

LANDSLIDES IN INDIA

CASE STUDY OF TAMIL NADU

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INTRODUCTION

In the vast and varied landscape of India, landslides are a serious natural hazard, particularly in hilly regions and areas with heavy rainfall. According to the Ministry of Earth Sciences, about 15% of India's land area is prone to landslides, affecting around 17 states and union territories, according to the Geological Survey of India (GSI). This story takes us through the landslide challenges in India, with a closer look at Tamil Nadu, and how the region is working to prevent and manage these disasters.

India's diverse geography and climate make it vulnerable to landslides, especially during the monsoon season. The "Landslide Atlas of India" (2022-23) by the Geological Survey of India (GSI) identifies the most at-risk regions, including the Himalayas, Western Ghats, and parts of the Eastern Ghats. These areas are prone to landslides due to their steep slopes and seismic activity (GSI, 2022-23). Data from the "Annual Landslide Report 2023" shows that over 80,933 landslides occurred in India between 2014 and 2022. States such as Uttarakhand, Tripura, Kerala, Himachal Pradesh, Mizoram, and Tamil Nadu were the hardest hit (ISRO). Landslides are responsible for significant economic losses in many developing countries, with the potential impact ranging between 1-2% of their gross national product, as noted by the Geological Survey of India. These losses arise from damages to infrastructure, property, and the environment, underscoring the importance of effective landslide management and mitigation strategies (Geological Survey of India, n.d.). These findings, highlighting the significant impact of landslides on both lives and economies losses due to landslides in India.

UNDERSTANDING THE PROBLEM

A CLOSER LOOK AT TAMIL NADU

The Nilgiris district in Tamil Nadu is classified as a high-risk zone for landslides, according to the Landslide Hazard Zonation Atlas of India, published by the Building Materials and Technology Promotion Council (BMTPC). Seasonal rains trigger significant landslides in the Nilgiris, with notable incidents including the Runnymede, Glenmorgan, and Coonoor landslides. Additionally, districts like Salem, Erode, and Dindigul face landslide risks. The Geotechnical Cell, in collaboration with Anna University's Institute of Remote Sensing, has identified vulnerable watersheds for mitigation efforts (ENVIS Centre, Ministry of Environment & Forests). In October 2023, the Nilgiris experienced a severe landslide caused by over 1898.5 mm of rainfall (Tamil Nadu, 2022-23). On August 18, 2022, following several hours of intense rain, landslides occurred near Nadu Gudalur in Gudalur Taluk. This event resulted in damage to around 15 houses and caused partial subsidence of the NH-181 road near Gudalur (Geological Survey of India, 2022). In November 2009, the Nilgiris District experienced a series of devastating landslides between the 10th and 15th, resulting in significant destruction. Over 1,150 landslides and slips were recorded during this period, leading to the tragic loss of approximately 80 lives. In addition, around 3,785 huts were reported damaged, and the region's roads and railway lines also suffered severe damage (Ganapathy & Hada, 2012).

STEPS TO ADDRESS THE ISSUE

In response to the landslide risks, Tamil Nadu has implemented several measures:

➤➤ LANDSLIDE HAZARD ZONATION (LSH) MAPS:

The Geological Survey of India has mapped landslide-prone areas in the Nilgiri. This mapping helps guide land-use planning and construction, avoiding high-risk zones. The Nilgiri District of Tamil Nadu, India, experiences frequent landslides due to its steep slopes, deforestation, and intense monsoon rainfall. Notable landslide events in 1978, 1979, 2009 and 2022 resulted in severe damage to infrastructure and loss of life. Landslide Hazard Zonation mapping has played a critical role in identifying areas with high landslide risk, particularly in Coonoor and Kotagiri. Through geospatial analysis, authorities can better understand landslide patterns and implement mitigation strategies, such as improving drainage systems and reinforcing vulnerable slopes (Thennavan & Ganapathy, 2020)



➤➤➤ EARLY WARNING SYSTEMS (EWS)

The Indian Meteorological Department and the Geological Survey of India (GSI) have developed early warning systems to predict heavy rains and potential landslides. According to a report by Down to Earth in 2024, early warning systems (EWS) for landslides are currently operational in highly vulnerable regions such as Kalimpong and Darjeeling in West Bengal, and the Nilgiris District in Tamil Nadu. The Indian government plans to extend the system across the country by 2030, recognizing its importance in managing the high frequency of rainfall-induced landslides. EWS plays a critical role in disaster mitigation by generating and disseminating timely warnings, which are essential for reducing the adverse impacts of landslides. The system involves several key components, including risk assessment, continuous monitoring, communication of warnings, and enabling quick response capabilities. It can forecast potential landslides either at a regional level or by targeting specific vulnerable slopes (Krishnamurthy, 2024).

➤➤➤ COMMUNITY AWARENESS

The "Public Awareness and Mass Campaigns" program educates local communities about landslide risks and preparedness. The Government of Tamil Nadu (GoTN) recognizes the importance of strengthening the knowledge and preparedness of various stakeholders in managing disaster situations. As a result, GoTN prioritizes capacity building for communities and other key groups. To raise awareness at all levels, GoTN utilizes a wide range of communication channels, including print, electronic, social, and traditional media, ensuring effective dissemination of disaster-related information across different sections of society (Tamil Nadu State Disaster Management Authority, 2023).

➤➤➤ CONCLUSION

Landslides remain a significant challenge in India, especially in regions like Tamil Nadu where the combination of steep terrain and heavy rainfall creates high-risk conditions. However, through hazard mapping, early warning systems, slope stabilization projects, and community education, Tamil Nadu is making strides in reducing the impact of these disasters. The ongoing efforts by state and national agencies, supported by research and technological advancements, are crucial for improving disaster preparedness and resilience.

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