Role of Department of Mines and Geology in the Field of Landslide

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Senior Divisional Geologist

Introduction

- Established in 1967AD as Nepal Geological Survey
- As Department of Mines and Geology in 1977 AD
- Establish of Landslide Section in 2018 AD

Objectives:

- Geological investigations and research
- Provide geo-scientific information and expert services
- Mitigation of natural hazards and protection of the environment through research
- Aware the people for natural hazards

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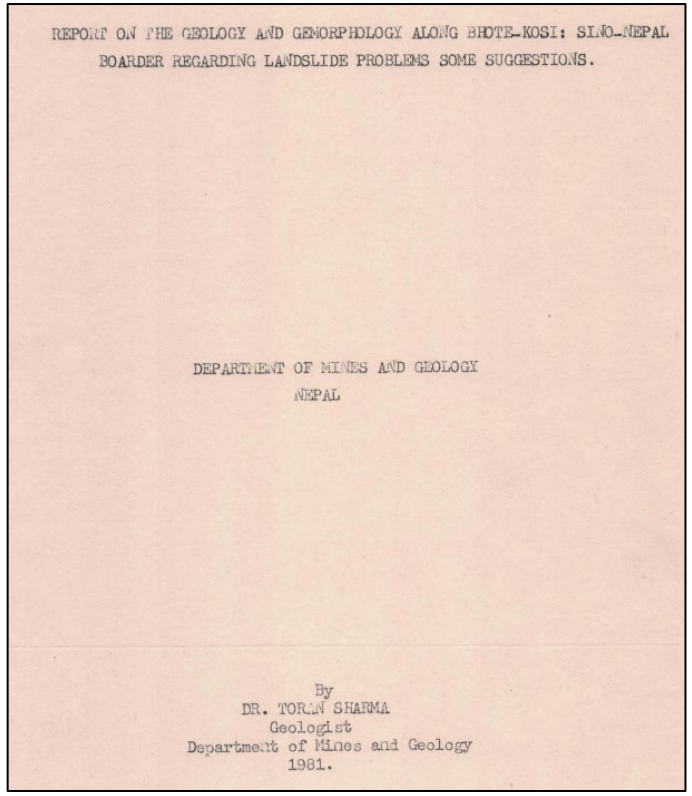
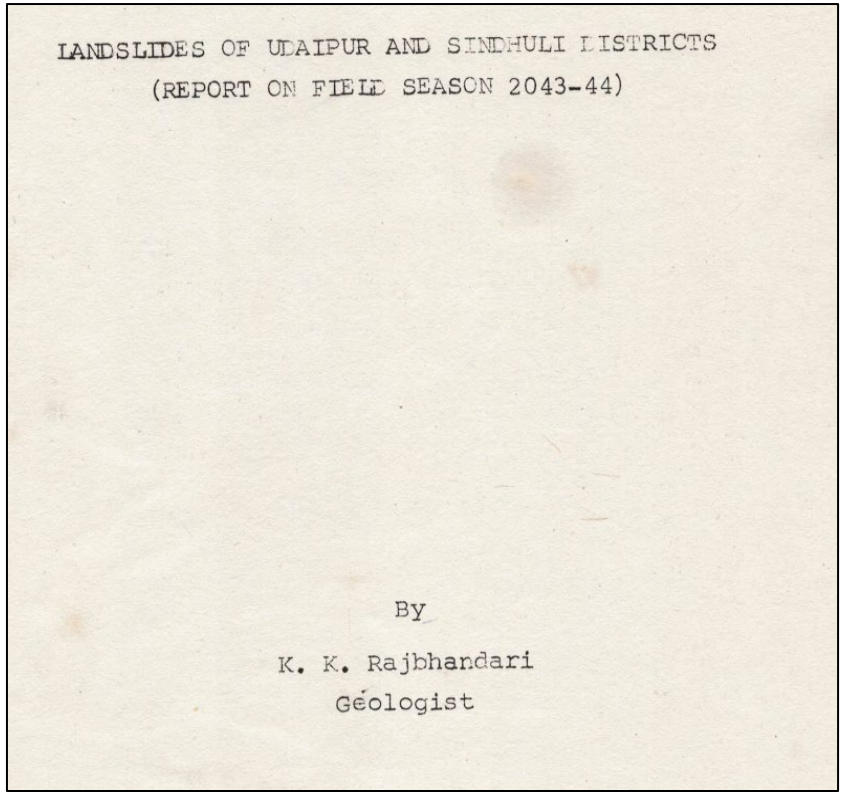
History of Landslide studies from DMG

- DMG started systematic landslide inventory survey and slope stability mapping in 1986AD to get an overview of those areas of Nepal most affected by landslides as a basis for future infrastructural planning.
- The German Technical Assistance Programme in DMG create a landslide inventory in the Lesser Himalayas by using remote sensing and Geographical Information System (GIS) technology in (1994).

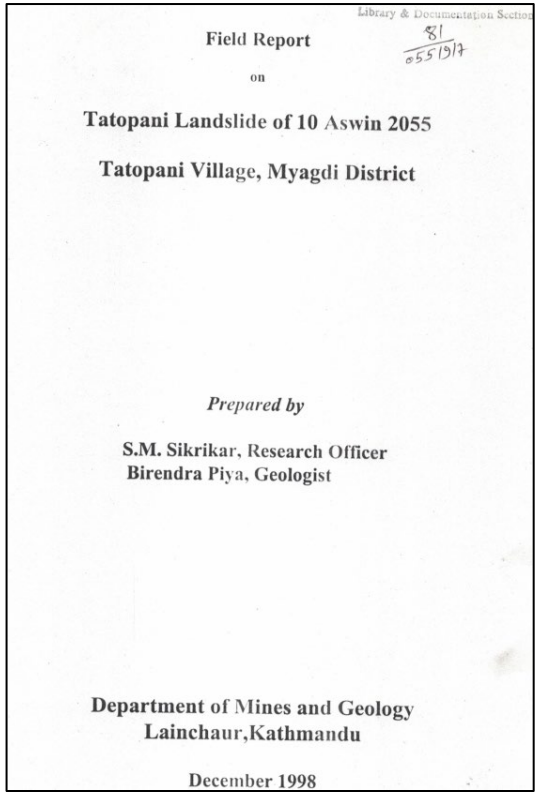

REPORT ON THE GEOLOGY AND GEMORPHOLOGY ALONG BHOTE-KOSI: SINO-NEPAL BOARDER REGARDING LANDSLIDE PROBLEMS SOME SUGGESTIONS.

DEPARTMENT OF MINES AND GEOLOGY
NEPAL

By
DR. TORAN SHARMA
Geologist
Department of Mines and Geology
1981.


LANDSLIDES OF UDAIPUR AND SINDHULI DISTRICTS
(REPORT ON FIELD SEASON 2043-44)

By
K. K. Rajbhandari
Geologist


Field Report
on
Tatopani Landslide of 10 Aswin 2055
Tatopani Village, Myagdi District

Prepared by
S.M. Sikrikar, Research Officer
Birendra Piya, Geologist

Department of Mines and Geology
Lainchaur,Kathmandu

December 1998

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Role of DMG in Landslide Risk Reduction

- Prepares landslide inventory and landslide distribution maps.
- Prepares landslide hazard zonation/ Landslide susceptibility maps
- It carries out Emergency Geological Studies in the landslide affected areas as per the request made through the Ministry of Home Affairs, Municipalities or other organizations and submits reports to the respective organizations.
- Carries out geological study of landslide affected areas, find out the cause of landslide and recommend suitable mitigation measures.
- Identification and Geological study of resettlement area.

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Landslide Hazard Zonation

- **Published Maps from DMG**

S.N.	Title	Area
1	Landslide hazard zonation map	part of Makawanpur, Dhading and Kathmandu district
2	Landslide hazard zonation map	part of Kaski, Myagdi and Parbat districts
3	Landslide hazard zonation map	part of Kaski, Myagdi and Parbat districts.
4	Landslide hazard zonation map	part of Syangja, Kaski, Parbat and Tanahun districts.
5	Landslide hazard zonation map	part of Gulmi, Parbat, Baglung and Syangja districts
6	Landslide hazard zonation map	part of Syangja, Palpa and Gulmi districts.
7	Landslide hazard zonation map	part of Syangja, Palpa and Tanahun districts.
8	Landslide hazard zonation map	part of Gulmi, Syangja and Palpa districts.
9	Landslide hazard zonation map	part of Myagdi, Baglung, Parbat and Kaski districts.
10	Landslide hazard zonation map	part of Baglung and Myagdi districts.

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Landslide Inventory, Hazard Zonation and Susceptibility

S.N.	Title
1	Landslide Inventory in Seven Districts of Central and Western Nepal
2	Landslide Hazard Zonation Mapping Around the Dhulikhel Area Of Kavrepalanchowk Districts.
3	Landslide Inventory and Hazard Zonation Map of Some parts of Makwanpur, Kabhrepalanchok, Lalitpur and Kathmandu Districts (Toposheet No. 72E/6 and E/7 by Parts)
4	Landslide Inventory and Hazard Zonation Mapping around the part of Kaski, Myagdi and Parbat Districts(Toposheet No. 62P/15)
5	Landslide Inventory and around the part of Syanja, Palpa and Gulmi Districts in Lumbini and Gandaki Zones (Toposheet No. 63 M/9)
6	Landslide Susceptibililty Mapping, Parts of Dailekh, Achham and Surkhet District, Western Nepal and Far Western Nepal (Toposheet no. 2881 03 C,D)
7	Landslide Susceptibililty Mapping, Parts of Rukum, Rolpa and Salyan district, Mid Western Nepal(Toposheet no. 2882 06B,D)

- Bulletin

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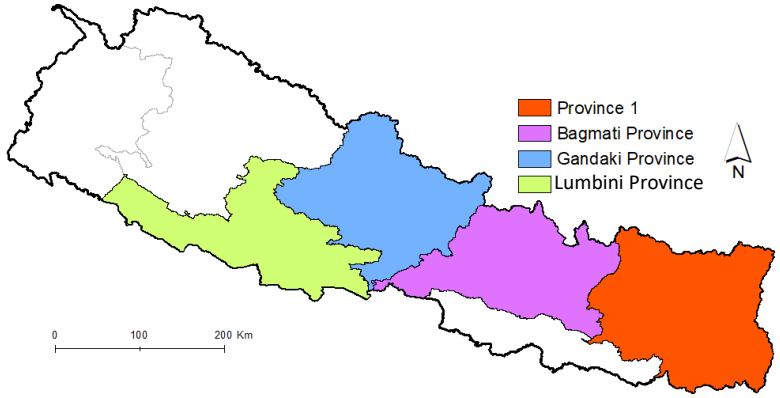
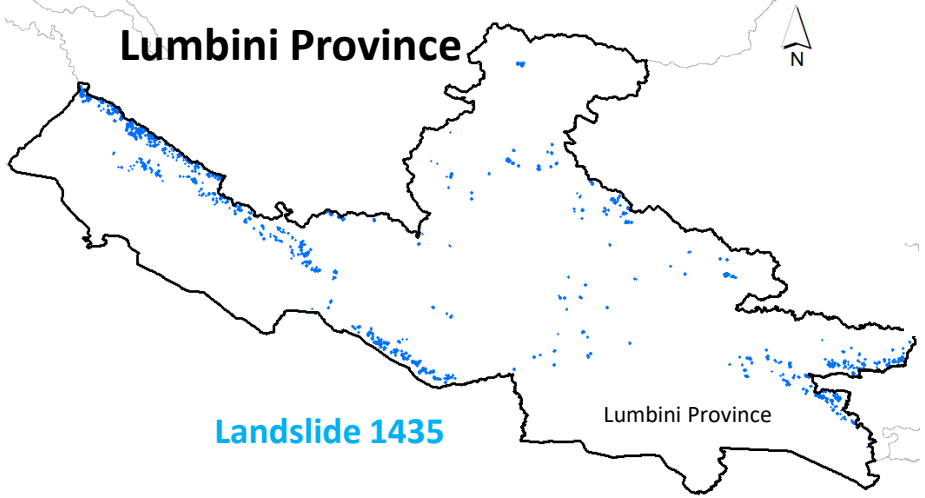
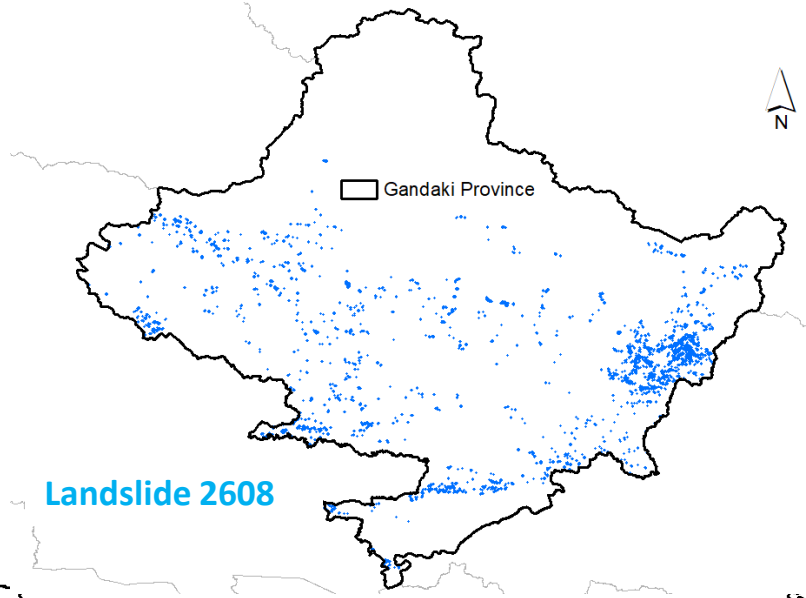
Landslide Inventoty Database and Distribution Map

- Provide **spatial distribution** of landslides
- Help regular **monitoring** of landslides

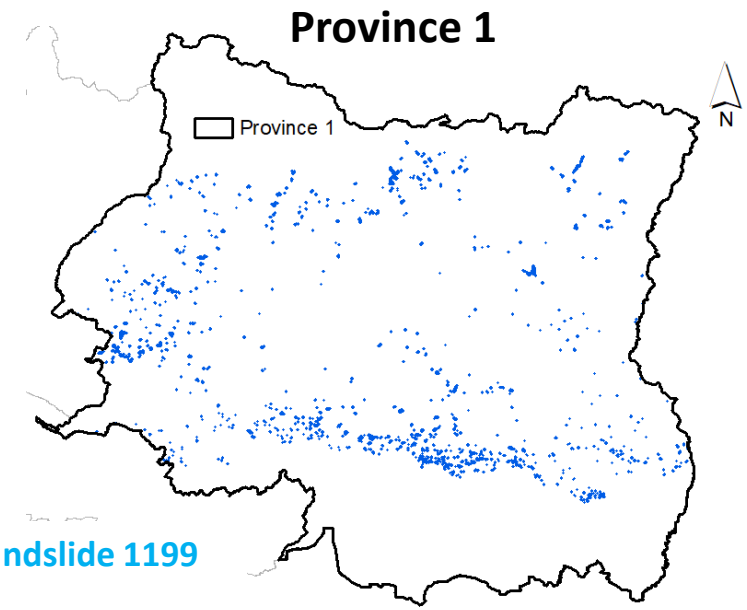




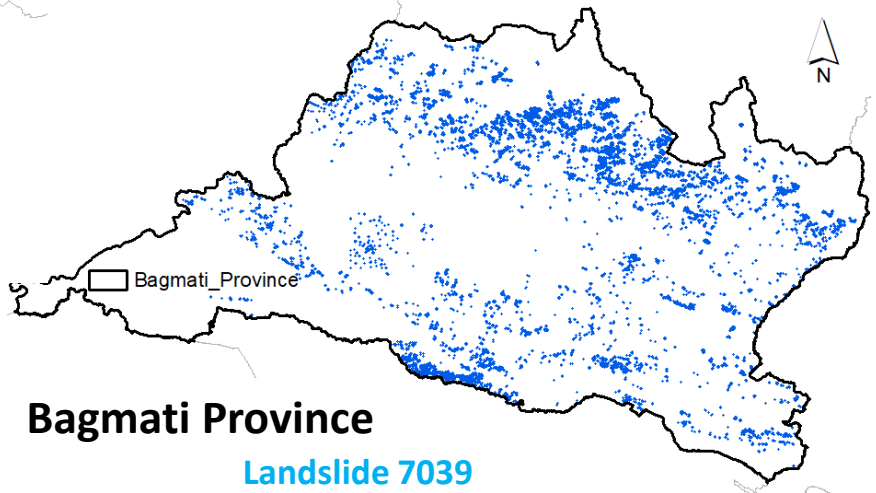
Landslide 1435



Landslide 2608



Landslide 1199

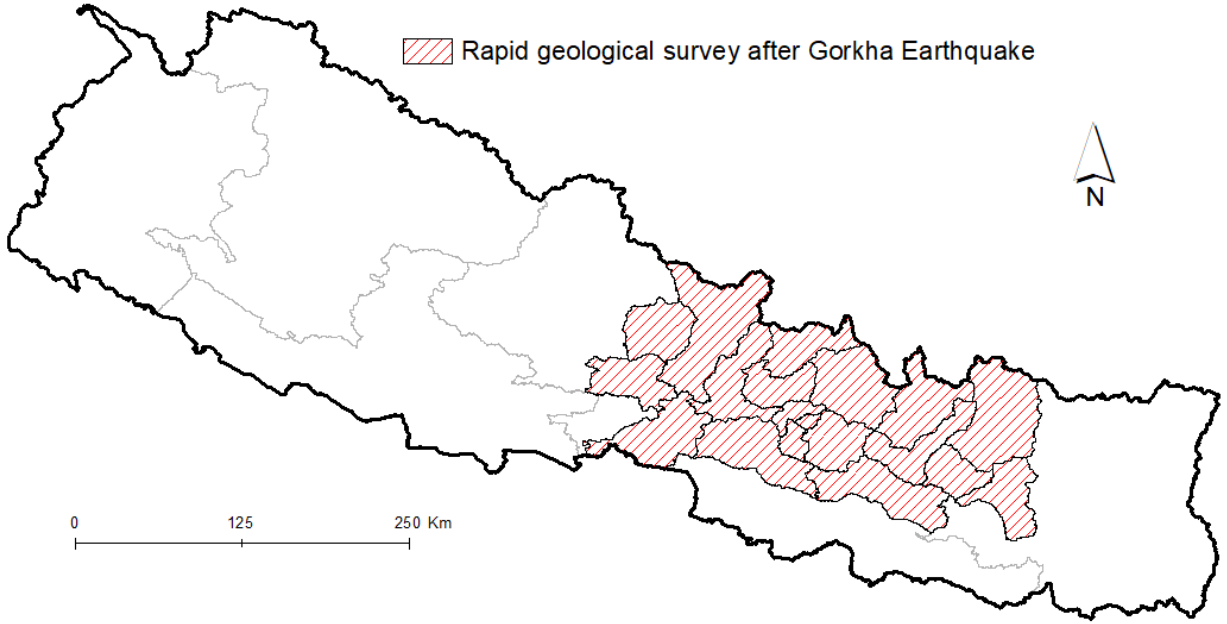


Bagmati Province

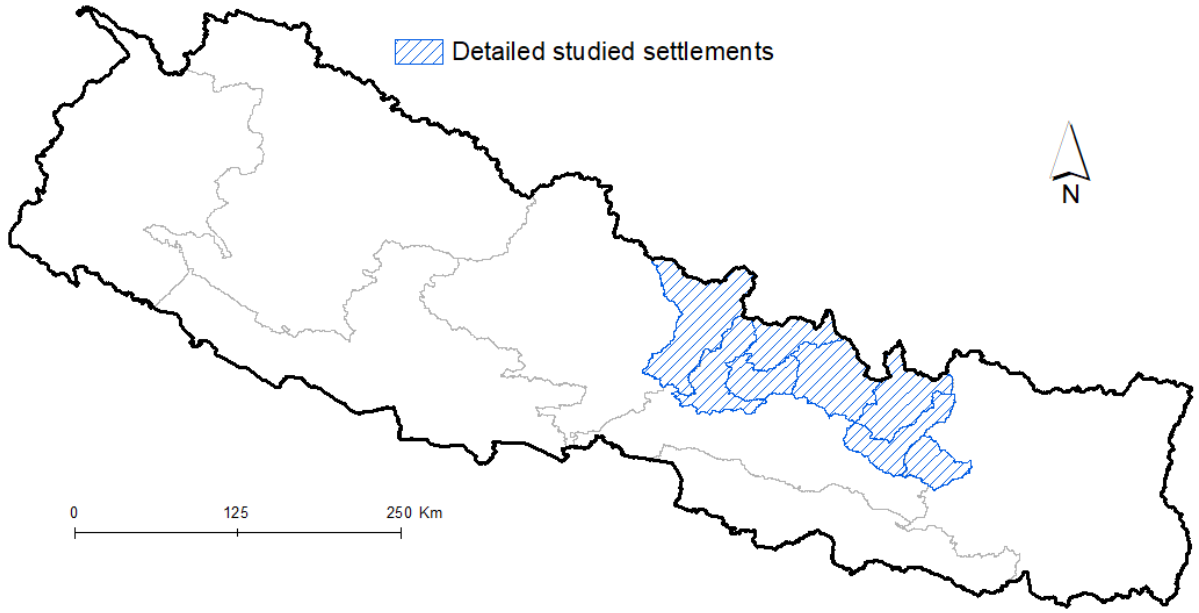
Landslide 7039

Emergency Geological Studies

Stability Study of Settlements Due to Landslides Triggered by Gorkha Earthquake 2015



Several Settlements of 19 Districts and 125 local bodies (VDC/Municipality) were studied



107 Settlements of 8 Districts were studied in Detail for stability

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Emergency Geological Studies

Geological Assessment of Earthquake Affected settlement

S.N.	Districts
1	Dhading
2	Dolakha
3	Rasuwa
4	Gorkha
5	Nuwakot
6	Okhaldhunga
7	Ramechhap
8	Sindhupalchowk

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Emergency Geological Studies in FY2077/78

S.N.	List of government authorities
1	Ministry of Home Affair
2	National Disaster Risk Reduction and Management Centre
3	Department of Urban Development and Building Construction
4	District Administrative Office
5	Different Local level
	Other….

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Emergency Geological Studies in FY2077/78

SN	Village/Gaupalika	District	Remarks
1	Durlung	Parbat	Report Submitted
2	Rahughat	Myagdi	
3	Duwar	Lamjung	
4	Isma, Musiko, Ruru	Gulmi	
5	Balaucha, Aalital	Dadeldhura	
6	Mandandeupur RM	Kavre	
7	Ghyangphedi,Dupcheswor	Nuwakot	
8	Marag, Takam	Myagdi	
9	Ramarosan	Achham	
10	Sitganga, Sandhikharka, Bhumikasthan	Argakhachi	
11	Kaligandaki, Biruwa	Syangja	
12	Phulkharka, Ghyangphedi/ Tadi	Nuwakot	

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EMERGENCY GEOLOGICAL STUDIES, 2077/78

S.N.	Village/GauPalika/NagarPalika	District	Remark
1	Whole district	Kalikot	has to be done
2	Whole district	Myagdi	
3	Ghairang, shahid lakhan Ga. Pa	Gorkha	
4	Dashinkali Na.Pa.	Kathmandu	
5	Warekot Ga.Pa.	Jajarkot	
6	Indrawati Ga.pa.	Sindhupalchowk	
7	Duhu Ga. Pa.	Darchula	
8	Miklajung Ga. Pa.	Morang	
9	Barahbise Ga. Pa.	Sindhupalchowk	
10	Raskot, NarhariNath, SanniTriveni Na. Pa.	Kalikot	
11	Others	.....	

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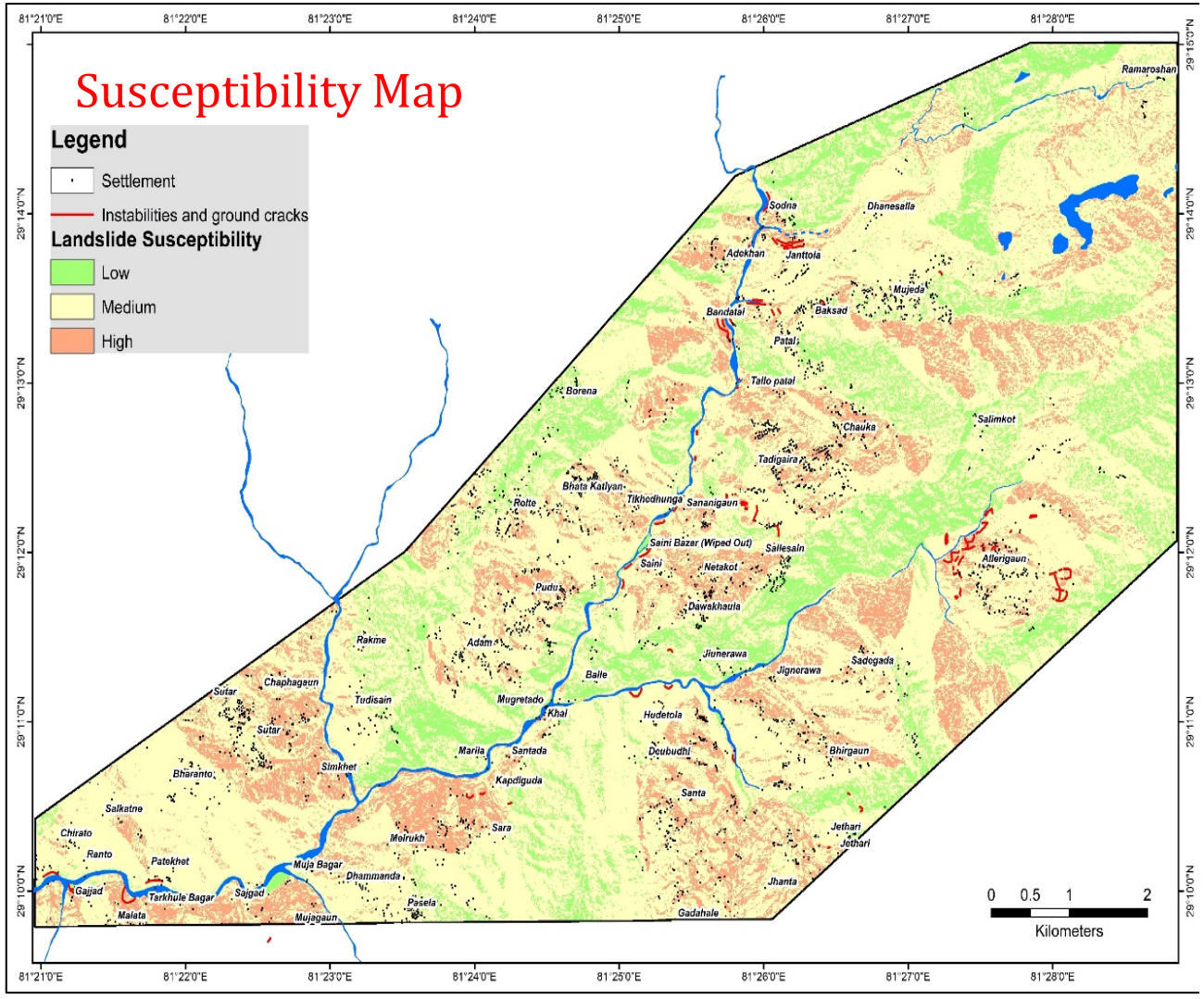
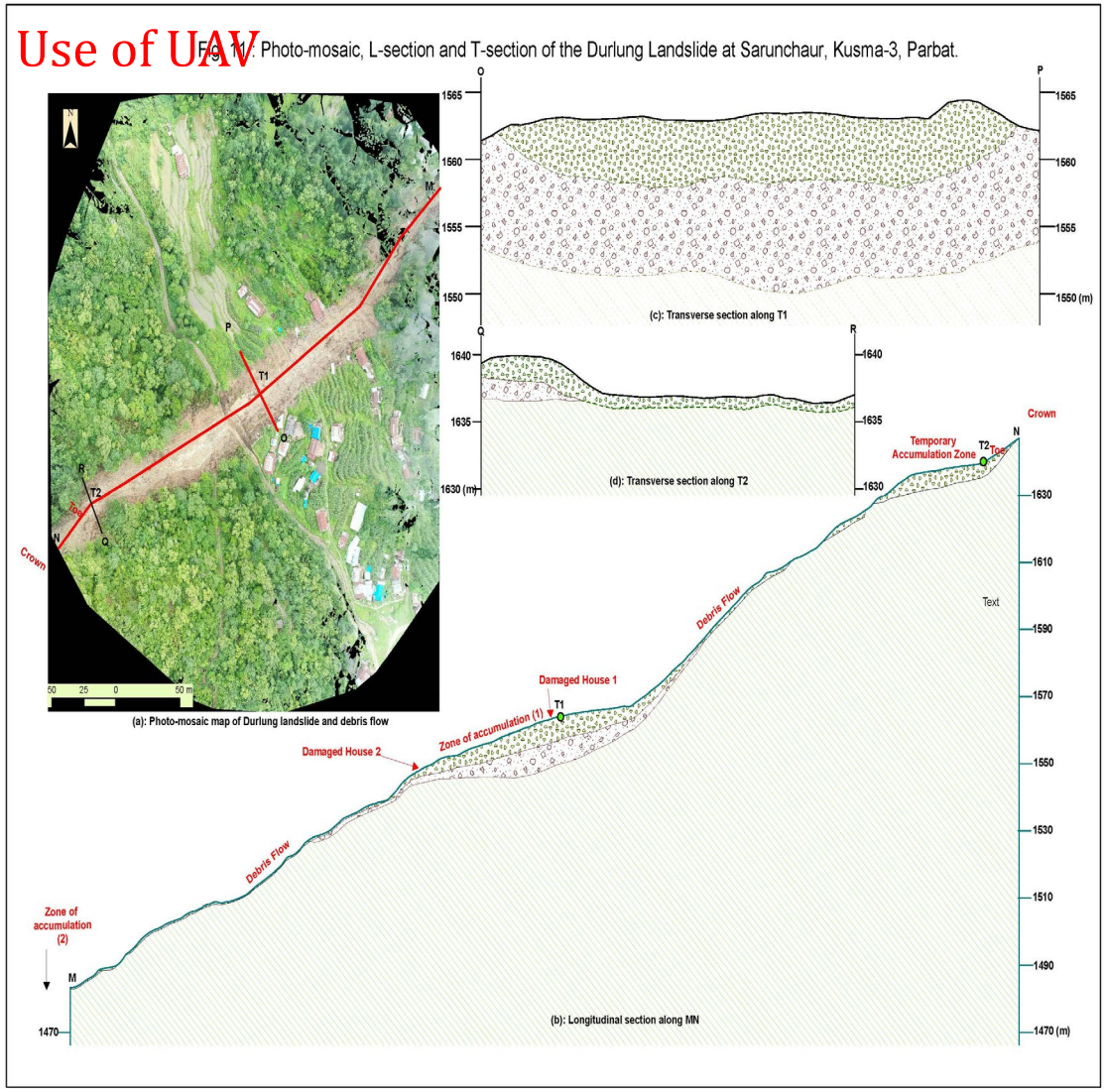
Techniques used in Landslide Study

Susceptibility Map



Use of UAV



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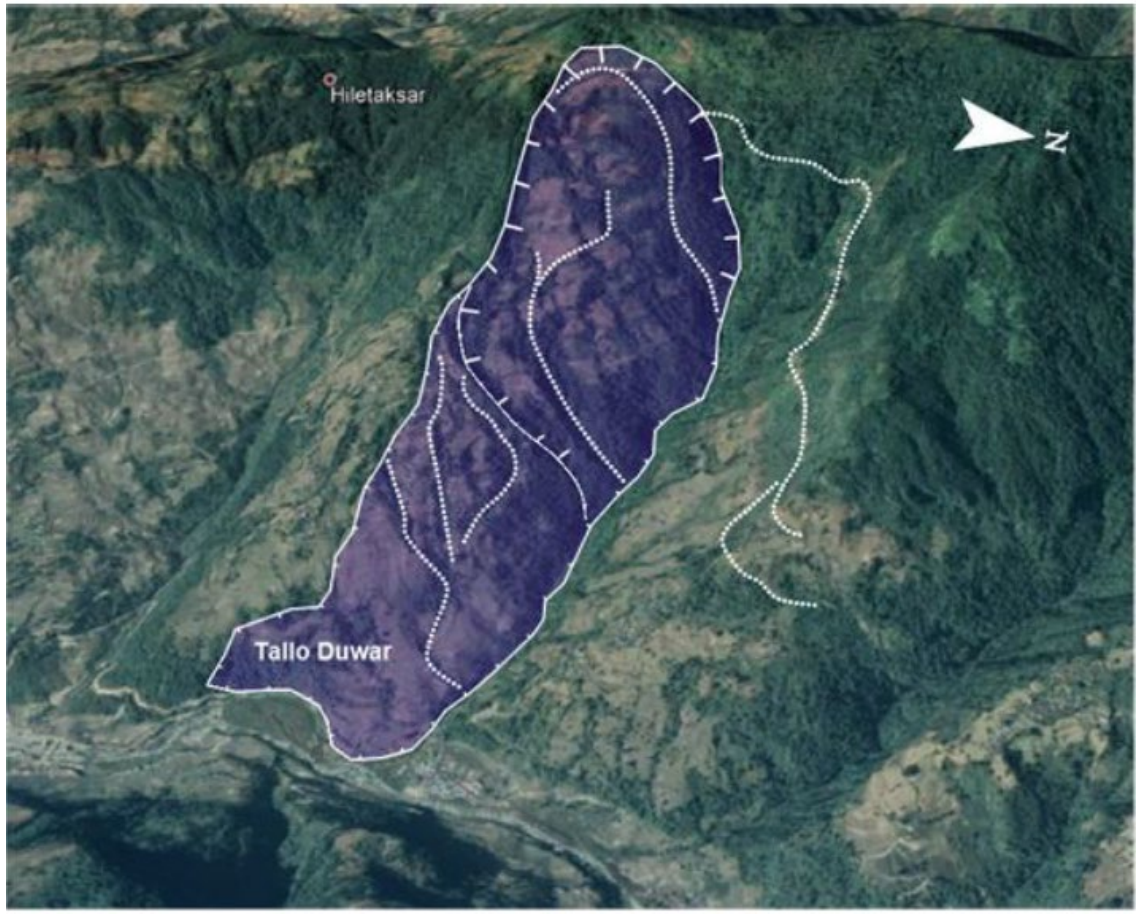
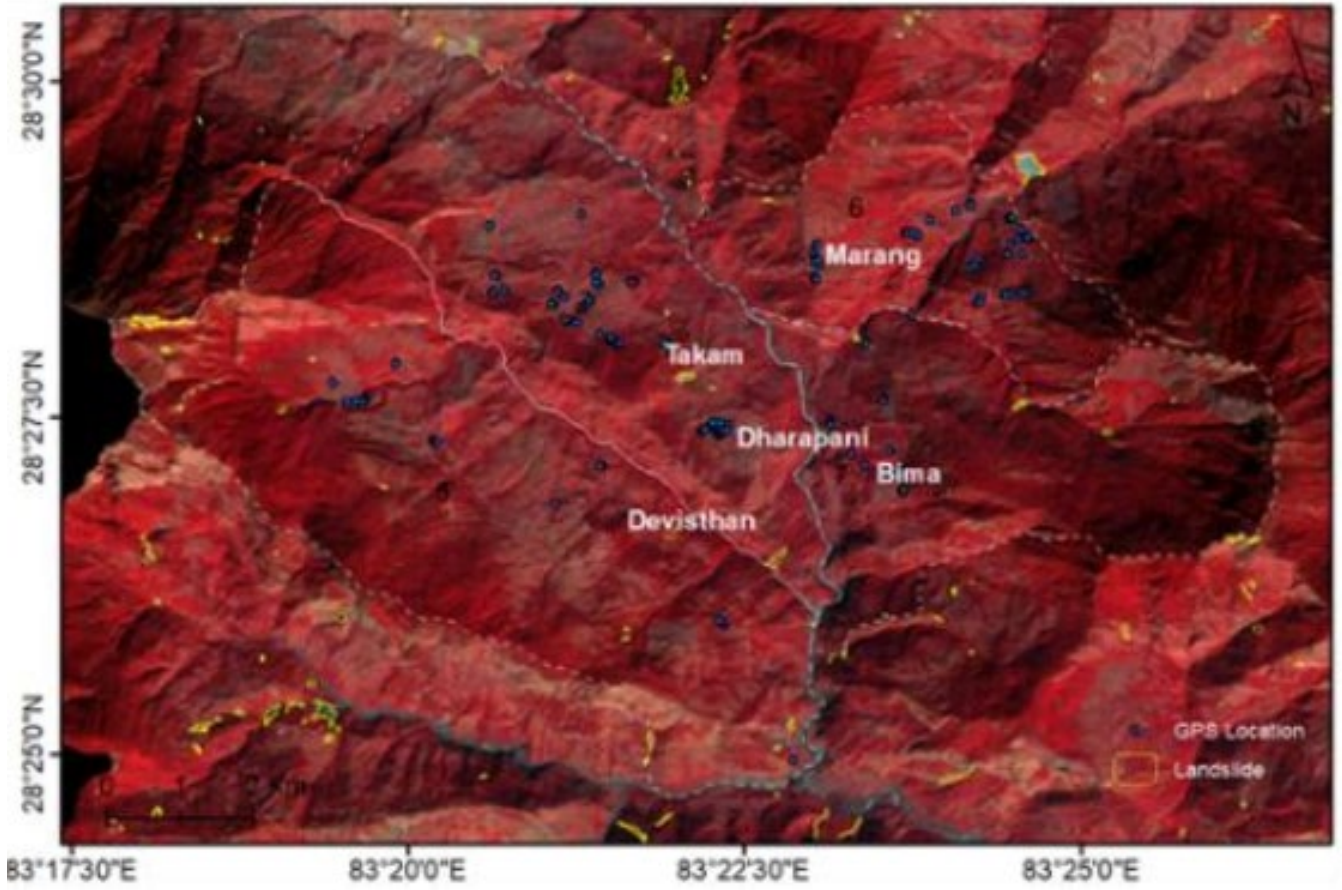
Techniques used in Landslide Study

Use of Google Earth



Use satellite image



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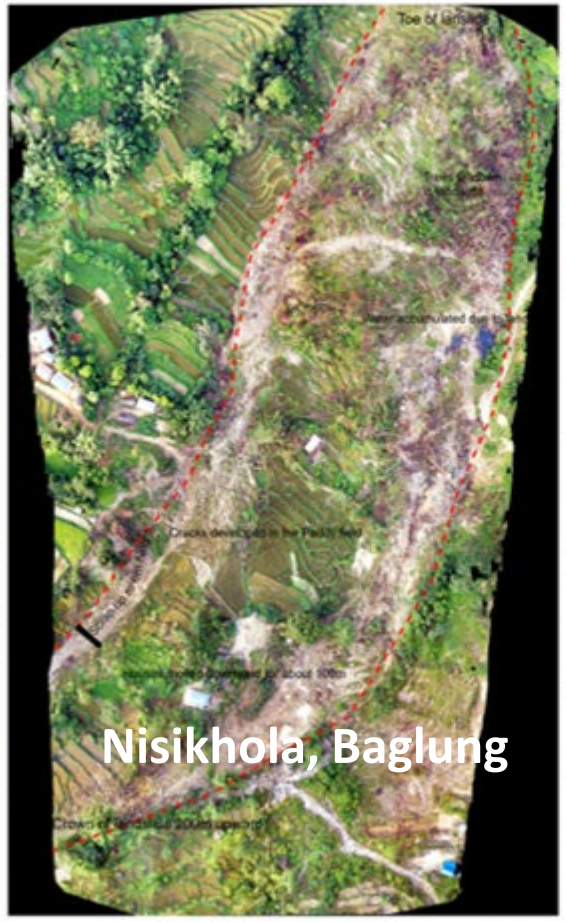
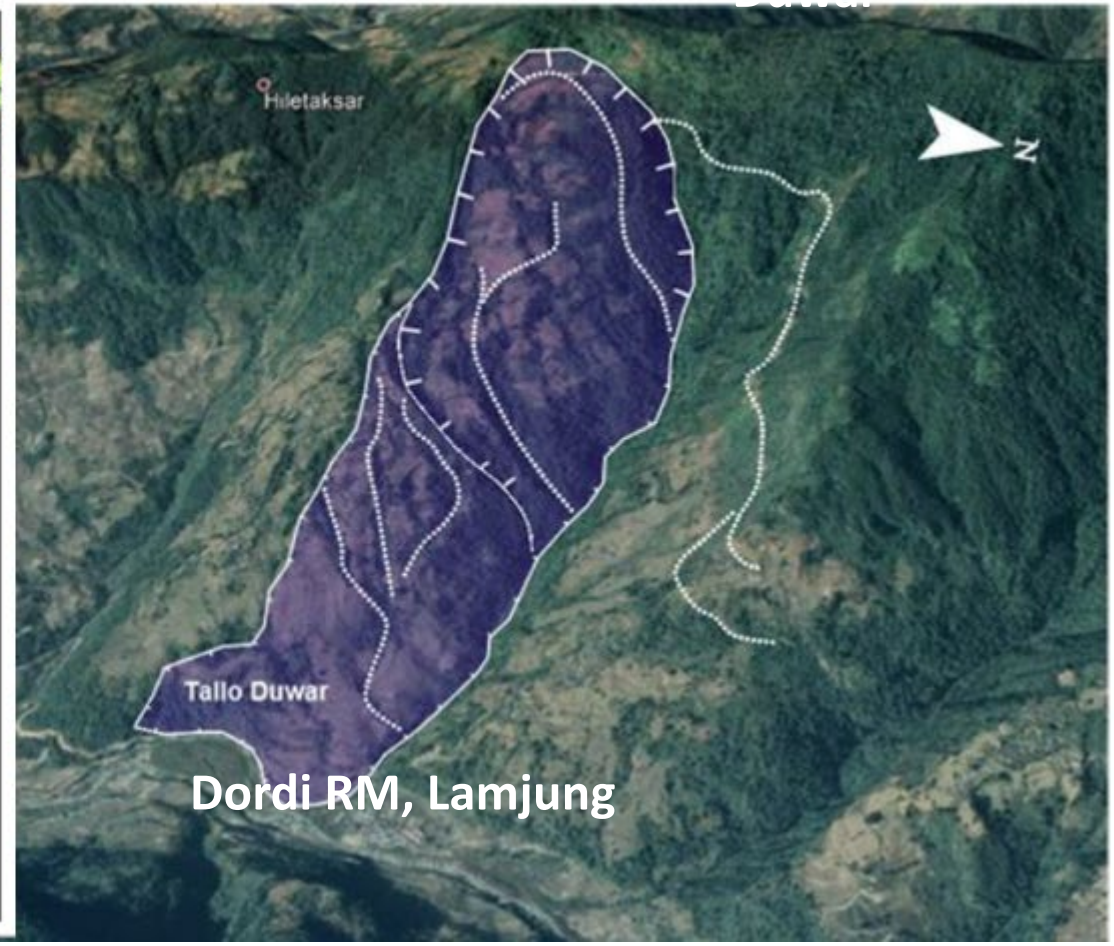
Major Findings

Major Types: 1. Deep Seated Landslides





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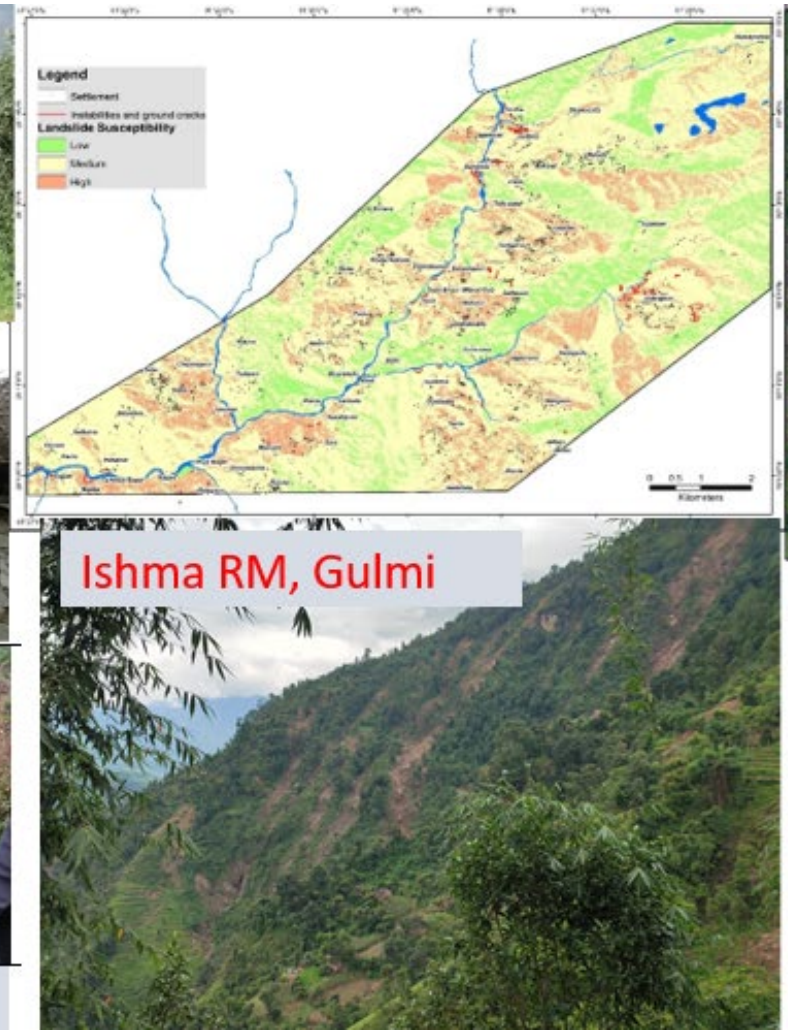
Major Findings

Major Types: 2. Shallow Soil slides/ Rockslides

Ramaroshan RM, Achham



Ishma RM, Gulmi

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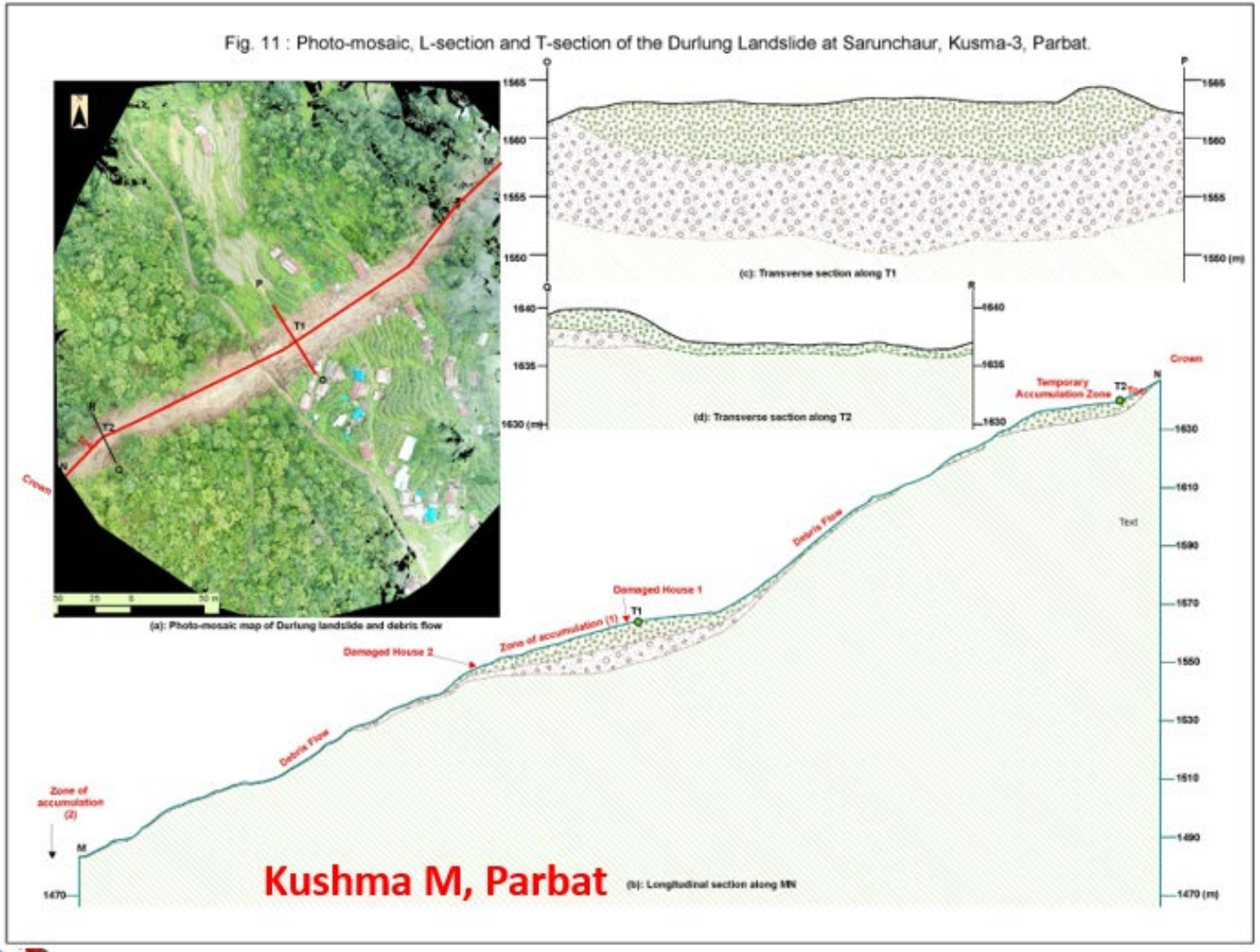
Major Findings

Major Types: 3. Debris flows



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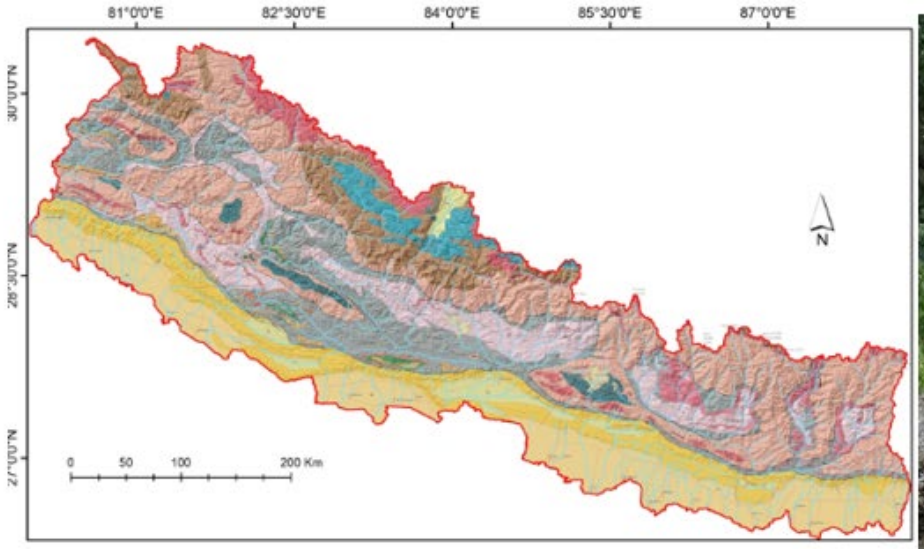
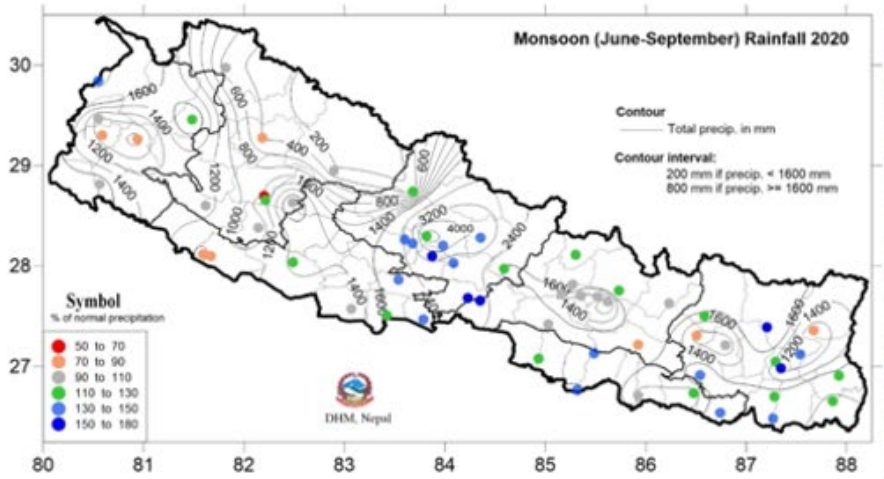
Major Findings

Causes:

- Geology
- Rainfall
- Anthropogenic





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Major Findings

Non-engineered road terror

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Major Findings, After onset of this monsoon

Tsum Nubri, Gorkha

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Challenges in Landslide Study:

- Complex Geological Formation
- Lack of adequate data like satellite image, rainfall data etc.
- Difficulty in accessibility during monsoon.
- Limited Human Resources

Immediate Response to Reduce Landslide Risk Reduction

- Community awareness
- Drainage management
- Use of local technologies

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LESSONS LEARNED

- Most of our settlements in hilly areas are in older landslide deposited mass. Natural and anthropogenic causes have made them unstable
- Community have high expectations with government. But they rely on instruments rather than expert knowledge
- Community awareness about disaster risk is very low
- There is no clear cut task division/ co-ordination and data sharing among government organizations
- There is always no positive response from the local representatives/ conflict among different political views and personal interests
- **One time interpretation is not always valid for a particular location.**

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PLANS OF FISCAL YEAR 2078/79

- Emergency Study of Landslides upon demand from various Government Authorities
- Landslide Susceptibility Mapping of Myagdi District

FUTURE PLANS

- Preparation and Publication of Landslide Inventory Map of Karnali and Sudur-Paschim Provinces
- Study of Landslides upon demand from various Government Authorities
- Use of Geophysical Instruments for landslide investigation
- Detail study of large landslide using SAR
- Instrument aided monitoring of landslides
- Use of UAV, DGPS for precise location and Change Detection
- Preparation of district wise Landslide Susceptibility Maps

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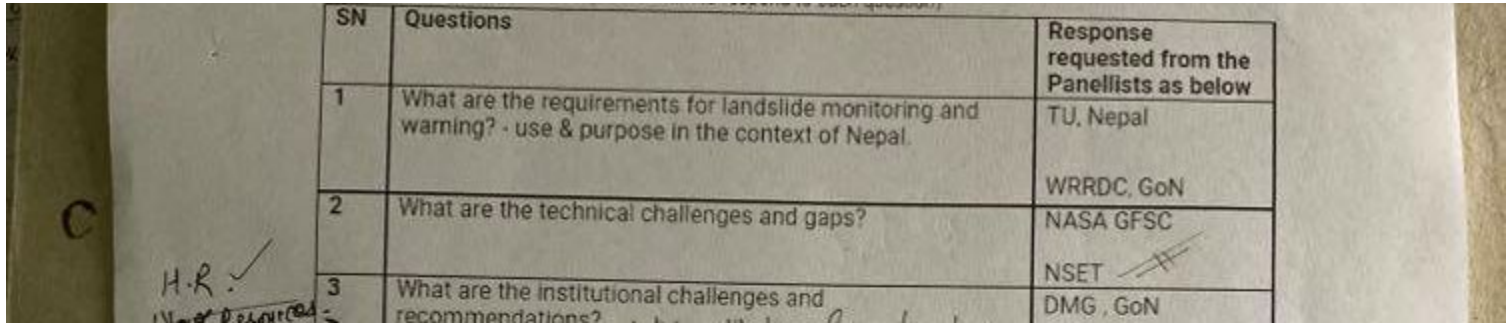
Thank You

1. Lack of Human resources (specially skilled/trained)
2. Lack of inter individual co-ordination within govt. agencies.
3. Lack of data such as rainfall, high resolution satellite imageries

1.No of new staff in this field in DMG should be increase
2. One gov. body like NDRRMA should play lead role to co-ordinate within all gov. agencies.
3. Data should be share among all gov. agencies

1. Landslide monitoring of large scale and development of warning system by modelling.
2. Training human resources, technologically update, and availability of high resolution satellite imageries and its utilization.
3. Preparation of hazard mapping if possible risk map for ex. ward level, municipality level in small scale 1:1000 or 1:5000.
4. Thus prepared map can use by local gov. agencies.
   for this and to quake assessment of the hazard.
5. There should be expert (technical) in local, provincial level or atleast in district level.



SN	Questions	Response requested from the Panellists as below
1	What are the requirements for landslide monitoring and warning? - use & purpose in the context of Nepal.	TU, Nepal WRRDC, GoN
2	What are the technical challenges and gaps?	NASA GFSC NSET
3	What are the institutional challenges and	DMG , GoN