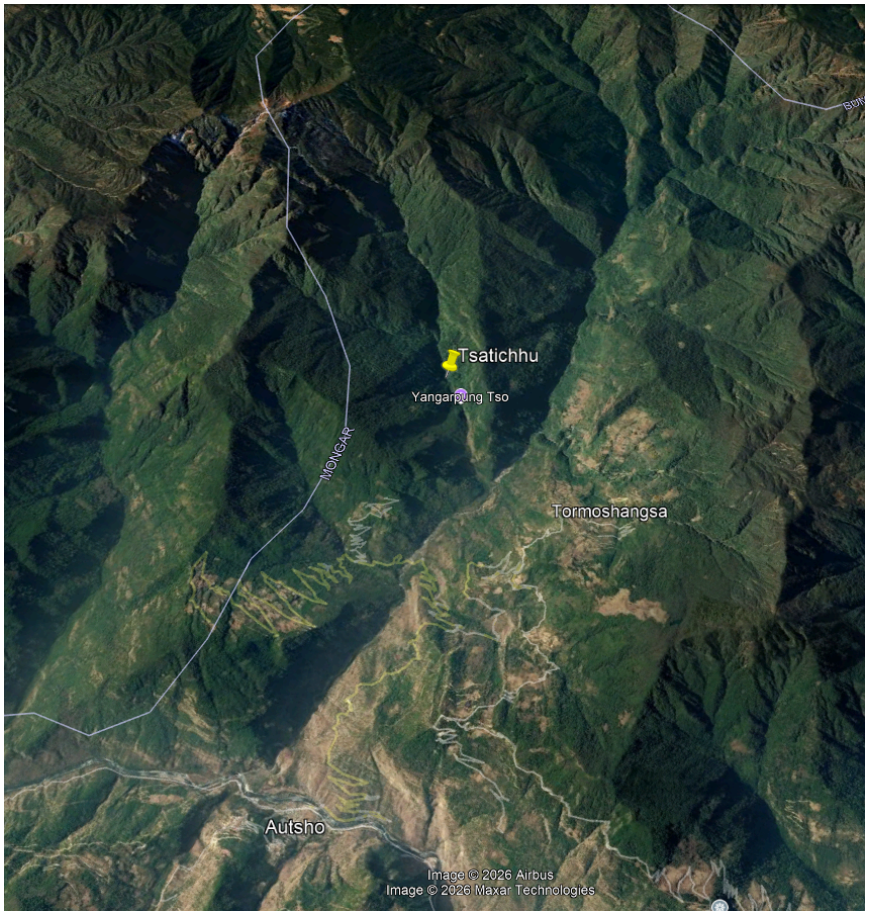
Post-Flash Flood Assessment Report:
Tsatichhu Flash Flood Incident of 19 July 2026 at Lhadrong, Lhuntse Dzongkhag



Submitted by
National Centre for Hydrology and Meteorology
Dorjilung Hydropower Project Authority
24 July 2026

Executive Summary

On 19 July 2026, a flash flood occurred at Tsatichhu, Lhuntse Dzongkhag. Post-event joint field verification on 22 July 2026 confirmed the Tsatichhu landslide Dam Lake has completely breached and drained. The outburst was triggered by intense localized precipitation combined with upstream slope failure undermining the natural dam toe. No immediate threat of secondary outburst exists, but loose material near the outlet requires continuous monitoring.

1. Background

On 19 July 2026, a flash flood event was reported in Tsatichhu, located opposite to Lhadrong village under Jarey Gewog, Lhuntse Dzongkhag. Initial information received by the NCHM indicated that the flood was likely triggered by heavy rainfall and upstream landslides, leading to the partial or complete breach of an existing landslide dam lake on the Tsatichhu stream.

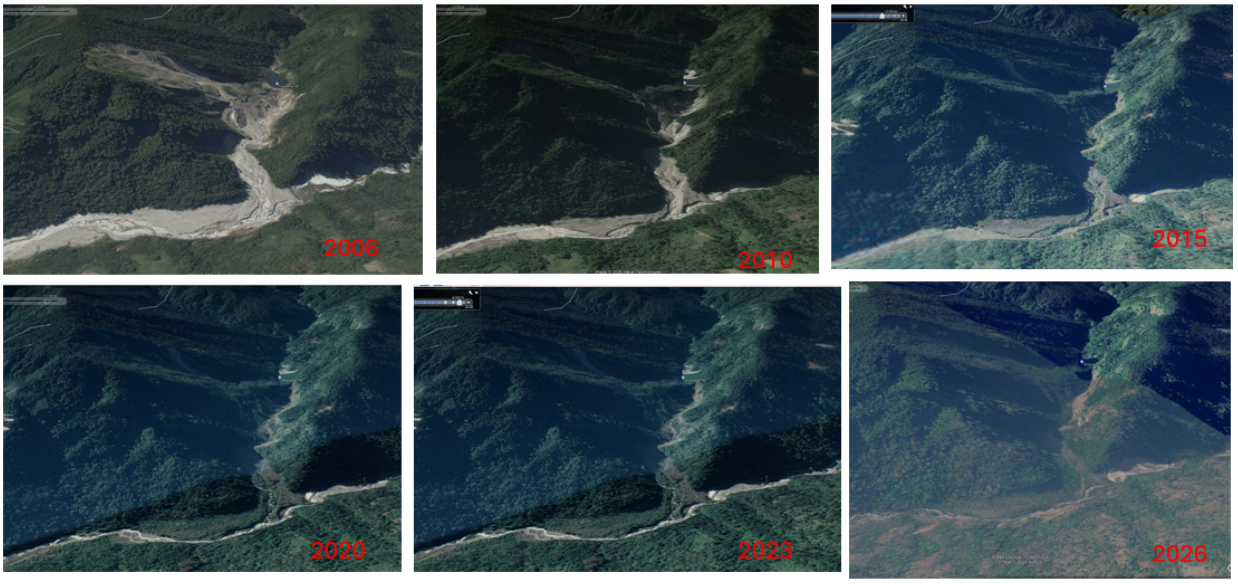


Figure 1: Time series google map of watershed area

Multi-temporal Google Earth imagery (2006–2026) of the Tsatichhu site highlights recurring geomorphic instability. A major landslide dam outburst was evident in 2006, followed by a relatively stable phase with vegetation recovery and confined channel conditions up to 2020. However, gradual slope weakening and channel constriction observed over time culminated in the temporary lake breach on 19 July 2026 at approximately 05:45 PM. This recurrence underscores the catchment as a critical landslide dam hotspot.

2. Location and Site Description

The technical parameters and geographical context of the event location are summarized below:

River / Tributary	Tsatichhu Stream
Geographic Location	Opposite Lhadrong Village, Jarey Gewog, Lhuntse Dzongkhag
Nearest Meteorological Station	Lhadrong Automatic Weather Station (AWS)
Nearest Hydrological Station	Autsho Hydrological Station (Secondary + AWLS)
Downstream Basin System	Confluence with Kurichhu river basin at Autsho

The catchment area is characterized by extremely steep terrain, fractured bedrock, and highly landslide- prone slopes, making it intrinsically susceptible to slope failures and temporary channel blockages during intense summer monsoon events.

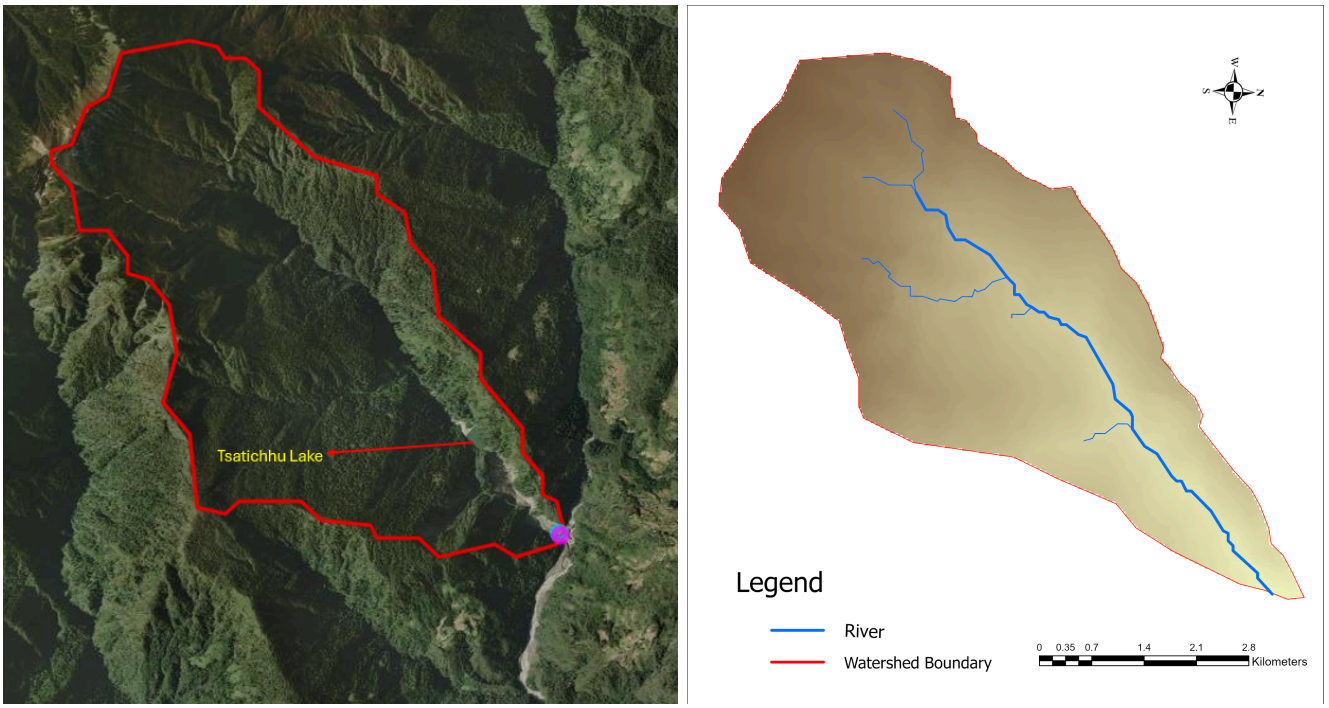


Figure 2: Watershed Map of Tsatichhu

3. Event Timeline

Time (19 July)	Event Description & Sequence
05:45 PM	Autsho Hydrological Station received initial flood information from local residents. Immediately notified Flood Warning Office (Kurizampa), Kurichhu Hydropower Plant (KHP), and FMCR NCHM Thimphu.
06:30 PM	Flash flood wave from Tsatichhu tributary arrived at Autsho (Kurichhu confluence).
07:00 PM	Water level recorded at Kurizampa Hydrological Station reached 9.40 m.
08:00 PM	Peak flood level observed at Kurizampa Station at 10.10 m (total surge height of ~0.70 m above baseline).
09:00 PM	Water level receded to 9.70 m, indicating rapid flood wave passage.

4. Meteorological Conditions

Precipitation data collected from the surrounding meteorological network indicated a marked
intensification of rainfall prior to the breach:

- Autsho Class-C Station: Recorded 10.6 mm on 18 July 2026, increasing to 35.6 mm on 19 July 2026.

- Lhadrong AWS: Recorded a peak daily rainfall sum of 47.8 mm on 19 July 2026 following moderate cumulative rainfall (30.0 mm on 13 July and 16.8 mm on 12 July).

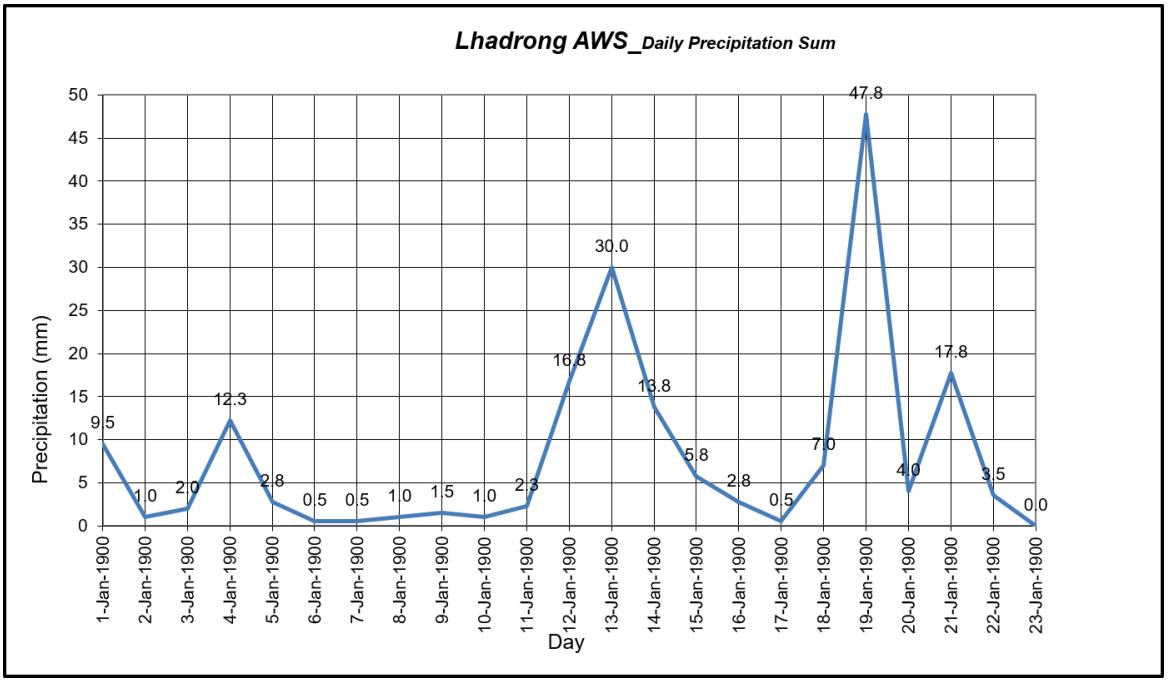


Figure 3. Daily precipitation sum plot for Lhadrong AWS for the month of July 2026

The cumulative antecedent rainfall over the preceding week saturated the steep slope mantles, reducing their shear strength and likely triggering slope failures.

5. Field Assessment

The **National Centre for Hydrology and Meteorology (NCHM)** initiated immediate field verification to assess the status of the lake, determine the probable cause of the breach, and evaluate potential downstream impacts. However, the team could not be deputed immediately due to risks associated with river crossings and adverse weather conditions in the area.

Main objectives of field assessment:

a. To physically verify the current status of the breached lake.
b. To assess the extent of the breach and document the existing site conditions.
c. To identify the probable cause of the lake breach based on field evidence.

NCHM, in coordination with the Dorjilung Hydropower Project, constituted a team and deputed them for site assessment and physical verification of the Tsatichhu landslide dam on 22 July 2026.

A joint technical team includes:

1. Mr. Tshering Wangchuk, Hydromet Technician, Autsho Hydrological Station, NCHM
2. Mr. Rinchen Dorji, Hydromet Technician, Sumpa Hydrological Station, NCHM
3. Mr. Karma Loday, Geologist, Dorjilung Hydropower Project Authority
4. Mr. Sonam Gyeltshen, Section Head, Dorjilung Hydropower Project Authority
5. Mr. Vishnu Adikari, Assistant Environmental Officer, Dorjilung Hydropower Project Authority

6. Mr. Sangayla, Gewog Tshokpa, Yumchey Chiwog

Figure 4: Joint Technical Team

6. Field Observations and Assessment

The following were key observations from the site assessment.

a. The joint team confirmed that Tsatichhu landslide dam lake had completely breached. No impounded standing water body remains at the original site, except for minor, isolated pools in local depressions.
b. The outlet section showed extensive physical evidence of severe erosion and scour. Freshly exposed soil, loose rock debris, and uprooted trees were observed along the right bank of the outlet.
c. The natural embankment collapsed rapidly during the failure event. The breach widened the primary discharge channel substantially, allowing rapid drainage.
d. Multiple fresh landslide scars were documented immediately upstream of the former lake basin, confirming recent mass movement during the rainfall event.
e. No structural obstruction currently holds back water, ruling out an immediate risk of a secondary outburst flood. However, unstable debris on the right flank remains susceptible to secondary sliding.

7. Preliminary Hydrological and Breach Mechanism Analysis

Field evidence indicates that the outburst was not caused by static, gradual overtopping. Rather, it was initiated by a flash flood wave originating upstream, loaded with heavy sediment and woody debris. This debris flow impelled significant shear stress at the toe of the natural landslide barrier, causing toe undermining and rapid structural collapse.

Figure 5. The lake remnants and outlet after the breached

Key Hydrological Indicators:

- The flood wave traveled from Tsatichhu to Autsho in approximately 45 minutes, reflecting a steep gradient and high flow velocity. Water levels at Kurizampa peaked at 10.10 m (0.70 m surge).
- The surge receded back to 9.70 m within one hour, confirming a short-duration, high- intensity flood hydrograph typical of lake breaches.
- The lake outlet remains flanked by solid rock on one side and highly unstable loose rock/debris on the other, creating a potential choke point for future damming if new slides occur.

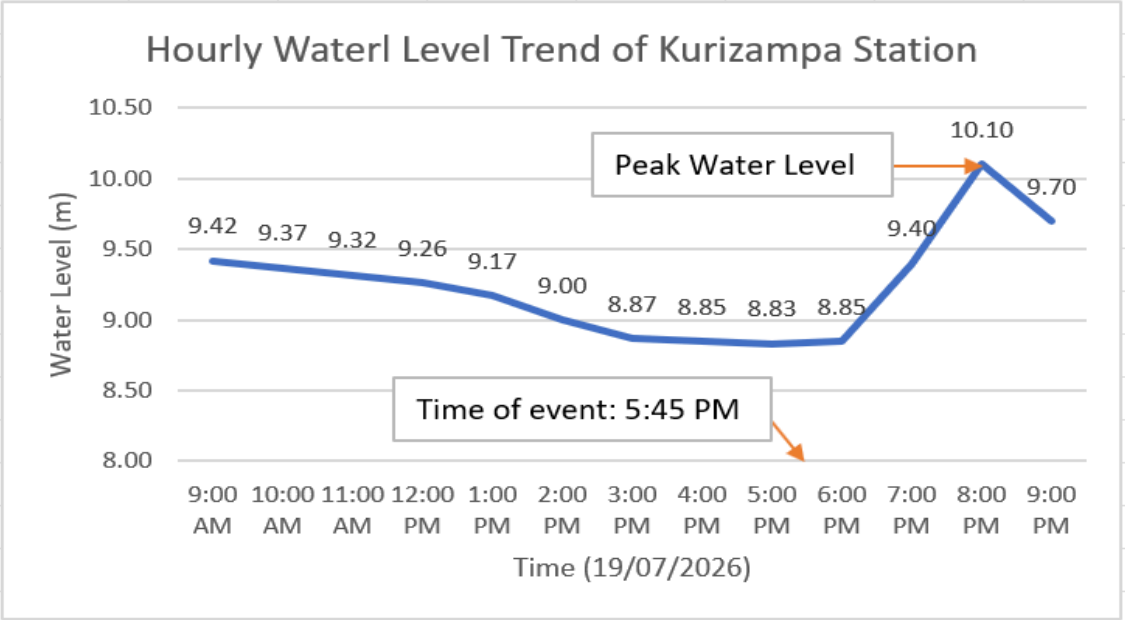


Figure 6. Hourly water level trend observed at Kurizampa

8. Damage Assessment

Category	Impact Description
Infrastructure	Bailey Bridge at Ganglapong connecting to Autsho was completely washed away.
Households & Livelihood	No major damage to residential structures, human casualties, or livestock reported.

Source: *Social media and local people*

9. Recommendations

a. Considering the flashy nature of the catchment and its history of frequent flash flood incidents, it is recommended to maintain continuous monitoring of the Tsatichhu catchment during the monsoon season to detect any renewed slope instability or the formation of temporary landslide dams.

b. Conduct a high-resolution UAV (drone) aerial survey and topographic mapping to analyze post-event channel morphology and perform volume calculations of unstable slope debris.

c. Sustain close operational coordination between the NCHM Hydrological Site Office, Dorjilung Hydropower Project Authority, the local community, and the Dzongkhag disaster management authorities for early warning dissemination.

d. For long-term understanding, conduct in-depth analysis correlating rainfall threshold limits with landslide initiation to establish reliable trigger thresholds for early warnings.

10. Acknowledgement

The National Centre for Hydrology and Meteorology (NCHM) would like to acknowledge the support of the Dorjilung Hydropower Project management for deputing manpower and a vehicle for the site assessment. We also acknowledge the contribution of the village Tshogpa from the community for joining the team in the field. We further extend our thanks and appreciation to the Autsho and Sumpa Hydrological Staff for participating and learning from the fieldwork.

Annexes: Flash Flood Event Photos from Social Media