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GIS DATA BASE GENERATION ON LANDSLIDES BY TRACING THE HISTORICAL LANDSLIDE LOCATIONS IN NILGIRI DISTRICT, SOUTH INDIA

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Abstract

Generating GIS database for landslide locations is attempted in the present paper. Literature surveys were conducted to take the information on landslides. The existing landslide locations were collected from the Geological Survey of India Miscellaneous publications and other literature survey. This information was collected in the form of latitude and longitude data source. This data were given as input in GIS. To understand the event in year wise information is spatially given to understand the landslide distribution in the study area. Major landslides were recorded in the year 2009 with a human death loss of around 50 numbers in the study area. So for around 900 landslides were reported. But the number of slides present is not identified so far. Many scar landslides are also reported in this paper.

Introduction

Landslide natural hazards are needed to study intensively, because the death loss is around 1 lakh and numbers up to 2007 and the number is also 983 (Pankaj, 2009). This shows the importance to study the landslides. Many workers have attempted to assess the landslides through Rainfall Vs Landslides in Nilgirs and Kodai regions (Gurugnanam, 2013 and Gurugnanam 2008), Geological survey of India is the pioneering institute to take up such studies to make a benchmark for the recent workers (Seshagiri, 1982). He has given a detailed working methodology for the southern geological terrain landslide studies. This publication has been utilized for marking the locations of landslides in the present study area. Similarly, the

Study Area

The study area is Nilgiris district, which is located in Tamilnadu state and lies between the latitudes 11°30' and 11°15'N and longitudes 76°45' and 77° 00' and 76 ° 02'E and it covers 2541 km^2 . The maximum and minimum altitudes are 2640m and 300m above mean sea level.

Methodology

The landslide locations were collected for the miscellaneous report from the Geological Survey of India. The location data were also collected from the literature survey 50 numbers of papers were collected from the Nilgiri regions. The details were taken from the existing reference. The data were formulated to give the latitude and longitude information point information in a GIS. These were tabulated with the information like landslide locations, latitude, longitude, Year of occurrence (Table.1).

Using the latitude and longitude information, the details were given as an input to GIS platform. Simple and multiple query analysis tools are used to display the spatial distribution of landslide locations in the study area.

Arc GIS was employed for the present work.

Historical Data Collection

The landslide data were collected from the secondary data source. From the Seshagiri, 1982, 1986 reports, it was collected that the major landslide were occurred in

1. Runneymade Slide
2. Hospital Slide
3. Glenmore Slide
4. Coonoor Slide
5. Karadipallam Slide

He has also reported the other important landslide locations as

1. Katteri Road Slide
2. Aravankadu Slide
3. Doddakombai Slides
4. Allada Slides
5. Selas Slides
6. Mallikorai Slide
7. St. Mary's Conoy Slide
8. Dunsdale Somarsdale Slide
9. Slide near Cinchona Office
10. Slide on the hill, 7018 South west of Tuneri
11. Slides on the North eastern flank of Elk Hill
12. Yellanahalli Church Slide
13. Amaokorai Slide
14. Slide on the right abutment of the Porthi mund dam

(Fig 1, Courtesy, GSI, Table 1)

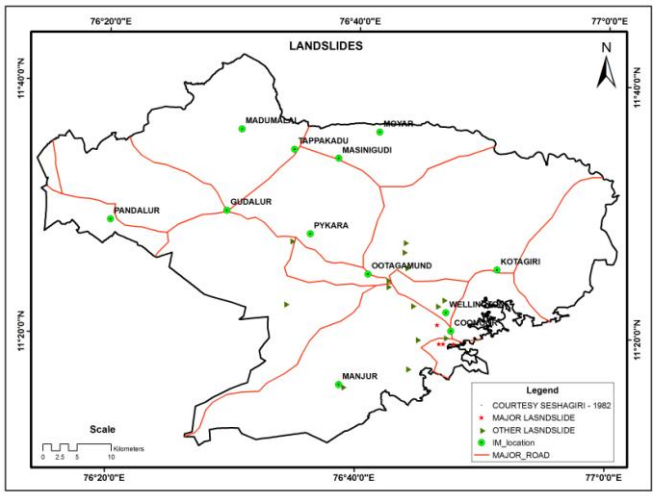

Fig.1

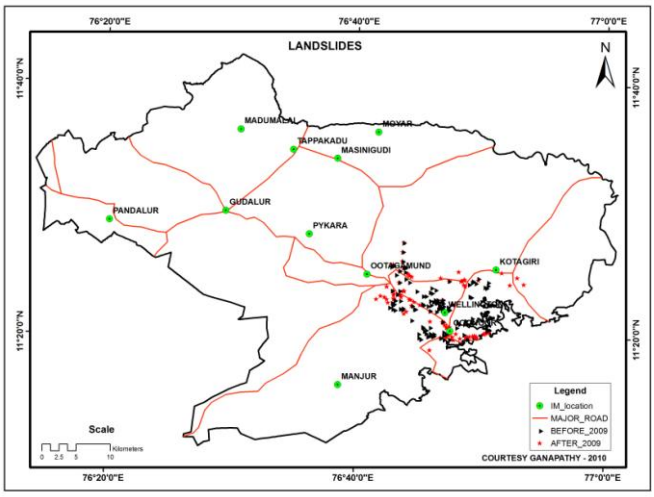

Fig.2.

Table -1 – Lansdslide Loc. (SESHAGIRI – 1982)

Sl.No	Name	X	Y
1.	MAJOR LANDSLIDE	76.797222	11.325
2.	MAJOR LANDSLIDE	76.783333	11.325
3.	MAJOR LANDSLIDE	76.777778	11.325
4.	MAJOR LANDSLIDE	76.791667	11.341667
5.	MAJOR LANDSLIDE	76.775	11.35
6.	OTHER LANDSLIDE	76.786111	11.333333
7.	OTHER LANDSLIDE	76.775	11.375
8.	OTHER LANDSLIDE	76.65	11.266667
9.	OTHER LANDSLIDE	76.736111	11.291667
10.	OTHER LANDSLIDE	76.748611	11.330556
11.	OTHER LANDSLIDE	76.783333	11.383333
12.	OTHER LANDSLIDE	76.708333	11.408333
13.	OTHER LANDSLIDE	76.579167	11.458333
14.	OTHER LANDSLIDE	76.733333	11.425
15.	OTHER LANDSLIDE	76.729167	11.445833
16.	OTHER LANDSLIDE	76.708333	11.4
17.	OTHER LANDSLIDE	76.741667	11.375
18.	OTHER LANDSLIDE	76.730556	11.458333
19.	OTHER LANDSLIDE	76.572222	11.375

Ganapathy et al., 2010 intensively studied about the landslides in Nilgiris and brought out the landslide locations (Fig.2, Table 2). He has highlighted the study in terms of landslide occurrence in two groups as before 2009 and during 2009. In 2009, higher number of landslides and its impact on death loss is reported.

Table -2 – Lansdslide Loc. (GANAPATHY 2010)

Sl.No	BEFORE		AFTER	
	X	Y	X	Y
1	76.843	11.34426	76.725	11.4055
2	76.84215	11.34311	76.6944	11.3833
3	76.85708	11.36286	76.7305	11.3944
4	76.81607	11.33149	76.7319	11.3944
5	76.81212	11.35146	76.7166	11.4277
6	76.81562	11.35229	76.7291	11.4333
7	76.81384	11.35595	76.7333	11.425
8	76.82096	11.35499	76.7305	11.425
9	76.82219	11.35925	76.725	11.4208
10	76.80275	11.35409	76.7166	11.4291
11	76.7924	11.33094	76.7291	11.4458
12	76.78771	11.33809	76.7	11.3875
13	76.78451	11.34074	76.7083	11.3833
14	76.78436	11.33641	76.7055	11.3861
15	76.78523	11.33091	76.7277	11.3861
16	76.78907	11.32792	76.7416	11.375
17	76.81138	11.33772	76.7305	11.458
18	76.80164	11.34678	76.7833	11.3541
19	76.80544	11.35137	76.7666	11.3681
20	76.77164	11.33821	76.7833	11.3833
21	76.77153	11.33559	76.7916	11.4083
22	76.76961	11.33479	76.7811	11.3333
23	76.76836	11.33661	76.718	11.3833
24	76.76661	11.33864	76.7666	11.3166
25	76.76451	11.33486	76.7083	11.4
26	76.76308	11.33462	76.72699	11.3896
27	76.76058	11.33891	76.72492	11.38943
28	76.75853	11.34178	76.71807	11.39065
29	76.76073	11.34294	76.71757	11.38875
30	76.76635	11.34649	76.71686	11.39462
31	76.75696	11.34614	76.74017	11.38305
32	76.75608	11.34734	76.73877	11.38327
33	76.75403	11.33081	76.75307	11.37607
34	76.75134	11.33304	76.76671	11.35462
35	76.75113	11.33778	76.78614	11.35023
36	76.74161	11.35569	76.78888	11.34746
37	76.74641	11.37048	76.78924	11.34614
38	76.74476	11.37046	76.79137	11.34549
39	76.74226	11.37474	76.79237	11.34281
40	76.79102	11.37106	76.7928	11.34759

41	76.79183	11.37001	76.79523	11.34133
42	76.78969	11.37359	76.80139	11.33857
43	76.79551	11.37806	76.79676	11.33439
44	76.77443	11.36735	76.78952	11.33535
45	76.77711	11.37093	76.79146	11.33666
46	76.77916	11.37273	76.78803	11.33464
47	76.77813	11.37476	76.79805	11.33042
48	76.77882	11.37633	76.80705	11.33252
49	76.78186	11.36986	76.81484	11.33389
50	76.7821	11.37263	76.81694	11.33456
51	76.78393	11.37499	76.81802	11.33401
52	76.78316	11.37894	76.8194	11.33482
53	76.78119	11.38083	76.82392	11.33572
54	76.77704	11.38041	76.82629	11.33655
55	76.77455	11.37896	76.82862	11.33522
56	76.77367	11.37994	76.82729	11.33399
57	76.77029	11.38046	76.8293	11.33344
58	76.76604	11.3816	76.83876	11.3384
59	76.76734	11.37617	76.83978	11.33959
60	76.76292	11.37476	76.84147	11.33995
61	76.75548	11.37769	76.84434	11.34056
62	76.75716	11.37602	76.84495	11.3411
63	76.75641	11.3879	76.7909	11.3694
64	76.76007	11.38802	76.71785	11.38436
65	76.77234	11.3831	76.73591	11.41745
66	76.77628	11.38309	76.73766	11.41599
67	76.76559	11.39292	76.71005	11.37884
68	76.76826	11.39197	76.73478	11.36705
69	76.77322	11.39628	76.73174	11.36448
70	76.7678	11.39868	76.74495	11.38001
71	76.74799	11.39436	76.80422	11.42037
72	76.72482	11.39445	76.8119	11.41057
73	76.73799	11.4059	76.81141	11.40929
74	76.72187	11.38995	76.80826	11.40861
75	76.7147	11.39444	76.80763	11.40796
76	76.71501	11.37838	76.81129	11.4032
77	76.71834	11.38119	76.8131	11.40153
78	76.71919	11.38177	76.8305	11.40942
79	76.72623	11.38145	76.86163	11.41977
80	76.71351	11.42614	76.88232	11.41348
81	76.73226	11.41926	76.8727	11.40365
82	76.73283	11.41035	76.8912	11.40476
83	76.72013	11.4154	76.7803	11.41189
84	76.83987	11.36722	76.74147	11.41317
85	76.82085	11.38727	76.73872	11.41461
86	76.81875	11.3883	76.7666	11.3166
87	76.81781	11.40386	76.73049	11.45803
88	76.82149	11.40675	76.72904	11.4457
89	76.82298	11.40847	76.7289	11.43331
90	76.82668	11.40554	76.71649	11.4291
91	76.83866	11.40048	76.71651	11.42774
92	76.84112	11.39945	76.72493	11.42086
93	76.84272	11.40259	76.73041	11.42504
94	76.84338	11.40691	76.73318	11.425
95	76.83003	11.41182	76.72481	11.40552
96	76.72899	11.36981	76.70823	11.39999
97	76.72975	11.37166		
98	76.72596	11.37075		
99	76.71896	11.36902		
100	76.71592	11.37032		
101	76.7118	11.37239		
102	76.71592	11.37535		
103	76.71769	11.37715		
104	76.72972	11.45789		
105	76.72887	11.44601		
106	76.72871	11.43346		
107	76.73021	11.42501		
108	76.73296	11.42539		
109	76.71677	11.42786		
110	76.71677	11.42786		
111	76.79095	11.40826		
112	76.72478	11.42086		
113	76.72466	11.4056		
114	76.78307	11.38339		
115	76.7661	11.36857		
116	76.78281	11.35423		
117	76.78072	11.33284		

From the other literature survey, we have collected landslide location details and plotted in the GIS. It shows that, 74 Numbers of landslides were reported by Gowtham Priya This information's were taken into GIS to locate the place is given in the Fig.3. Table 3.

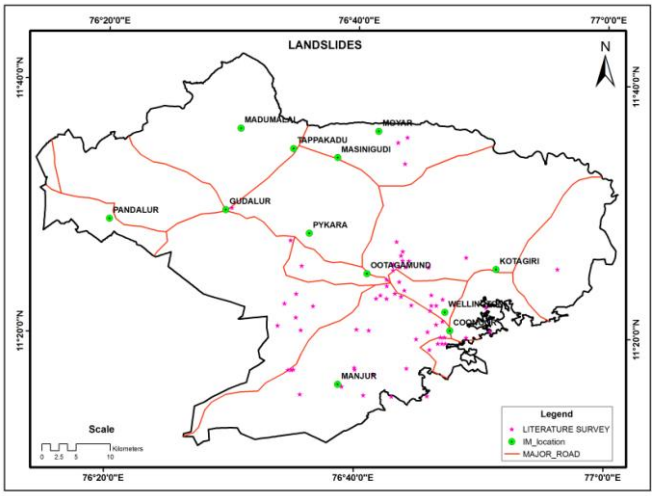

Fig.3

Table - 3 – Lansdslide Loc. LITERATURE SURVEY LANDSLIDES

Sl.No	NAME	X	Y
1	Vannarapettai-Coonoor Road	76˚ 47' 00"	11˚ 21' 15"
2	Slide near Aravakadu	76˚ 46' 00"	11˚ 22' 05"
3	Katteri road slides	76˚ 47' 10"	11˚ 20' 00"
4	Slide of the Glendale estate or Glenmore Slide	76˚ 46' 40"	11˚ 19' 30"
5	Doddakombai Slide	76˚ 39' 00"	11˚ 16' 00"
6	Aliada Slides	76˚ 44' 10"	11˚ 17' 30"
7	Karadipallam Slides	76˚ 46' 30"	11˚ 21' 00"
8	Selas Slides	76˚ 44' 55"	11˚ 19' 50"
9	Slide in Manjakombai Village	76˚ 41' 30"	11˚ 17' 00"
10	Slide of Maliikorai village	76˚ 47' 00"	11˚23' 00"
11	St Mary's Hill colony ooty	76˚ 42' 30"	11˚ 24' 30"
12	Slides in Chamraj estate	76˚ 40' 00"	11˚ 17' 30"
13	Slides on the northeastern portion of the Elk hill	76˚ 42' 30"	11˚ 24' 00"
14	Slides on ooty-Doddabetta Road	76˚ 43' 30"	11˚ 24' 20"
15	Manjanakorai Slides	76˚ 41' 40"	11˚ 23' 00"
16	Dunsdale-Somasdale slide	76˚ 34' 45"	11˚ 27' 30"
17	Slide southwest of the agriculture farm	76˚ 43' 30"	11˚ 25' 30"
18	Slide 80 m downstream of tiger hill reservoir	76˚ 43' 50"	11˚ 33' 40 "
19	Slides north and south of tiger hill reservoir	76˚ 43' 55"	11˚ 23' 40"
20	Slides on the road linking north ooty and doddabetta road junction	76˚ 43' 00"	11˚ 25' 40"
21	Slides in the govt Chinchona estate on Idhuhatti	76˚ 44' 15"	11˚ 26' 00"

22	Karimundi road slides	76˚ 43' 45"	11˚ 26' 00"
23	Slide near govt chinchona office	76˚ 44' 00"	11˚ 25' 30"
24	Twin slides 200m west of the slide in the govt Cinchona office	76˚ 43' 15"	11˚ 35' 20"
25	Slide north east of Cinchona office	76˚ 44' 00"	11˚ 35' 45"
26	Slides on the eastern flank near a graveyard of kodappamund	76˚ 43' 00"	11˚ 25' 15 "
27	Slide north east of the koddapamund graveyard	76˚ 43' 00"	11˚ 15' 16"
28	Slide in the Eucalyptus forest north of the raj bhavan upper road	76˚ 43' 00"	11˚ 25' 45"
29	Slides on the 7018 hill range -15 kms southwest of Tuneri	76˚ 43' 45"	11˚ 26' 45"
30	Potential area beyond the junction of ooty-Kundah-Manjanakarai road	76˚ 42' 00"	11˚ 23' 15"
31	Slides near exit portal of railway tunnel15	76˚ 42' 30"	11˚ 23' 00"
32	Slides near lovedale post office	76˚ 42' 30"	11˚ 23' 00"
33	Slides located near culvert 42/79 on ooty-coonoor road	76˚ 43' 40"	11˚ 23' 10"
34	Slide at 200m west of the Cinchona office	76˚ 43' 15"	11˚ 35' 20"
35	Yellanahalli church	76˚ 44' 30"	11˚ 22' 30"
36	Anaikarai slide	76˚ 43' 15"	11˚ 27' 30"
37	Slide on the Perhimund Dam	76˚ 34' 20"	11˚ 22' 30"
38	Runneymade Slide	76˚ 47' 15"	11˚ 19' 30"
39	Hospital slide	76˚ 47' 00"	11˚ 19' 30"
40	Coonoor Slide	76˚ 47' 30"	11˚ 20' 30"
41	Aravakkadu slide	76˚ 46' 30"	11˚ 22' 30"
42	Krodumund Slide	76˚ 35' 15"	11˚ 23' 17 "
43	Porthimund Dam slide	76˚ 34' 20"	11˚ 22' 30"
44	Emerald slide	76˚ 36' 37"	11˚ 22' 20 "
45	Kadcuppa slide	76˚ 35' 15"	11˚ 21' 25"
46	Porthimund RF Slide	76˚ 33' 48"	11˚ 20' 45"
47	Tulitalai slide	76˚ 40' 08"	11˚ 20' 32"
48	Bala kola Slide	76˚ 41' 07"	11˚ 20' 28"
49	Belithala Slide	76˚ 38' 42"	11˚ 49' 02"
50	Naraidu betta Slide-I	76˚ 34' 42"	11˚ 17' 15"
51	Naraidu betta Slide-II	76˚ 34' 57"	11˚ 17' 15"
52	Naraidu betta Slide-III	76˚ 35' 07"	11˚ 17' 17"
53	Mainalaimattam	76˚ 40' 02"	11˚ 17' 22"
54	Carigmore slide	76˚ 43' 10"	11˚ 23' 25"
55	Manthada slide	76˚ 43' 37"	11˚ 26' 25"
56	Bellattimattam slide	76˚ 50' 30"	11˚ 22' 22"
57	Halakarai slide	76˚ 23' 15"	11˚ 23' 07"
58	Paiyangi slide	76˚ 48' 50"	11˚ 26' 20"
59	Slide at Gudalur	76˚ 30' 00"	11˚ 30' 00"
60	Small slides occurred on kallar-Coonoor Railway road ooty	76˚ 46' 00"	11˚ 19' 00"
61	Slide at 2km southwest of Coonoor	76˚ 46' 53"	11˚ 20' 00"
62	Slide at 2.5 km East of Aravankadu	76˚ 46' 06"	11˚ 22' 30"
63	Slide at 5 km east of Manjanakarai	76˚ 46' 05"	11˚ 23' 20"
64	Marapallam Slide	76˚ 48' 55"	11˚ 20' 00"
65	Vulnerable spot	76˚ 45' 50"	11˚ 15' 20"
66	Vulnerable spot	76˚ 45' 50"	11˚ 20' 25"
67	Vulnerable spot	76˚ 45' 50"	11˚ 25' 30"
68	Vulnerable spot	76˚ 45' 50"	11˚ 20' 25"
69	Vulnerable spot	76˚ 50' 51"	11˚ 20' 30"
70	Vulnerable spot	76˚ 35' 40"	11˚ 15' 20"
71	Vulnerable spot	76˚ 35' 40"	11˚ 20' 25"
72	Vulnerable spot	76˚ 56' 10"	11˚ 25' 30"
73	Vulnerable spot	76˚ 35' 40"	11˚ 25' 30"
74	Vulnerable spot	76˚ 40' 45"	11˚ 15' 20"

All the information's were overlaid to understand the number of landslides in ooty regions it shows that, there are about 306 Numbers of landslides were reported from the said literature and keep on tracking the information is under process. The ability of GIS in spatial distribution clearly depicts to understand the landslide locations in the Nilgiri district.

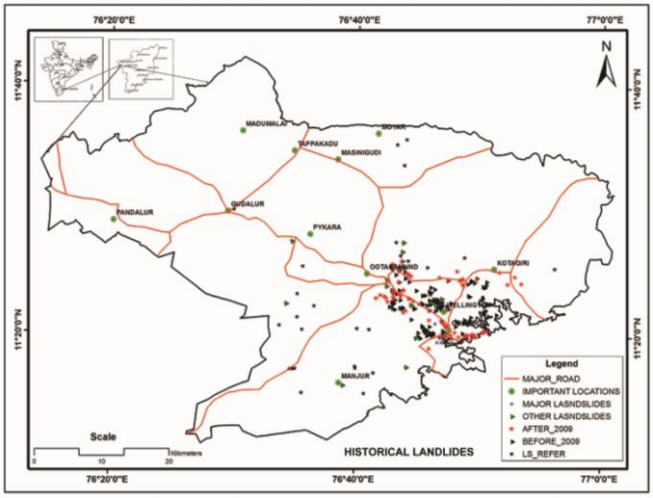

Fig.4

Conclusions

The present study reports that the spatial distribution mapping of bringing the information available to generate GIS based data base. After plotting the landslide information, the study reveals that to see where the higher amount of landslides occurred.

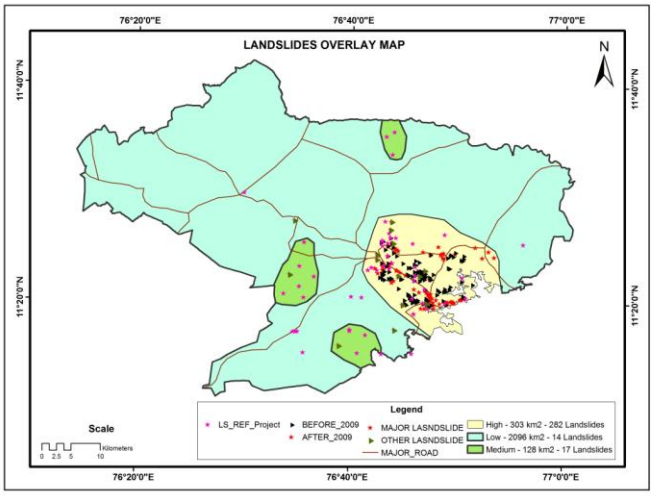

Fig.5

It shows that the clustering or grouping of more landslides into this category. Three groups were arrived; one is with the higher density of landslides groupings, medium and low landslide locations demarcations.

The numbers of landslides in this group are higher clustering of 282 numbers of landslides in top category and 17 numbers of landslides in medium clustering category and 14 numbers of landslides in low clustering category. (Fig.5)

The spatial coverage of this group is 303 Km^2 in higher clustering, 128 km^2 in medium clustering and 2096 km^2 in low clustering (Fig.6).

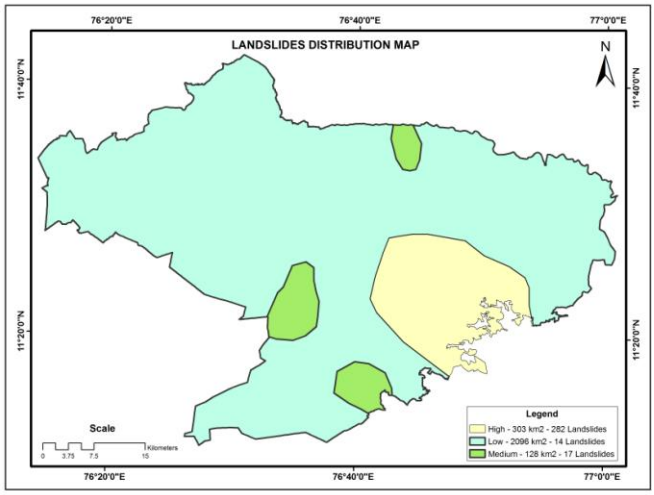

Fig.6

Acknowledgments

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The author place a heartfelt thanks to GSI, the pioneers in Landslide studies in Nilgiris report was taken as a base for the present work.

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Biographies

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