CENTRE OF EXCELLENCE

GOVT. DEGREE COLLEGE SANJAULI

SHIMLA-06

Geological Field Visit Report

A FOUR-DAY FIELD EXCURSION FROM SHIMLA TO BARALACHA LA PASS

FROM 21-10-2026 TO 24-10-2026

Objective

1. To study the regional geology of the Himalayan region.
2. To identify different rock types and minerals in the field.
3. To observe geological structures such as folds, faults, and joints.
4. To understand the role of tectonic processes in Himalayan evolution.
5. To study glacial and fluvial landforms.
6. To examine river valleys, channel deposits, alluvial fans, terraces and other landforms.
7. To observe the relationship between geology and engineering works.
8. To study geological hazards and their environmental impacts.
9. To develop practical skills in geological field observation and recording.
10. To relate theoretical geological concepts to real field conditions.





Introduction

The Himalayas constitute one of the most geologically significant mountain systems on Earth, offering valuable insights into tectonic evolution, mountain building, rock deformation, and landscape development. Geological field excursions provide an essential link between theoretical knowledge and the practical understanding of natural geological features.

The four-day geological field excursion from Shimla to Baralacha La Pass was undertaken to study the regional geology of the western Himalayas through direct field observations. The excursion provided an opportunity to understand different rock types, geological structures, and landforms shaped by tectonic, fluvial, and glacial processes.

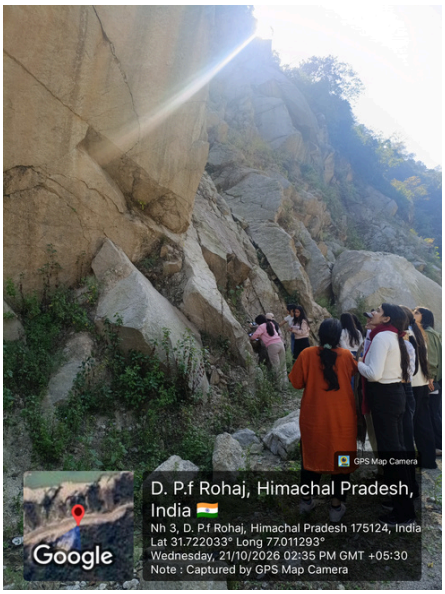
The region's complex geological history is closely associated with the collision of the Indian and Eurasian plates, which led to the formation of the Himalayan mountain belt. The excursion also highlighted the significance of geological processes in shaping the landscape and influencing environmental conditions and engineering activities.



Field Observations

1. SHIMLA TO MANDI REGION

- The geological traverse from Shimla towards Mandi exposed sedimentary and metamorphosed rocks characteristic of the Lesser Himalaya.
- The observed lithologies included carbonaceous shale, clay–feldspar-rich sediments, and metamorphosed shale or slate.
- The dark colour of the carbonaceous shale may indicate deposition under oxygen-poor conditions, while the metamorphosed rocks exhibited inclined bedding, deformation, and extensive weathering.
- A dip of approximately 70° was recorded at one exposure.
- Mechanical and biological weathering, exfoliation, joints, and fractures were also noted, contributing to the breakdown of exposed rock masses.
-The field observations highlight the diversity of Himalayan lithologies and the influence of sedimentation, metamorphism, deformation, and weathering on the geological characteristics of the region.









2. LESSER HIMALAYAN REGION

The geological traverse across the Shali Group and Mandi region revealed diverse lithologies and structural features characteristic of the Lesser Himalaya. The Shali Group is represented by carbonate-rich rocks, particularly dolomitic limestone, associated with the sedimentary succession of the region. The Mandi–Darla section exposed purple shale and river-terrace deposits containing rounded pebbles, indicating fluvial transportation and deposition. Engineering geological features, including a tunnel, retaining wall, and wall cracks, were also noted, highlighting the importance of slope stabilisation in mountainous terrain. The presence of clay-rich material, potentially including montmorillonite, may influence the stability of the slope due to its water-sensitive properties. Further observations in the Mandi region included volcanic and pyroclastic rocks associated with Mandi volcanism, along with the Mandi Syncline, a significant structural feature. Weathering, erosion, folding, and deformation reflect the combined influence of tectonic and surface processes on the geological evolution of the region.

Overall, these observations demonstrate the significance of sedimentary, carbonate, and volcanic lithologies, structural geology, fluvial processes, and engineering geology in understanding the complex geological framework of the Lesser Himalaya.















3. PANDOH DAM



The geological exposure near Pandoh Dam consists of granitic gneiss containing minerals such as biotite, feldspar, and muscovite. The outcrop exhibits structural features, including a major fault and a possible synclinal fold, indicating significant tectonic deformation. These features reflect the complex geological history of the Lesser Himalaya, where crustal movements have influenced rock structures and deformation. The observations highlight the importance of identifying rock-forming minerals, geological structures, and discontinuities in understanding regional tectonic evolution and evaluating geological conditions relevant to dam and infrastructure stability.

4. ATAL TUNNEL



The Atal Tunnel section provided an opportunity to understand the relationship between Himalayan geology and tunnel engineering. The field observations focused on geological discontinuities, rock structures, and their orientations, as represented in the field sketches and measurements. Joints, fractures, and other structural features are important factors affecting rock-mass stability and tunnel construction. The observations highlighted the challenges of excavating tunnels through geologically complex and tectonically deformed Himalayan terrain, emphasising the importance of geological mapping, structural analysis, and engineering measures for ensuring tunnel stability and safety.



5. HAZARD ZONES STUDIED

Landslide Exposure



The exposure contains fractured rock blocks bounded by bedding planes and major joints. Intersections between these discontinuities may have contributed to block detachment and slope failure. The rocks are highly jointed, weathered, and deformed. An inclined surface is recorded at approximately 52°–55°, with a possible southeast-facing orientation.



Manali Flood Hazard Zone





This station focused on the geomorphology of the Beas River and the flood hazard potential of the surrounding area. The observations include river-bed materials, floodplains, and river terraces. These features reflect fluvial processes such as erosion, transportation, and deposition. The distribution of river sediments and the local topography are important factors influencing flood susceptibility.

Darcha Landslide

The Darcha section exposes granitic and metamorphic rocks associated with the complex geological evolution of the Higher Himalaya. The observed lithologies include Darcha granite, phyllite, slate, chlorite schist, and biotite schist, with quartzite also noted in the field records. These rocks indicate the influence of igneous intrusion, metamorphism, and intense tectonic deformation. Structural features such as folding, chevron flexures, and inclined rock layers reflect compressional stresses associated with Himalayan mountain building. A dip angle of approximately 75° was recorded, with direction NS 40° and strike value 140° NW. The exposure also highlights the relationship between fractured and deformed rock masses and slope instability in mountainous terrain. Overall, the Darcha section provides valuable insight into Himalayan lithology, metamorphism, tectonic deformation, and landslide-related geological conditions.





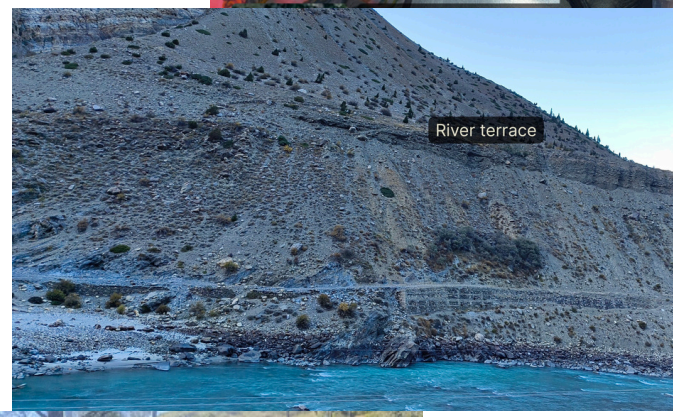


6. TYTHIAN EXPOSURE LAHAUL SPITI REGION











Tythian exposure provide insights into the complex geological evolution of the Higher Himalaya. The observed rocks include crystalline rocks, phyllite, slate, and granite, showing evidence of metamorphism, folding, and intense tectonic deformation. These structures reflect compressional forces associated with the collision of the Indian and Eurasian plates. The Tythian exposure also records steeply inclined rock beds and foliation, indicating significant deformation. Lahaul-Spiti region, the landscape reflects the combined influence of tectonic uplift, glacial erosion, and fluvial processes. Glacial deposits, including moraines and till, further indicate past glacial activity. Overall, these observations demonstrate the importance of tectonics, metamorphism, and glacial processes in shaping the Himalayan landscape.

Field Photographs









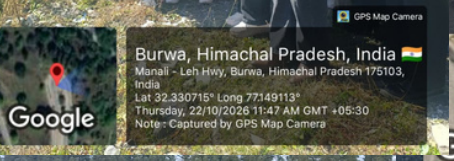









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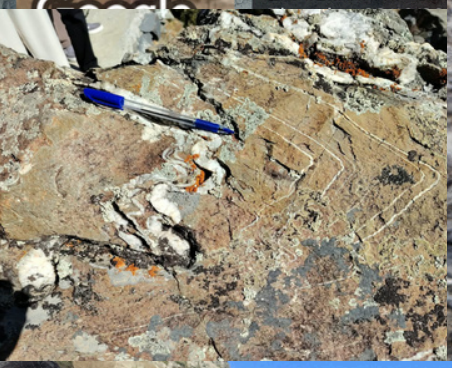

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GPS Map








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Shale siltstone

Summary



The four-day geological field excursion from Shimla to Baralacha La Pass offered a fascinating insight into the geological evolution of the Himalayas. From ancient crystalline rocks and metamorphic formations to complex folds, faults, and glacial landforms, the journey revealed how tectonic forces and surface processes have shaped this remarkable mountain system.

Observations of rock deformation, weathering, river terraces, and engineering structures highlighted the close relationship between geology, landscape evolution, and human activities.

Overall, the excursion bridged classroom learning with real-world geological evidence, strengthening practical field skills and deepening an appreciation of the dynamic processes that continue to shape the Himalayas.





Outcome



This geological field excursion provided valuable practical experience in understanding the geological complexity of the Himalayas. Through field observations, we developed a better understanding of rock identification, lithological variations, mineral composition, and geological structures such as folds, faults, joints, and foliation. The study of sedimentary, igneous, and metamorphic rocks helped us understand the roles of sedimentation, magmatism, metamorphism, and tectonic deformation in Himalayan evolution.

The excursion also enhanced our understanding of fluvial and glacial processes through observations of river terraces, sediment deposits, moraines, and glacially influenced landscapes. Examination of landslide-prone slopes highlighted the importance of rock discontinuities, weathering, and geological conditions in slope instability. Observations around tunnels and other engineering structures demonstrated the practical application of engineering geology in mountainous terrain.

Furthermore, the fieldwork strengthened our skills in geological mapping, recording field observations, interpreting structural measurements, and relating theoretical concepts to actual outcrops. Overall, the excursion provided an integrated understanding of Himalayan geology, landscape evolution, natural hazards, and the importance of field-based investigation in geological studies.



