CLIMATE CHANGE

Heavy rainfall due to climate change increasing landslides, say experts

73% of landslides in the Himalayas due to heavy rains, low absorbtion into the ground

By Seema Prasad
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Debris from the landslide in Manipur has blocked a portion of the Ijai river. Photo: Sobhapati Samom

Climate change is triggering heavy rainfall, leading to more landslides across the world, said researchers.

A landslide descended on a railway construction camp in Manipur's Noney district and claimed at least 79 lives on June 29, 2022. As of July 4, 47 bodies have been recovered. Fourteen people are still untraceable, including two Army personnel.

The disaster has brought to fore the reason behind the landslide triggers.

Read more: *Manipur landslide: Weak soil, incessant rain, anthropogenic pressure to blame, say experts*

Across the world, climate change is triggering heavy rainfall and destroying steep slopes with loose soil, a 2020 study by the Indian Institute of Technology (IIT) in Delhi said.

In India, about 73 per cent of landslides in the Himalayas are caused by heavy precipitation and rainfall infiltration, the researchers said.

Most landslides are rainfall induced

On a global scale of rainfall-induced landslides, the Himalayas account for 15 per cent.

The IITians found that the other two factors triggering landslides are also indirectly linked to rainfall. Water drawdown triggers 2 per cent of landslides and soil erosion 14 per cent.

However, DK Sharma, the former deputy director-general, Geological Survey of India (GSI), is wary of this preprint study. He is currently advising the Bihar government on geological engineering.

The study said earthquakes only trigger 3 per cent of the landslides. However, Sharma said natural phenomena are not quantifiable.

The Himalayas are the collision zone of two tectonic plates, namely the Indian and Eurosian ones, and are very seismically active.

"High isoseismic areas see the most number of landslides triggered by earthquakes," said Sharma.

Western Ghats

A 2021 study observed how rains trigger landslides in the Western Ghats.

With high rainfall in short durations of time, large-scale deforestation and change in land use, one important factor of the hydrological cycle — the

infiltration phenomena — stops working effectively, found Scientist TV Ramachandra.

“Generally, 50 per cent to 60 per cent of the rainwater must be absorbed into the underlying ground to recharge groundwater,” Ramachandra told *Down To Earth*.

“Due to degradation of the landscape, the water stops percolating and with change in vegetation patterns, the soil is losing its holding capacity. This causes water to collect over the ground, loosening the soil, leading to landslides and mudslides,” he said.

Whether it’s the Western Ghats or Himalayas, climate change is the driving factor for the increase in landslides, Ramachandra believes.

The IIT study also quantified the damages sustained in the last 70 Years: between 1950 and 2017, 3.9 million were affected after surviving landslides, they said, quoting EM-DAT, an international researcher’s database.

Man-made causes like building hydropower projects in flood-prone or seismic zones and roads contribute to landslides, too.

The National Highway (NH)-40 and NH 44 are prone to landslides. Mizoram’s NH-44A has witnessed several landslides in the last decade as well.

Today, most state governments are savvy with remote sensing data to conduct long-term or short-term analyses. But the prediction of landslides still remains a challenge, as it is with any disaster, Sharma says.

Flooding due to landslide dams

In Manipur, authorities are trying to prevent the situation from escalating since debris from the landslide has blocked a portion of the Ijai river and accumulated water into a reservoir that could potentially overflow into closeby low-lying areas.

The formation of dams after landslides is a major cause of flooding, according to the *Journal of Asian Earth Sciences*, 1998, which looked at the history of natural dams in the Himalayas.

In the Himalayan and northeastern regions, dams have formed at many places in the past, says Sharma. “The potentiality of such occurrences in the future is also high,” he said.

A dam was created in 2021 when a landslide occurred in The Lahaul and Spiti district in Himachal Pradesh near Nalda village, reported South Asia Network on Dams, Rivers and People (SANDRP).

A portion of a hill slipped into the Chenab river, blocking it. When the water level increased, agricultural fields and homes on the bank were flooded.

In 1893, a landslide caused the formation of the Gohna Tal lake when heavy rainfall blocked the Birahi Ganga River in Kumaon Himalaya. The journal said the dam collapsed and flooded the mouth of the Birahi Ganga a year later.

Research focuses on Western Himalayan landslides

A 2022 review of studies published across prominent journals found that the majority or 69 per cent of the research conducted on landslides in India is concentrated in the Western Himalayan region, comprising Jammu and Kashmir, Himachal Pradesh and Uttarakhand.

Only 12 per cent of research on India focuses on Meghalaya, Nagaland, Manipur, Mizoram, Sikkim, Tripura, the hills of Assam, and Arunachal Pradesh.

However, the researchers’ bias towards the Western Himalayas stems from the high incidences of death due to landslides, the review said.

The Himalayan mountain range covers 16.2 per cent of the country’s landmass and is a volatile zone. The area is seismically active and receives high precipitation.

Of the 5,228 casualties recorded between 2007 and 2015, 83 per cent occurred in the Western Himalayas in India, according to a 2019 assessment led by Duy Tân University in Vietnam.

CLIMATE CHANGE

More rainfall, snow in India in next 30 years: Report

Majority of India will see 30% relative increase in precipitation by end of century

By Rohini Krishnamurthy
Published: Monday 04 July 2022

India is the current “drought hotspot” but is likely to see more precipitation (rain and snowfall) within the next 30 years, a new study estimated.

The country is likely to see a 15-30 per cent relative increase in precipitation by 2050 under a high-emissions scenario, the study showed.

By 2100, the data indicated that a majority of the country will see a 30 per cent relative increase in precipitation.

Drought frequency, however, may slightly increase in northern India, the study published in the journal *Nature Communications* predicted.

Mediterranean regions, southern and central South America, Australia and northern Africa are likely to become drought hotspots within the next 30 years, the report showed.

Researchers from Korea, Japan, the United States and a few European nations estimated the time of the emergence of unprecedented drought conditions under climate change.

“Climate change mitigation is often discussed with several targets, with deadlines of mitigation efforts falling on 2025, 2030, 2050 and so on,” Yusuke Satoh, a research associate professor at Korea Advanced Institute of Science & Technology and lead author, told *Down To Earth*.

Attention is rarely paid to such targets for climate change adaptations, he pointed out. “In general, a deadline plays a critical role in achieving one’s goal.”

Previous studies, according to researchers, found regional discrepancies in the impact of climate change at a certain period.

The new report quantified these regional discrepancies in terms of the pace of growth of the climate change impact, they said.

The team calculated the time of emergence (TFE) of consecutive unprecedented droughts in 59 global subcontinental regions until the end of the 21st century.

TFE, according to the team, signals the year of onset of drought conditions exceeding the maximum value climate variability reached during 1865-2005, and continues for more than five years.

The team obtained the daily global river discharge data from five computer simulations. They also considered high- and low-emissions scenarios.

Drought frequency showed a global increase of 25 per cent and 28 per cent under low and high emissions scenarios by 2050.

However, there were regional variations. “The projected impacts of warming show significant regional disparities in their intensity and the pace of their

growth over time," Satoh said in a statement.

The researchers estimated that 18 out of 59 regions will reach TFE of unprecedented droughts by 2050 under a high greenhouse gas concentration scenario.

Eleven regions are projected to reach TFE of unprecedented by 2100 under a low greenhouse gas concentration scenario, the researchers estimate.

Southwestern parts of South America and the Mediterranean region consistently showed early and robust TFE under both high- and low-emissions scenarios.

“Because drought frequency in these hotspot regions is projected to increase significantly during the first half of the 21st century, their TFEs are highly likely regardless of the emission scenario,” Satoh explained.

Mediterranean regions, southern and central South America, Australia and Northern Africa, are likely to see a decrease in precipitation, he said. In contrast, India, China, Russia and Canada are projected to see an increase.

Such evaluations, the researchers said, are essential to take appropriate climate change strategies, especially for climate adaptations.