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FIELD GUIDE

INPOST - 10

EXPLORING THE GEOHERITAGE AND PALEOCLIMATE ARCHIVES OF MEGHALAYA

Atul Kumar Singh and Devesh Walia



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Field Guide Book

INPOST-10
Exploring the Geoheritage and Paleoclimate Archives of Meghalaya

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Abstract

The Shillong Plateau of North Eastern India is a tectonically active and geomorphologically dynamic region that preserves valuable records of geological, climatic, ecological, and human history. This field trip aims to understand the key geological features and cultural localities that provide insights into the evolution and regional geology of the Shillong Plateau, Holocene climatic changes, and past human activities. The Shillong Plateau hosts the most extensive karst landscapes in the Indian subcontinent, developed within Palaeocene-Eocene carbonate rocks through prolonged karstification, producing an extensive network of caves, sinkholes, and other characteristic karst landforms. These cave systems preserve a variety of speleothems, including stalagmites, stalactites, flowstones, and columns, which serve as records of Quaternary palaeoclimate, monsoon variability and environmental change. Among these caves, Krem Mawmluh is of exceptional global significance, which provided the Global Boundary Stratotype Section and Point for the Meghalayan Age. A visit to Krem Mawmluh Cave will highlight the globally important speleothem records and document the 4.2 ka climatic event. Mawthadraishan high-altitude lake serves as a valuable archive for palaeoenvironmental reconstruction. This field trip also includes the examination of archaeological evidence from the Myrkhan Neolithic site, along with geomorphic, ecological, and cultural landmarks such as Dieng Ïei Hill, Mawlynnong village, living root bridges, and the Pobitora Wildlife Sanctuary. This field trip is designed to provide both scientific and cultural perspectives on Meghalaya's natural heritage and its significance for Quaternary research and environmental reconstruction.

Preamble

The Shillong Plateau is a detached cratonic block of the Indian Shield and forms one of the most distinctive physiographic and tectonic elements of northeastern India. It has a complex geology, with rocks spanning the Precambrian to the present. The Shillong Plateau lies between the Himalayan arc to the north and the Indo-Burmese Ranges to the east. Meghalaya is also one of the most active areas of weathering and erosion, resulting in a complex and striking topography of caves, waterfalls, gorges and canyons. The combination of these factors with tectonic activity provides Meghalaya a unique opportunity to study the relationship between climate, tectonics and surface processes.

The Shillong Plateau occupies a unique position in this global context. At the point where the Indian summer monsoon zone, the Himalayan foreland, and the tectonically active northeast edge of the Indian Plate converge, the region records some of the highest rainfall in the world while undergoing active tectonic processes. These conditions have produced a dynamic landscape characterised by high rates of erosion, deep valleys, large-scale karst systems, wetlands, and a wide array of sedimentary records. Despite its great scientific value, the plateau's Quaternary geology and palaeoenvironmental history remain largely unexplored.

The present field transect is unique in that it brings together multiple archives of environmental and cultural change within a small geographic area. The Krem Mawmluh Cave, which is the Global Boundary Stratotype Section and Point (GSSP) for the Meghalayan Age, the high-altitude lake deposits at Mawthadraishan, which provide evidence of Holocene environmental change, and the Neolithic site of Myrkhan, which records prehistoric human occupation, will all be examined. In addition, the field excursion explores living cultural landscapes, including megalithic structures, living root bridges, and traditional Khasi communities, which testify to long-term human adaptation.

Regional Geology and Tectonic Setting

The Shillong Plateau in North Eastern India forms an uplifted horst block that rises above the Bangladesh Plains and is commonly explained by the "pop-up" tectonic model (Nandy, 2001; GSI, 2024). This model attributes the plateau's elevation to crustal shortening and compression driven by the India–Eurasia collision and the subduction of the Indian Plate beneath the Burmese Plate since the Cenozoic (Bilham & England, 2001). Lithologically, it comprises ancient basement rocks, metasediments, intrusive igneous rocks and younger sediments. It is bounded on all sides by faults and thrusts, with the Dauki fault in the south, the Brahmaputra faults towards the north, and the Jaumna/Dhubri fault and Kopili fault towards the west and east, respectively (Figure 1; Walia et al., 2010; Lozovsky et al., 2025).

The plateau comprises lithostratigraphic units, including: (a) Archaean–Proterozoic Assam Meghalaya Gneissic Complex with both acidic and basic intrusives; (b) Proterozoic Shillong Group of metasedimentary rocks intruded by basic bodies and porphyritic granite batholiths; (c) Lower Gondwana sequences; (d) Cretaceous Sylhet Traps and Sung Alkaline Complex; (e) Late Cretaceous to Paleogene-Neogene fluvio-marine sediments; and (f) Quaternary alluvium (Walia et al., 2010; Ali & Duarah, 2022) (Figure 2; Table 1). The representative photomicrographs from different lithostratigraphic units are presented in Figure 3.

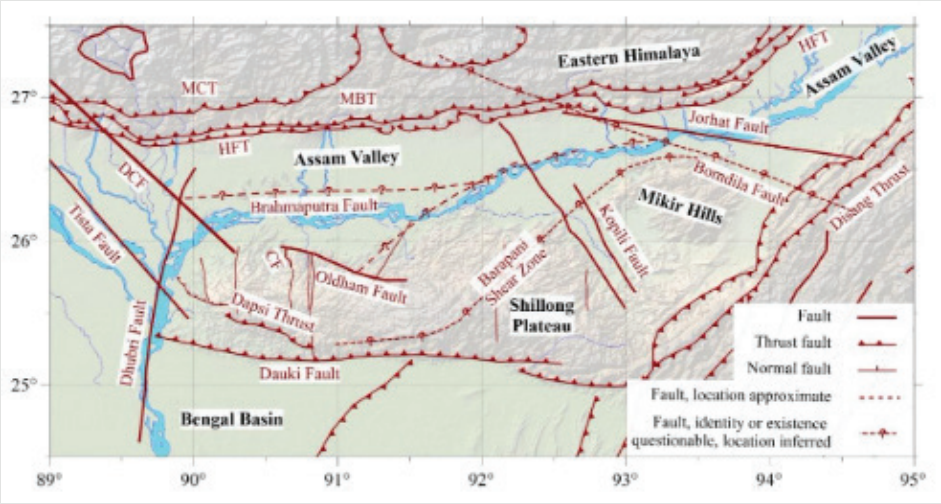


Fig. 1 : Tectonic setting of the Shillong/Meghalaya Plateau and adjacent areas, adapted from Lozovsky et al. (2025). Major faults are shown in red. Abbreviations: HFT-Himalayan Frontal Thrust; MBT-Main Boundary Thrust; MCT-Main Central Thrust; DCF-Dhubri-Chungtang Fault Zone; CF-Chedrang Fault.

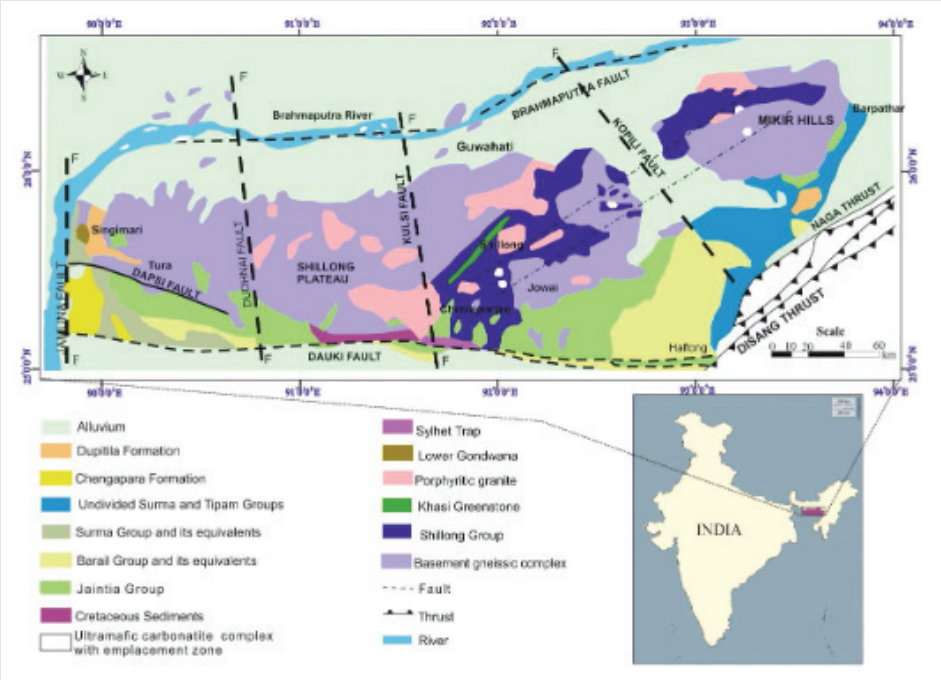


Fig. 2 : Geological Map of Shillong Plateau (after Walia et al., 2010).

Fig. 3 : Photomicrographs from different lithostratigraphic units, Shillong Plateau showing: (a) Quartzite, Shillong Group; (b) Metagabbro, Khasi Mafic-Ultramafic Intrusive; (c) & (d) Myllieum, Granite (Granite Plutons); (e) & (f) Basalt, Sylhet Trap; (g) & (h) Sandstone, Mahadek Formation; (i) & (j) Limestone consisting of LBF and Coralline algae (Shella Formation); (k) & (l) Sandstone, Kopili Formation. (Q=Quartz, M=Muscovite, Am=Amphibole, Cl=Chlorite, Pl=Plagioclase feldspar; Bi=Biotite; My=Myrmekitic texture; Py=Pyroxene, Ol=Olivine, Kf=K feldspar; Mx=Matrix).

Regional Structure

The Shillong Plateau has experienced three major global orogenic events, namely Columbian (~1600 Ma), Grenvillian (~1000 Ma), and Pan-African (~570 Ma), which have formed numerous shear zones, sutures, deep-seated faults, and lineaments (Acharyya & Lahiri, 1991). The Nongchram Fault, Brahmaputra Fault, and Dauki Fault are major regional structural features in the area (Dasgupta, 1977; Desikachar, 1974; Hiller & Elahi, 1984; Walia et al., 2010; Lozovsky et al., 2025). During the northward drift of the Indian Plate, especially over the Kerguelen Plume, the plateau underwent a period of extension, with deep-seated crustal fracturing along an N-S trend, leading to the formation and reactivation of major structures such as the Nongchram Fault and the Umngot (Golani, 1991; Storey, 1992). Several mafic and lamprophyre dykes, along with minor carbonatite intrusions, were emplaced along the Nongchram Fault (Nambiar, 1988). The Brahmaputra Fault, located north of Meghalaya and trending E-W, forms the structural boundary between the Shillong Plateau and the Assam plain. To the south, the Dauki Fault system, trending E-W, separates the plateau from the Bangladesh plains. The

Dauki Fault is a high-angle reverse fault system that has been active from the Cretaceous to the present, with peak activity during the Eocene and Miocene. Basaltic flows are reported to have occurred along a sympathetic fault of this (GSI, 2024).

Palaeontology

Fossil records from Meghalaya, as detailed below, are found in Late Cretaceous and Paleogene sediments:

Late Cretaceous Mahadek Formation : The Mahadek Formation consists of medium- to coarse-grained sandstone with minor intercalations of clay. It is also characterised by glauconite and appreciable amounts of feldspar. Diverse invertebrate fossil assemblages reported from the Mahadek Formation include bivalves, naticid gastropods, holothroid echinoids and heteromorphic ammonites (Mukherjee, 2012). Some vertebrate fossils, wood fossils and coal lenses are also reported from the Lower Mahadek, indicating a marginal marine/fluviatile environment. The presence of bivalves such as inoceramids, pectinids, oysters, and other diverse invertebrates points to a shallow-marine environment for the upper Mahadek.

Late Cretaceous-Palaeocene Langpar Formation : The Langpar Formation consists of alternating calcareous and arenaceous units, with thinly bedded argillaceous units. The major fossil content comprises Micraster and Stygmatopygus echinoids, Ampulina and Nerita gastropods, and nautiloids such as Cymatoceras (Mukherjee, 2012). Ichnofossils and some vertebrate fossils have also been reported from the Langpar Formation. The presence of these fossil assemblages suggests a warm, shallow-marine environment for the Langpar Formation.

Palaeocene-Eocene Shella Formation : Thick alternating carbonate and siliciclastic sequences characterise the Shella Formation. The carbonate sequences are dominated by large benthic foraminifera (LBF), Lithophyllum and Dascycladaceae (calcareous algae). LBF include Nummulites (Figure 4), Assilina, Alveolina, Discocyclina, Lockhartia, Quinqueloculina, etc. Several researchers, including Jauhri (1994, 1998), Jauhri and Agarwal (2001), Tiwari et al. (2010), Sarkar (2015a, b, 2020) and Das et al. (2025), have made significant contributions to the understanding of palaeoecology, biostratigraphy, sedimentology and palaeoenvironments of this carbonate facies. The larger benthic foraminiferal (LBF) assemblages from the Palaeogene succession of Meghalaya have been correlated with both the Tethyan and Indo-Pacific provinces (Jauhri, 1994; Jauhri et al., 2016), as the region occupied the eastern margin of the remnant East Tethys (Neo-Tethys) Ocean during the Palaeogene (Stampfli, 2000; Boudagher-Fadel et al., 2015). The fossil assemblages indicate an open-lagoonal to proximal middle-shelf environment for the Palaeocene-Eocene carbonate sequences.

Middle to Late Eocene Kopili Formation : The Kopili Formation comprises alternating splintery grey to black shale, ferruginous sandstone, and silty shale. The lower part is characterised by a dominance of shale and silty shale, whereas the upper part is dominated by plane-laminated, fine- to medium-grained, ferruginous sandstones and shale. The fossil assemblage, including foraminifera, molluscs, and ichnofossils, supports deposition in an open-marine inner-shelf to carbonate platform environment (Devi et al., 2021).

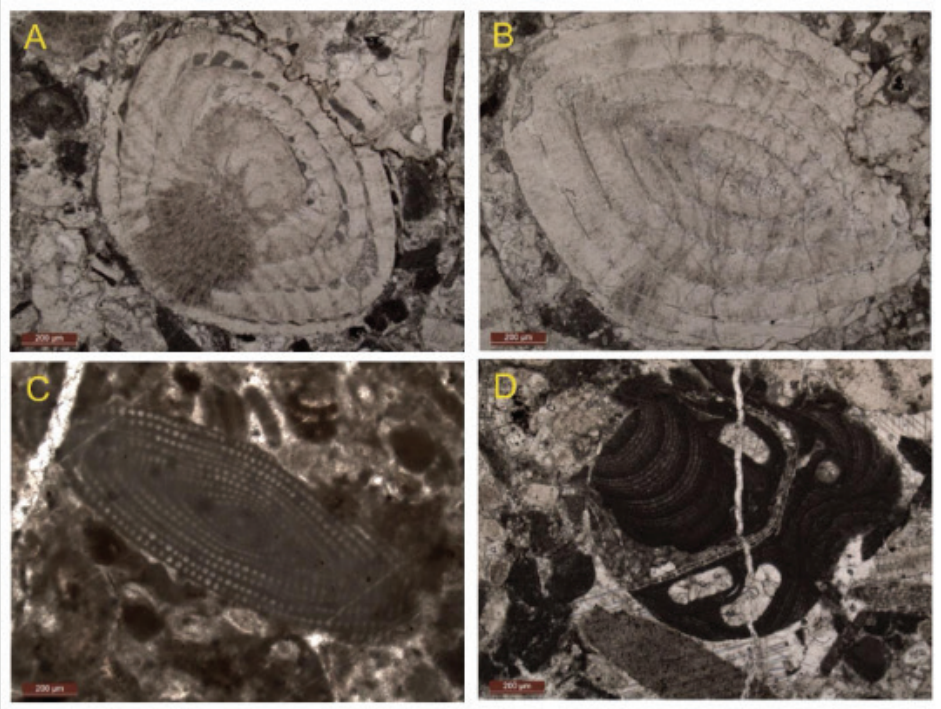


Fig. 4 : Photomicrographs of Lakadong Limestone (Shella Formation) showing: (A) and (B) Nummulites sp.; (C) Alveolina sp.; (D) Lithoporella melobesoides.

Quaternary Geology

The Quaternary geology of the Shillong Plateau results from processes such as active tectonics, intense monsoonal precipitation, mass wasting, and river incision. Human activities have also significantly shaped the landscape in recent years (Bradley, 1999; Prokop & Bhattacharyya, 2011). Bounded by the Dauki Fault to the south and the Brahmaputra Valley to the north, the plateau has experienced substantial uplift in the late Cenozoic, leading to steep relief, deeply incised valleys, and dynamic geomorphic processes (Nandy & Dasgupta, 1986; Bilham & England, 2001; Kayal et al., 2006; Walia et al., 2010; Ali & Duarah, 2022; Lozovsky et al., 2025). Chronological data suggest that most preserved Quaternary sediments are Holocene in age, with only a few sites containing Late Pleistocene deposits (Prokop & Bhattacharyya, 2011). Active tectonics, uplift, faulting, and frequent earthquakes have driven river incision, terrace formation, drainage-pattern adjustments, and recurrent slope failures, thereby influencing sedimentation and sediment preservation. Additionally, late Quaternary soil erosion and sediment redistribution have increased due to human activities like shifting cultivation, deforestation, coal and limestone mining, and rapid urbanisation. According to Prokop and Bhattacharyya (2011), the limited peat bogs, wetlands,

and valley-fill deposits also preserve paleoenvironmental records that reveal Holocene climatic changes, monsoon variability, vegetation history, and anthropogenic impacts on the Shillong Plateau.

Flora, Fauna, Weather and Climatic Conditions of Meghalaya

Flora of Meghalaya

Meghalaya is one of India's richest floristic zones. It exhibits diverse climates, varying elevations, and very high rainfall. The area is home to several forest types, including flowering plants, shrubs, climbers, medicinal herbs, and epiphytes. The state is home to more than 3,000 flowering plant species, which account for approximately 18% of all Indian flora (Khan et al., 1997; Meghalaya Biodiversity Board, n.d.). Given the state's diverse ecosystem and its membership in the Indo-Burma biodiversity hotspot, many plant species are indigenous to the area (Mir et al., 2019).

Many types of forests grow in this region, including tropical evergreen, semi-evergreen, subtropical pine, and temperate forests, as well as grasslands. The distribution of these forests depends on factors such as altitude, rainfall, soil, and microclimates (Mir et al., 2019). Tropical evergreen forests, which receive heavy rainfall, are common in the southern Khasi and Jaintia Hills. These forests have dense cover, tall trees, and thick canopies. Subtropical broad-leaved forests occur at higher elevations, while pine forests are found on the plateaus. Many epiphytes, including ferns and orchids, inhabit these forests, contributing to their biodiversity and structure.

The high degree of endemism in the area's ecosystem is one of its defining characteristics. Nepenthes khasiana, an omnivorous pitcher plant native to the Khasi Hills, is among the best known. In India, it is the only species of its kind. It is currently endangered by habitat loss and overexploitation and employs unique mechanisms to trap insects to obtain food and nutrients (Mir et al., 2019). Indigenous peoples' sacred groves are important repositories of biodiversity that often preserve endangered and extinct plant species.

A unique botanical species found in Meghalaya is a shrub belonging to the genus Strobilanthes that blooms in magnificent mass flowerings once every twelve years. These plants belong to the renowned Neelakurinji group and are commonly referred to by the Khasi people as "Jah Khei" (Figure 5). These plants exhibit a characteristic called gregarious flowering, in which a community of plants flowers simultaneously over a wide area. The plants die after producing seeds, completing their life cycle. The ecotone between the Khasi

and Jaintia Hills is home to species such as Strobilanthes echinata, whose communities are known to exist in the Sung Valley and the Mawsmai–Mawpyrshong area.



Fig. 5 : Strobilanthes echinata ("Jah Khei"), a Neelakurinji-associated shrub from Meghalaya.

Fauna of Meghalaya

The diverse ecosystems of Meghalaya support a wide variety of wildlife. Many rare or endangered mammalian species can be observed in the state. Notable carnivores such as the Clouded Leopard, Indian Leopard, and Marbled Cat help regulate prey populations and sustain ecological balance (Government of India, n.d.). Other animals include monkeys, a range of bats that assist in seed dispersal and pollination, and herbivores such as deer and wild boar. Forests, wetlands and river valleys of Meghalaya offer excellent habitats for both local and migratory birds. These habitats contribute to the region's high avian fauna diversity (Dixit et al., 2021). Birds, ranging in size from tiny woodland species to massive raptors, play an important role in pollination, seed dispersal and pest control. Wetlands and forest areas frequently serve as habitats for frogs, toads, snakes, and lizards, and the humid tropical ecosystem is well-suited to reptiles and amphibians. Amphibians are especially significant as bioindicators due to their vulnerability to environmental changes. A wide range of invertebrates is evident in the numerous species that engage in pollination and nutrient cycling.

A distinctive feature of Meghalaya's biodiversity is the state's extensive limestone cave ecosystems, which provide habitats for specialised animals adapted to dark environments. Evolutionary adaptations, such as reduced pigmentation and enhanced sensory abilities, underscore the ecological and scientific importance of these cave-dwelling organisms, including bats and other invertebrates (Dixit et al., 2021). Chremisticaribhoi, also known locally as Niangtaser, is a rare cicada species endemic to Meghalaya's Ri-Bhoi district. It is another notable feature of the state's faunal diversity. Its unique, highly organised four-year life cycle makes it the only known periodical cicada on the Indian subcontinent. The species is commonly referred to as the "World Cup cicada" because of the FIFA World Cup's four-year cycle and the uniform timing of its mass emergences. Beyond its distinctive biology, C. ribhoi holds important ecological and cultural significance as a key component of the traditional knowledge systems and ecological heritage of surrounding populations. Its peculiar life-history strategy and restricted range make it a species of special importance for research on insect ecology, evolution and biodiversity conservation.

Weather and Climate of Meghalaya

Meghalaya has a humid subtropical climate, strongly influenced by geography, altitude and monsoon winds from the Bay of Bengal. The state's plateau and mountainous landscape create significant climatic diversity. In general, the northern regions of the Khasi Hills receive comparatively less precipitation, whereas the southern slopes receive exceptionally high amounts. The climate pattern comprises two primary seasons, the dry season (November to March) and the wet season (May to October).

The orographic effect produces heavy rainfall throughout the wet season as moisture-rich southwest monsoon winds rise over the Khasi Hills (Murata et al., 2007). In general, the dry season is characterised by cooler temperatures, lower humidity, and clear skies. Altitude affects temperatures, and plateau areas such as Shillong have a moderate climate. Winter temperatures may fall below 6°C at higher elevations, while summer temperatures usually range from 17°C to 24°C.

Meghalaya is recognised worldwide for its excessive precipitation. Cherrapunjee has recorded some of the highest rainfall levels historically, and Mawsynram is also well known as the wettest place on Earth (Government of India, n.d.; Murata et al., 2007). Meghalaya receives more than 4,000 mm of annual precipitation on average, while some regions receive more than 7,000 mm. Such excessive precipitation promotes agriculture, river systems, and dense vegetation; however, it also contributes to environmental problems such as flooding, landslides, and soil erosion.

Literature Review

Quaternary geology research in India has moved beyond basic field surveys to include areas like geomorphology, sedimentology, paleoenvironmental reconstruction, geochronology, and geoarchaeology (Tiwari et al., 2023). Even so, the north-eastern region remains one of the least studied due to its difficult terrain, dense vegetation, and unpredictable climate. This means that important information about environmental history, sediment chronology, and landscape evolution is still lacking, so more focused research is needed in this area.

Although the Shillong Plateau receives substantial rainfall each year, often exceeding 11,000 mm, its Quaternary deposits are rare and poorly preserved. Prokop and Bhattacharyya (2011) found that most sediment layers in the Khasi Hills are shallow and predominantly Holocene, with little evidence of older Pleistocene deposits. The area's active tectonics and complex landforms, such as frequent earthquakes, landslides, and fast erosion, make it hard for these deposits to last. Human activities such as mining, deforestation, and shifting cultivation have also altered the landscape, leading to the loss and fragmentation of these important geological records.

Mehrotra and Shah (2017) reported similar findings from Tripura, where deposits were primarily Holocene in age. Additionally, the study revealed radiocarbon age reversals, which were linked to slope instability, tectonic disturbances and sediment deposition. Together, these findings demonstrate that North East India's ongoing tectonic activity and intense monsoonal rainfall make it extremely challenging to preserve consistent Quaternary sedimentary records over the long term.

Geomorphological research shows that denudation and tectonic processes play a key role in shaping the Shillong Plateau. Migoń and Prokop (2013) studied the Mylliem granite pluton and found tors, domes, and heavily weathered rocks. They suggested that headward erosion linked to the Dauki Fault changed the original plateau, forming a rugged landscape with deep valleys and showing the impact of tectonic activity.

In the region between the Himalayan Frontal Thrust (HFT) and the Main Boundary Thrust (MBT) in Arunachal Pradesh, Luirei et al. (2022) identified several strath terraces and linear mountain fronts. During the Quaternary, these geomorphic features indicate continuous river incision and tectonic uplift. Similarly, Baruah et al. (2024) identified several types of neotectonic features, such as pressure ridges, fault scarps and interrupted drainage networks, in the frontal zone of the Mikir Massif in Assam. Their results demonstrate the ongoing impact of active tectonics on the evolution of Quaternary landscapes and the formation of today's drainage patterns.

Nath et al. (2024) suggested that the Shillong Plateau has undergone multiple phases of deformation. The Oldham Fault continues southeastward, as evidenced by slope breaks, knickpoints, and Ksn values in northward-flowing rivers. Morphometric studies indicate that the basins, though mature, are still evolving, indicating neotectonic reactivation of SP. The high drainage texture, relief parameters, earthquake data, sinuosity, and lineament analyses show that these elements are prone to reactivation. The river profiles suggest significant hydroelectric potential that is yet to be fully exploited. Existing dams must be maintained, and future ones must be designed with regional tectonic activity in mind, as it can reactivate

faults, cause terrain changes, and shift river courses during or after earthquakes. Lineaments, reflecting regional stress, should be analysed from a structural engineering perspective.

The landforms in Meghalaya are shaped by active regional tectonic elements, which influence human activities. Recognising these structures is crucial for urbanisation, natural hazard management, flood and landslide mitigation, and development planning.

Strong et al. (2019) noted that the northern Shillong Plateau region is entirely different from the southern and central regions of the plateau. They observed high steepness in the lower reaches of northeast-flowing rivers, where the Brahmaputra River controls the base level of these rivers. The southern and central Shillong Plateau has been planated by preferential erosion of cover sediments along the contact with the basement, re-exposing a palaeosurface that is expressed as the modern low-relief surface of the Shillong Plateau. Rosekranz et al. (2018) reported very low erosion rates (50 to 80 m My-1) from the plateau, despite intense rainfall and active tectonics, owing to thick vegetation cover, low rainfall variability, and competent basement rocks. Strong et al. (2019) suggest that surface rupture of the Dauki Fault and higher fault slip rates could explain three things: deep incision along the southern plateau margin, the delay between exhumation starting in the early Miocene and surface uplift at the end of the Miocene, and the roughly 3.5-million-year gap between the start of surface uplift and the arrival of basement-derived sediment in the southern sedimentary basin. However, they argue that exhumation of the tilted basement surface alone can explain these patterns without requiring changes in fault slip rates. This study also proposes that the hard sedimentary rocks above the basement may have slowed the delivery of basement-derived sediment to the Surma basin. The slope of the exposed basement contact probably affects where rivers cut into the landscape, and headward retreat may be limited by low sediment supply from the plateau interior.

Quaternary deposits across the Shillong Plateau and surrounding areas remain poorly documented, despite significant advances in the study of Quaternary geomorphology and neotectonics in North-East India. Most studies are localised and reconnaissance-based, whereas integrated investigations combining sedimentology, geomorphology, stratigraphy, geochronology, and tectonic analysis remain limited (Tiwari et al., 2023). Therefore, systematic, regional-scale studies are required to better reconstruct Quaternary landscape evolution and environmental changes in Meghalaya.

Field Transect

Figure 6 presents the field transect map showing the selected locations.

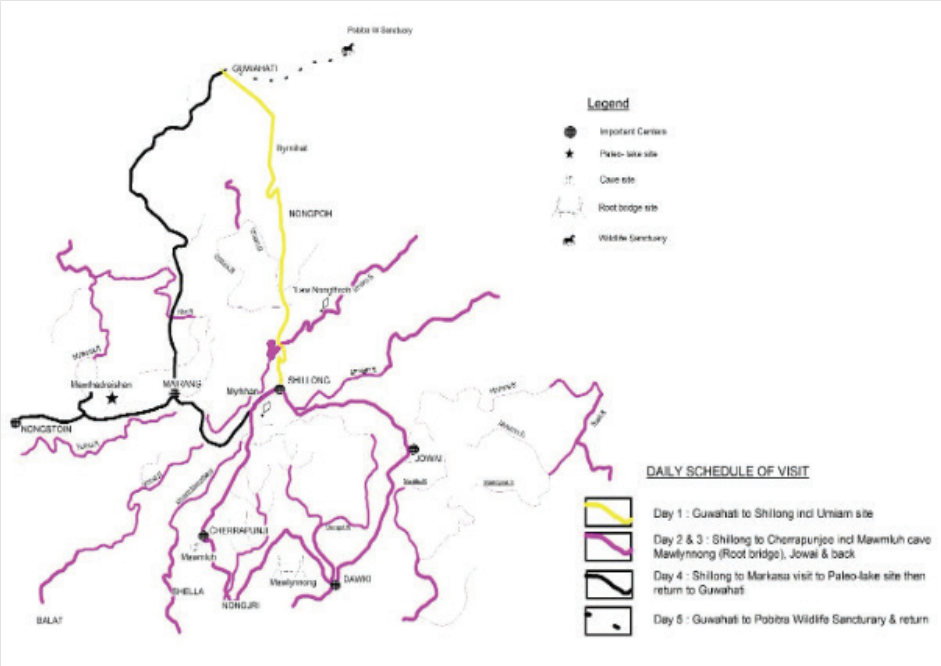


Fig. 6 : Map showing the day-wise field plan and route.

Field Excursion Location(s)

Figure 7 presents the DEM of the Shillong Plateau and showing the selected locations.

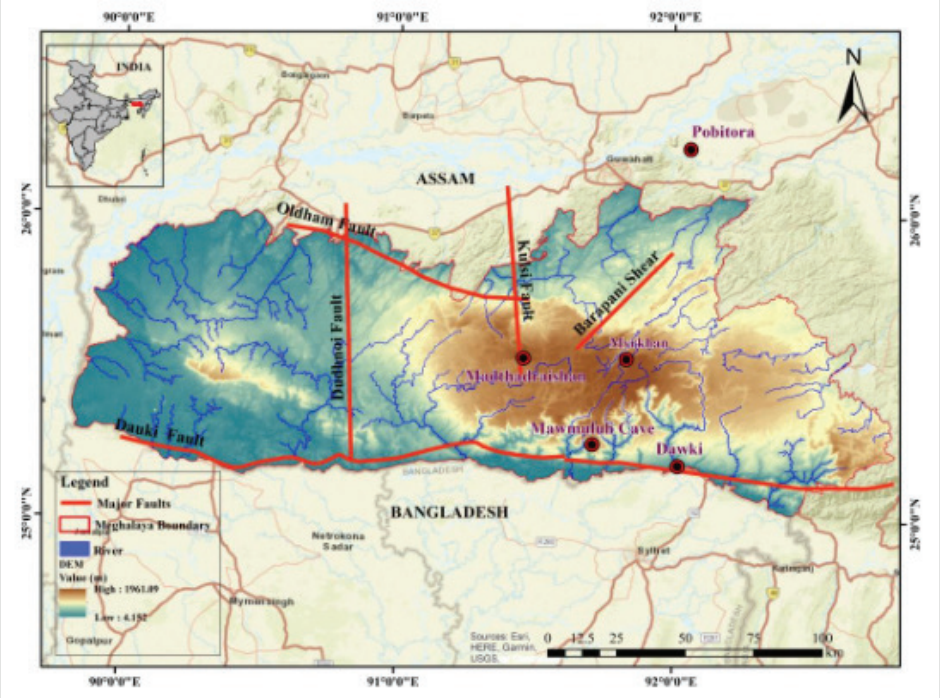


Fig. 7 : Digital elevation model (DEM) map of the Shillong Plateau, showing the locations of Mawmluh Cave, Mawthadraishan High-Altitude Lake, Myrkhan Neolithic site, Dauki, and Pobitora Wildlife Sanctuary.

Day 1

Stop 1: Dieng Ïei Hill (25°40′ 35.57″N - 91°53′ 46.35″E)

Dieng Ïei Hill is located about 25 km from Shillong. The name "Dieng Ïei" refers to a mythological tree that is believed to have once stood on the hilltop (Figure 8). This site has a strong connection with the earliest occupation of the Khasi community in these hills. It lies at the top of a hill, where there is a trace of a large cavity formed by the base of a mythological tree said to have grown there. From an anthropological perspective, the site offers valuable insights into the interaction between culture and the environment in the Khasi Hills.



Fig. 8 : Dieng Ïei Hill, Meghalaya, is a culturally significant landscape associated with Khasi oral traditions.

Day 2

Stop 1: Krem Mawmluh Cave (25°15′ 32.33″ N – 91°42′ 45.80″ E)

Krem Mawmluh is located in the East Khasi Hills district, Meghalaya, North Eastern India, near the town of Sohra (Cherrapunji), on Lawbah hill adjacent to the village of Mawmluh. Krem Mawmluh (Figure 9) is regarded as one of the largest and most important cave systems in the Indian sub-continent, with a total length of ~7.1 km and a subterranean drainage system. It channels allochthonous surface runoff through a complex dendritic passage system developed within highly karstified carbonate rocks. The cave entrance lies about 3 km north-northeast of Mawmluh village, at the base of the west-facing escarpment of Lawbah hill, also locally known as Rangsanobo or Rynsan U Buh. Cave formation is controlled by the lithological contact between the Lakadong Limestone of the Shella Formation and the underlying Therria Sandstone (Breitenbach et al., 2015). The nearest town, Sohra

(Cherrapunji), is situated approximately 58 km southeast of Shillong and about 15 km north of the India–Bangladesh border.

The region receives a high mean annual rainfall of ~11,000 mm, nearly 70% of which occurs during the peak Indian Summer Monsoon season from June to September (Murata et al., 2007). Monsoonal precipitation is significantly driven by convective systems and low – level moisture transport from the Bay of Bengal, which propagates northward towards the Tibetan Plateau (Sengupta & Sarkar, 2006; Berkelhammer et al., 2010). Non – monsoonal rainfall is minimal and mainly sourced from westerly disturbances and locally recycled moisture (Breitenbach et al., 2010, 2015; Berkelhammer et al., 2012).

Krem Mawmluh cave hosts abundant speleothems, including KM-A, the oldest published speleothem record from the site (Figure 10, Breitenbach et al., 2015; Myers et al., 2015). Uranium series dating of KM-A provides a continuous Upper Pleistocene – Holocene δ18O record that documents a marked shift towards heavier isotopic values at ~4.2 ka, indicating a major weakening of the Indian Summer Monsoon across the Indian subcontinent and Southeast Asia (Berkelhammer et al., 2012).

The ~4.2 ka event represents a major reorganisation of global ocean-atmosphere circulation systems and is widely recognised as a near-global climatic anomaly marking the onset of the Meghalayan Age of the Holocene (Paasche et al., 2004; Railsback et al., 2018). Proxy records from across all continents, including North America, Europe, West Asia, China, Africa, Andean-Patagonian South America, Antarctica and the central North-Pacific document abrupt climatic shifts during this interval, characterized predominantly by widespread aridification and weakening of Indian Summer Monsoon and East Asian Summer Monsoon, along with glacier advances in high latitude regions (Mayewski et al., 2004; Staubwasser & Weiss, 2006; Weiss, 2017; Bailey et al., 2018). Societal impacts were severe during this climatic perturbation, including agricultural collapse, migrations, and the fall of various civilisations such as Mesopotamia, the Indus Valley, Egypt, and China (Railsback et al., 2018).

Owing to its globally recognisable climatic signature, the event defines the base of the Meghalayan Age, with the Global Boundary Stratotype Section and Point (GSSP) established at Mawmluh Cave, where high-resolution speleothem $\delta^{18}O$ records preserve evidence of an abrupt monsoon weakening and severe megadrought between ~4071 and 3888 yr BP (Walker et al., 2018).



Fig. 9 : Speleothems within Krem Mawmluh Cave, Meghalaya (A) Stalagmite; (B) Flowstone; (C) Stalactites; (D) Well-developed Stalactites and Stalagmites.



Fig. 10 : (a) Speleothem KM-A from Mawmluh Cave, Meghalaya, northeast India, showing (b) the position of the 4.2 ka event. The speleothem is ~308 mm long. (source Walker et al., 2018).

Day 3

Stop 1: Dauki River (25°11′ 24.08″N - 92°01′ 08.92″E)

The Dauki Fault lies along the southern edge of the Shillong Plateau, between northeast India and Bangladesh (Figures 1 and 2). The Shillong Plateau is a Precambrian massif that rises 2 km and is detached from the Indian shield due to a 250 km eastward horizontal displacement along the Dauki tear fault (Evans, 1964). However, Desikachar (1974) proposed contradictory

ideas. Various models have been proposed for the plateau's development, including (i) a pop-up structure bounded by two reverse faults, the Oldham Fault to the north and the Dauki Fault to the south (Bilham & England, 2001; Islam et al., 2010); (ii) uplift driven by the Oldham Fault, viewed as a back-thrust to the Dauki Fault, with the Dauki Fault as a north-dipping thrust (Yin et al., 2010); or (iii) Clark and Bilham (2008) suggested that the Oldham Fault is a back-thrust to a deeper, master blind north-dipping fault, with the Dauki Fault as a surface expression of a fold propagating from this fault. Biswas et al. (2007) argued that the Oldham Fault played a minor role in the plateau's evolution, with the Dauki Fault shaping the current landscape. Consequently, the Dauki Fault has been a key focus of study. The Shillong Plateau behaves as a rigid block moving at ~46.5 mm/yr towards N51°E tied to the Indian shield (Jade et al., 2007), with the Dauki Fault and Brahmaputra Fault forming its southern and northern margins, respectively (Islam & Shinjo, 2012). The Shillong plateau is complex and tectonically active; it experienced a major earthquake in 1897, known as the Great Assam earthquake. There are differing views on the origin of this earthquake; for example, Bilham and England (2001) suggested that it was caused by 'pop-up' tectonics between the north-dipping Dauki fault and the south-dipping Oldham fault. However, Rajendran et al. (2004) proposed that the Brahmaputra fault, along the Brahmaputra River farther north than the Oldham fault, is the source of the earthquake. Morino et al. (2011) trench across a warped terrace at Gabrakhari village in Mymensingh district of Bangladesh and observed small fault strands and sand dikes. They identified three small north-dipping reverse-fault strands and performed Accelerator Mass Spectrometer (AMS) radiocarbon dating on charcoal, peat, and organic-rich sediments. They identified a seismic event between A.D. 1500 and 1630 and correlated it with a historically reported 1548 earthquake. Numerous sand dikes and sills due to paleo-liquefaction near the ground surface were observed, and these were dated and correlated with the 1897 Great Assam earthquake. The Dauki River exits the plateau near Dauki village (Figure 11A and B) and enters Bangladesh (Figure 11C) with a sudden decrease in topography.



Fig. 11 : The Umngot River (Dauki River) showing clear water condition characteristics of the southern escarpment of the Shillong Plateau.

Stop 2: Living Root Bridges (25°12′ 23.79″ N - 91°53′ 52.61″E)

The famous Single Decker Living Root Bridge, one of the most iconic examples of indigenous bioengineered infrastructure, is located in Riwai Village near Mawlynnong and Dauki, Meghalaya (Figure 12A). Locally known as Jingkieng Jri, the Khasi people developed Living Root Bridges (LBRs) by carefully training and interweaving the aerial roots of Ficus elastica (Indian rubber tree). The construction and maintenance of LRBs embody a rich repository of traditional knowledge, reflecting a profound and enduring relationship between local communities and their natural environment.

Stop 3: Mawlynnong Village: Asia's Cleanest Village (25°12′ 04.83″N - 91°54′ 59.33″E)

Mawlynnong, situated in the verdant East Khasi Hills district, about 90 km from Shillong, was recognised as Asia's Cleanest Village by the travel magazine Discover India. Home to approximately 600 residents, it is affectionately called "God's Own Garden." The village emphasises community-driven sustainability practices, including the use of bamboo dustbins, rainwater harvesting, universal household sanitation, and a strict prohibition on single-use plastics (see Figure 12B). Predominantly inhabited by the Khasi community, it has a social structure deeply rooted in a traditional matrilineal system. Over the last twenty years, tourism has grown to become a significant part of the local economy.



Fig. 12 : (A) Single Decker Living Root Bridge, Dauki, Meghalaya. (B) Entrance to Mawlynnong (Cleanest Village in Asia).

Day 4

Stop 1: Myrkhan Neolithic Site (25°32′ 40.01″N - 91°48′ 34.06″E)

The Myrkhan Neolithic site is situated in Myrkhan village, East Khasi Hills district of Meghalaya (Figure 13). Situated above the eastern gorge of the Umiam stream, the site has yielded archaeological remains, including unfinished stone tools, cord-impressed potsherds, carved paddle potsherds, charcoal samples, large artefact piles, and

concentrations of lithic flakes (Mitri & Neog, 2016). The presence of unfinished stone tools and lithic waste indicates that Myrkhan functioned primarily as a stone tool production centre during the Neolithic period (Mitri & Neog, 2016; Rohit & Sharma, 2024). The lowest layer of the site yielded an AMS radiocarbon age of Cal BP 3850 to 3695 Cal BP (Mitri & Neog, 2016).



Fig. 13 : Excavation features at the Myrkhan Neolithic site, Meghalaya: (A) & (B) Excavated trench; (C) Profile of Trench 4 showing distinct sedimentary horizons; (D) Circular stone-lined structural remains.

Micromorphological analysis of soil samples from the Myrkhan Neolithic site also provides evidence of combustion activities and stone tool manufacture (Rohit & Sharma, 2024). Fourier transform infrared spectroscopy (FTIR) analysis identified acid phosphates, which are key indicators of human activity in the region's low-pH soils (Rohit & Sharma, 2024). X-ray diffraction (XRD) analysis detected vivianite, an iron phosphate, further indicating the presence of anthropogenic remains in tropical soils (Rohit & Sharma, 2024).

Stop 2: Mawthadraishan High-Altitude Lake (25°32′ 46″N- 91°27′ 12″E)

Peatlands and higher-altitude lakes provide an important natural archive for recreating historic climatic and environmental conditions (Bradley, 1999; Chambers et al., 2012). The

highest place on the Shillong Plateau is the Mawthadraishan high-altitude lake, located in the West Khasi Hills of Meghalaya at an elevation of approximately 1860 meters above mean sea level. It provides an ideal location for such kinds of studies (Figure 14). Strong erosion and weathering result from the region's high monsoonal rainfall, which is amplified by orographic uplift (Soja & Starkel, 2007). These processes facilitate continuous sedimentation into depressions like the Mawthadraishan basin. Peat development and the gradual accumulation of sediment are favoured by the marshy, wet environments of the basin.

Prokop and Bhattacharyya (2011) studied a 124 cm sediment core composed mostly of loamy peat overlying gneissic bedrock, which sheds light on environmental changes that occurred during the late Holocene. As reported by Chambers et al. (2012), lithological characteristics such as tiny particle size, black colour, and high organic content suggest deposition under low-oxygen conditions characteristic of peat-forming environments. Accelerator Mass Spectrometry (AMS) radiocarbon dating indicates ages that are approximately 210 ± 25 years BP at 40–44 cm depth and around 325 ± 30 years BP at 110–112 cm depth (Prokop & Bhattacharyya, 2011). These results indicate extremely recent environmental and climatic change on the Shillong Plateau and suggest that sediment accumulation occurred during the late Holocene.

For the past few centuries, the Mawthadraishan basin has maintained a fairly uniform wetland ecology, as evidenced by sediment characteristics. Continuously wet conditions, which are necessary for the preservation of organic matter, are reflected in ongoing peat development. Because they often retain pollen, plant macro-remains and microfossils. Such peat deposits serve as valuable records for paleoenvironmental reconstruction, providing extensive insights into historical vegetation dynamics and climate variations.



Fig. 14 : Mawthadraishan High-Altitude Lake, Meghalaya, northeastern India: (A) Panoramic view of the lake; (B) southern margin of the lake showing the gently sloping catchment, embankment, and mist-covered uplands characteristic of the high-altitude setting.

Day 5

Stop 1: Pobitora Wildlife Sanctuary (Latitude: 26º12′ N and 26º15′ N; Longitude: 91º59′ E and 92º 05′ E)

Pobitora Wildlife Sanctuary, encompassing approximately 40 square kilometres, contains the highest density of the Greater One-Horned Rhinoceros in India (Figure 15). Situated on the outskirts of Guwahati, the sanctuary is recognised as a leading example of wildlife conservation, particularly for its effective habitat management strategies. It comprises two

principal reserves: Rajamayong Reserve Forest and Pobitora Reserve Forest. The Rajamayong hills support a diverse range of fauna, including leopards, capped langurs, porcupines, and pangolins. The grassland region of Pobitora offers significant opportunities to observe the Greater One-Horned Rhinoceros, as well as wild water buffalo, monitor lizard, and wild boar. Over 375 bird species have been recorded within the sanctuary.



Fig. 15 : Representative wildlife and habitats, Pobitora Wildlife Sanctuary, Assam: (A) One-horned Indian rhinoceros (Rhinoceros unicornis) (source: www.pobitorawildlifesanctuary.in); (B) One-horned Indian rhinoceros (Rhinoceros unicornis); (C) Wildwater Buffalo (Bubalus arnee); (D) Swamp Deer (Rucervus duvaucelii).

Geoheritage, UNESCO heritage, archaeological sites in the vicinity, cuisines and culture

Monoliths

The Nartiang Monoliths, one of the most significant megalithic complexes in India, are located in the West Jaintia Hills, Meghalaya (Figure 16). These remarkable stone monuments provide valuable information about the cultural heritage, social organisation and commemorative traditions of the Jaintia people. The site comprises 30 megalithic structures that vary considerably in size, with a few reaching heights of 8 m. The towering, upright, horizontal, table-like stones are locally termed Moo Shynrang and Moo Kynthai, respectively. These structures are commonly regarded as commemorative, erected to honour ancestors and celebrate victories. This site is an important heritage landmark that reflects the rich megalithic tradition and socio-cultural history of the Jaintia Hills region.



Fig. 16 : Nartiang Monoliths, West Jaintia Hills, Meghalaya. (A) Upright stones (Moo Shynrang) and horizontal stone slabs (Moo Kyntha); (B) Archaeological Survey of India (ASI) inscription plaque detailing the historical and cultural significance of the Nartiang monoliths.

Khasi Culture

Meghalaya is inhabited by the Khasi, Jaintia and Garo tribes (Bareh, 1985). One of the most distinctive features shared by the three major tribes is their matrilineal social system, in which lineage and inheritance are traced through the female line (Marak, 2017). In Khasi society, men take part in family decision-making, while women play a significant role as guardians of ancestral property and family identity (Nakane, 1967). In addition to the Khasi, Jaintia and Garo, Meghalaya is also home to several minor communities, such as the Rabha, Koch, Hajong, Dalu, Lyngngam, Boro and Biate.

Religion has also been an important factor in shaping Meghalaya's culture. Indigenous belief systems such as Niam Khasi and Garo Songsarek have coexisted with Hinduism and Christianity. Meghalayan society upholds traditions while adapting to new circumstances. Economic pursuits have shifted from shifting cultivation to agriculture, trade, wage labour, and other occupations. They continue to retain unique material culture, such as Jaintia megaliths, Garo ritual objects, and the sharing of kwai (areca nut) among the Khasi, as markers of identity, relationships, and societal cultural values (Marak, 2017). Tribal communities in Meghalaya maintain their cultural identity despite modernisation and globalisation.

Local Conveniences

Emergency & Traveller Assistance Guide

Whether trekking through the living root bridges, exploring waterfalls, studying the limestone cave systems, or conducting field research in Sohra (Cherrapunji), knowing where to seek assistance during an emergency is essential. This field guide provides practical information regarding police assistance, medical facilities, passport loss procedures, emergency transport, and traveller safety in the Sohra region. The field vehicle would have a basic first-aid kit. However, participants are advised to carry the necessary medicines as per their personal requirements.

Key Emergency Services in Sohra

• **Sohra Police Station:** Primary contact point for theft, lost passports, missing belongings, FIR registration, and traveller assistance. Available 24 hours daily.

• **Sohra Community Health Centre (CHC):** Primary healthcare facility for injuries, trekking exhaustion, infections, dehydration, and emergency medical support.

Passport Theft or Loss (Immediate Action)

1. **File an FIR:** Visit the Sohra Police Station immediately and obtain a First Information Report (FIR).

2. **Keep Copies:** Maintain both printed and digital copies of the FIR for embassy and insurance use.

3. **Contact Embassy:** Inform your embassy or consulate in India regarding the loss.

4. **Notify Insurance Provider:** Most travel insurance policies cover passport theft and emergency travel assistance.

5. **Use Backup Documents:** Keep scanned copies of your passport, visa, travel insurance, and tickets stored securely online.

Emergency Contact

Service	Number
Police Emergency	100

"Meghalaya Police is committed to assisting visitors and travellers. Do not hesitate to approach local authorities or checkpoints for guidance and emergency support."

Medical Care

Sohra Community Health Centre : The Sohra Community Health Centre (CHC) is the primary healthcare facility serving travellers, researchers, and residents in the region. The centre handles general illnesses, trekking-related injuries, dehydration, infections, and minor emergencies commonly experienced by visitors exploring remote trails and cave systems.

Medical Services Available

- General medical treatment
- First aid and emergency care
- Treatment for trekking injuries and exhaustion
- Dehydration and fever management
- Basic ambulance support

Emergency Ambulance Service

Service	Number
Ambulance	108

Advanced Medical Care — Shillong

Shillong Civil Hospital: Nearest major referral hospital for trauma care, surgery, cardiac emergencies, and specialist treatment.

Distance & Travel Time: Approximately 50 km from Sohra with a typical travel time of 1.5–2.5 hours by road.

Local Bazaar & Essential Supplies

Sohra Market : The main market area in Sohra serves as the primary commercial and supply centre for travellers and field teams.

Facilities Available in the Bazaar

- Pharmacies and medical stores
- Grocery and ration shops
- Local eateries and tea stalls
- ATM and banking facilities
- Rain gear and trekking supplies
- Mobile recharge and SIM services

The market is centrally located and easily accessible from most hotels, guesthouses, and homestays in town.

Monsoon & Field Safety Advisory

• **Field Hazards:** Landslides, slippery trails, dense fog, sudden flooding, and poor visibility are common during the monsoon season.

• **Safety Tips:** Carry rain protection, trekking footwear, a basic medical kit, power banks, and sufficient drinking water.

• **Travel Planning:** Always inform your accommodation provider or guide before entering remote trails or cave systems.

Essential Emergency Contacts

Service	Number
Police Emergency	100
Ambulance Service	108
Fire & Rescue	101
Tourist Assistance	Local hotel, guide, or tour operator

Distances & Locations at a Glance

Location	Distance from Sohra	Travel Time	Purpose
Sohra Police Station	0–1 km	5–10 min walks	FIR, theft, police assistance
Sohra CHC	0–1 km	5–15 min	Primary medical care
Shillong Civil Hospital	~50 km	1.5–2.5 hrs	Advanced emergency care
Shillong City Centre	~50 km	1.5–2.5 hrs	Banks, embassies, transport

Traveller & Field Safety Checklist

- Carry printed and digital copies of important travel documents.
- Keep emergency contacts saved offline on your phone.
- Avoid isolated trekking routes during heavy rainfall.
- Wear proper trekking footwear in wet terrain.
- Carry waterproof bags and rain protection.
- Maintain communication with accommodation providers or guides.

Road and Excursion Stop

The Field Trip is a post-Congress trip that departs from Guwahati on 04th February, 2027 and returns to Guwahati Airport on 8th February 2027, for a total of five days, including the journey. The tentative plan is as per the table below.

Days	Journey and Halt	Objective
Day 1 04.02.2027	Arrival at Guwahati by air, Guwahati to Shillong by road, halt at NEHU, Shillong	In transit, visits to Dieng Ïei Hill and Umiam Lake
Day 2 05.02.2027	NEHU to Cherrapunjee by road, halt at Cherrapunjee	To study the lithology from different stratigraphic units and visit the Krem Mawmluh Cave (GSSP)
Day 3 06.02.2027	Cherrapunjee-Dauki to Shillong, halt at NEHU	Visits to Dauki River, Living Root Bridge, Mawlynnong Village: Asia's Cleanest Village
Day 4 07.02.2027	NEHU to Nongstoin Highway (NH106)-Guwahati, halt at Guwahati	Visits to Myrkhan Neolithic Site and Mawthadraishan High-Altitude Lake
Day 5 08.02.2027	Guwahati and Departure	Visits to Pobitora Wildlife Sanctuary (early morning)

Day 1 (04.02.2027): Arrival of Delegates at Guwahati airport at 11:00 hrs., followed by departure to NEHU, Guest house, Guwahati for refreshments and brief orientation. The field trip will start from the NEHU Guest House, Guwahati, at 13:30 hrs. to Shillong by road. En route, participants will visit Dieng Ïei Hill and Umiam Lake. The day concludes with arrival and an overnight stay at NEHU, Guest House, Shillong.

Day 2 (05.02.2027): The journey will commence from NEHU Guest House, Shillong, at around 07:30 hrs., to Cherrapunjee (Sohra) by road. En route, the participants will observe the lithology and structural features from different stratigraphic horizons that aid in understanding the regional geology of the Shillong Plateau. The highlight of the day is to visit Krem Mawmluh Cave (GSSP) and conclude with an overnight stay at Cherrapunjee.

Day 3 (06.02.2027): The field trip will start from Cherrapunjee at around 07:30 hrs. to Dauki via road. At Dauki, participants will study the geological significance of the Dauki fault and its associated features. En route, the participants will visit the Living Root Bridge and Mawlynnong Village, and the excursion will then continue to Shillong, concluding with an overnight stay at NEHU Guest House, Shillong.

Day 4 (07.02.2027): The field trip will commence from NEHU, Guest House, Shillong, at around 07:30 hrs. and proceed along NH106 towards Nongstoin. Along the traverse, the participants will visit the Myrkhan Neolithic Site and the Mawthadraishan High-Altitude Lake. Following the field observations, the journey will continue to Guwahati, where participants will arrive in the evening for an overnight stay.

Day 5 (08.02.2027): The day will start with an early-morning visit to Pobitora Wildlife Sanctuary to ensure better visibility of the Indian one-horned rhinoceros and associated fauna. Following the visits, participants will have lunch in Guwahati and subsequently proceed to the airport to board their scheduled flights for their respective destinations, marking the conclusion of the field excursion.

Conclusion

The field trip across the Shillong Plateau aims to provide participants with a thorough understanding of geological evolution, Quaternary landscape development, paleoenvironmental records, and cultural heritage. Visits to key sites, including Krem Mawmluh cave, Mawthadraishan Lake, Myrkhan Neolithic site, Dieng Ïei Hill, Mawlynnong village, living root bridges, and Pobitora Wildlife Sanctuary, are expected to offer valuable insights into the geological, ecological, environmental, and cultural history of northeastern India. Special focus will be placed on the significance of Krem Mawmluh cave as the Global Boundary Stratotype Section and Point (GSSP) for the Meghalayan Age and on documenting

climatic event. Observations of Mawthadraishan Lake will emphasise the role of lake sediments as records of recent environmental change, while the Dauki Fault and related features will highlight the impact of tectonic activity on landscape evolution.

In addition, the field trip will highlight the rich biological diversity, cultural traditions, and archaeological heritage of northeastern India through visits to sites such as Myrkhan Neolithic site, Dieng Ïei Hill, living root bridges, Mawlynnong village, and Pobitora Wildlife Sanctuary.

Overall, the field excursion is expected to serve as an important platform for Quaternary research, paleoenvironmental reconstruction, geoarchaeology, and the sustainable conservation of natural and cultural heritage.

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Annexure

Field Excursion Guidelines: Do's and Don'ts

To ensure the safety of all participants and to promote responsible scientific field practices, all participants are requested to adhere to the following guidelines throughout the field excursions.

Keep a valid passport (for international participants) or a government-issued photo ID (for Indian participants) with you at all times during the field excursion.

Do's	Don'ts
1. Follow the instructions of the excursion leaders, coordinators, and local authorities at all times.	1. Do not collect rocks, fossils, archaeological artefacts, biological specimens, or any other materials without prior authorization.
2. Remain with the group and inform the excursion leader before leaving the designated route.	2. Do not damage, deface, or remove material from geological outcrops, caves, monuments, heritage structures, or other natural features.
3. Wear appropriate field attire, including sturdy closed-toe footwear, full-length trousers, a hat or cap, and weather-appropriate clothing.	3. Do not wander alone or separate from the excursion group without informing the field leaders.
4. Carry sufficient drinking water, personal medications, sunscreen, insect repellent, and other essential field supplies.	4. Do not climb unstable slopes, cliffs, rock formations, or enter hazardous areas unless specifically instructed or supervised.
5. Keep a valid photo identification and your excursion registration details with you during travel.	5. Do not swim or enter rivers, lakes, lagoons, or coastal waters unless expressly authorized by the excursion leaders.
6. Respect local customs, religious sites, cultural heritage, and private property.	6. Do not consume alcohol, recreational drugs, or engage in unsafe or irresponsible behaviour during the excursion.
7. Follow the Leave No Trace principles by carrying back all waste and helping to keep field sites clean.	7. Do not operate drones or other restricted equipment without obtaining the necessary permissions.
8. Use designated trails and approved observation areas to minimise environmental disturbance.	

9. Observe geological, ecological, archaeological, and cultural features carefully without causing any damage.

10. Record field observations systematically and collect samples only with prior permission from the excursion leaders and the relevant authorities.

11. Exercise caution near cliffs, riverbanks, caves, unstable slopes, road cuts, and other potentially hazardous terrain.

12. Respect wildlife by maintaining a safe distance from animals, birds, reptiles, insects, and their habitats.

13. Immediately report any illness, injury, emergency, or hazardous situation to the excursion organizers.

14. Be prepared for changing weather conditions and comply with all safety advisories issued by the excursion leaders.

8. Do not photograph restricted installations, sensitive locations, or local residents without prior permission.

9. Do not create excessive noise or disturb local communities, religious activities, wildlife, or natural habitats.

10. Do not leave valuables unattended or rely solely on mobile phone connectivity in remote areas.

11. Do not undertake any activity that may compromise your safety, the safety of fellow participants, or the conservation of the area's geological, ecological, archaeological, or cultural heritage.

Disclaimer

Participation in the field excursions is entirely at the participant's own risk. While the Organising Committee and excursion leaders will make every reasonable effort to ensure participant safety and provide appropriate guidance, they shall not be held responsible for any personal injury, illness, loss of personal belongings, property damage, delays, or unforeseen incidents arising during travel or field activities. Participants are expected to act responsibly, follow all instructions issued by the excursion leaders, and comply with applicable local laws and regulations throughout the excursion.

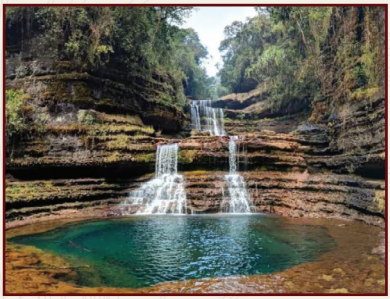












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Field Guide Book

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