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Research on Study of the Investigation of mass Movement along Malshej Ghat

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Abstract: ***Landslide is a characteristic wonder which is happen due to either by artificial or because of regular variables. Landslide events in slope improvement zones assume a critical part to adjust the landslide. Slope cutting and leveling for home and improvement of zone in a case of synthetic action which is an explanation behind land sliding around there Natural factor, for example, excess precipitation , surge in waterway are the case of characteristic factor so that for reason for understanding their specialized perspective we embrace examination in malshej ghat in this year(2017-18).In our in examination and overview we gather soil and rock test from site in which we will done different test for researching their properties . In our review with our guide we take GPS perusing implies scope, Longitude and rise of these point and furthermore comprehended the topographical and geomorphologic qualities of shake and soil. The principal phase of our task is the study of malshej ghat and gathering topographical data of site and next stage is accumulation of test of each point and testing the soil and rock sample and their outcome can be contrast with ASTM. After testing we decide to specify area is prone to landslide .if the area is prone to landslide we providing the remedial measure.***

Keywords: Hillside, Latitude, Longitude, GPS

1. Introduction

In the recent time the hazard due to natural manmade activity in India and all around the globe is increasing rapidly.one such example of natural hazard is landslide which have the effect in socio economical way the society. The downward and outward movement of the consolidated and unconsolidated soil and rock matter from any geomorphic features due to natural and manmade caused are termed as landslide. Such movement or displacement occurs under the influence of gravity force pressure of water gently aids the phenomenon as it make the rock and soil media weak and mobile. . India is a one of the fastest developing country in the world. The rate of development in India is very rapid. A land slide is happen when the piece of normal incline can't sustain its own weight because of regular or anthropogenic reason. For instance, Soil strata on an elusive surface beneath it or toe of slant cut by synthetic action can turn out to be overwhelming with delayed substantial rain fall and may slide down because of expanding weight of soil strata the mass of moving soil material and stone can be crush the property along its way of development and cause demise of individuals and living hood. Generally landslide is occur in low slope gradient ground too .Increasing demand of infrastructure and cheap residence has caused the development on hill. Malshej ghat is having heavy and prolonged rainfall and most prone area to landslide and till not studied by the landslide point of view by any national and international researchers.

Every year there is news in newspaper about national and international researchers .Every year there is news in Newspaper about malshej ghat is having highest chances to be in the landslide activity. Every year there is news in newspaper about malshej ghat is having highest chances to be the landslide activity. During our visit to landslide incident were present in complex manner. The geological survey of India carried out study of landslide hazard which is divided into two types

1) Before Disaster Studies
2) After Disaster Studies

I) Before disaster Studies

The identification of susceptible slope is done by landslide hazard zonation (LHZ) mapping technique on the various scales or by studying the slope which are carried individually. There are mainly five type zone in India

a) Very high hazard
b) High hazard
c) Moderately high hazard
d) Low hazard
e) Very low hazard

II) After Disaster study

In the after disaster studies the detailed analysis of the landslide which have occurred already is done and the remedial measure are suggested.

2. Literature Review

Landslide is natural events, but many turn into hazard and cause loss of lives and damage manmade and natural structures. The term landslide hazard is studies by many authors differently, among them are as follows.

According to Dr.P.D.Sable and S.M.Gawande *et al*,(2017), On August, a landslide occured in a village of tamhini ghat in mulshi tahshil of pune district in Maharashtra, India.

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Landslide in tamhini ghat was occured due to heavy rainfall in the locality. In the western ghat region in tamhini ghat village along the road are more and continuous landslides are occurred because of manmade activity and natural activity, the soil loosen its strength of creep day by day due to weight of soil which will slide down. So conclusion of that project after study various parameter and investigation of side we measurably found that and anthropogenic and natural phenomenon are the reason for landslide in tamhini ghat.(1)

According to Dr.P.D.Sable and Prof.S.B.Shinde *et al*,(2016)**,** In the village along the road sectors more and continuous landslides are occurred because of anthropogenic activity and naturally the soil loosen its strength of creep day to day could be the causes of landslides. morever sudden discontinuous in slope means vertical cuts for road builds up could be reason The work had defined that the importance of monitoring studied in mahadevwadi village, anthropogenic and natural phenomena are reason for the landslide especially economic advantages of socio economic environment showed the ignorance of people aware about the particular phenomena but they finally lacked in the awareness knowledge for such land other resource of the life needs.(2)

According to B.Arunkumar et al, (2013), Nilgiri region is highly noted for the active landslides. All kinds of landslides has been occurred and accounted largely. The impact of landslide is accounted in and around 21 States and Union Territory of Pondicherry, hilly regions of Himalayas, North Eastern parts of India, Nilgiri, Eastern Ghats, and Western Ghats, in every year and makes loss of life, infrastructure and property (Sharda,2008). The area precipitated with rainfall in both the southwest and northeast monsoon. Southwest monsoon 50% in west and 40% in west are accounted as precipitation. It was moderate in northeast monsoon which contributes near 40% of rainfall. Significant level of rainfall accounted in both winter and summer periods. The temperature is salubrious in all the year of the climate. The humidity is more in afternoon than mornings when in range exceeding of 90% (Subramanian, 2012). As the landslides of 1979 were more massive and of larger magnitude, detailed profiles of landslides, detailed mapping on larger scale and study with earthly photogrammetric work, were taken up (Sharda, 2008).In 1979 November a heavy rain occurred in coonor and in sales heavy landslides too occurred. In this a house totally buried and including 2 women with 3 children dead in the debris (Ganapathy, 2012).(4)

3. Methodology

The field work survey identified and notifies the landslide activities such as scars, remedial measure in study area .The location are denoted using standard GPS instrument for the latitude and longitude .Study area map has been generated through different software. Visited location are planned from post 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 specify 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.

3.1 Objective

a) To study landslides in study area and re-markation for possible location.
b) To apply preventive measures at possible landslide points/locations.
c) To examine and investigate exact reason of landslide at study area.
d) To provide soil conservation structure along the slope and to plant the trees in short to maintained ecological balance.
e) To avoid risk of mass movement during travelling along the road.

3.2 Study Area

We select investigation territory is Malshej Ghat which is goes under western ghat go in the thane and pune region of Maharashtra province of India The scope and longitude of malshej ghat is 19°20'26.25"N and 73°46'28.39"E individually, rise of Malshej Ghat is 588.29m the geomorphology is likewise extraordinary at different area the profoundly weathered, respectably weathered, minimized basalt are exist at different spot.

Image 1: western ghat in Maharashtra

Image 2: Satellite image of malshej ghat

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Table 1: Traversing of Malshej Ghat

S. No	Location	Lat-Long	Chainage of RL	Type of Movement	H	L	Nature of slope
1	150 m from Sushant Hotel	19°19.722'N and 73°48.565'E	2	Sliding	70m	60m	Steep
2	Just 25 m From first location	19.19°764'N and 73°48.593'E	1	Sliding	40m	35m	Moderate to steep
3	At the border Of thane pune dist.	19°465'N and 73°47.219'E	3	Sliding	15m	100ft	Moderate to steep
4	At 500 m From Tunnel right corner	19°70'N and 73°46.929'E	4	Sliding	80m	40.6m	Moderate to steep
5	50m from corner Of II water fall	19°117'N and 73°46.898'E	1	Sliding	80m	50m	Vertical Steep
6	50 m from III location	19°28.132'N and 73°46.878'E	2	Sliding	80m	50m	Vertical
7	50 m from IV Waterfall	19°137'N and 73°46.836'E	3	Sliding	80m	50m	Vertical
8	50m from V Waterfall	19°20.197'N and 73°46.742'E	4	Sliding	80m	50m	Vertical
9	50 m from VI Waterfall	19°20.227'N and 73°46.691'E	5	Sliding	80m	50m	Vertical
10	50 m from VII waterfall	19°20.227'N and 73°46.632'E	6	Sliding	80m	50m	Vertical
11	50m from VII Waterfall	19°278'N and 73°490'E	7	Sliding	80m	50m	Vertical
12	50 m from IX waterfall	19°20.333'N and 73°46.552'E	8	Sliding	80m	50m	Vertical
13	50 m from X waterfall	19°407'N and 73°480'E	9	Sliding	80m	50m	Vertical
14	50 m from XI Waterfall	19°3335'N and 73°2785'E	10	Sliding	80m	50m	Vertical
15	End point of Valley	19°483'N and 73°467'E	11	Sliding	80m	70ft	Vertical

4. Result of Test on Rock & Soil Sample

4.1 Crushing strength of rock

Table 2: Crushing strength of rock

Sample No	Compressive Strength of rock Sample(KN/mm^2)
01	7.066
02	2.66
03	2.326
04	0.763
05	0.766
06	0.775
07	6.607
08	0.535
09	0.763
10	3.043
11	7.007
12	5.746
13	2.314
14	2.326
15	1.672
16	1.700
17	2.731

4.1.1Result of test

The crushing strength all rock found in Malshej Ghat is low means site having weathered rock which is responsible for landslide.

4.2 Test on soil sample

4.2.1Differential free swell test

Table 3: Free swell test

No	Initial volume(ml)		Volume after 24 hr(ml)		Free swell index%
	water	Kerosene	water	kerosene	
1	12	11	14.9	11	35.45
2	11	10.5	12.5	10.5	19.05
3	12	11	13.6	11	23.64
4	10	10.2	12.9	10.2	26.47
5	11	10.9	14.2	10.9	30.27
6	13	10.5	14.5	10.5	38.09

4.2.2Interference

According to NHAI(National Highway Authority of India. The maximum allowable change in volume is 5% the sample shows different swelling pressure at its various slope but maximum expensive nature is at S1 & S6 which is similar in landslide prone area, hence area is susceptible to landslide

4.3 Liquid Limit Test

Table 3: Liquid limit of soil

Can No	01	02	03	04	05	06
Mass of can	188.4	186.9	183.7	192.2	192.7	188.5
Mass of wet soil + can	272.3	281.4	291.0	262.5	281.9	254.9
Mass of dry soil + Can	241.6	246.5	254.3	240.8	258	238.7
Mass of dry soil	53.2	59.6	70.6	48.6	65.3	50.2
Mass of water	30.7	34.9	36.7	21.7	23.9	16.2
Water content	57.7%	58 %	51%	44%	36%	32%
No. of blows	22	14	10	12	25	11

4.2.3Inferences

The reading of sample collected from area in different manner is shows that the highest shrinkage index is at the top which according to literature review which lead to toe failure and ultimate landslide activity

5. Result and Discussion

Conclusion of our project after studying various parameter and investigation the site we measurably found that anthropogenic and natural phenomenon are the reason for landslide in malshej ghat. Heavy rainfall in July to August 2017 is a main reason of landslide in malshej ghat. There is need to provide various landslide control and prevent measures like netting, bolting and shortcreating etc.

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