

# Floods in Sitamarhi District: A Geographical Analysis (2000–2024)

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## Abstract

This research paper examines the occurrence and impacts of floods in Sitamarhi district, Bihar, covering the period 2000–2024. Sitamarhi, located in the Bagmati–Adhwara basin, experiences recurring floods that disrupt agriculture, livelihoods, and health. Using data from the Water Resources Department (WRD), Central Water Commission (CWC), Bihar State Disaster Management Authority (BSDMA), and peer-reviewed studies, the paper provides a chronology of flood events and assesses their socio-economic impacts. The results show that embankments and structural measures offer temporary relief but often fail due to breaches and sedimentation. The study recommends a resilience-oriented approach combining structural measures with community-based early-warning systems, nature-based solutions, and long-term adaptation strategies.

**Keywords:** Sitamarhi; Floods; Bagmati River; Embankment breaches; Disaster management; Agriculture; Public health; Resilience; Bihar; 2000–2024

## Introduction

Flooding is one of the most persistent natural hazards in Bihar, especially in its northern districts where Himalayan-fed rivers such as the Bagmati cross into India from Nepal. Sitamarhi district is highly vulnerable due to its low-lying topography, fertile alluvial plains, and dependence on agriculture. Major floods have occurred repeatedly in 2004, 2007, 2008, 2013, 2017, 2020, and 2024, each causing extensive damage to agriculture, housing, and health. This study aims to analyze the geographical context of floods in Sitamarhi, assess their impacts, and evaluate existing management strategies while suggesting improvements.

## Study Area

Sitamarhi district lies in the northern plains of Bihar, bordering Nepal in the north and covering an area of about 2,185 km<sup>2</sup>. It is traversed by several rivers, including the Bagmati, Lakhandei, and Adhwara tributaries. The district has fertile soil and high population density. Agriculture is the main occupation, but recurring floods

damage crops and livelihoods. Blocks such as Runni Saidpur, Pupri, and Nanpur are among the most flood-prone.



Figure 1 : Locational Map of Sitamarhi

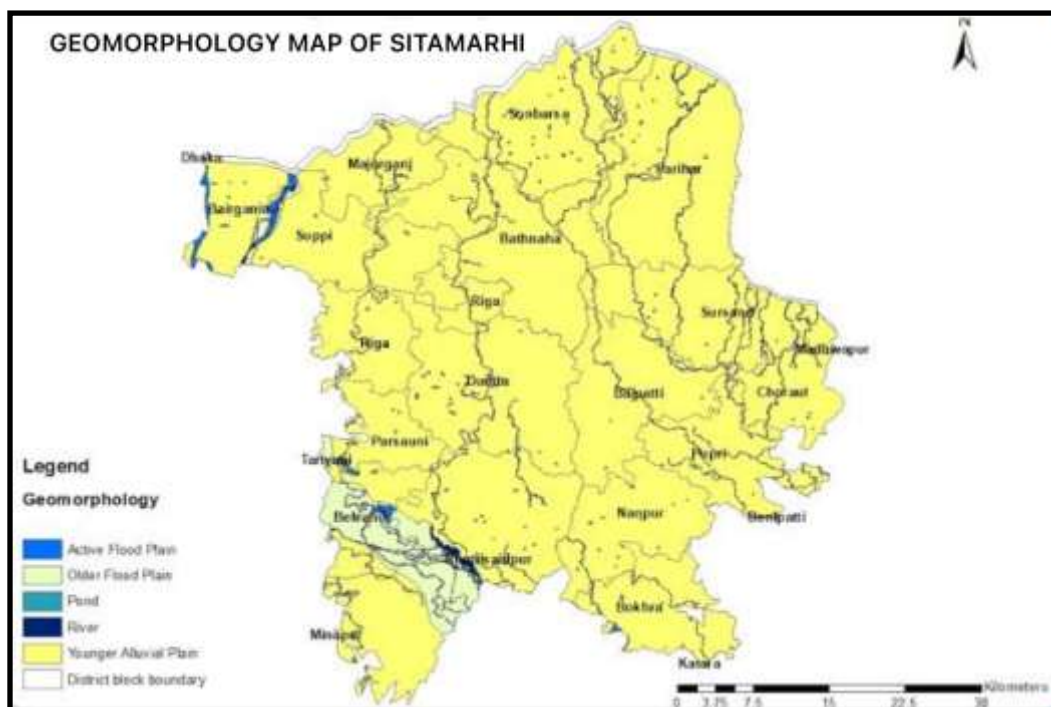


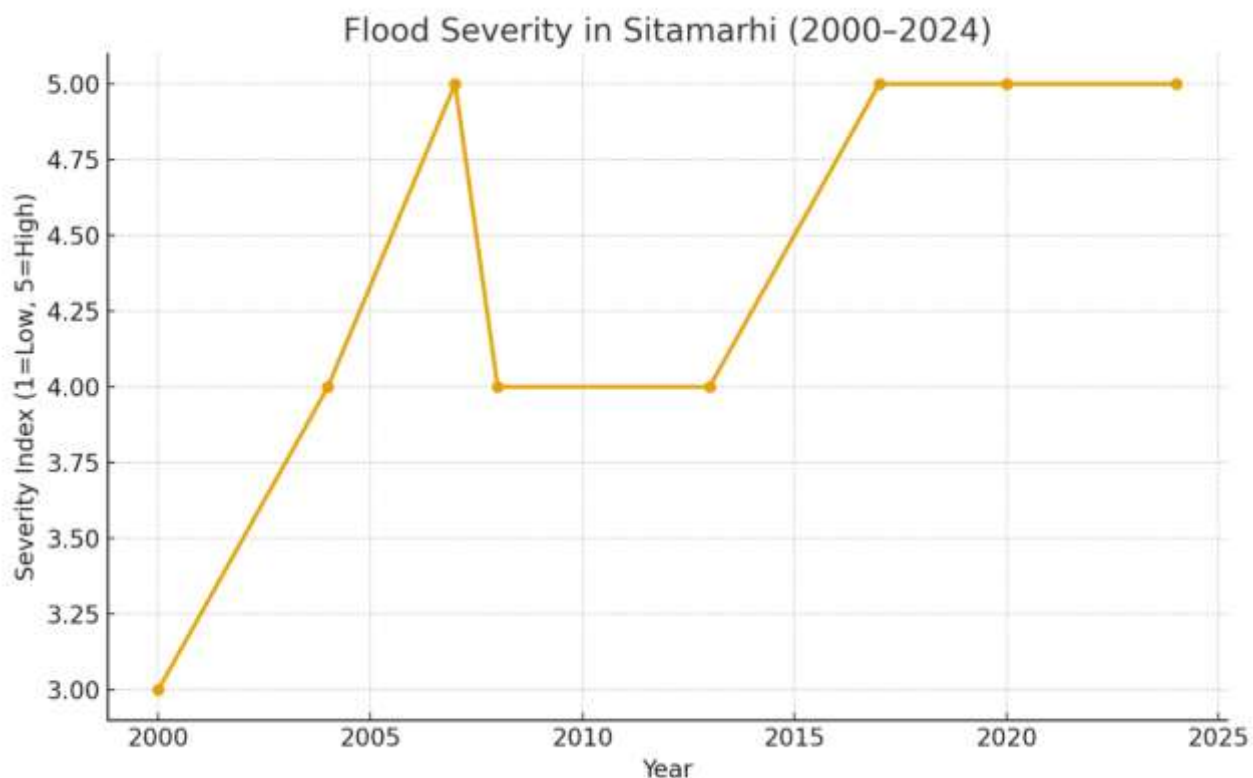
Figure 2 : Geomorphology Map of Sitamarhi

## Methodology

The methodology includes analysis of secondary data from WRD, CWC, BSDMA, and NIDM flood reports. ReliefWeb and Sphere India reports were used to document recent events such as the 2020 and 2024 floods. Remote sensing studies were referenced for inundation mapping. A flood chronology was compiled, and statistical charts were prepared to represent severity, affected population, and crop losses.

## Results

Floods in Sitamarhi have been recurrent from 2000 to 2024, with major years being 2004, 2007, 2008, 2013, 2017, 2020, and 2024. Embankment breaches in 2007, 2017, and 2024 caused widespread displacement. Agriculture and housing remain the worst-affected sectors. Public health crises emerged repeatedly, with drink-water scarcity and disease outbreaks reported. The following figures illustrate key trends.



*Figure 3 : Flood Severity Trend in Sitamarhi (2000–2024)*

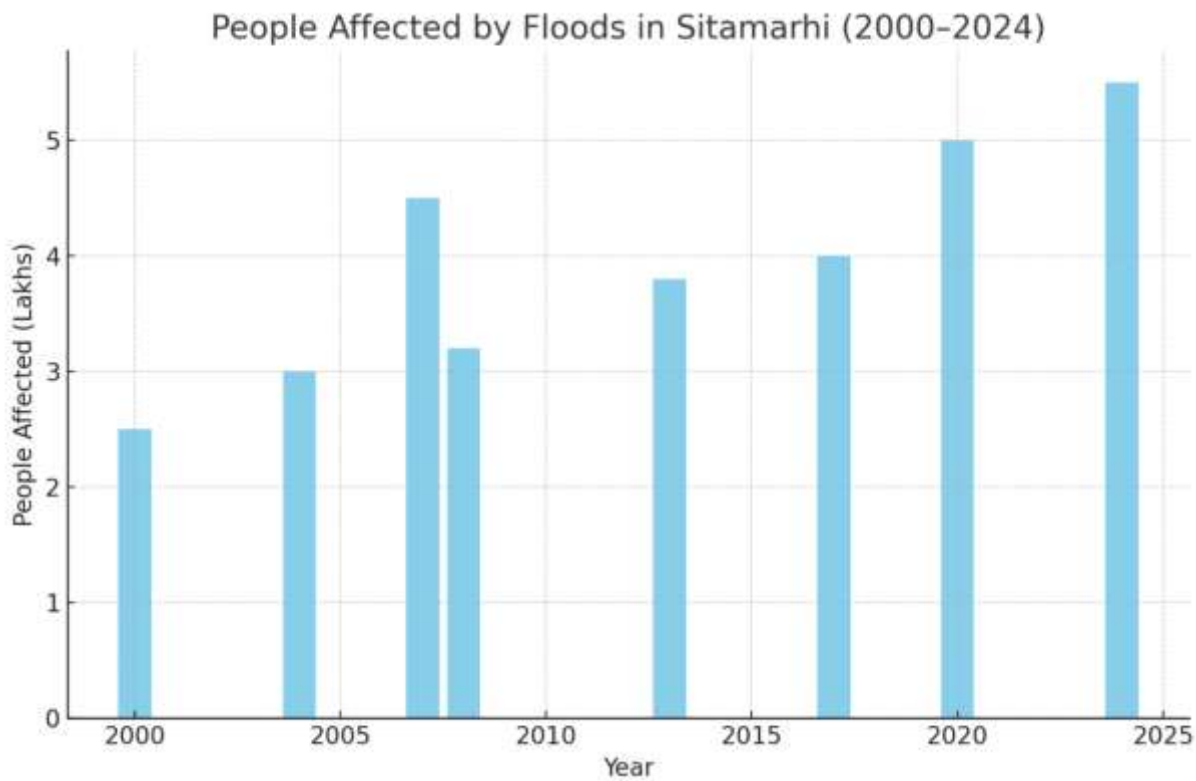


Figure 4 : People Affected by Floods in Sitamarhi (2000–2024)

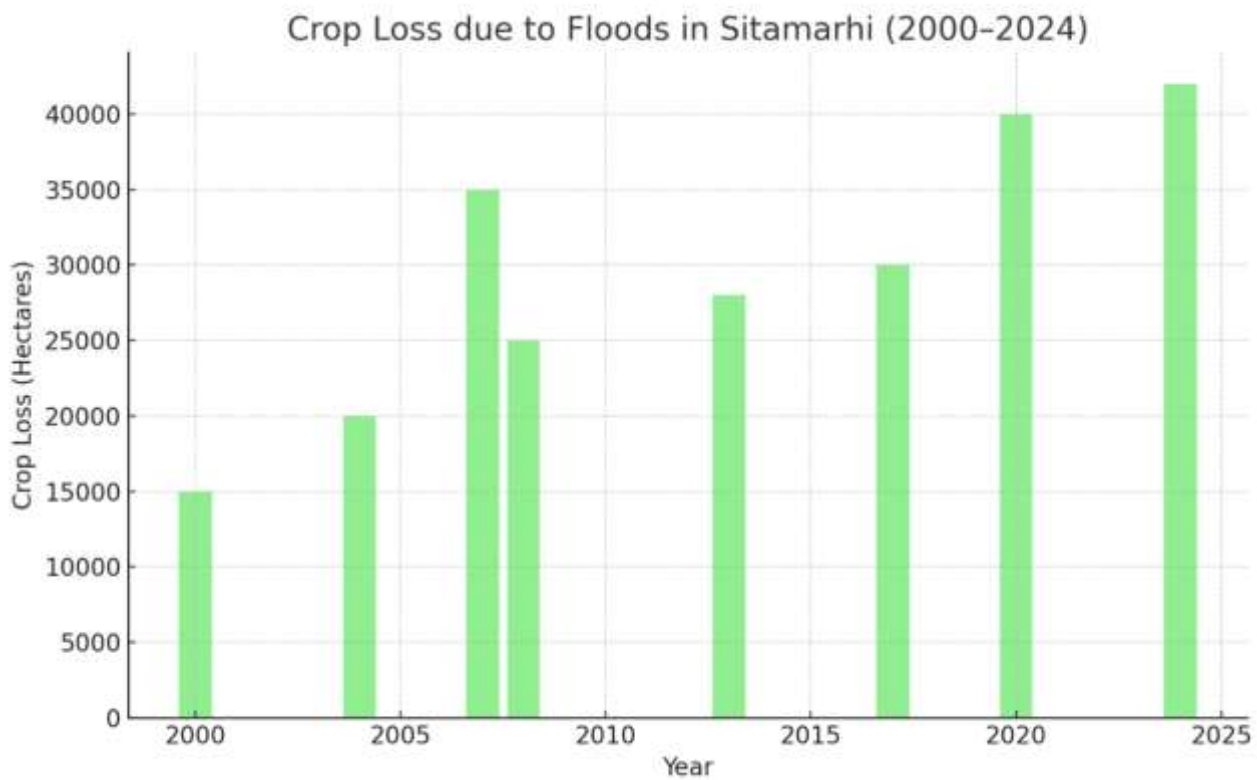


Figure 5 : Crop Loss due to Floods in Sitamarhi (2000–2024)

## Discussion

The evidence shows that while embankments and flood-control projects under the Bagmati Project help in reducing short-term impacts, they are not reliable due to breaches and poor maintenance. Sedimentation raises riverbeds, further intensifying flood risks. Climate variability has increased rainfall intensity, leading to higher flood magnitudes. Non-structural measures such as community-based early warning, floodplain zoning, and nature-based approaches remain underdeveloped in Sitamarhi. The 2024 floods highlighted gaps in preparedness and relief delivery.

## Recommendations

1. Strengthen embankment monitoring and ensure regular maintenance with local community involvement.
2. Establish GIS-based flood vulnerability mapping and district-level dashboards.
3. Expand early-warning systems using mobile alerts and local volunteers.
4. Promote nature-based solutions such as wetland restoration to absorb excess water.
5. Provide safe drinking-water infrastructure and mobile treatment units during floods.
6. Create a year-wise flood impact database for Sitamarhi to support long-term planning.

## Conclusion

Floods in Sitamarhi from 2000 to 2024 show a persistent cycle of disaster and relief. The geography of the Bagmati–Adhwara basin, combined with embankment fragility and climate variability, ensures recurring floods. Agriculture, health, and housing remain most vulnerable. To move beyond short-term relief, Sitamarhi requires integrated flood management that combines structural works with non-structural and community-driven resilience strategies. Adopting such measures will reduce vulnerability and support sustainable development in the district.

## References :-

- Bihar Water Resources Department. (2024). Real-time telemetry and flood bulletins. Government of Bihar. <http://fmis.bih.nic.in>
- Central Water Commission. (2023). Flood forecasting and warning network appraisal report. Ministry of Jal Shakti, Government of India.
- Bihar State Disaster Management Authority. (2024). District disaster management plans. Government of Bihar.
- NIDM. (2021). Archival records of significant floods in India. National Institute of Disaster Management, Government of India.

- ReliefWeb. (2024, September). Bihar floods: Situation report. Sphere India & UN OCHA. <https://reliefweb.int>
- Tripathi, S., Singh, A., & Kumar, R. (2022). Flood hazard and risk zonation in North Bihar, India. *Sustainability*, 14(5), 2956. <https://doi.org/10.3390/su14052956>
- Matheswaran, K., et al. (2019). Satellite-based assessment of floods in South Asia. *Natural Hazards*, 96(1), 273–291.
- DownToEarth. (2024, September). Embankment breaches in North Bihar: Causes and impacts. <https://www.downtoearth.org.in>
- Jain, S. K., Agarwal, P. K., & Singh, V. P. (2007). *Hydrology and Water Resources of India*. Springer.
- Kahn, M. E. (2005). The death toll from natural disasters: The role of income, geography, and institutions. *The Review of Economics and Statistics*, 87(2), 271–284.
- Mishra, V. (2021). Climate change and increasing flood risk in the Ganga Basin. *Current Science*, 120(2), 215–222.
- Singh, R. B., & Kumar, P. (2018). Flood risk and disaster management in Bihar: An overview. *The Geographical Review of India*, 80(1), 32–45.