First Information Report in Mundakkai- Chooral mala areas, Meppadi Grama panchayat, Vythiri Taluk of Wayanad District, Kerala (prepared on 30.07.2024)

On 30.07.2024, multiple rainfall triggered landslides wreaked havoc in the hilly areas of Meppadi Grama panchayat, Vythiri Taluk of Wayanad district, covered by Toposheets no. 58A/03, killing many lives and hundreds were feared trapped. At least 107 people have died (as per media report) in the landslides following torrential rain on 29th & 30th July 2024. The incidences occurred in Chooralmala, Mundakkai, Attamalai and Vellarimala which now becomes a picture of gloom after the landslide hit in the area and isolated the area from other places. Out of these four landslide incidence locations, the most devastating are Chooralmala and Mundakkai which together took 107 lives and huge property losses are also reported. Being the Nodal agency for landslide studies, GSI responded immediately and a team visited the site on 30.07.2024 by giving best effort to access the area for gaining an insight of the present scenario and collecting the data as a part of generating First Information Report (FIR) of the landslide incidences. The spell of heavy rainfall initiated in these areas since the third week of July 2024.

On 9th August 2019, Puthumala, a massive and fatal debris flow occurred which is around 2.5 km east of Mundakkai village and the recorded rainfall was above 500 mm. However during the post disaster landslide studies carried out by GSI during FS 2019-20, reported a series of major and minor landslide incidences in and around Vellarimala, and Churalmala. Considering the present scenario of Wayanad, as per the IMD rainfall forecasting, the northern part of Kerala, including Wayanad is under Orange alert ie. the area is expected to receive heavy to very heavy rainfall (7cm to 20 cm). Local residents of the area informed that around 1.00 AM, first landslide occurred at Chooralmala and later another landslide in Mundakkai around 4 AM. It is also reported that multiple landslides (debris flow) occurred as a succession of first landslide in Mundakkai area which almost devastated the village. The probable source of Mundakkai Debris flow is same as the source area of Punapuzha, a tributary of Chaliyar river and flows towards Chooralmala town in the east. Collapse of bridge over Punapuzha, which is the only connective way of Mundakkai to Chooramala and other parts of Wayanad, isolated Mundakkai and thus arised difficulties in rescue operations in this area. The Debris flow may initiated as a Debris slide at the source and followed the path of the stream carrying tons of overburden mixed with water formed slurry and washed

away its path it flowed. Thus, altogether this havoc made the Mundakkai and Chooralmala villages, a graveyard. As a result of heavy downpour and the enourmous volume of landslide material forced the river Punapuzha (4th order) to change its course.

GSI has carried out NLSM in this area during the field season 2015-16. As per susceptibility map of NLSM, all the four affected area viz. Chooralmala, Mundakkai, Vellaramala and Attamala comes under Moderate Susceptibility Zone (MSZ). Nevertheless, the high reaches/ hilly areas around these affected are highly susceptible according to NLSM map.

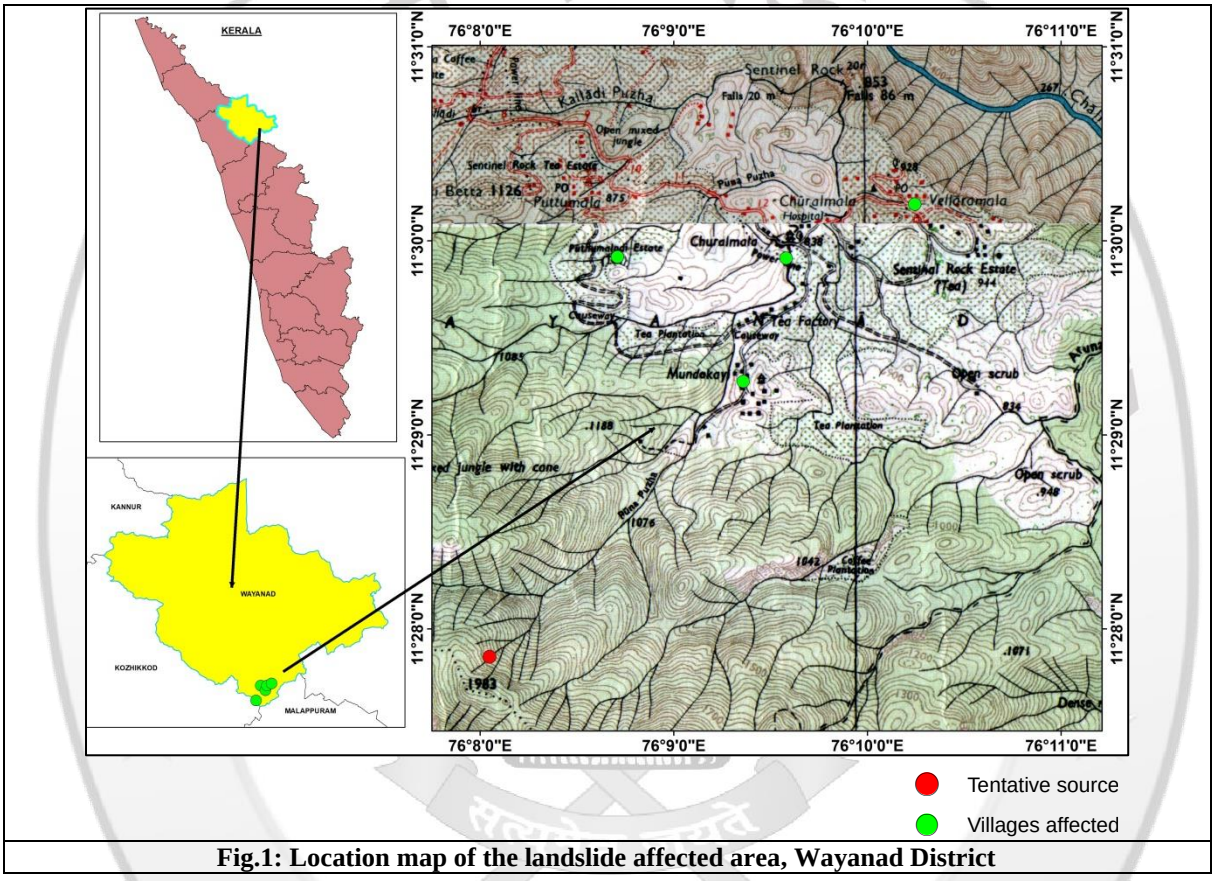


Fig.1: Location map of the landslide affected area, Wayanad District

Physiographically, the Mundakkai area lies on Wayanad plateau having a rugged terrain with ridges and valleys and its relative relief is around 1000m. The probable source of the Mundakkai Debris flow is having an elevation of 1544m and it is approximately 3km and 5km from Mundakkai and Chooralmala villages respectively. Geomorphologically the source area is a part of moderately dissected slopes having a steep slope angle varies from ~25-40^0 with overburden thickness of <5m. The loose and unconsolidated nature of overburden material resulted in rising excess pore pressure within due to incessant rain is assessed to be the triggering factor for all these incidences. As far as landuse-landcover is concerned, the upslopes and midslopes in and around the source area are covered by thick forests and the affected areas include tea plantation and mixed crops. Geologically the area belongs to

Southern Granulite Terrain (SGT) comprising rocks of Wayanad, charnockite and Migmatite groups.

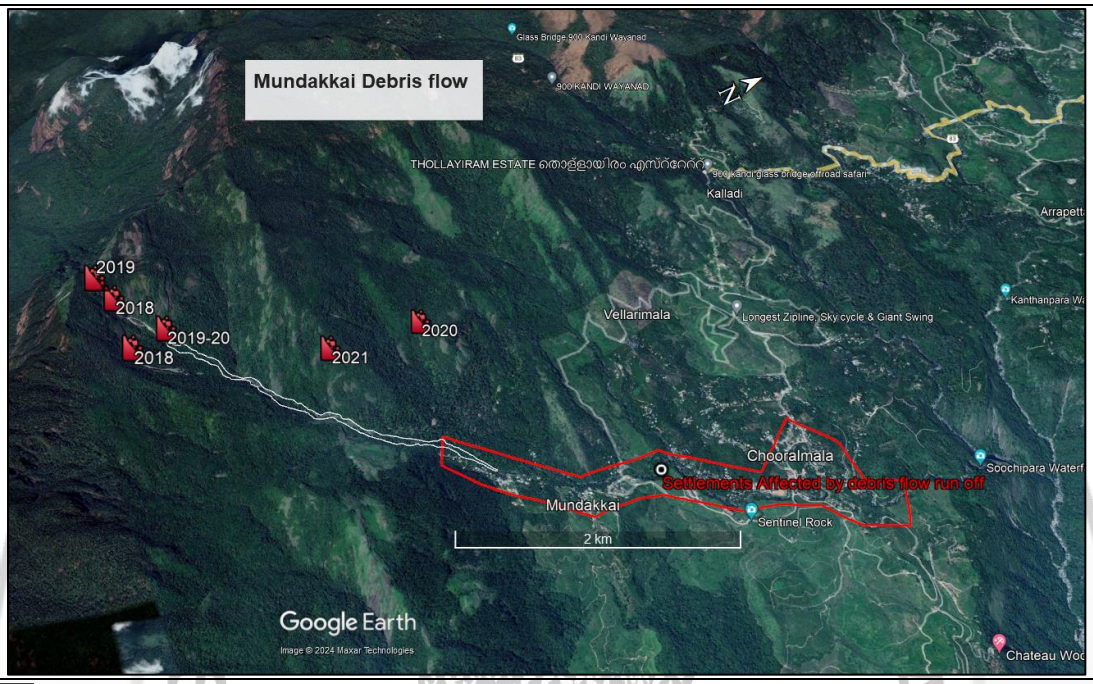


Fig.2: Google Earth imagery of origin of Mundakkai Debris flow and its delineated affected areas along Mundakkai & Chooralmala villages along the lower reaches of Meppadi hill ranges.

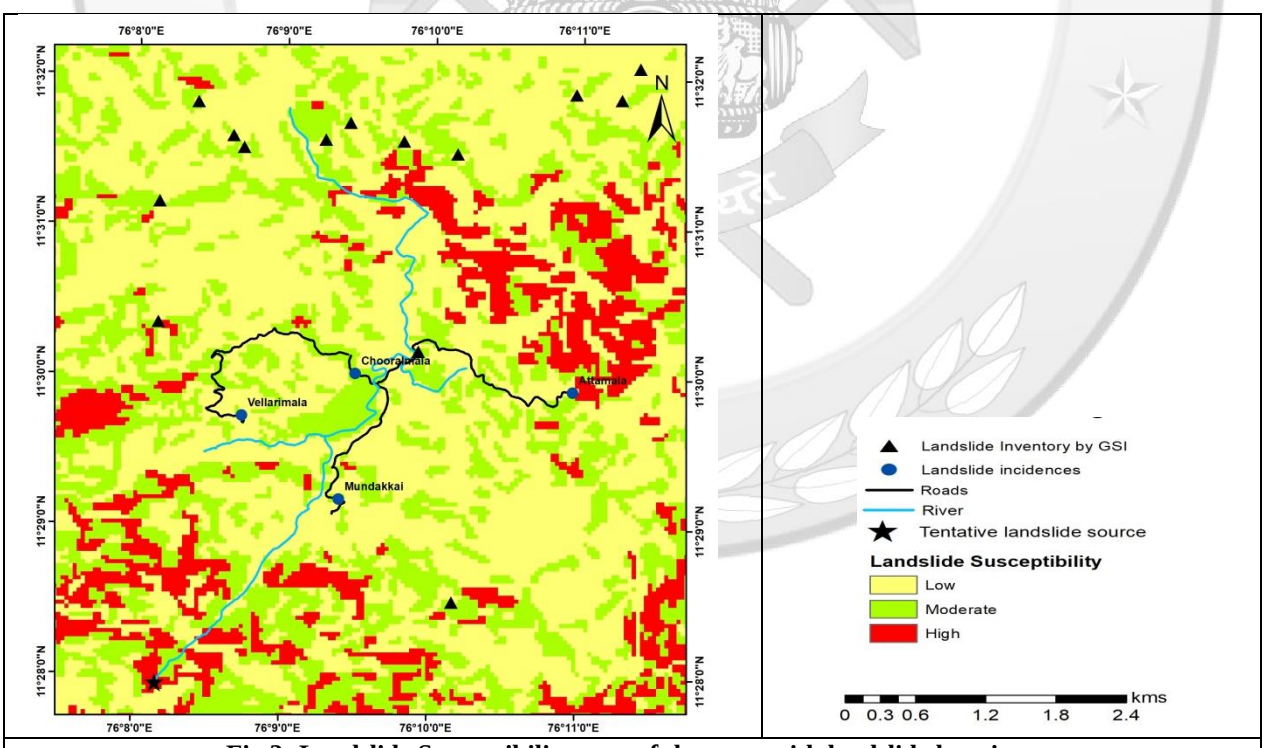
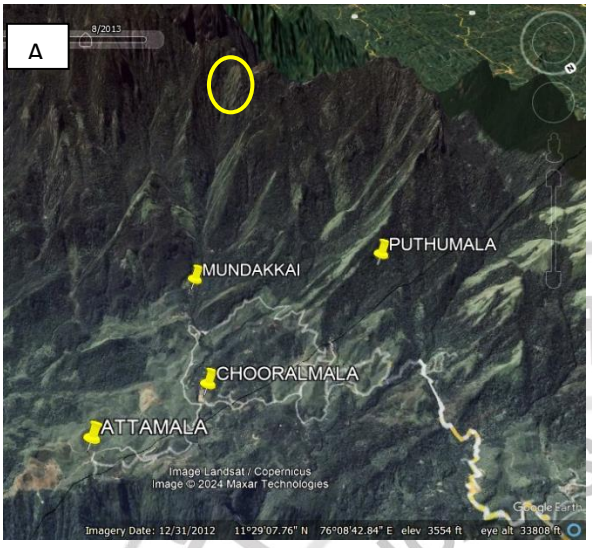
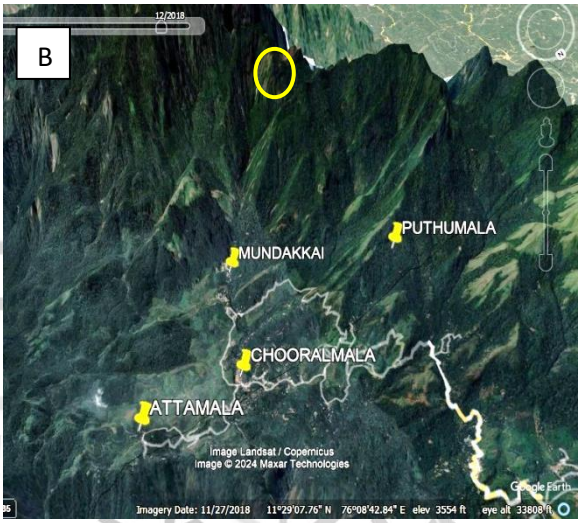


Fig.3: Landslide Susceptibility map of the area with landslide locations





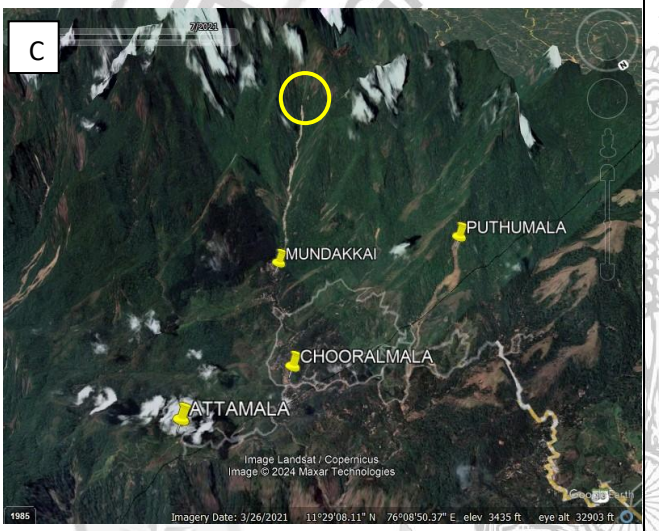


Fig 4: Comparitive study of multi-temporal Google Earth imageries of Mundakkai-Chooralmala areas along the same slope

A: GE imagery of 2012 (no sign of initiation)

B: GE imagery of 2018 (presence of minor slides

C: GE imagery of 2021 (A major debris flow occurred)



Fig.5: GSI officials visiting the landslide affected area



Fig.6: Chooralmala, the devastated village

The details of landslide incidences recorded on a 42-point geo-parametric data during preliminary investigation

No	Field		Description
1	Slide No.	:	*KER/WYD/58A03/2024/01*
2	State	:	*Kerala*
3	District	:	*Wayanad*
4	Toposheet No.	:	*58 A/03*
5	Name of the slide	:	*Mundakkai- Chooralmala*
6	NH/SH/Locality	:	*Mundakkai-Chooralmala-Meppadi road*
7	Latitude	:	*$11^0$27'46"*
8	Longitude	:	*$76^0$08'03"*
9	Length	:	--
10	Width	:	--
11	Height	:	--
12	Area	:	--
13	Depth	:	--
14	Volume	:	--
15	Run out distance	:	*7 km (Approx.)*
16	Type of Material	:	*Debris*
17	Type of movement	:	*Flow*
18	Rate of movement	:	*Extremely Rapid*
19	Activity	:	*Active*
20	Distribution	:	*Retrogressive*
21	Style	:	*Multiple*
22	Failure mechanism	:	*Deep rotational (≥ 5m) failure (?)*
23	History	:	*As per GE imageries, initiation of the landslide in the source area occurred during the monsoon of 2018. During the successive years, the area of the slide seems increasing and also observed minor slides developed along both the flanks of the stream. The present debris flow occurred at 1:00 AM on 30.07.2024*

24	Geomorphology	:	*Moderately dissected slope and valley*
25	Geology/Lithology	:	*Garnetiferous Biotite Gneiss, Charnockite*
26	Structure		--
27	Landuse/ Landcover	:	*High Height Plantation, Low Height Plantation and Settlement*
28	Hydrological condition	:	*Flowing*
29	Triggering Factor	:	*Heavy Rainfall*
30	Death of persons	:	*~107 persons (till 5:30 PM on 30.07.2024)*
31	People affected	:	*Not evaluated yet*
32	Livestock Loss	:	*Not evaluated yet*
33	Communication	:	*Roads, bridges and transmission lines damaged. Bridge connecting Mundakkai to Chooralmala washed away.*
34	Infrastructure	:	*Not evaluated yet*
35	Agriculture/forest/Barren	:	*Agricultural loss, forest loss*
36	Geo-scientific Causes	:	*The excessive rainfall is the major triggering factor which results in increase of pore water pressure and reduction of strength on super saturation initiated the slide. Toe erosion by stream.*
37	Remedial measures	:	*Detailed scientific study has to carried out for proposing proper remedial measures*
38	Remarks, if any		-
39	Photos. Sketch of Plan & section of the slide	:	





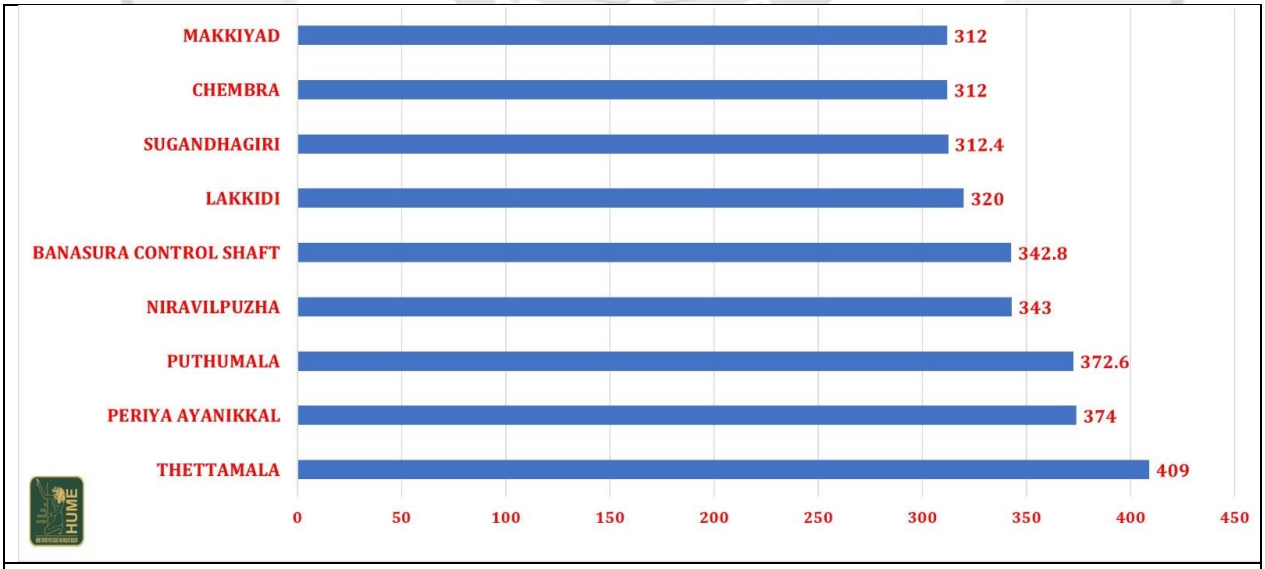


Fig. 7: Rainfall data (in mm) received in various parts of Wayanad District in the last 24 hrs.

Various Thematic maps of source and landslide affected area

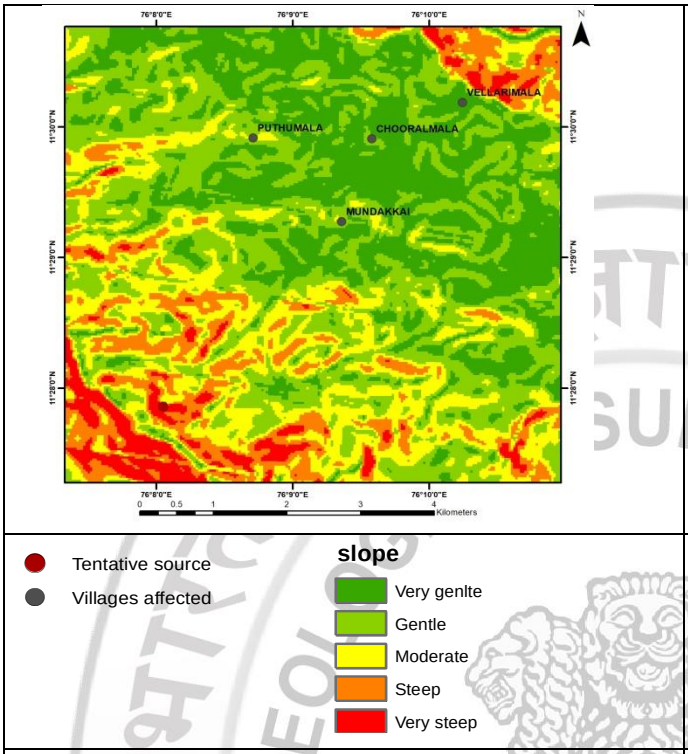


Fig. 8: Slope Map of the landslide affected area

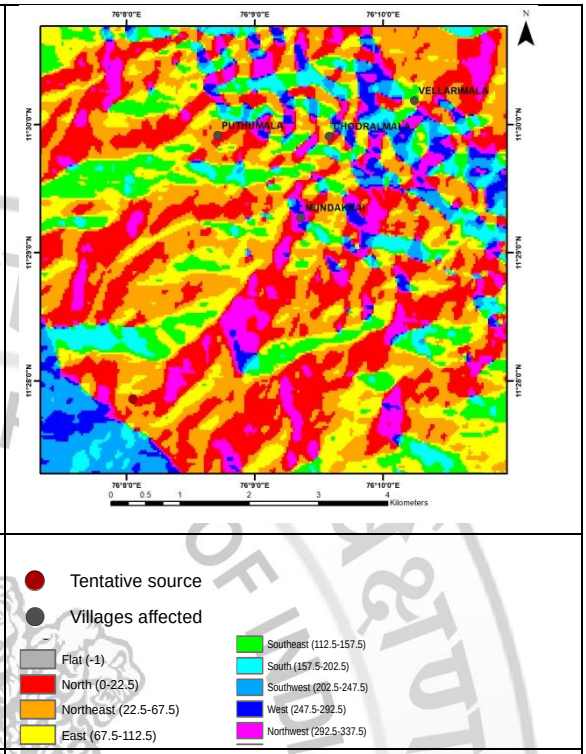


Fig.9: Slope aspect Map of the landslide affected area

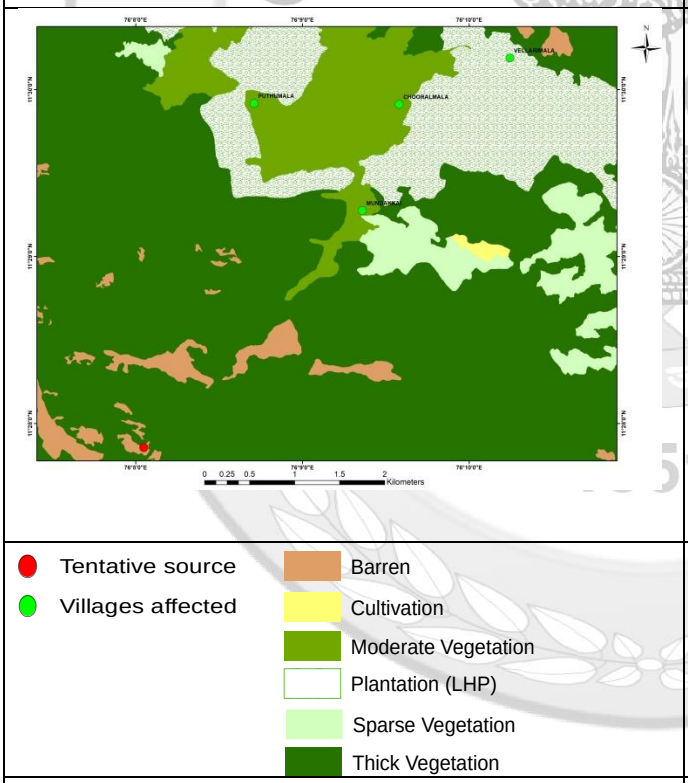


Fig.10: LULC Map of the landslide affected area

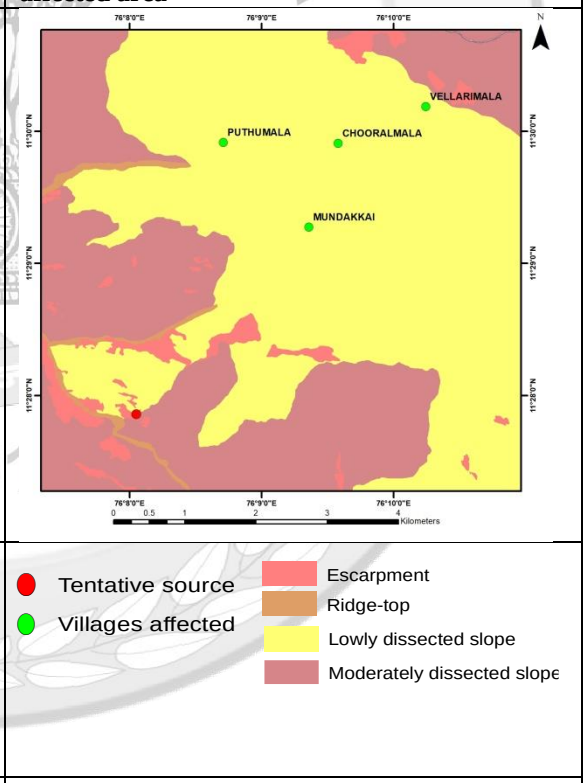


Fig.11: Geomorphology Map of the landslide affected area