

# Landslide Investigation In Bhore Tahsil: A Case Study of Mahadevwadi

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**Abstract-** The rapid landslide occurrences at the hillside development areas play an important role to modify the landslide. To understand their technical aspects we undertake investigation in the village of Mahadevwadi, Bhore Tahasil Pune. In the recent time the hazards due to natural and manmade. In our project will be collect the rock and soil sample. we have selected the stream in Mahadevwadi origin of this stream in Rajgad Fort. Stream is passing through the Mahadevwadi village. In our project the stream can be divided in 30m distance and each point we taken the GPS reading means latitude, longitude and elevation of that point and also shown the geological and geomorphologic characteristics of rock and soil. The all stream is studied up to it can be meet to the backwater of Bhatghar dam. The first stage of project is the survey of stream and next stage is the collection of sample of each point and testing the soil and rock sample and their results can be compare to ASTM. After testing we decide this specific area is prone to landslide. If the area is prone to landslide we providing the remedial measures

**Keywords-** Hillside landslides, development, slopes, building on slopes.

## I. INTRODUCTION

In the recent time the hazards due to natural and manmade activity in India and all around the globe is increasing rapidly .one such example of the natural hazard is landslide. Which have the effects in socio-economic way on the society. The downward and outward movements of the consolidated and unconsolidated soils and rock matter from any geomorphic features due to natural or manmade causes are termed as the landslide. Such movements or displacement occur under the influence of gravitational force presence of water greatly aids this phenomena as it makes the rocks and soil more weak and mobile. India is one of the most fastest developing country in the world. The rate of development in India is very rapid. A land slide occurs when the part of natural slope is unable to support its own weight due to natural or anthropogenic reasons. for example, soil strata on a slippery surface below it or toe of the slope cut by man-made activity, can become heavy with prolonged heavy rain fall and may slide down due to the increasing weight of the soil strata. A

landslide is a downward or outward movement of soil mass which includes soil, rock and vegetation under the influence of the gravity. This movement can occur in many types e.g. fall, topple, slide etc. The speed of the landslide depends on the slope of the hill cliff. The mass of the moving material can destroy the property along its path of movement and cause death to people and livestock. Generally landslide occurs in the steep slope area but they can occur in the low slope gradient ground too. Due to increasing demand of the infrastructure and cheap residence has caused the development on the hill too. The main reasons behind the occurrence of the landslide are cutting of hills, road construction, farming, and housing etc. has caused hill slope unstable. The natural ecosystem of the mountainous region like Himalaya, western Ghats is often characterizes by the unfavorable geological, topographical and seismic condition. The study area which we selected comes under the western ghat region. Bhore Tahasil is the area which is not studied by the landslide point of view by any national and international researcher. Bhore area region is having heavy and prolonged rain fall within this region many landslide prone areas are found among of them the Mahadevwadi is having highest chances to be in the landslide activity. During our visit the landslide incidents was present in area in complex manner. The geological survey of the India carried out the study of landslide hazard which is divided into two types:

1. Pre Disaster Studies
2. Post Disaster Studies

### 1. Pre disaster studies

The identification of the susceptible slopes is done by the landslide hazard zonation (LHZ) mapping technique on the various scales or by studying the slopes which are critical individually. In photo shown the landslide zones in India and also shown the location of our project site. There are mainly five types zones in India,

1. Very high hazard
2. High hazard
3. Moderately high hazard
4. Low hazard
5. Very low hazard

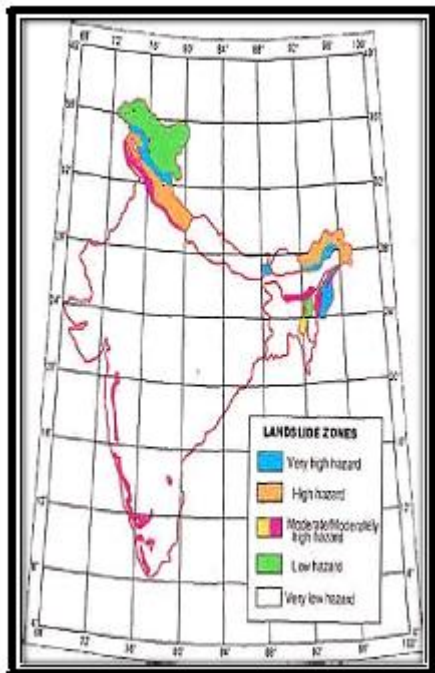
**2. Post Disaster Studies:**

In the post disaster studies the detailed analysis of the landslides which have occurred already is done and the remedial measures are suggested.

The most affected parts by the landslide activity in the India is Himalaya region, western Ghats, vindyas and nilgiri. 15% of the Indian terrain is susceptible to the to the landslide.

Following are the major landslide that occurred in India within past.

Date/Year	District/state	Remark
July 26, 2015	Sakinaka Mumbai, Maharashtra	104 people died in Mumbai.
July 30, 2014	Malin dist. Pune, Maharashtra	More than 200 people died in this tragedy
June 16, 2013	Kedarnath, uttarakhand	Here cloud bursting took place and more than 5700 casualties happened
Sept 14 <sup>th</sup> 2008	Parampure District, Arunachal Pradesh	17 people were killed in a series of landslides preceded by heavy rainfall
6th Sept 2007	Village Baram/Sia Ldhar, Dharchula Pithorgarh district, Uttarakhand	A landslide due to excessive rainfall resulted in 15 fatalities and loss of livestock



Landslide hazard zoning according to GSI



Toposheet of the Bhore Tahsil

**II. STUDY AREA**

The study area is part of Western Ghats. The latitude and longitude of study area is N18<sup>o</sup>14.06" and E073<sup>o</sup>42.049" respectively, elevation is 815m. This village is located at the toe of Rajgad fort. The lithology is the compact basalt, vesicular compact basalt. The population of the village is 200. The village is located at the plain plateau. The north side of village stream is present which we have studied. In the village primary school first to fifth standard. The grampanchayat of the village is in Maley



The MahadevWadi Village



Satellite Image of the MahadevWadi

### III. METHODOLOGY

The field work survey identify and notify the landslide activities such as scars ,remedial measures and vulnerable zone has been conducted in study area. the location

are denoted using standard GPS instrument for the latitude and longitude. study area map has been generated through elsewhere software . Location visited are planned from previous studies as important . the surveys are used to classify to differentiate the mitigation level of action and interpret further. the sample can be collected to specific stream and test can be performed related to rock and soil sample and result can be compare to ASTM, decided the area is prone to landslide or not.

### IV. LANDSLIDES

In the village along the road sectors more and continuous landslides are occurring because of anthropogenic activity and naturally the soil loosen its strength of creep day to day could be the causes of landslides.moreover sudden discontinuous in slope means vertical cuts for road builds up could be reason

### V. REMEDIAL ACTIONS

Rocky assemblage side walls along the road sectors where the landslide is prone. provided the closed conduit trenches,bunds ,vegetation etc.in the settlement areas the cement side wall has been constructed to simulate the landslide activities.

### VI. CONCLUSION

The work has defined that the importance of the, monitoring studies in the mahadevWadi village, anthropogenic and natural phenomena are reason for the landslide especially economic advantages of socio economic environment shows the ignorance of people .people aware about the particular phenomena but they finally lacking in the awareness knowledge for such land other resource of the life needs.

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### REFERENCES

- [1] A. Sengupta A., Gupta S., Anbarasu K.,2010 “Landslides - Investigations And Mitigation In Eastern Himalayan Region” *In Journal Of The Indian Roads Congress.*

- [2] Brian D., Collins, Dobroszlac znidarcic 2000, “Stability analysis of rainfall induced landslide”, In *Journal Of Geotechnical & Geoenvironmental Engg*, @ASCE.
- [3] Daule A. D., Gaware A. H. 2015, “Landslides Hazards And Remedial Measures: A Case Study On Malin Landslide”, In *International Journal Of Engineering, Education And Technology*, Volume 3, Issue 2.
- [4] Guest editorial 2010, “Recent advances in landslide investigation: issues and perspectives” *Elsevier /geomorphology*,
- [5] Gupte R.B. 2012 ,*Textbook of “ Engineering Geology”*, P.V.G. publication, pune,
- [6] K.T. Chau, Y.L. Sze, M.K. Fung, W.Y. Wong, E.L. Fong, L.C.P.Chan 2003, “ Landslide hazard analysis for HongKong using landslide inventory and GIS”, In *Elsevier*.
- [7] Mike G Winter 2014, “A Strategic Approach to Landslide Risk Reduction “, In *International Journal Of Landslide And Environment*, Vol. 2.
- [8] Prakshap Mehta, Kalyan Tejaswi, Chandresh Parekh, Trilok N. Singh, Uday B. Desai 2008 , “Senslide: A Distributed Landslide Prediction System” In *University of Colorado, Boulder*.
- [9] Dr.B.C. Punmia,2007 “*Soil Mechanics And Foundation Engg*”, Laxmi publication pvt. Ltd. Pune,
- [10] Robin Chowdhury1, Phil Flentje 2014 “Mitigation of Landslide Impacts, Strategies and Challenges for the 21<sup>st</sup> Century”, In *International Journal Of Science, Environment And Technology*.
- [11] Tikke B. B., Patil Amrut K., Chavan R. R., Ms. Desai S.S. 2014, “Review Of Landslide: A Special Attention To Western Ghat Of Maharashtra”, In *International Journal Of Engineering, Education And Technology*, Volume 3, Issue 2.
- [12] Tzenko Tzenkov, Slaveiko Gospodinov 2003, “Geometric Analysis Of Geodetic Data For Investigation Of 3D Landslide Deformations”, In *Natural Hazards Review*, @ASCE..