

# GEOLOGICAL FIELDWORK REPORT

## ‘BARIPADA BED’



B.Sc. GEOLOGY

PG Department of Geology

M.P.C. Autonomous college, Baripada.

**Submitted To**

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## **ACKNOWLEDGEMENT**

I would like to express special gratitude to the M.P.C. Autonomous College, Takatpur for organizing the enriching and insightful field work. I would like to acknowledge with appreciation to **Prof. P.C. Sahu** and Co-Teachers for their indispensable guidance, they organized this tour in well-defined and pre-planned manner which facilitated all students of the class. Besides the theoretical knowledge, here we came to know about the actual and real geological exposure; and field experience. Working with such an enthusiastic and honest team during “the field mapping of the area was a matter of honor. So special gratitude to my teammates and classmates for creating a wonderful environment for working and learning and also for making things easier through group discussion.

## **ABSTRACT**

This report summarizes geological fieldwork conducted in the Baripada **Similpal** region, focusing on **Baldiha**, **Sitakund**, **Lulung**, and **Asurhadi**. The primary goals were to study **lithology**, **sedimentology**, **dam structures**, **basement rocks**, and **paleontological findings** in these areas, providing a practical understanding of geological processes.

Overall, the fieldwork underscored the interconnections between **lithology**, **sedimentology**, and **paleontology**, offering a comprehensive understanding of the region's geological history. The experience enhanced both theoretical knowledge and practical geological skills contributing significantly to a deeper appreciation of the Earth's dynamic processes.

## OBJECTIVES

The primary objective of this fieldwork was to study and document the geological, **Paleontological, sedimentary, Geomorphic and stratigraphic** features of the *Baripada beds* focusing on their *Mio Pliocene* age. The aim was to identify and analyze fossil assemblages, to interpret the paleoenvironment and depositional settings of the formation. This work contributes to a deeper understanding of sedimentary processes, the stratigraphy of the region, and the palaeoecological conditions of the *Mio Pliocene* period.

## **INTRODUCTION:**

On February 24, 2024, our team embarked on a full-day field study that began at sunrise and continued till sunset. The objective of this fieldwork was to observe and document the natural environment, behaviors, and interactions within the designated area. The entire day was spent gathering data, conducting observations, and engaging with the environment to understand the specific subject of our study. The time frame from dawn to dusk provided an opportunity to capture a comprehensive view of the area's dynamics, which will be analyzed in this report.

## **Geology of Baripada:**

The **Baripada Bed** is a Miocene-aged sedimentary formation located in the **Mayurbhanj district** of Odisha, India. It primarily consists of **sandstones** and **shales**, and it is notable for the presence of **marine fossils**, particularly **shark teeth**. These fossils indicate that the region was once influenced by a marine environment during the Miocene epoch (approximately **23 to 5 million years ago**). The presence of these fossils suggests a **coastal or shallow marine setting**, which contrasts with the earlier Gondwana formations. The Baripada Bed provides valuable insights into the Miocene paleoenvironments of eastern India.

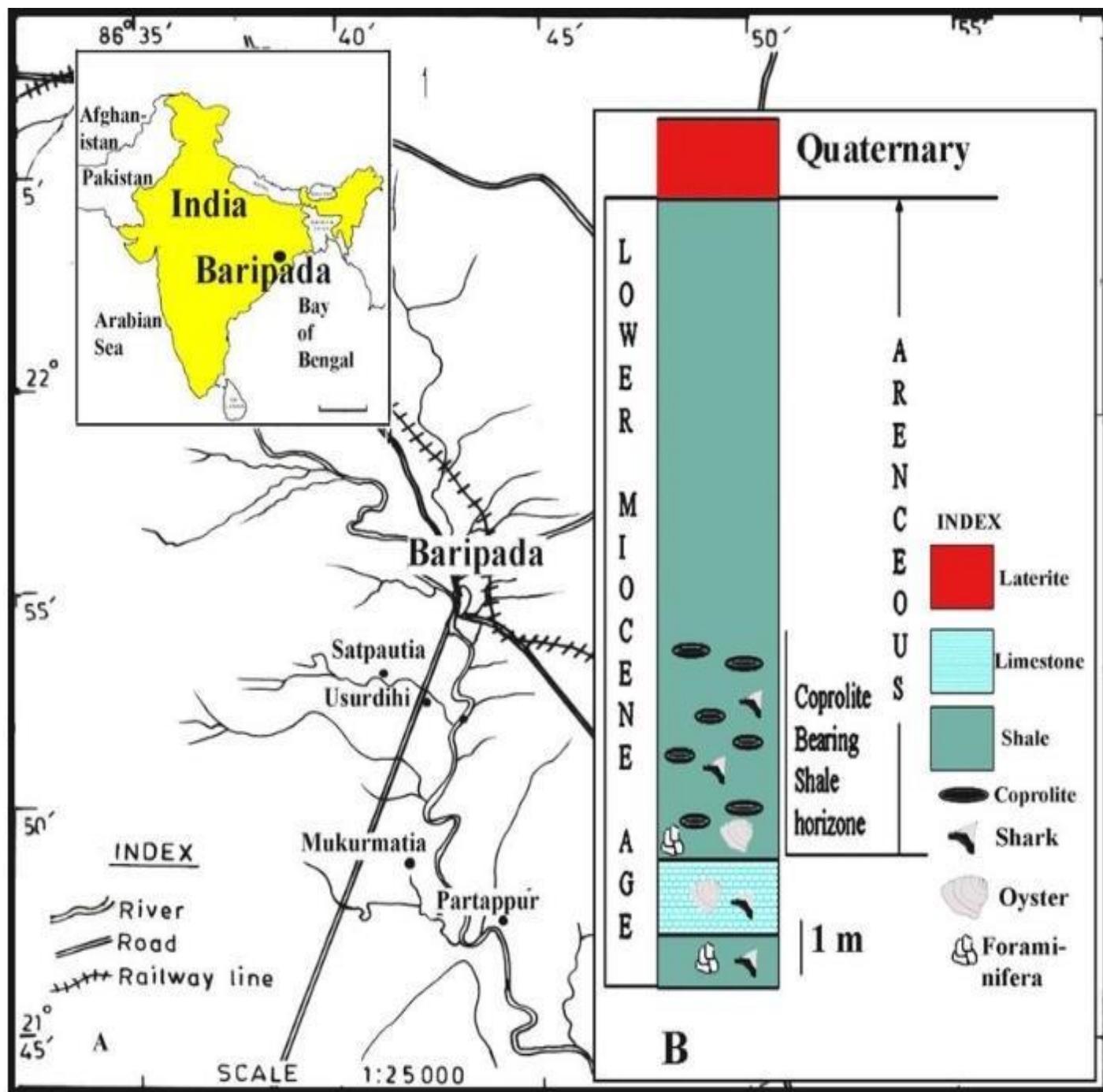


Fig.1. Image taken from Mondal et al. (2009) and Sharma & Sharma (2017).



**Fig.2.** Location 1 travers (Google Earth Pro TM (Version 7.3.6.9796 (64-bit)

## Location 1



**Fig.3.** Baldiha Dam landscape view

**Spot 1(Right abutment of Dam) Lat:**

21°57'37.12" N

**Long:** 86° 36'46.32" E**Altitude:** 121m

Our first field location was Baldiha Hill, marked on topographic map 73K/9 (scale 1:50,000). Orientation and location were achieved using a Brunton compass and map. Back bearings of **Chandri Pahar (125°)** and **Baldiha Hill (250°)** were recorded to ensure accurate positioning.

The topography of the site features an elongated ridge trending nearly N-S, flanked by valleys on both sides. These valleys are characterized by distinct vegetation, indicating the presence of softer rock compared to the ridge.

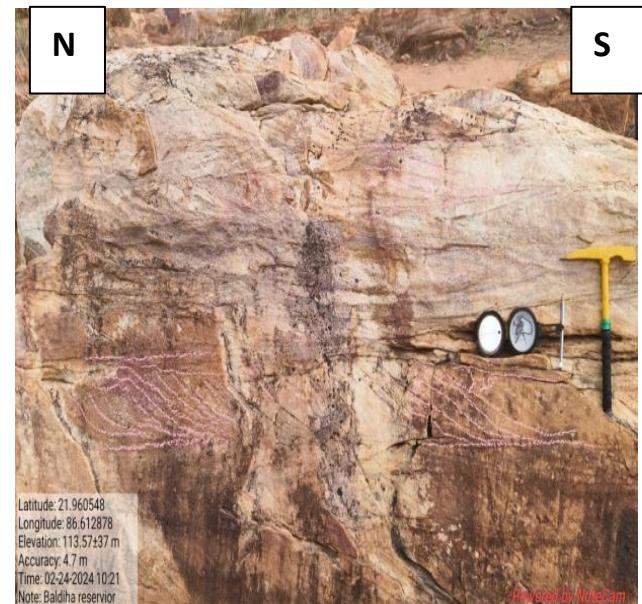
**Lithology:** The lithology of the ridge primarily consists of bedded quartzite, derived from sedimentary parent rocks that have undergone partial metamorphism, hills made up of quartzite. The bedding planes are inclined at approximately 45°, as observed in the field.

**Sedimentary structure:** Cross bedding and bedding planes seen.



**Fig4.** Prof. P.C. sir was teaching us about the

Cross-bedded Quartzite.



**Fig5.** Cross-bedding in quartzite.

**Paleoenvironment:** "The quartzite's cross-bedding reflects the preservation of sedimentary structures during low-grade metamorphism, linking it to a dynamic depositional history." This may be fluvial or alluvial.

### **Attitude data: (bed):**

	Strike	Dip amount	Dip direction
1.	315°	45°	045°
2.	340°	43°	070°
3.	330°	34°	060°
4.	344°	31°	074°

### **Conclusion:**

From the above observations, the strike of the bed is 330 °, dip amount 40 ° and dip direction towards NE.

So, we conclude that it is a uniformly dipping Quartzite within small scale. In the dipping direction the grade of metamorphism increases.

### **Spot 2:**

We move forward to our next spot on the downstream side of the left abutment base rock of the dam. Where phyllite is well exposed.

### **Attitude data:**

	Strike	Dip amount	Dip direction
1.	150°	35°	066°
2.	350°	60°	080°
3.	355°	35°	085°
4.	350°	45°	080°

**Spot 3:**

**Lat:**  $21^{\circ} 57' 54''\text{N}$

**Long:**  $86^{\circ} 36' 40.435''\text{E}$

**Altitude:** 121m

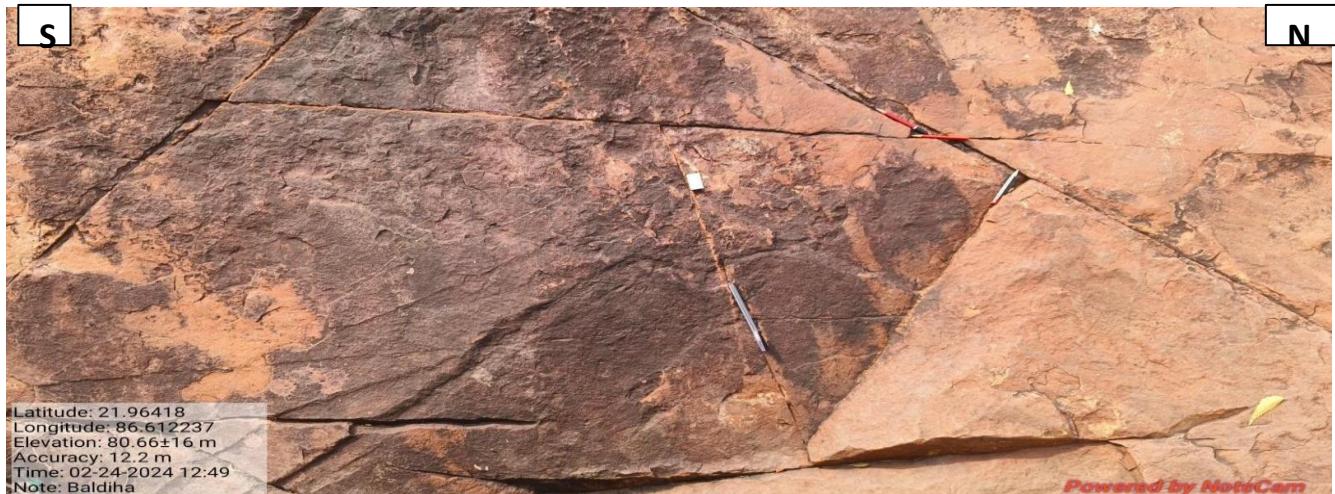


**Fig.6.** Massive quartzite

**Spot 4(Left abutment of dam)**

**Lat:**  $21^{\circ} 57' 50''\text{N}$

**Long:**  $86^{\circ} 36' 43''\text{E}$



**Fig.7.** Joint sets

In our next spot exactly at the left abutment of dam, encountered a massive quartzite (highly jointed), where four sets of joints are developed. Quartz veins are also seen in the rock.

Onion skin weathering seen on rocks.

### **Attitude data: (joint sets):**

	Strike	Dip amount	Dip direction
1.	150°	35°	066°
2.	350°	60°	080°
3.	355°	35°	085°
4.	350°	45°	080°

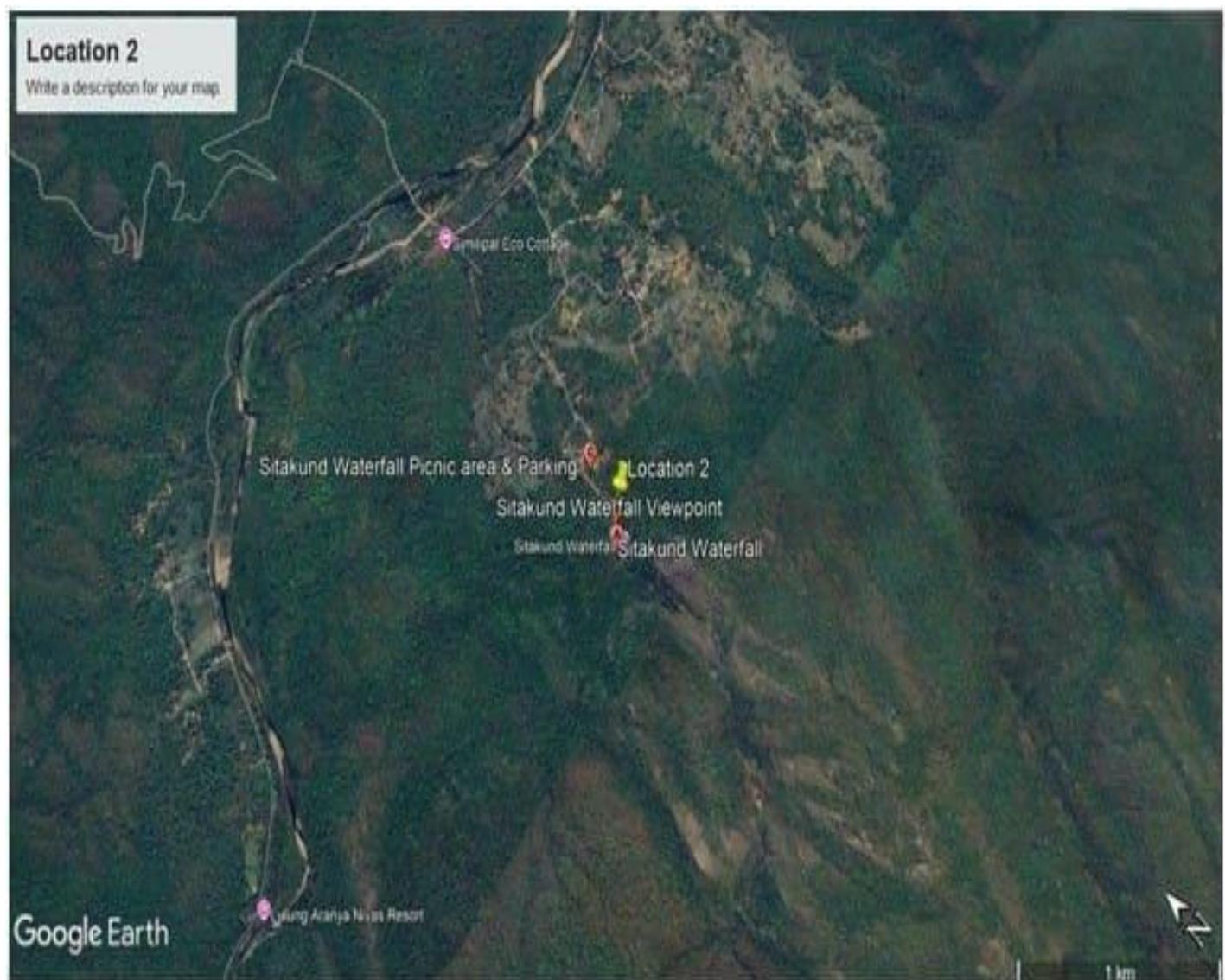
### **Conclusion:**

From the above observations, the strike of the bed is 330 °, dip amount 40 ° and dip direction towards NE.

So, we conclude that it is a uniformly dipping Quartzite within small scale. In the dipping direction the grade of metamorphism increases.

## Location 2

The next location we explored that day was the Sitakund waterfall, 25 KM far away from main town. Here, we encountered an igneous intrusion, which divides the quartzite and basic igneous rocks. Waterfall represents fault.



**Fig.8.** Google Earth Pro TM (Version 7.3.6.9796 (64-bit))

**Lat:** 21° 55' 45"N

**Long:** 86° 34' 18"E

**Altitude:** 171m

**Area:** Sitakund



**Lithology:** Quartzite, basic igneous rocks and phyllite.

**Fig.9.** Overturned west dipping beds

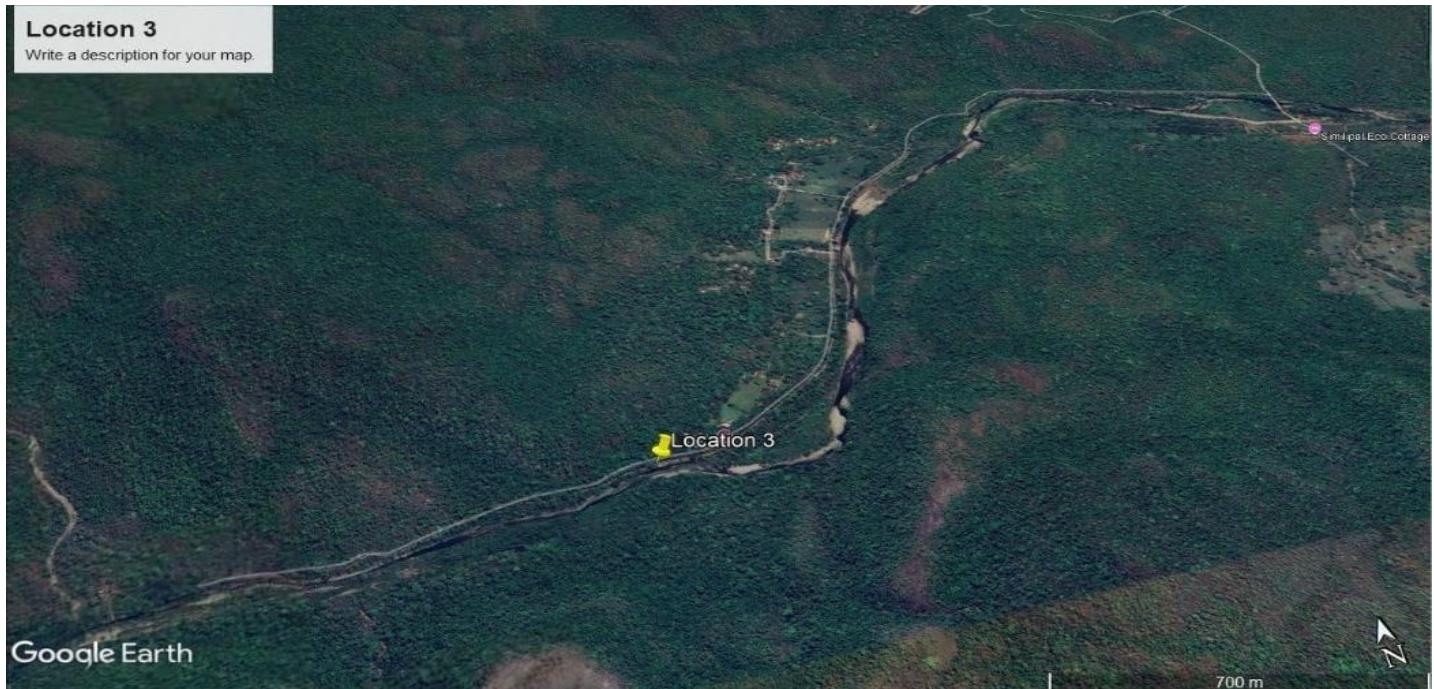


## Location 3

Lat: 21° 56' 24.457"N

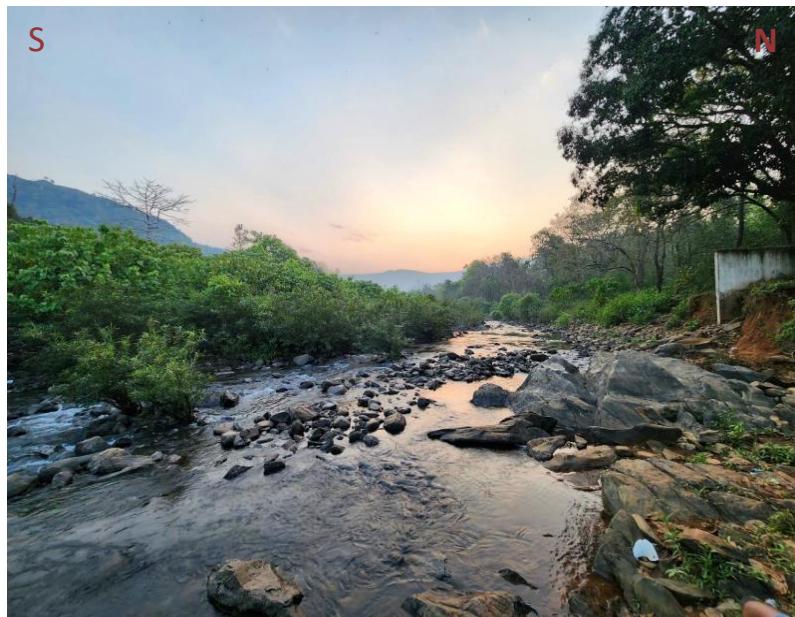
Long: 86° 33' 21"E

Altitude: 161m



Area: Lulung River section

**Fig.11.** Google Earth Pro TM (Version 7.3.6.9796 (64-bit))



**Lithology:** *Phyllite, bedded quartzite*

Water flowing on dip direction of the bedding. This is a dip valley.

**Fig.12.** Lulung near left side of riverbank

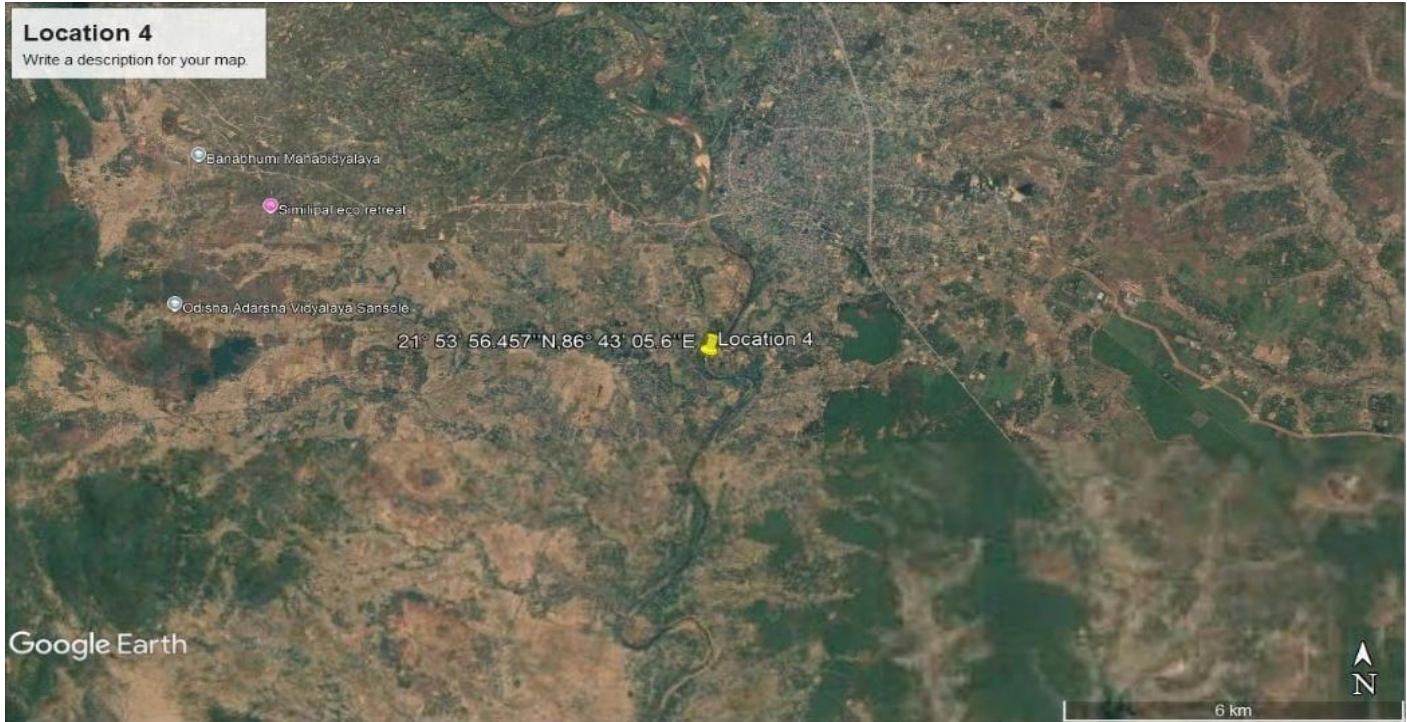
## Location 4

**Lat:** 21° 53' 56.457"N

**Long:** 86° 43' 05.6"E

**Altitude:** 52m

**Area:** Asurhadi



**Fig.13.** Google Earth Pro TM (Version 7.3.6.9796 (64-bit))

## GEOLOGICAL INFORMATION

The final location visited during the fieldwork was **Asurhadi**, where Baripada Limestone of *Mio Pliocene* age was studied.

The Baripada Beds represent Miocene to Pliocene marine sedimentary deposits that are highly fossiliferous. The presence of Baripada Limestone, along with fossils such as ***Ostrea gogensis*** (Bivalvia: Mollusca), indicates a shallow marine depositional environment. Rich assemblages of vertebrate fossils—including sharks, rays (batoids), teleost fishes, turtles, crabs, crocodilians, and mammals—suggest a biologically productive marine ecosystem influenced by marine transgression during the *Middle to Late Miocene*.

In addition to vertebrates, invertebrate fossils like gastropods, bivalves, and foraminifera further support the interpretation of a warm, shallow marine setting.

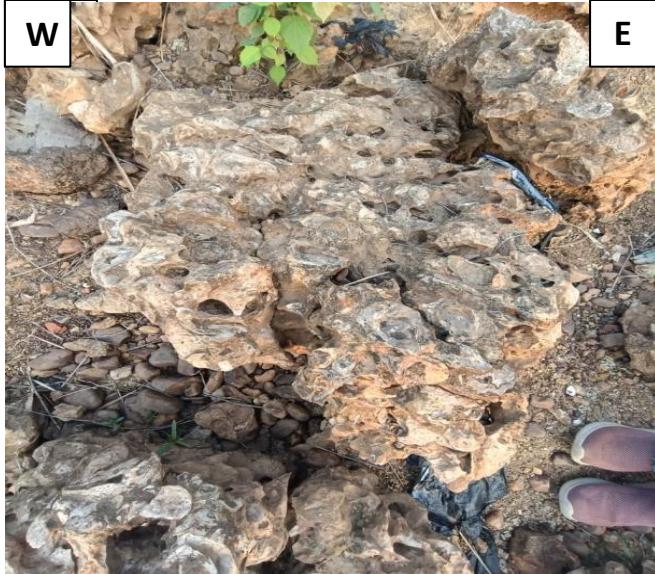


Fig.14.*Ostrea gogensis*.

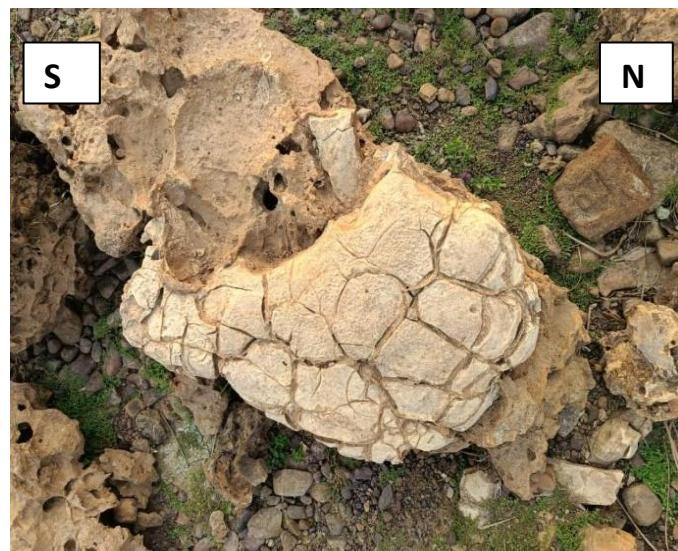


Fig.15.Elephant foot structure (Limestone)

## INTERPRETATION

The fossil content and lithology show strong correlation with Miocene marine sequences of Kutch and Mizoram, indicating broader regional paleoenvironmental connections in the Indian subcontinent during that period. Indicating Baripada bed was a **shallow marine depositional** environment, marine transgression occurs during the *Middle to Late Miocene*.

Examination No - 2492013

7349

L1

Bedrock Quadrangle

Danisoda Limestone

Imitative body

Massive dolomite

Plutite

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36°

38°

40°

42°

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I would like to sincerely thank my field team members **Sitaram Marandi**, **Jayashree Giri**, **Nibedita Behera** and **myself**, for the collective effort, cooperation, and enthusiasm during the fieldwork. Their support in observations, data collection, and discussions greatly enriched the learning experience and helped ensure the success of this study.

**Fig.17.** Teammates

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