**Uttarakhand Landslide Mitigation and Management Center (ULMMC)**
**Government of Uttarakhand**
6th Floor, USDMA Building, IT Park, Sahastradhara Road, Dehradun – 248013
E-mail id – uklmmc@gmail.com

Govt. of Uttarakhand

**Letter No.** 218 / 32/ ULMMC / 2024-25 **Dated** 21 July, 2025

सेवा में

उप सचिव,
आपदा प्रबंधन विभाग,
उत्तराखण्ड शासन।

**विषयः–** **जनपद पिथौरागढ़ के सीमान्त क्षेत्र धारचूला के ग्राम पंचायत जिप्ती के तोक गर्बा के आपदा प्रभावित 66 परिवारों के पुनर्वास एवं विस्थापन एवं मुआवजा की मांग तथा समस्याओं के निस्तारण किये जाने हेतु जियोटैक्निकल सर्वे से संबंधित स्थलीय निरीक्षण आख्या।**

महोदय,

उपरोक्त विषयगत शासन के पत्र संख्या 283760/XVIII-B-2/2025 दिनांक 19 मार्च, 2025 का संदर्भ ग्रहण करने का कष्ट करें, जिसके द्वारा विषयगत कार्य के संबंध में मृदा परीक्षण/जियोटेक्निकल सर्वे कराये जाने की अपेक्षा की गयी है।

2. उक्त के अनुपालन में इस केन्द्र द्वारा जनपद पिथौरागढ़ के सीमान्त क्षेत्र धारचूला के ग्राम पंचायत जिप्ती के तोक गर्बा के आपदा प्रभावित क्षेत्र का स्थलीय निरीक्षण किया गया, जिसकी आख्या इस पत्र के साथ संलग्न कर यथावश्यक कार्यवाही हेतु शासन को प्रेषित की जा रही है। आख्या के मुख्य बिन्दु निम्नानुसार हैः–

**"स्थल की विस्तृत जांच और उसके बाद किए जाने वाले निवारण कार्यों की लागत अधिक हो सकती है। हालांकि वास्तविक लागत का सटीक आंकलन केवल विस्तृत परियोजना रिपोर्ट (डी.पी.आर.) तैयार होने के बाद ही किया जा सकता है। इसलिए प्रभावित आबादी क्षेत्र के योजनाबद्ध पुनर्वास के विकल्प पर भी विचार किया जाना उचित होगा"**

भवदीय

21/7/25

**(डॉ0 शान्तनु सरकार)**
निदेशक

**संख्या एवं तिथि तदैव।**
**प्रतिलिपि–**

1. महानिदेशक, उत्तराखण्ड भूस्खलन न्यूनीकरण एवं प्रबंधन केन्द्र, देहरादून।
2. अपर महानिदेशक, उत्तराखण्ड भूस्खलन न्यूनीकरण एवं प्रबंधन केन्द्र, देहरादून।

**(डॉ0 शान्तनु सरकार)**
निदेशक

सेवा में,

निदेशक,
उत्तराखण्ड भूस्खलन न्यूनीकरण एवं
प्रबन्धन केन्द्र, देहरादून।

**विषयः–** **जनपद पिथौरागढ़ के सीमान्त क्षेत्र धारचूला के ग्राम पंचायत जिप्ती के तोक गर्बा के आपदा प्रभावित 66 परिवारों के पुनर्वास एवं विस्थापन एवं मुआवजा की मांग तथा समस्याओं के निस्तारण किये जाने हेतु जियोटैक्निकल सर्वे से संबंधित आख्या।**

महोदय,

कृपया इस केन्द्र के कार्यालय आदेश संख्या 156/32/ULMMC/2024-25, dated 17 June, 2025 का संदर्भ ग्रहण करने का कष्ट करें, जिसके द्वारा अन्य के साथ ही जनपद पिथौरागढ़ के सीमान्त क्षेत्र धारचूला के ग्राम पंचायत जिप्ती के तोक गर्बा के आपदा प्रभावित 66 परिवारों के पुनर्वास एवं विस्थापन एवं मुआवजा की मांग तथा समस्याओं के निस्तारण किये जाने हेतु जियोटैक्निकल सर्वे कराये जाने हेतु गठित टीम को स्थलीय निरीक्षण की स्वीकृति प्रदान की गयी है।

2. उपरोक्त के अनुपालन में उक्त क्षेत्र का टीम के सदस्यों द्वारा दिनांक 18 से 21 जून, 2025 को स्थलीय निरीक्षण किया गया है। स्थलीय निरीक्षण आख्या इस पत्र के साथ संलग्न कर अग्रिम आवश्यक कार्यवाही हेतु प्रेषित की जा रही है।

**संलग्नक–उपरोक्तानुसार (17 पृष्ठ)**

भवदीय
21-07-2025
**(पंकज उनियाल)**
डिजायन इंजीनियर
यू.एल.एम.एम.सी.

भवदीय
21 july 2025
**(डॉ0 रघुवीर नेगी)**
भूवैज्ञानिक
यू.एल.एम.एम.सी.

Seen
21/7/25

# Preliminary visit to Garbha Dhar, Jipti, Dharchula, Pithoragarh, Uttarakhand


उत्तराखण्ड राज्य

**Uttarakhand Landslide Mitigation and Management Center (ULMMC)**

**6th Floor, USDMA Building, 36 IT Park, Dehradun**

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(Dr. Raghuveer Negi)
Geologist

(Design Engg.)

## LIST OF FIGURES

# 1. INTRODUCTIONS

With reference to Letter No. 156/32/ULMMC/2024-25 dated 17 June 2025, a field visit was conducted in accordance with Government Order Letter No. 283760/18XVIII-(B-2)/2025 dated 19 March 2025 and as per District Magistrate Pithoragarh's Letter No. 480/13-आ0प्रा0/विस्थापन/2025 dated 20 January 2025. The objective of the visit was to conduct a geotechnical survey in connection with the resettlement, rehabilitation, compensation demands, and resolution of issues faced by 66 disaster-affected families in Garbha, a village under the Gram Panchayat Jipti, located in the border area of Dharchula, District Pithoragarh (***Figure 1 and 2***). The site visit was undertaken by a team comprising Dr. Raghuveer Negi (Geologist) and Er. Pankaj Uniyal (Design Engineer).

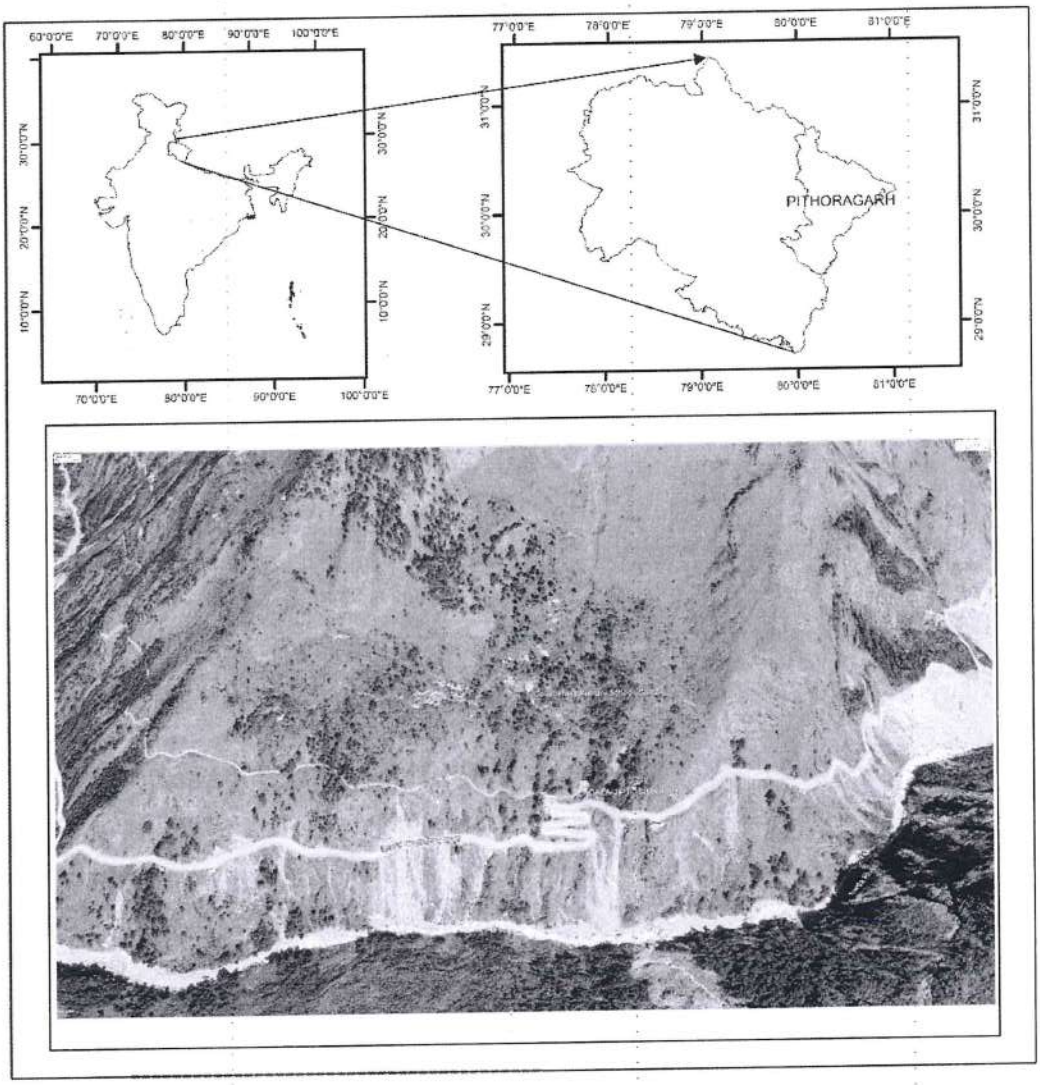


***Figure 1:*** *Location of the Jipti area using google earth imagery.*

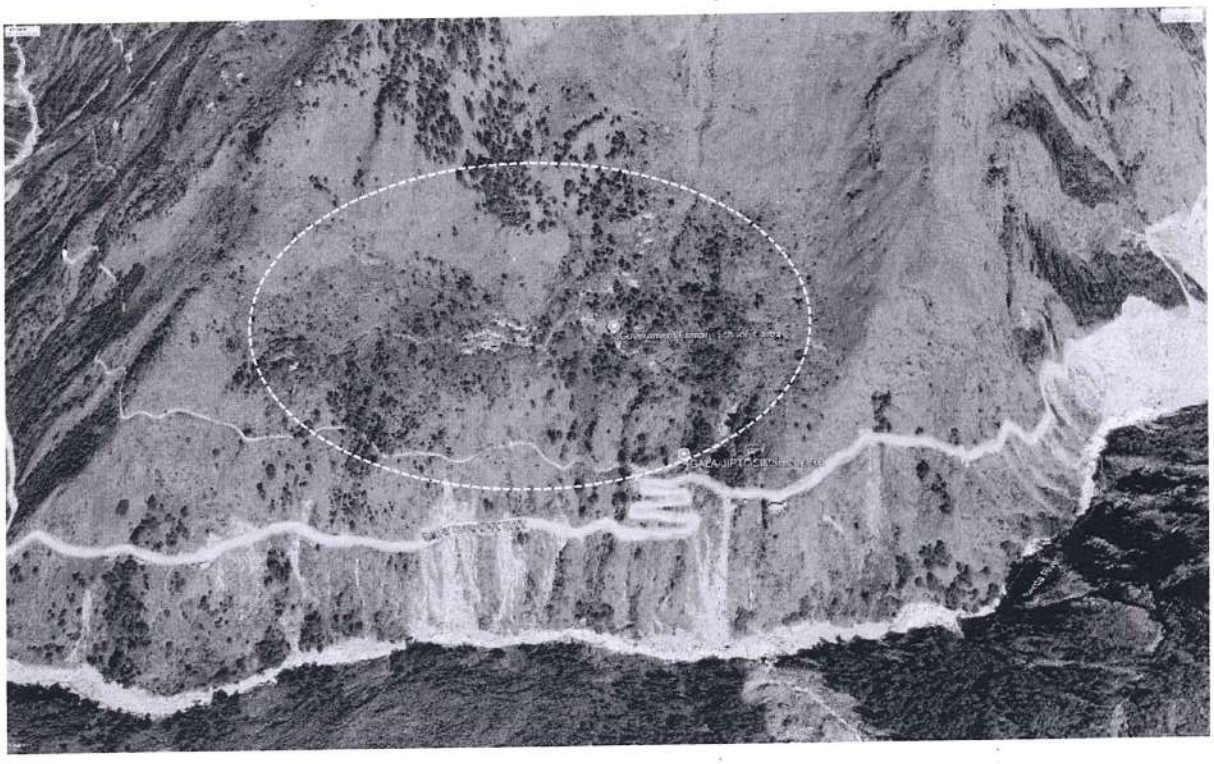

***Figure 2:*** *Google Earth imagery showing the location of Garbha Dhar and surrounding areas including Jipti village in Dharchula tehsil, District Pithoragarh, Uttarakhand.*

## 2. GEOMORPHOLOGICAL AND GEOLOGICAL SETUP

The Jipti area in Dharchula, located within the Higher Himalayan Crystalline (HHC) zone, is geologically significant and highly sensitive to natural hazards. This region is composed mainly of high-grade metamorphic rocks such as augen gneiss, micaceous gneiss, garnet-bearing schists, along with slope wash materials and colluvial debris containing large boulders (***Figure 2***). These rocks are part of the Main Central Thrust (MCT) zone, a major tectonic boundary in the Himalaya, known for its active geological processes and susceptibility to landslides and slope failures (Valdiya, 1980; Upreti, 1999).

***Figure 3:*** *Field photograph showing a slope failure in the Garbha Dhar area, near Jipti village, Dharchula tehsil, Pithoragarh district. The failed slope consists of heterogeneous material, including slope wash deposits, colluvium, and large boulders. The exposed lithology primarily comprises augen gneiss, micaceous gneiss, and garnetiferous schist, reflecting the geological complexity and slope instability characteristic of the region.*

The terrain is steep and rugged, marked by deep valleys and gorges, making the area particularly vulnerable during the monsoon season. The Mahakali (Sharada) River flows along the valley floor and also forms the international boundary between India and Nepal in this region. The continuous river incision, combined with steep slopes and weak geological formations, increases the risk of erosion and slope instability (Searle & Godin, 2003).

## 3. OBSERVATIONS

The Garbha Dhar of Jipti area is mainly affected by multiple slope failure mechanism including debris slide, creep movement, and rock fall. These slope movements pose a significant threat

to nearby settlements (***Figure 1***). The following observations were made during the site investigation:

1. The settlement of Garbha Dhar is under significant threat due to ongoing and potential slope instability, particularly in the form of rock falls originating from the uphill slopes, mainly on the Gharmali side of the village. These rock falls pose a direct hazard to the habitations situated below.
2. As per local accounts, the first major slope failure in the area was observed during the 2006 monsoon, which brought intense rainfall and triggered initial signs of instability. The village is situated approximately 150–200 meters upslope from the Lipu Lake–Tawaghat road, resting on a steep and geologically sensitive hillside.
3. Residents report that rock falls are a common occurrence during the monsoon season, putting lives and property at risk. They have also observed wide and deep cracks developing in the rocks near the hilltop. However, due to the steep terrain and dense vegetation, the crown area could not be accessed or visually examined during the field visit, and thus the cracks could not be directly verified.
4. The slope angles in the area are very steep, ranging between 60° to 75°, and in some places, even steeper, especially where frequent rock falls are reported. The general slope orientation is towards the south and southeast, which aligns with the natural drainage and gravitational movement patterns contributing to instability.

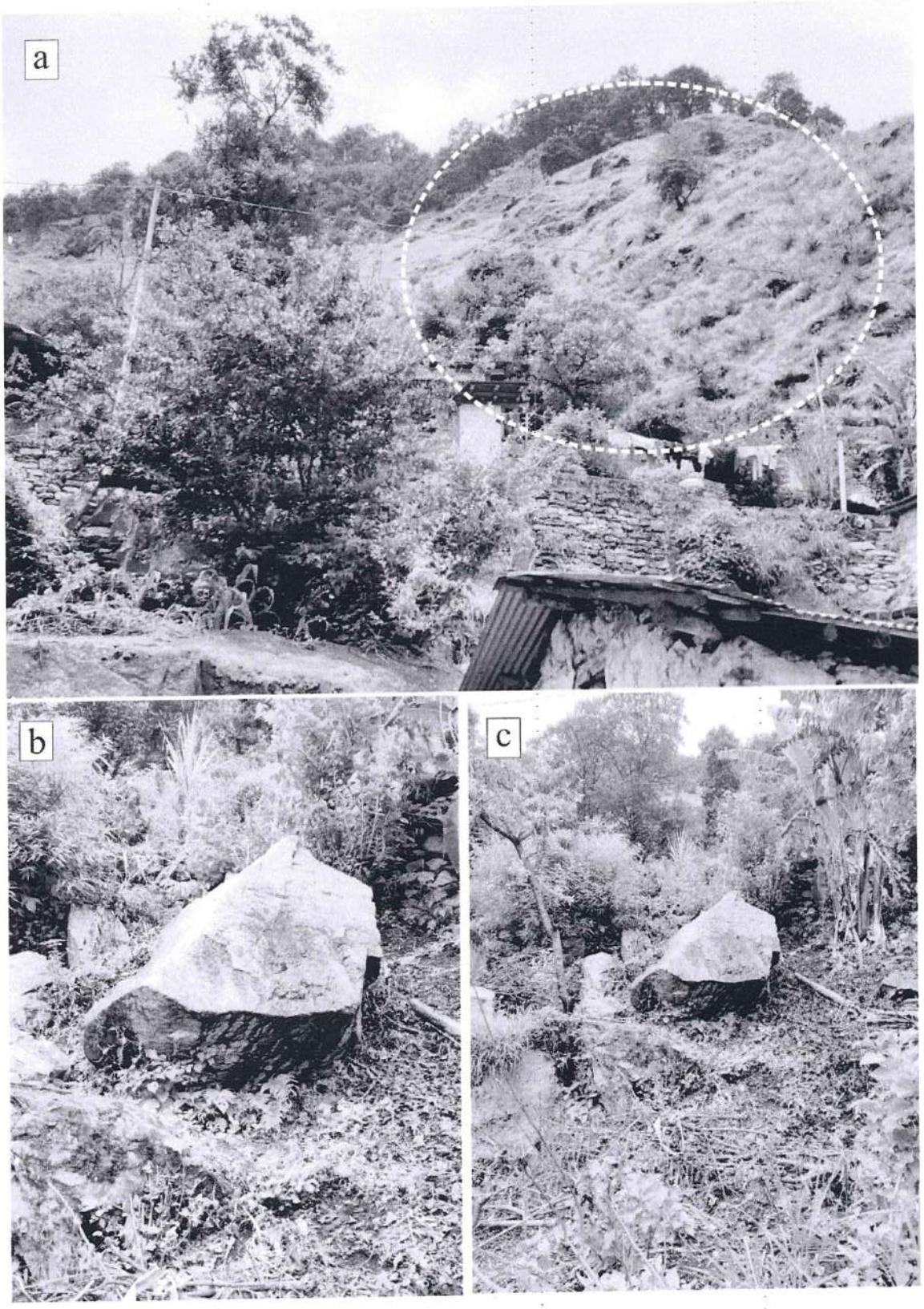


***Figure 4:*** *Field photograph showing the zone of active slope with evidence of rock fall and the presence of large detached rock blocks in the Garbha Dhar area. The steep slope and exposed rock surfaces indicate ongoing mass wasting processes.*

5. Several houses in Garbha Dhar have developed multiple structural cracks, indicating stress and movement within the ground. These cracks are symptomatic of ongoing slope deformation and ground instability.
6. The entire village appears to be situated on slope wash or debris material, which lacks stability and exhibits multiple signs of slow creep movement, debris slides, and localized rock fall activity. These geomorphic indicators suggest that the foundation material is weak and prone to movement, especially during monsoonal rainfall.
7. Tilting of houses, accompanied by multiple cracks, has been observed across the settlement, further confirming differential ground movement and the compromised bearing capacity of the underlying debris material.
8. Water seepage and the emergence of springs at multiple locations within the affected area were also noted during the field visit. The presence of seepage indicates subsurface water movement, which can exacerbate slope instability by reducing shear strength and promoting sliding, particularly in loosely packed debris zones.

***Figure 5:*** *Cracks observed in building structures during field inspection, suggesting potential differential settlement or ground movement.*

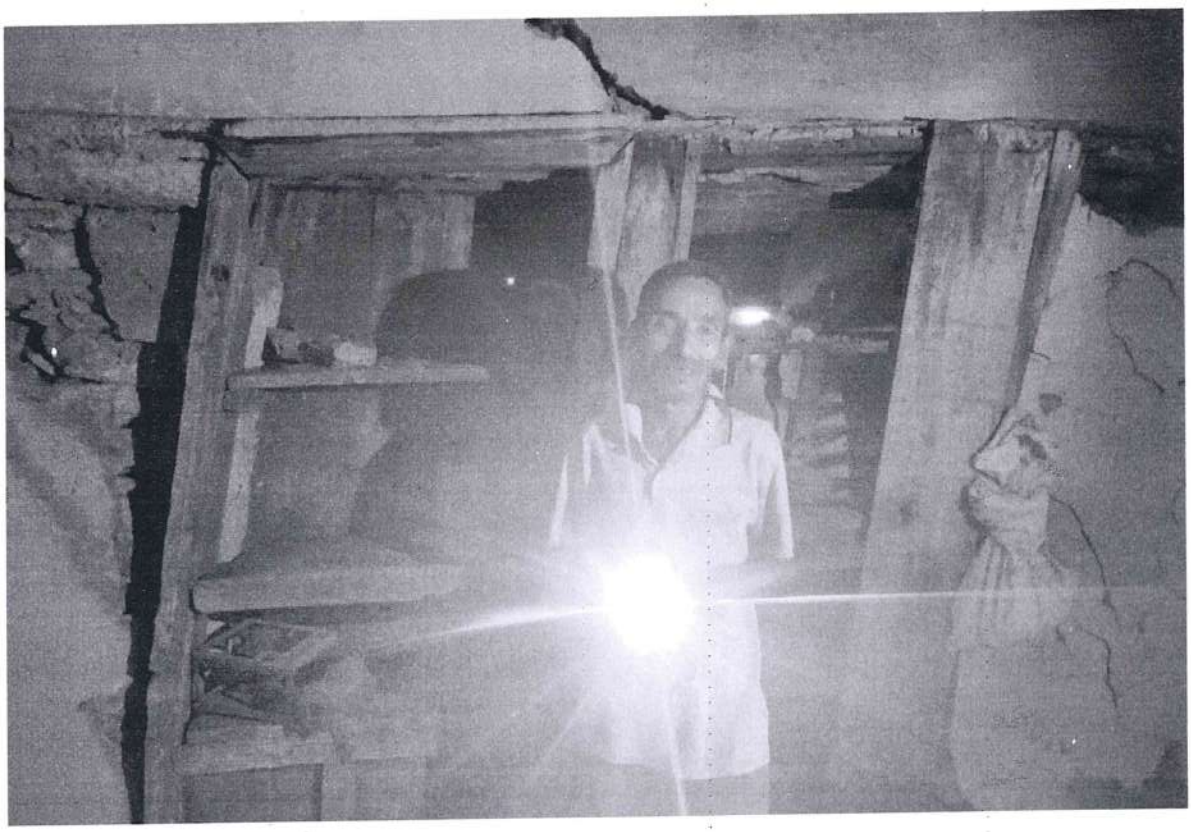

***Figure 6:*** *Cracks observed in buildings at Garbha, highlighting signs of damage possibly due to creep.*

## 4. SUGGESTIONS

The Garbha Dhar area is currently experiencing active slope failure, rock fall events, and signs of slow creep movement. Based on preliminary field observations and community feedback, the following recommendations are proposed to assess the slope condition and identify appropriate mitigation or rehabilitation measures:

1. The slope material predominantly consists of colluvial debris and angular to sub-angular boulders of varying sizes, making it challenging to determine the depth to competent bedrock. To address this, geophysical investigations, such as Electrical Resistivity Tomography (ERT) and Seismic Refraction Surveys, along with exploratory borehole drilling, are recommended. These will help delineate the subsurface stratigraphy and accurately assess the depth, nature, and continuity of bedrock.
2. A detailed geotechnical investigation is essential to evaluate the engineering behavior of both the overlying debris and any encountered bedrock. This should include

laboratory and in-situ testing to determine key parameters such as shear strength, permeability, density, moisture content, and Atterberg limits.

3. If grain size analysis reveals a clay content of approximately 10% or more, clay mineralogical analysis (e.g., X-ray Diffraction/XRD) should be carried out. This will help identify expansive or hydrophilic clay minerals, which could significantly influence the slope's long-term stability by enhancing water retention or swelling behavior.
4. A high-resolution topographic survey using Drone-based photogrammetry, LiDAR scanning, or Differential GPS/Total Station methods is strongly recommended. Such surveys will assist in accurately mapping slope geometry, surface deformation features, drainage paths, and potential failure zones.
5. Detailed geological, engineering geological, and geotechnical mapping should be conducted throughout the affected area. This should include documentation of lithology, structural discontinuities (joints, faults, foliation), slope angles, material interfaces, and visible signs of instability, which are critical for any comprehensive slope stability assessment.
6. Based on the integrated findings from geological, geotechnical, geophysical, drilling, and topographic investigations, site-specific mitigation measures should be designed. These may include a combination of slope regrading, surface and subsurface drainage improvement, construction of retaining walls or gabion structures, ground anchoring, shotcreting, or bio-engineering techniques, depending on the local geotechnical conditions and failure mechanisms identified.

## 5. CONCLUSIONS

The cost of detailed investigations and subsequent mitigation may be on the higher side; however, the actual costs can only be accurately assessed after the preparation of a Detailed Project Report (DPR). Therefore, it is advisable to also consider the option of planned rehabilitation of the affected population as an alternative.

# REFERENCES


Valdiya, K. S. (1980). *Geology of the Kumaun Lesser Himalaya*. Wadia Institute of Himalayan Geology, Dehradun.

Upreti, B. N. (1999). An overview of the stratigraphy and tectonics of the Nepal Himalaya. *Journal of Asian Earth Sciences*, 17(5–6), 577–606. https://doi.org/10.1016/S1367-9120(99)00047-4

Searle, M. P., & Godin, L. (2003). The South Tibetan Detachment and the Manaslu Leucogranite: A structural reinterpretation and restoration of the Annapurna–Manaslu Himalaya, Nepal. *Journal of Geology*, 111(5), 505–523.

## Other field photograph