocean Monitoring; Sustainable Development.