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Conservation of Reiek Tlang: a brief assessment of the adverse effect of vehicles and a plea for its cessation

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ABSTRACT

In Mizoram, slightly west of Aizawl, lies a magnificent ridge known as Reiek Tlang. In a state where, according to the Environment and Forest Department, 87.42% is covered with forest, the ridge is uncharacteristic. It hosts splendid meadow-like vegetation in an otherwise rugged, mountainous region. The thin soil on the ridge-top, a nutrient rich silt loam, forms a skin that envelopes the bed-rock and provides sustenance for the tall grass as well as for other vegetation. The absence of tall trees enables one to view the steep cliffs to the east that overlook thick forest while a gentle rolling valley to the north is also in clear sight. As a result, Reiek Tlang is frequented by visitors from all over Mizoram and beyond. Its close proximity to the state's capital, Aizawl also makes it a popular destination. Unfortunately, its lure is also degrading its beauty as vehicles plying on this slope are thinning the soil and removing the skin off the ridge.

Key words: Conservation; forest; Mizoram; Reiek Tlang; soil; vegetation.

INTRODUCTION

For most of its history, Reiek Tlang was only reachable to a plethora of wild animals and the occasional wayfarer. The misguided zeal of government planners made the top reachable by automobile. Since then, the bio-diversity in the vicinity has declined noticeably. It has also caused erosion, so much so that a trail that exposes the bedrock forms a wide scar all the way to the top. As the meadows are a major factor towards the appeal of Reiek, the erosion and compaction of its soil by vehicles must cease forthwith in order to maintain this appeal. The continuation of traffic will denude the soil to a point that renders it irreparable to sustain the meadows, hence lessening the value and aesthetics of the idyllic peak. The location of the ridge and the relatively slow process of soil formation make the ecosystem of the ridge already fragile, but the allowance of vehicles to the top will surely accelerate its degradation.

The top of Reiek presents a sharp contrast to the rest of the mountain. The dominant vegetation changes rapidly from trees to meadows. Although other environmental

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Figure 1. Damage caused by vehicles at Reiek Tlang.

challenges in the region do exist, this study concerns the top where vehicles have damaged the soil which sustains the meadows. Here, 'Reiek Tlang' refers to the top, close to the peak, where the dominant vegetation is the tall grasses which form a pasture.

Understanding the delicate nature of Reiek Tlang needs consideration of the formation of the soil. While the climate of Mizoram is considered moderate, its rainfall is substantial; an annual average rainfall being 400 cm[1]. This may speed up soil formation by accelerating physical and chemical weathering of the parent material; however, it also contributes to its degradation via erosion, especially when one takes into consideration the topography. To truly fathom the gravity of the intricacies involved in the production of the soil climate, relief (topography), parent material, organism, and time[2] would need to be scrutinized. Limitations, financial and manpower, hinders such a task, but the general gist of the complexities in its formations can be highlighted.

Materials and Methods

The following methods were used in the study:

- Measurement of slope
- Field investigation of exposed rock
- Measurement of soil depth
- Measurement of width of area damaged by vehicles
- Random collection of soil and rock samples for laboratory investigation
- Interview of locals

OBSERVATIONS AND DISCUSSIONS

Measurements of the slope were taken at the main spots scoured by vehicles. Closer to the peak, but at the shoulder, was 8° while at the bottom of the hilltop still at the shoulder, it was steeper at 12°. It should be noted that variations in micro-topography exists where some portions are steeper while others are less. The steepness of the slopes at the points of study fall under the 'moderate' category but is leaning towards 'extreme'. This makes it 'prone to mass movement, severe rain splash and sheet erosion' as well as 'domains of active gully and erosion'.[3]

Field Investigation of the exposed rock at the hill top revealed it to be medium grain sandstone. The sandstone is hard and compact and grey to brown in colour. Negative results of the hydrochloric tests affirmed that the sedimentary stone was not calcareous (findings were confirmed at Mizoram University.) Soils derived from sandstone tend to be 'generally of low fertility with loose sandy topsoil and a gradual increase in clay content with depth'[4] colour, texture and lab examination determined that the soil, on the contrary, was fertile. While sandstone soils tend to be yellowish, the soil on Reiek Tlang was dark brown. Unlike sandstone soils which are usually high in sand, the samples textured was low in sand but instead high in silt: hence the likelihood of the parent material being residuum, i.e. formation of the soil from the bedrock beneath, is low.

The location of the ridge that forms Reiek Tlang has no higher areas adjacent to the top, eliminating the possibility of colluviums; gravity deposited soils. As water that reaches the top naturally can only be from the sky, then fluvial processes or materials deposited by water can also be ruled out. Hence the initial formation of soil can seemingly be attributed to Aeolian processes, or wind-blown material, specifically loess. The soil texture, determined to be silt loam, would support the assessment that the soils parent material is loess as it is defined in geology as 'deposits of silt that has been laid down by wind action.'[5]

To determine the age of the soil would be out of the scope of this project and possibly unattainable. Technologies such as optically stimulated luminescence (OSL) or various luminescence methods may be necessary to know the precise age of the aeolian material on Reiek Tlang, but even without it, it is clear that the soil build-up did not occur overnight. Even if one doesn't consider the hundreds of years an inch of soil takes to form, the accumulation of the silt sized particles on Reiek Tlang is a complex process. While quantification of the time would be desirable, the fact that only a thin layer of soil covers the bedrock after millennia without disturbance, serves as proof that the process is long.

Measurements of soil depth to bedrock in various locations of Reiek Tlang varied from 0 to 25 cm with most falling in the 10cm to 20 cm range. Samples were collected at random locations for subsequent lab tests. Determination that the soils were 'silt loam' was made on field. The pH value neared 7, contrast to that typical of soils of Mizoram which often measures beneath 5. While the pH falls within the range of what is considered as favorable for most plants, phosphorous may

Table 1. Comparison of soils derived from sandstone and the soil on Reiek Tlang.

Soils Derived from Sandstone	Soil of Reiek
Low fertility	Seemingly fertile based on texture and colour
Yellow	Dark Brown
Sandy Grains (0.05 to 2mm)	Silty (0.02 to 0.05mm)

Figures 2-4. Measuring depth of soil, width of damage sustained by vehicles and texturing soil.

serve as a limiting factor as phosphate tests revealed it to be low in most samples taken and medium in some. While more tests should ideally be conducted to know the worth of the soil, time and budget constraints served as obstacles.

Interview with a local man, an active member of Reiek village who was familiar with the region, attested that the bald spots were made by vehicles. According to him, before the top was reachable by vehicles, the bald and denuded spots were not present and the meadows reached from edge to edge. Indeed measurements of the bare areas did support his claim as it averaged 6 meters, 5.3 without the outlier. The measurements seemed typical of roads of Mizoram and it was visually apparent that it was caused by vehicles. He clarified that fire was also a cause for concern and that it played a role in soil erosion, but vehicles were the main reason in the complete removal of the soil. Another man previously interviewed, an YMA member, monitoring the region for forest fires also was concerned that vehicles had harmed the hilltop. He reasoned that if people cannot park their cars and walk the last few kilometers, they should not come to Reiek Tlang at all!

He went so far as to suggesting ways to restore the bare areas. He recommended that small structures of stones be lined up along the exposed bedrock, perpendicular to the slope, in order to capture eroded soil. The structures would slow water runoff during rain events and allow deposition, covering adjacent bare areas. Interestingly, the Anasazi people in Mesa Verde did just that to sustain their civilization. Using similar structures called 'check dams', the Anasazi people were able to control erosion for centuries a millennia ago in the barren region of the junction of present day Colorado, New Mexico, Texas and Arizona ('four corners'). Before restoration efforts such as that suggested by local man is considered, vehicular traffic to the top

Figure 5. Interviewing an active member of Reiek village.

of Reiek Tlang must cease.

Exposure of bedrock is conducive to further soil degradation. As the velocity of water run-off is higher at the exposed bedrock than in the areas where vegetation exists, it scours the nearby soil. Hence a positive feedback loop accelerates erosion. In fact, examination of such areas where bedrock met the soil did reveal gaps where water runoff had created recesses and inlets priming the soil for collapse.

As previously mentioned the lack of finances prevented optimal investigation. For instance, more research could empower us with knowledge of the history of the soil, painting a clearer picture of its formation. Its environmental value can also be known by examining its present contents. Unfortunately, test performed were due to accessibility and their results were not heavily significant. Such were tests for ammonical nitrogen, nitrate and phosphate, which ranged from medium to low whose significance is inconclusive as far as soil fertility is concerned.

Conservation of the soil on Reiek Tlang should be in the best interest of a myriad of groups. It supports bio-diversity; hence environmentalists would support its preservation. Tourism would also benefit, as a bald hilltop would lower its aesthetic appeal. Fewer visitors would also have a negative impact on the economy of Reiek village. Adventure groups have also complained that vehicles disturb the tranquility of their campsites and indeed, who would like a noisy automobile driving past your tent? They may even be the cause bats

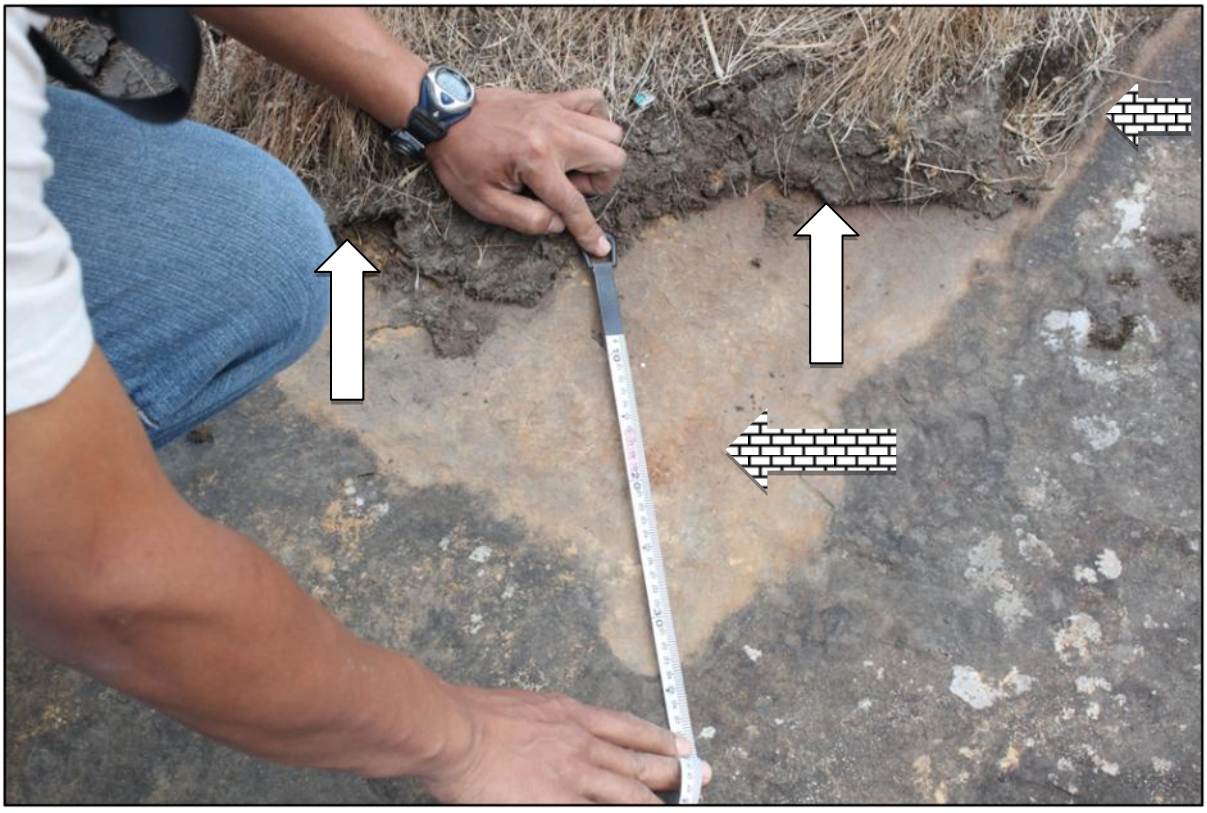

Figure 6. Checkered arrows indicate areas recently subjected to erosion. The white arrows indicate recesses caused by water run-off, further weakening soil structure.

have abandoned nearby caves. If one does an analysis on the benefits of vehicles reaching Reiek Tlang versus the costs incurred by allowing vehicles to reach the top, clearly the costs outweighs the benefits.

Unfortunately, the name of the Reiek resident interviewed before local people was not recorded, but they suggested that vehicles not be allowed to the top should be taken into consideration. He suggested one of two places where automobiles should be stopped; 'point A' a rocky outcrop that forms a semi-cave less than a kilometer before the summit; 'point B' a relatively wide area that allows parking of vehicles a few hundred meters before Point A. Due to the reasons cited, cars should no longer be allowed to reach the top and indeed the area referred to as Point A is a convenient point to stop vehicles from further passage. Not only is there no other convenient locations prior to the top after Point A, there is room for parking of many vehicles. The further vehicles are away from the top, the less the damage and for this reason Point B would be an even better choice for there too are spaces to park vehicles. Once a point is selected a simple barrier to halt vehicles can be erected along with a sign to alert people of the prohibition.

The remoteness of Mizoram has been advantageous from an environmental perspective. Isolation has allowed many critical areas to remain intact for most of its history. However, the last few decades have seen Mizoram go through change at an exponential rate. Environmental awareness has not kept up with the changes and hence, the forests, soils and water bodies have degraded substantially. Environmental degradation has become the norm and many, even if bothered, do nothing. Mizoram has high bio-diversity and falls in the eco-region with the highest bird species richness within the Indo-Pacific region[6]. As population increase will make more critical area endangered, it is worth every effort to preserve all areas that aren't ruined.

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REFERENCES

1. Singh SK & Sinha A (2003). *Geomechanics and Ground Control*. Allied Publishers Pvt. Ltd., New Delhi.
2. *CLORPT for Short.* Smithsonian National Museum of Natural History. http://forces.si.edu/soils/02_01_04.html.
3. *Slope Gradient and Soil Erosion.* University of Windsor. http://web2.uwindsor.ca/courses/earth_science/hudec/nigeria/Inclination%20of%20slope.htm.
4. *Soils of Sydney – Sandstone Soils*. Sydney Environment and Soil Laboratory. http://www.sesl.com.au/fertileminds/201006/Sandstone_soils.php
5. *Glacial Deposits: Loess and Till.* Illinois State Museum. http://www.museum.state.il.us/exhibits/larson/loess.html.
6. *Mizoram-Manipur-Kachin rain forests.* Wild Worldlife Foundation. http://www.worldwildlife.org/wildworld/profiles/terrestrial/im/im0131_full.html.

