Challenges to overcome: An overview of recent landslides with special reference to Meeriabedda landslide

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ABSTRACT: Landslides can be considered as one of the main and frequently faced natural disasters by our island. Although the area of influence is small, the extent of damage caused to lives and property by a landslide is immense. The Meeriyabedda landslide in the Koslanda estate occurred on 29th of October at about 7.45am. Rainfall data of the Poonagala gauging station revealed that the amount of precipitation poured in to the area for three consecutive days from 26 to 29 exceeded 500mm. Consequence was the destabilization of the already identified high potential area located above 6 line houses claiming about 12 deaths and 23 missing of people lived in those houses which were completely drawn in the debris.

Main causes for a landslide to occur are twofold. They are natural causes and effects created due to manmade activities. Although all causative factors satisfy favorable conditions for a landslide occurrence, failures are not taken place until the threshold limit of main decisive triggering factor; rainfall is achieved. Therefore, it is a very well-known fact even in well developed countries that the prediction of landslide disasters is very difficult to near precision. But, geologists can give the probability of landslide occurrence to a greater precision by evaluating all available causative factors with local and regional geomorphology.

As a result of unfavorable human interventions, existing drainage and land use patterns had been drastically altered over the years creating slope instability, which was the main reason for the Meeriabedda tragedy.
Victims of the Meeriyabedda landslide disaster are estate workers residing in line houses. It is impossible for them to cope with this type situation without the help of estate officials and the government with their capacity. National Building Research Organisation (NBRO) is the responsible government agency for the identification of vulnerable areas and provide guidelines to the relevant authorities. But, NBRO has not yet been established and empowered by a Parliament act giving the due recognition and legal provision enabling it to carry out its activities effectively. Therefore, NBRO is lacking required power in case of resettlement of identified vulnerable population or adopting mitigatory measures to such areas.

However, it is a must now, to apply short term mitigation measures after identification until detailed measures are implemented. At the same time if the risk is high, evacuation of vulnerable community must be done and proper temporary shelters must be provided to them immediately before the permanent evacuation, if necessary. Hence, a mechanism and legal provisions must be established to relevant agencies. For this purpose, it is essential to strengthen NBRO by legally with its capacity and resources, since being a self-funded organization, which is not depended on the treasury; it is very difficult to cope this national requirement effectively with prevailing status.

1 INTRODUCTION

Landslides can be considered as one of the main and frequently faced natural disasters by our island. Although the area of influence is small, the extent of damage caused to lives and property by a landslide is immense. In addition, this is directly related to the economic development of the country. It is clearly evident by bitter experiences we had in the past.

The Meeriyabedda landslide in the Koslanda estate occurred on 29th of October at about 7.45am. Rainfall data of the Poonagala gauging station revealed that the amount of precipitation poured in to the area for three consecutive days from 26 to 29 exceeds 500mm. Each day has received over 100mm rainfall at that station. Consequence was the destabilization of the already identified high potential area located above 6 line houses claiming about 12 deaths and 23 missing of people lived in those houses which were completely drawn in the debris.

2 BACKGROUND

Main courses for a landslide to occur are twofold. They are natural causes and effects created

due to manmade activities. But the decisive triggering factor for Sri Lankan landslides is the high intensity rain fall. Mainly Sri Lanka receives precipitation from two monsoonal; North Eastern and South Western and two inter-monsoonal rains. Slopes of the Uva province is covered by the second inter-monsoon which effects from October to November and the north eastern monsoon which effects from December to February.

Six main causative factors can be identified for landslide occurrences, namely bedrock geology including degree of weathering and nature and intensity of defects, Slope angle, Landform, Overburden soil cover, drainage pattern and land use pattern. First four factors are static whereas the last two are dynamic, which are being ever changing with time mainly due to human interventions. Although all of these six factors satisfy favourable conditions for a landslide occurrence, failures are not taken place until the threshold limit of main decisive triggering factor is achieved. Therefore, it is a very well known fact even in well developed countries that the prediction of landslide disasters is very difficult to near precision. But, geologist can give the probability of landslide occurrence to greater precision by evaluating all available causative factors with local and regional geomorphology.

3 GEOMORPHOLOGICAL SETTING OF MEERIYABEDDA AREA

Geomorphologically, the area is a gently inclined talus slope, where a thick loosely compacted colluvium deposit was observed at the foot of the near vertical rocky scarp and is situated at the middle part of the slope. The lower area shows a fairly steep surface as well. The composition of the colluvium deposit includes a randomly arranged mixture of weathered clayey and sandy products and organic material that can act as a sponge with high water content. The area was an abandoned tea cultivated land in which the properly maintained surface drainage system has been neglected. This colluvium deposit is underlain by garnet biotite gneiss bed rock, which is highly foliated and jointed.

4 MECHANISM OF MEERIYABEDDA LANDSLIDE

Due to the destruction of the existing drainage system and vegetation cover as a result of human activities, infiltration of rain water in to the soil overburden is enhanced tremendously in the area during the recent past. As a result, an underground water pool is developed increasing the weight of the soil mass in a short period of time. This may weaken the inter particle attractive forces prevailing among soil particles loosing the shear strength of the material leading to create slip surfaces along weak planes. At the same time, internal water pressure in joint planes can also be developed by percolating water in to them. As a result, these joint planes can be expanded by creating an additional force on to the soil mass. This also helps to satisfy the appropriate conditions to loosen the shear strength of the soil material. Ultimate consequence is the downward movement of all available material on the slope along a surface of rupture under the gravity to attain a static condition with low potential energy. This whole phenomenon is known as a landslide. The Meeriyabedda mass movement is a deep seated rotational landslide, which is incorporated with several minor slip surfaces apart from the main one.

5 NEGLIGENCE OF PEOPLE ABOUT PRE SIGNALS

Generally, almost all landslides show pre signals; such as appearance and expansion of tension cracks on the ground and floors and walls of buildings located at upper slope areas, disappearance of springs and drying up of wells located at upper slopes, appearance of springs and increase of water levels of wells located at lower slope areas, Muddy water out pouring from springs at lower slope areas, ground subsidence of upper slopes, tilting of poles and trees etc., prior to the main movement except in some rapid sudden slope failures. In the case of Meeriyabedda landslide, some of these features like appearance and widening of tension cracks on the Koslanda - Poonagala road, floor and ground cracks of line houses, small local ground subsidence happened at times in the middle part of the destabilized area, water seepages more or less throughout the year revealing high elevated ground water level, etc., have been observed prior to the incident. However, many people are not prepared to act on these pre signals although they have been well aware.

6 REQUIREMENT OF LEGAL PROVISIONS

Victims of the Meeriyabedda landslide disaster are estate workers residing in line houses. With their

capacity, it is impossible to resettle themselves without the help of estate officials and the government. National Building Research Organisation (NBRO), which had initiated landslide studies in back in late eighties and still continuing with greater development has identified the high potentiality of the Meeriyabedda area in the year 2005 and informed the severity to relevant government authorities. Due to the service rendered to the nation in terms of landslide disaster management, NBRO has been recognized as the national focal point by the government, public and private sector institutes. But, NBRO has not yet been established and empowered by a Parliament act giving the due recognition and legal provision enabling it to carry out its activities effectively. Therefore, NBRO is lacking required power in case of resettlement of identified vulnerable population or adopting mitigatory measures to such areas. Due to lack of adequate lands belonging to the government also hinders the resettlement activities. In addition, some people do not want to vacate their original places though they have been informed about their vulnerability, since immediate threat is not exhibited on the ground because, landslide warnings are issued based on the higher probability. Government is being directing NBRO during last few years to mitigate some such places with priority basis. Somehow, it is a need of today to attend such unstable areas after they have been identified. For this purpose, the capacity and resources of NBRO must be upgraded. Being a self funded organization, which is not depended on the treasury, it is very difficult to cope this national requirement effectively with available facilities.

However, it is a must now, to apply short term mitigation measures such as surface drainage control, application of erosion control measures and dewatering of high elevated ground water level after identification. Mechanism and legal provision must be established to relevant agencies. At the same time if the risk is high, evacuation of vulnerable community must be done and proper temporary shelters must be provided to them immediately. Then, sudden steps to be taken for permanent resettlement with a social assessment along with technical considerations. More importantly, the new place must be provided with more facilities than the original place. If such a system is available any community will not deny settling in a more comfortable location.

7 CONCLUSIONS

The basic need is to build awareness and understand the genuine necessity of the resettlement of vulnerable people, among all related parties, not only government or the public authorities but also the affected communities. It is real fact that, with the population growth, people encroach marginalized lands such as reservations and moves onto unstable steep lands. Most of the cases, these people are under privileged groups whose income level is far below the required to survive. Therefore, they have no other option than the occupation of such areas exposing themselves to various types of hazards.

It is necessary to formulate a national policy or Standard Operating Procedures (SOPs) to optimize these activities in the country. Accordingly, relevant institutes must undertake their due responsibility earnestly.

NBRO is the responsible agency for the identification of vulnerable areas and provision of guidelines to the relevant authorities. And also mitigation proposals can also be prepared. However, proper mechanism has not still been put in place to apply mitigation or precautionary measures on such identified unstable slopes.