



## OPEN ACCESS

EDITED AND REVIEWED BY  
Alexander Kokhanovsky,  
German Research Centre for Geosciences,  
Germany

\*CORRESPONDENCE  
Uday Chatterjee,  
✉ raj.chatterjee459@gmail.com

RECEIVED 15 January 2024  
ACCEPTED 18 January 2024  
PUBLISHED 01 February 2024

CITATION  
Chatterjee U, Kumar S, Karuppanan S and  
Das S (2024), Editorial: Geophysical,  
climatological and anthropogenic hazards and  
disaster: vulnerability, risk assessment,  
and sustainability.  
*Front. Environ. Sci.* 12:1370984.  
doi: 10.3389/fenvs.2024.1370984

COPYRIGHT  
© 2024 Chatterjee, Kumar, Karuppanan and  
Das. This is an open-access article distributed  
under the terms of the [Creative Commons  
Attribution License \(CC BY\)](#). The use,  
distribution or reproduction in other forums is  
permitted, provided the original author(s) and  
the copyright owner(s) are credited and that the  
original publication in this journal is cited, in  
accordance with accepted academic practice.  
No use, distribution or reproduction is  
permitted which does not comply with these  
terms.

# Editorial: Geophysical, climatological and anthropogenic hazards and disaster: vulnerability, risk assessment, and sustainability

Uday Chatterjee <sup>1\*</sup>, Suresh Kumar <sup>2</sup>,  
Shankar Karuppanan <sup>3</sup> and Sandipan Das <sup>4</sup>

<sup>1</sup>Department of Geography, Bhatler College, Kharagpur, West Bengal, India, <sup>2</sup>Agriculture, Forestry & Ecology Group, Indian Institute of Remote Sensing (IIRS), Indian Space Research Organization (ISRO), Department of Space, Government of India, Dehradun, Uttarakhand, India, <sup>3</sup>Department of Applied Geology, School of Applied Natural Sciences (SoANS), Adama Science and Technology, Adama, Ethiopia, <sup>4</sup>Symbiosis Institute of Geoinformatics, Symbiosis International (Deemed University), Pune, India

## KEYWORDS

natural disaster, remote sensing, hazard assessment, environmental management, disaster risk reduction

## Editorial on the Research Topic

**Geophysical, climatological and anthropogenic hazards and disaster: vulnerability, risk assessment, and sustainability**

In the contemporary era, the global community grapples with frequent natural and human-induced threats, spanning from droughts and floods to deforestation, placing a substantial population at risk of catastrophic destruction and loss of life. Recognizing the inevitability of natural hazards, the quantification of these events and the development of reliable forecasts emerge as crucial tools to mitigate their adverse impacts, contributing to the establishment of a more resilient and secure society. This Research Topic aims to consolidate existing knowledge on multiple hazards, emphasizing monitoring and management, with the objective of bridging the gap between scientific understanding, policy formulation, and community engagement. It focusses on applications of remote sensing, GIS and precision methodologies for precise and reliable evaluation of various natural and environmental hazards. Additionally, the studies underscore the implementation of eco-friendly and sustainable management approaches to foster resilient societies. The rich contents, both thematic and regional perspectives, sheds light on the dynamic nature of climate crisis, natural resources, landscapes, agricultural ecosystems and water systems, across various spatial and temporal scales. It covers both theoretical and applied aspects, serving as a comprehensive guide for future research endeavours. The research primarily focussed on exploring various aspects of hazards and disasters associated with natural resources covering groundwater depletion, occurrence of drought and floods, land use/land cover change, soil erosion, landslides, water scarcity and the investigation of SINDEI framework. The primary objective is to enhance comprehension of Geospatial Technologies, scrutinizing their interplay with

hazards, landscapes, land use, water scarcity, forestry, spatial modeling, artificial intelligence, and the environment to actively contribute to the sustainable development.

In summary, this Research Topic provides a comprehensive understanding of both conventional and cutting-edge geospatial technologies applied in atmospheric, lithospheric, hydrospheric, biospheric, and socio-economic contexts. Addressing hazards, disasters, and sustainable development and management, the compilation proves invaluable for researchers, scientists, non-governmental organizations (NGOs), academic professionals, policymakers, and university communities involved in hazard and disaster resilience, climate change, environmental sciences, geomorphology, remote sensing, natural resources management, GIS, hydrology, and soil sciences.

Tang et al. assessed the metropolitan area which plays a crucial role in shaping city agglomerations in China and is vital for achieving integrated development within the region. Specifically, the Guangzhou metropolitan area holds significant importance in Guangdong Province's economic development plan. This research investigates the multi-dimensional perspective of city resilience within the metropolitan area, focusing on the spatial-temporal pattern and the factors that influence it. The findings aim to offer valuable insights and serve as a reference for fostering the coordinated development of metropolitan areas.

Wang et al. evaluated the risk of debris flow in Shaling Gully through FLO-2D model and systematic approach. In this paper hazard zonation at different rainstorm frequencies was determined using ARCGIS 10.8 software and also highlighted the numerical simulation was employed to evaluate the efficacy of a retaining dam in mitigating debris flow, providing technical insights to improve the safety of downstream structures.

Hoa et al. highlighted a unique perspective to the discourse by combining knowledge-driven consultation with precise statistical analysis of geospatial data. This integration considers essential explanatory factors, leading to a dependable delineation of landslide-prone areas across both spatial and temporal dimensions in the tropical monsoon areas.

Liu et al. focused on delineating landslide susceptibility in a coastal mountainous area of Vietnam through the integration of the subjective Analytic Hierarchy Process (AHP) and the objective Shannon Entropy (SE). By combining these methods, the study provided a substantial advancement in the geographical information system (GIS)-based zoning of landslide susceptibility in Vietnam. This advancement enhances the capacity for early warning and mitigation of catastrophic hazards. Notably, the approach not only draws on expert knowledge but also incorporates reliable statistical evidence, offering resilience against potential uncertainties associated with future climate changes.

Rahman et al. assessed the flood susceptibility map for the SRB in the eastern Hindu Kush region of Pakistan, utilizing a GIS-based FR model. Additionally, the research explores how various factors contributing to floods impact the increased vulnerability to flooding in the area. The paper assesses the effectiveness of the FR bivariate

statistical model in delineating flood susceptibility in the SRB. The insights gained from this research offer valuable perspectives for stakeholders, aiding in the implementation of efficient flood risk management strategies and promoting sustainable development.

Alam prepared an innovative Modified Mercalli Intensity (MMI) map, crafted by analyzing the cumulative impact of 80 earthquakes in Bangladesh spanning from BC 810–2015, covering both Bangladesh and its neighboring regions. The paper commences with an exploration of earthquake hazard zoning and preparedness initiatives.

Le et al. evaluated the effectiveness of six machine learning (ML) algorithms in land surface mapping (LSM) specifically in Inje County, South Korea. This research serves as a valuable initial step for exploring the application of ML techniques in LSM not only in South Korea but also in other geographical areas around the world as well.

Mohanty et al. made a comparison of traditional decision support models like AHP and machine learning algorithms in the evaluation of flood vulnerability and risk within Bhitarkanika National Park, Odisha, India.

Setiawati et al. explores local climate trends, evaluates their potential consequences, and analyzes policy interventions in the Seribu Islands, Indonesia.

Seo et al. comprehensively examines the factors affecting the behavior of retaining walls in response to ground excavations in urban areas. The results of this study suggest that the lateral movement of the wall caused by excavation is closely tied to both the unit weight and shear strength of the soil.

## Author contributions

UC: Conceptualization, Writing—original draft, Writing—review and editing. SuK: Conceptualization, Writing—review and editing. SaK: Supervision, Writing—review and editing. SD: Conceptualization, Formal Analysis, Supervision, Writing—review and editing.

## 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

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.