Indian J.Sci.Res. 4(1) : 143-148, 2013 ISSN : 0976-2876 (Print)
ISSN : 2250-0138 (Online)

LANDSLIDES: AN ENVIRONMENTAL HAZARD IN THE PIR-PANJAL HIMALAYAN RANGE IN POONCH DISTRICT OF J&K STATE, INDIA

ANIL K.VERMA[a] AND RAHEELA MUSHTAQ[b1]

Department of Zoology, Govt. P.G.College, Rajouri, J&K, India
[a]E-mail: anilverma.ak@gmail.com
[b]E-mail: raheelamushtaq@rocketmail.com

ABSTRACT

The Himalayas truely one of the most outstanding yet fragile ecosystems of our planet constitutes one of the most threatened life-support system on the earth today. The Pir- Panjal range a group of mountains situated in the inner Himalayan region is no longer left untouched by the development fever depicting the consequences of the same in the form of landslides, soil erosion, climate change and loss of biodiversity. Of them landslides is the most common and conspicuous environmental hazard prevailing almost every year in the study area. Occurrence of landslides not only disrupts the environmental equilibrium but also checks and retards the overall development of the area. The Pir-Panjal range is under threat due to constant occurrence of landslides caused by natural and anthropogenic mechanisms. Therefore, the management of such an environmental hazard has become one of the prime importances in the pursuit of human development. In this study, an attempt has been made to find out the landslides affected areas in the Mughal road in Poonch district. The possible factors triggering the landslides and need for checking of landslides have also been discussed.

KEYWORDS : Landslides, Pir-Panjal Himalayan Range, Environmental Management

Landslides is a very important type of mass movement which takes place over the earth surface on the down slope under the influence of gravity and consequently the broken rock materials get accumulated at the foothills. The nature of the landslides depends on the surface characteristics (i.e. topography, rock types and slope vegetation) and the tectonic events which make equilibrium stage of the slope. This equilibrium stage is, however, interrupted quite frequently by various environmental factors particularly change in climate, plant cover and the loss of surface material besides the anthropogenic interventions (Doornkamp and King, 1971; Gupta et al, 2009; Kaul and Verma, 2009; Namgyal, 1991; Ray and Sen, 2009; and Tiku, 2009).

The experience of the past few decades has shown that industrialization, urbanization and economic development have changed the earlier scenario of the environment by straining, altering to a larger extent or even destroying the ecosystem. The unchecked deforestation and the resultant high intensity landslides, unplanned developmental activities combined with natural factors have accentuated the process of ecological deterioration which has serious repercussions. The development, no doubt is an integral part of human life but concurrent remedial measures restoration and rehabilitation should also be a part of all the developmental projects.

In India, the Himalayan range covers the entire northern part of India, one being the state of Jammu and Kashmir (J&k). The higher regions of the state are covered by the inner Himalayan ranges, one of which is the Pir-Panjal range. This range includes a group of mountains that lie in the inner Himalayan region, running from the east, south east to west, northwest across the state of J&K where elevation varies from 1400m to 4100 m asl. Pir-Panjal is the largest range of the lower Himalayas belonging to the Panjal zone with major rock formations of Panjal traps and agglomerate slates. Other rocks overlying the Panjal zone are various varieties of shales, schists and coal. Shiwalik group of rocks are also met with here & there (Gupta et.al, 1995).

The main objective of the present study is therefore, aimed at to discuss the landslide causes in a stretch of Mughal road at Poonch region for which there is lack of information till date and this communication also suggests some measures to check the landslides.

MATERIALS AND METHODS

Study Area

The present study area ie, Behramgala-Chattapani-Peer Gali lies in the Poonch district of J&K State. It is one of the frontier remote districts of the State situated on the line of control surrounded by Kashmir valley in the north-east; district Rajouri in the south and Pakistan occupied Kashmir (POK) in the west. Poonch is separated

[1]**Corresponding author**

Figure 1: A segment of Historical Mughal Road In Pir-Ki-Gali Sector of Poonch

from Kashmir valley by the gigantic Pir-Panjal range of the Himalayas whose highest peak Tatakuti standing at 15560 ft above sea level falls in poonch. The historical Mughal road links up Poonch region of Jammu and the Kashmir valley (Figure, 1).

Topography of district Poonch is hilly and mountainous barring few low lying valleys, sky touching peaks covered with shining snow and the lush green surroundings presents a stunning scenery. The general climate varies from sub-temperate to temperate. Barring some low altitudinal areas, the summers are cool & winters cold with unusual snowfalls. January and February are typical cold months in the region with the temperature in higher reaches (4000m asl) as low as 10 to 20^0C below freezing point while in the lower reaches and above (1100m asl) it is of the order of 2 to 3^0C. During April through June, the temperature goes as high as 25^0C.The annual rainfall ranges from 1500 to 2000 mm, the bulk of which is received during monsoon period.(July to September).The natural vegetation of the higher reaches is comprised dominantly of *Pinus wallichiana* (Kail), *Cedrus deodara*(Deodars), *Pinus rouxburghii* (Chir) and *Quercus* sp.(Oaks).

METHODS OF ANALYSIS

On several occasions the survey was conducted to study the mountain slope characteristics and gently slopping valleys were observed for their macro-morphology and vegetation cover. Relevant still photography of the desired sites was done with the help of the digital photographic camera (Sony make). Landslides prone areas were identified and probable causes noticed. Additional data and information has been collected from literature, local folks and from fields by the authors themselves.

OBSERVATION AND DISCUSSION

The ecosystems in the Himalayas have recently been the focus of attention of a number of multi-disciplinary and problem specific studies. The study area, Pir-Panjal is one of the environmental hazard prone areas not only in the J&K State but also in the country as a whole. Human interference in this virgin land started during the Mughal rule when Mughals preferred and selected the area not only as a health resort but also for various sporting activities. Since then, the pressure of population in the virgin forest land had been increasing decade after decade and century after century. Behramgala-Chattapani-Pir Ki Gali Road, the

Figure 2: A Landslide Prone Area Along The Mughal Road Which Occurred Instantly As The Authors' Vehicle Crossed The Site

southwestern sector of Mughal road is vulnerable to landslides every year especially at the time of intensive and heavy rains.The hazard of soil erosion and landslides is one of the greatest human made disasters, which poses a serious threat to the livelihood and food security of the local people, especially those in the lower economic strata living in the hill areas and remote places in the valleys.

Though landslides and soil erosion is a global phenomenon in India it is seen in its worst form in the Himalayas and its watershed that sustains a huge population and replenishes several perennial river system. The major factors (natural and manmade) responsible for causing slides in this study area are:

NATURAL FACTORS

Virgin slopes

The virgin slopes predominate along the Mughal road which either are bare of any vegetation or have scrub and bushy growths .At some slopes there are lush green pastures where grazing is practiced .The mindless cutting of trees (deforestation) for fuel and over-grazing of the livestock has also reduced the vegetative cover of the rain fed areas of Pir-Panjal range. Bare rocky surfaces rather than vegetation cover are much susceptible to landslides .The environmental degradation has been quick in these areas because of the poor quality of soil and also due to increased demands on fuel, fodder and food. Lack of environmental awareness due to low socio-economic status of the people living in these areas has made them their own enemy.

In the study area, the average slope starts from 150 and it reaches about 300 as we move from Bufliaz (Poonch) to the Peer Ki Gali Sector(Gupta et al. 1995). The influence of slope steepness on landslide occurrence is the easiest factor to understand as steeper slopes have a greater chance of land sliding. There are many factors which are responsible for instability of hill slopes. The variations in degree of these factors viz. nature of relief, bedrock regolith, drainage, earthquake and human interference (Cook and Deornakamp, 1990) effectively determines the intensity and spatial extent of slope failure. Landslides usually occur at unstable hill slopes. The factor stability and instability is determined by the factor of safety FS, where

$$FS = \text{shear strength/shear stress}$$

If FS>1.0 than the stability is likely to occur and if

FS<1.0 than the instability is likely to occur causing landslides. The altitude along the study area varied from 54,00ft masl to 11,500ft masl which is known to have maximum landslides in relation to the relative relief. The amount of landslides as per rule gradually decreased towards the lower and higher relief zones.

Heavy Rainfall and Precipitation

The study area is characterized by monsoonal climate where the rainfall starts from the month of July and continues till September. The average annual rainfall recorded was approx. 1500-2000mm. This study area also experienced precipitation in the form of heavy snowfall from October to March every year as is evident from shots which were clicked during October 2011 overland flow is a common phenomenon during rainstorms. This may have been due to precipitation intensities exceeding soil infiltration with consequently greater surface run off over the soils which has only reduced the slope stability but also caused slumping down of the debris and loose soil leading to landslides as witnessed at Maansar (Figure, 2).

Anthropogenic Activities

Besides the natural causes various anthropogenic activities noticed at the study area which can also be held responsible for the landslides in this sector includes:

Over Exploitation of Natural Resources

These includes not only the authorized extraction of timber for generating revenue for the state but also the clandestine plundering of forests by various agencies like villagers, contractors and the nomads who use this area for grazing of their livestock resulting in the destruction of the tree cover. Trees have an essential role to protect soil and water and preventing the landslides to a great extent because of the reason that the trees leaves act as a shield to the incessant rains and the rain water seeps down into the roots and protects the soil from being loosened.

The hilly slopes made bare of tree cover as discussed earlier, are subjected to the torrential rains, which the soil devoid of vegetation and tree cover are not in a position to hold and as such water passes in great force uprooting scarce vegetation, boulders and topsoil thus creating erosions, landslides and floods. Along the Mughal road, the green pastures predominate and such grazing lands situated at high altitudes within coniferous forests or above them are known as “margs”, the comparatively flat lands devoid of the tree growth and supporting a thick grass cover. Nomad grazers called gujjars and bakerwals own large herds of cattle and sheep (Figure 3), use there margs for grazing of their livestock. The pressure of grazing on the mergs and the forest areas, adjoining these pastures is far above the carrying capacity of these areas which has caused rapid deterioration of the pasture lands, soil erosion and insignificant regeneration of forests on account of heavy trampling and browsing.

Tourism Infrastructure

There has been a constant increase in tourists flow to Poonch-Rajouri twin border districts connecting Jammu division with the valley of Kashmir and such heavy tourist influx has enforced the govt. agencies as well as the local people to develop large scale infrastructural base in terms of roads, huts, guest houses and other installations of tourists use. The infrastructural development has no doubt boosted the tourist flow, but simultaneously threatened the environment of these areas which are highly fragile and ecologically less accommodating in nature.

The infrastructural development in this region has involved the mass consumption of timber from the local forests and also stones being extracted (Figure 4) from surrounding landscape. Soft rocks have been excavated manually while harder portions are blasted which weakens the rocks and debris produced has been dumped on the slope to further aggravate the situation. Construction of the motor able roads far & wide, for instance, along Mughal road has pierced the forest cover by massive felling of trees which has adversely affected the ecosystem.

Occurrence of landslides at some points is one of the major problems in the Himalayas in general and the Mughal road in particular due to slope failures. These slopes are very sensitive and lithologically speaking consists of weak rocks which are very unstable. Moreover growth in transportation network and building constructions has enhanced slope instability. The Mughal road passing through Pir Panjal range presents a scene of massive degradation of the forests as a result of construction and maintainence of the road. Man and the mountains are at a constant war with each other in finding a safe road for carriage of traffic and goods.

Figure 3 : A Nomad Along With A Flock/herd Of His Livestock Another Anthropogenic Pressure On The Natural Resources Along Mughal Road

Figure 4 : Infrastructural Development Along The Mughal Road For Recreational Purpose

The sinking of the Chattapani is attracting the attention of the experts where, the road is sinking and the area ploughed to maintain the road. During rainy season it is a usual sight to see the pink muddy torrential rivulet coming from this site on all sides as the tree cover has almost crumbled and the soil binding and water holding capacity has collapsed. The exploitation of forest for timber and fuel is going unabated. The timber and the firewood which is sold in most private organized sale depots in Jammu and the innumerable kilns run on Jammu-Poonch route and Jammu-Pathankote route for production of wood charcoal and brick is a sufficient proof of the greater devastation of the forest cover in the region.

It is an undesirable fact that society has to play a greater role in preventing exploitation of the forest resources of the state and protect the environment from fast degradation. It may be mentioned here that the environmental holocaust in the Himalayan range by man will ultimately destroy us and, therefore, it is very necessary to save the Himalayan environment not only in our own interest but also in the interest of our future generations to come.

REFERENCES

Cook R.U and Doornakamp J.C, 1990. Geomorphology in environment management, Oxford univ., press, New York.

Doornkamp J.C and King C.A, 1971. Numerical analysis in geomorphology. Edward Arnolds, London: 1-181.

Gupta R.D, Singh K. and Gupta J.P., 1995. Morphology, genesis and classification of forest soils from Pir-Panjal Himalayan region of Jammu & kashmir. In:Ecodegradation of Himalayas-Causes and remedies.(Ed.) B.L.Koul. M/S Vinod Publishers and Distributors. Jammu.: 479-499.

Gupta, R.D., Bhan,D and Kher, D;2009. Morphological and physico-chemical properties of acid soils from Jammu Himalayan region (J&k) and their management. Ibid.:152-172.

Kaul B.L and Verma A.K., 2009. Impact of degrading habitat on wildlife in Jammu and Kashmir. In: Biodiversity conservation in the Himalayas. B.L.Koul (Ed). M/S Daya publ. house, New Delhi:49-53.

Namgyal P.T., 1991. Darjelling district: A study in geomorphology and environmental management. Ph.D Thesis U.B. Santiniketan.

Ray P.P. and Sen. J., 2009. Landslides in Darjeeling Himalayas. Ibid. : 231-256.

Tiku J.L., 2009. Ecodegradation of the Himalayan state of Jammu and Kashmir: A review. Ibid. : 14-30.