


# Chapter 1

# Understanding the Science of Natural Disaster

**Qamar Ali**

 <https://orcid.org/0000-0002-8178-7591>

*Virtual University of Pakistan, Pakistan*

**Muhammad Tariq Iqbal Khan**

*Government College University, Faisalabad, Pakistan*

## **ABSTRACT**

*This chapter examines the relationship between natural hazards and vulnerabilities such as economic, social, environmental, and physical factors, which heighten the global impact of natural disasters. Recent data show alarming trends with 3.6 million deaths, 7.7 billion people affected, and \$3.3 trillion in economic losses due to natural disasters. These events, including earthquakes, floods, and wildfires, have increased in frequency and intensity due to human activities such as rapid urbanization, environmental degradation, and climate change. Developing countries are particularly vulnerable due to their socio-economic conditions, exacerbating disaster impacts. This study advocates for sustainable urban planning and resilient human settlements as essential strategies to mitigate disaster effects and promote sustainable development. Recommendations include adopting integrated, eco-friendly development strategies that prioritize environmental conservation and human well-being to enhance resilience against future disasters.*

DOI: 10.4018/979-8-3693-9745-9.ch001

Copyright © 2026, IGI Global Scientific Publishing. Copying or distributing in print or electronic forms without written permission of IGI Global Scientific Publishing is prohibited. Use of this chapter to train generative artificial intelligence (AI) technologies is expressly prohibited. The publisher reserves all rights to license its use for generative AI training and machine learning model development.

## INTRODUCTION

Natural disasters have always occurred (Rossello et al., 2020) and have become an international problem in recent times (Guo et al., 2015). Natural disasters are when hazards interact with economic, social, environmental and physical vulnerabilities. Vulnerability in country to natural disasters is usually at the level of development and economic structure (Benali et al., 2018). The effects of natural disasters have increased universally today and so there is a constrict urgency to achieve sustainable cities and human settlements (Panwar & Sen, 2019). The estimated global natural disasters with 3.6 million deaths, 7.7 billion affected people, and \$3.3 trillion economic losses are recorded at 13,386 (Fang et al., 2019). Among such natural disasters like earthquakes, droughts, floods, extreme temperatures, epidemics, wildfire, insects infection, storms, mass movements (dry), landslides, mass movements, have increased globally and in their intensity. (Fang et al., 2019; Panwar & Sen, 2019). The risk of a disaster was perceived due to natural hazards until the 1970s. After decades of research, social scientists revealed the social dimension of disaster risk and claimed that disasters can be linked with human activity (Peduzzi, 2019). The rapid increase in the population, development of coastal zones, deterioration in wetlands, and changing climatic conditions like global warming were responsible for the increase in the vulnerability of human beings (Wang, 2019).

The pursuit of over exploitation of the nonrenewable resources has been going on for ages. the development activity and the attempts for reduction of the gap between led to ecological) supply and demand for the betterment of human living standards although there is a hue and cry and environmental imbalance leading to disasters, I've read about it and that disasters are cyclical but disaster follow a cycle. An overexploitation may not be the only reason for disasters, as they are an in evident part of nature and human life. While being accelerated by it, it can be overturned by the growing coping capacity of the people. Sustainable development activity is one which limits the gap between development and else ecological degradation would overrun the former, to relevant environment.

Since to understand this balance, one must work with empathetic and scientific point of view together. Rather times towards disaster mitigation must bring about development and now only the All the developmental projects which were undertaken in that area would be ecofriendly and pro-environment.

Natural disasters and man made disasters (technology) are generally considered as disasters. Environmental activities linked provoke natural disasters such as earthquakes, floods and hurricanes. with the law of nature. While natural disasters are called the "Act of God", man-made disasters occur due to human activities termed as "Act of Man". In contrast, a hybrid-form of natural disasters occurs due to both environmental and human activities (Ramli et al., 2014). Natural disasters

18 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: [www.igi-global.com/chapter/understanding-the-science-of-natural-disaster/391373](http://www.igi-global.com/chapter/understanding-the-science-of-natural-disaster/391373)

## Related Content

---

### Utilizing AI and Machine Learning for Natural Disaster Management: Overview of Machine Learning and Its Importance in Disaster Management

Divya S. V., Venkadesh P., Yazhini S. and Shiny K. V. (2024). *Utilizing AI and Machine Learning for Natural Disaster Management* (pp. 1-23).

[www.irma-international.org/chapter/utilizing-ai-and-machine-learning-for-natural-disaster-management/345851](http://www.irma-international.org/chapter/utilizing-ai-and-machine-learning-for-natural-disaster-management/345851)

### IoT Devices for Natural Disasters: IoT Technologies for Natural Disaster Management

A. Gobinath, Manjula Devi, P. Rajeswari and A. Srinivasan (2024). *Internet of Things and AI for Natural Disaster Management and Prediction* (pp. 121-139).

[www.irma-international.org/chapter/iot-devices-for-natural-disasters/341714](http://www.irma-international.org/chapter/iot-devices-for-natural-disasters/341714)

### Emerging Technology-Based Natural Disaster Prevention Infrastructure

S. Arjune, Neeraj Kumar, R. Vinoth Kumar, M. Lakshmi Priya, P. Arulkumar, K. Bharti and V. Bhoopathy (2026). *Predicting, Preventing, and Mitigating Natural Disasters Through Advanced Technologies* (pp. 175-200).

[www.irma-international.org/chapter/emerging-technology-based-natural-disaster-prevention-infrastructure/403508](http://www.irma-international.org/chapter/emerging-technology-based-natural-disaster-prevention-infrastructure/403508)

### Predicting Rainfall by Fuzzy Logic: A Preliminary Analysis of a Case Study in Mexico

Jaime Santos-Reyes and Yunue Garcia-Pimentel (2024). *Utilizing AI and Machine Learning for Natural Disaster Management* (pp. 99-117).

[www.irma-international.org/chapter/predicting-rainfall-by-fuzzy-logic/345856](http://www.irma-international.org/chapter/predicting-rainfall-by-fuzzy-logic/345856)

### Application of Machine Learning Techniques in Hydrometeorological Event Prediction

Anna Msigwa and Ayodeji Samuel Makinde (2024). *Modeling and Monitoring Extreme Hydrometeorological Events* (pp. 135-161).

[www.irma-international.org/chapter/application-of-machine-learning-techniques-in-hydrometeorological-event-prediction/336597](http://www.irma-international.org/chapter/application-of-machine-learning-techniques-in-hydrometeorological-event-prediction/336597)