

Landsliding and its Management in Naseeranagar, Meppadi, Wayanad, Kerala

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Abstract: Wayanad is one of the beautiful hill stations located in the Western Ghats on the north eastern part of Kerala state. Out of fourteen districts of Kerala, Wayanad is considered as most backward (least developed) district. DM Education and Research Foundation, after studying the needs of the people and lacuna in the health care facilities in Wayanad area, decided to set up DM WIMS at Naseeranagar. Landslides, defined as the movement of a mass of rock, debris or earth down a slope, can be triggered by a variety of external stimulus, such as intense rainfall, earthquake shaking, water level change, storm waves or rapid stream erosion that cause a rapid increase in shear stress or decrease in shear strength of slope forming materials. 1. Landslide hazards stand the second geological hazards following earthquake. Therefore in Naseeranagar there is always timely action and reactions are taken to reduce damage to the nature, buildings, road and human life. Landsliding is very well prevented by modification of the slope geometry by excavation, drainage of surface and ground water, use of retaining structures, and internal slope reinforcement. Increase in settlements at hill tops, both slope and rock dipping outwards from the ghat sections, continuous heavy rains are the characteristic features behind the Wayanad landslides.

Keywords: Buildings, Excavation, Hazards, Landslides, Wayanad.

1. Introduction

Wayanad is one of the beautiful hill stations located in the Western Ghats on the north eastern part of Kerala state. A large part of Wayanad is forested and covered by plantations. Despite the large forest cover and plantation economy in Wayanad, poverty among the Adivasi communities is estimated at 60.4 percent.

Wayanad was traditionally known as the land of forests. There are different versions about the origin of the name Wayanad, that it was derived from the word Vayalnadu (the land of paddy fields) or Vananadu (the land of forests) and that it was the land of forests as well as paddy fields.

Out of fourteen districts of Kerala, Wayanad is considered as most backward (least developed) district. Many factors like geographical topography, poor industrial growth and sluggish business ventures have played key roles. This is also reflected in the health sector. There were no medical colleges, a few hospitals, poor health service and care. Though the government is making commendable effort, government – public partnership is the need of the hour in fulfilling the aspiration of the local people.

The populations of Wayanad, including a large number of Tribals, majority of who fall in the category of BPL, were thus deprived of health care. On a day-to-day basis, they suffered from lack of facilities for trauma care, specialists care and superspeciality services. The locals had to travel at least 100 kms to get proper treatment. DM Education and Research Foundation, after studying the needs of the people and lacuna in the health care facilities in Wayanad area, decided to set up DM WIMS at Naseeranagar with the following objectives:

1. Training & Development of High Calibre Healthcare Professionals.
2. Quality Medical Care at Affordable Cost.

3. Medical Education merging with nature.
4. Improving Health Infrastructure.
5. Overall development of the region.

Landslides, defined as the movement of a mass of rock, debris or earth down a slope (Cruden, 1991)¹, can be triggered by a variety of external stimulus, such as intense rainfall, earthquake shaking, water level change, storm waves or rapid stream erosion that cause a rapid increase in shear stress or decrease in shear strength of slope forming materials. In addition, as development expands into unstable hill slope areas under the pressures of increasing population and urbanization, human activities such as deforestation or excavation of slopes for road cuts and building sites, etc., have become important triggers for landslide occurrence.

Landslides of different types are frequent in geodynamically active domains in the Himalayan and Arakan-Yoma belt of the North-Eastern parts of the country as well as in the relatively stable domains of the Meghalaya Plateau, Western Ghats and Nilgiri Hills. The phenomenon of landslides is pronounced during the monsoon period. Landslide not confined to the only hilly or mountainous areas rather it can be found in coastal areas and offshore too. In fact 27 states of the country are affected by landslides, although they differ from the scale of severity of disaster (Table 1). They affect at least 15% of land area of our country exceeding 0.49 million km [1]. Landslide hazards stand the second geological hazards following earthquake (Li et al., 1999²; Geological survey of India, 1982³).

Table 1: macrozonation of landslides

<i>Hill Range</i>	<i>Landslide Incidences Potential</i>	<i>Proximate Causes</i>
Himalayas	Very high to high	Predominantly naturally increasing due to human intervention
North Eastern Hill Ranges	High	Predominantly natural
Western Ghats & Nilgiris	High to Moderate	Human intervention dominant Natural causes Secondary
Eastern Ghats	Low	Predominately due to human intervention
Vindhyaans	Low	Predominantly due to Human Intervention

Landslides and other mass movements like weathering and erosion have always been occurring since the origin of the earth, including mountains and hills, and considered as part of landscape forming. Generally the areas uninhabited and away from human intervention have been considered less prone to such phenomena. While, the areas where human interaction with nature increased, vulnerability of the land to such processes has also increased. As the population has increased quite rapidly over the last century, people had to venture in new areas, not inhabited earlier, for their survival. Most of these areas are vulnerable to such processes and pose a threat to the life and property of the people.

2. Naseeranagar Landslides

Whenever there is heavy rain and there is no proper drainage to the rain water there are heavy chances for the land sliding at the land sliding prone areas. Land sliding is commonly occurs near the newly constructed road and buildings.



Figure 1: Landslide at Naseeranagar due to heavy rain fall near the Road



Figure 2: Landslide due to heavy rain fall at Naseeranagar

3. Measures taken to prevent landsliding at Naseeranagar

whenever there is a new road or building is constructed, the areas around them is prone for land sliding during rainy season.

To prevent the land sliding many measures can be taken like

1. Making a proper way for the rain water to flow.
2. Prevent the rain water storage at the high altitude.
3. Prevent the heavy loaded vehicles to travel on newly constructed road in rainy seasons.
4. Step ladder like cutting the area around the road and building construction instead of steep cutting of the hill.
5. Plantation at the slopping areas of the hill using the biodegradable mesh, which gives strength to the plants and its roots.
6. Put concrete around the building which prevent water slugging, if water stays around the building for more time it liquefies the soil and makes the area around the building prone for land sliding.
7. If there is more slopping area or steep cut around the building put concrete wall.
8. Making a proper drainage for rain water on both sides of the road.
9. The trees which have many roots inside the ground should be retained to give strength to the soil.



Figure 3: stepladder cutting of hill while making road



Figure 4: Plantation along the slopping areas to prevent soil erosion



Figure 5: putting a concrete around the constructed building and plantation at the slopping area to give strength to the soil.



Figure 6: stones and cement is used at slopping area near the building to prevent land sliding and giving strength to the foundation of the building.



Figure 7: plantation is done at slopping area by using biodegradable mesh, which gives strength to the plants and its roots.

4. Discussion

During monsoon whenever there is a heavy rain it is common to see the landsliding along the road side and also along the rain water flowing areas. Expecting these problems during monsoon we should always should take precautionary measures before the monsoon starts. Failure to take the precautionary measurements will cause heavy loss in finance to rebuild the damaged. If there is heavy landsliding occurs on the road, there will be problems in transportation. Sometimes by the landsliding there may be risk for the human life also [Anderson MG⁴]. Therefore in Naseeranagar there is always timely action and reactions are taken to reduce damage to the nature, buildings, road and human life.

Rainfall remains an important triggering factor, human activities hold an evident relevance, since about 20% of the old mass movements are attributed to quarrying activity and excavations; the latter factors, along with rainfall, contribute to another 59% of events [D. Di Martire⁵].

Landsliding is very well prevented by modification of the slope geometry by excavation, drainage of surface and ground water, use of retaining structures, and internal slope reinforcement. These remedial measures are excellent site specific management tools for landslides if correctly designed and constructed. Slope geometry modification by removal of all or part of the earth driving the landslide is the most efficient way of increasing the factor of safety of a slope, especially in deep seated slides (Bromhead, 1997⁶).

Real time monitoring data on rainfall, earthquake, pore pressure, and displacement of landslides, which may be a trigger for landslide occurrence, or indications of the movement of specific landslides, should be communicated into the database in real time for the purpose of landslide warning (Kishor Kumar et al, 2009⁷).

5. Conclusion

The pattern and nature of landslides occurrence in the Naseeranagar, Wayanad are similar as compared to the other parts of western ghat. Irrespective of Vegetated or non-vegetated, steep or gentle slopes, all are prone to landslides during heavy rain, unless taken care properly. Increase in settlements at hill tops, both slope and rock dipping outwards from the ghat sections, continuous heavy rains are the characteristic features behind the Wayanad landslides.

New developments can be prohibited or restricted in landslide-prone areas. Landslide prone areas can be used as open space, parks, woodland and recreation.

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