

# The 16th AOGEO Symposium

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## Country Report : Nepal

Prakash Joshi

Director General

Survey Department,

Government of Nepal

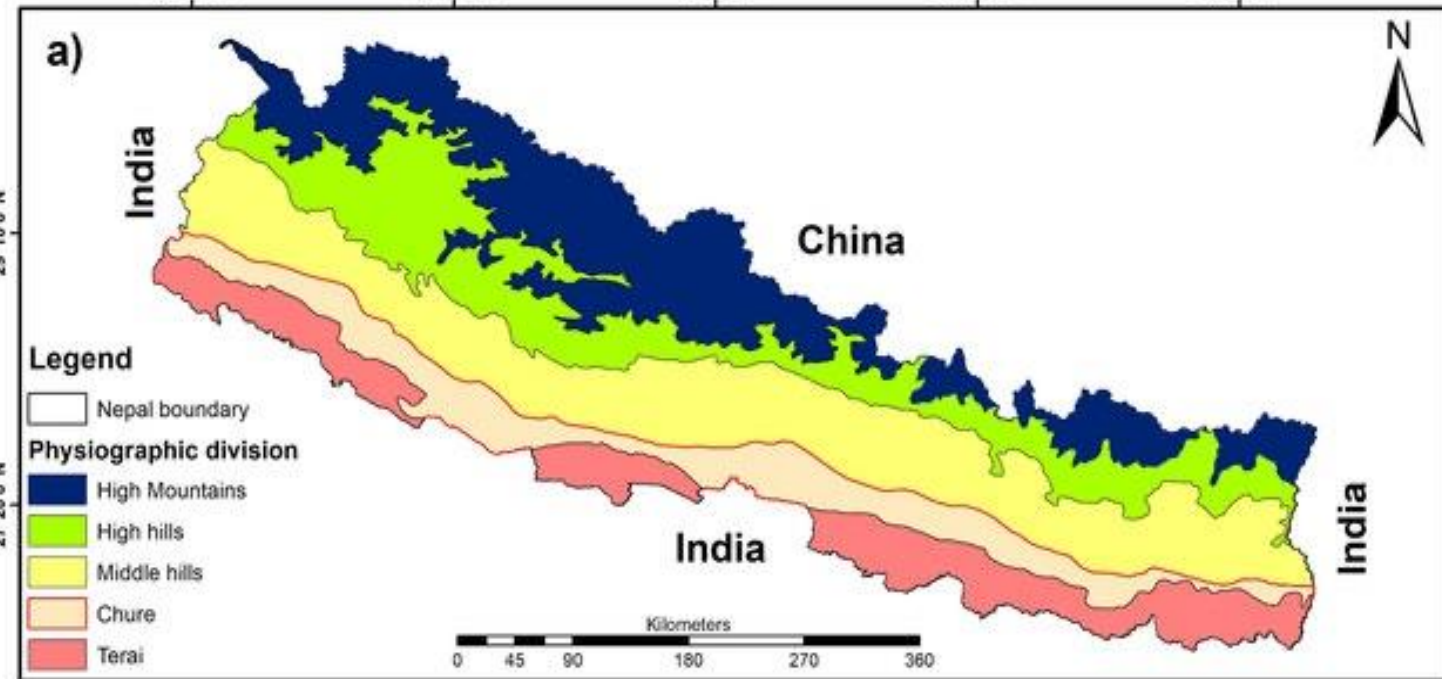
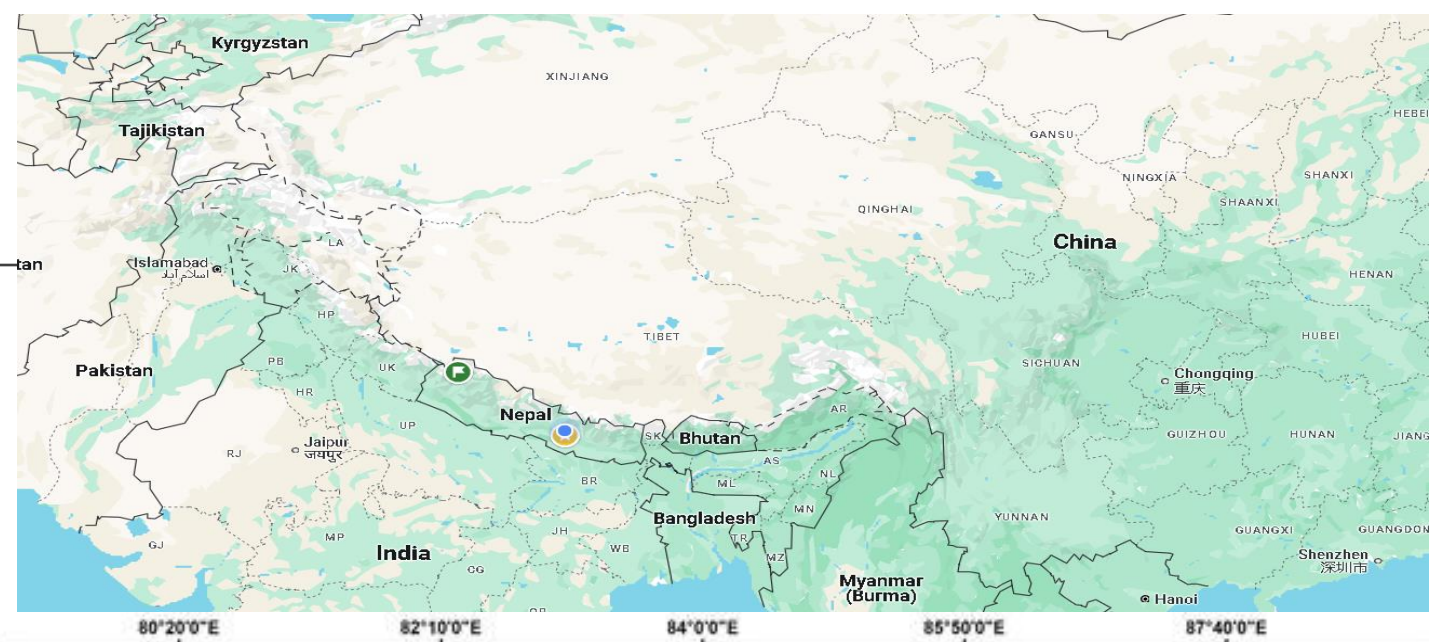
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# Nepal

1. GEO member since 2005
2. Landlocked Himalayan Country in South Asia
3. Federal Democratic Republic Country
4. 7 province and 753 local units
5. Population: 29 million 164 thousand 578 (CBS, 2021)
6. Multi-lingual, multi-ethnic, and diverse culture
7. Uneven geographical terrain (ranging from 60 m in the south to 8848.86 m in the north from MSL ) with Five physiographic divisions

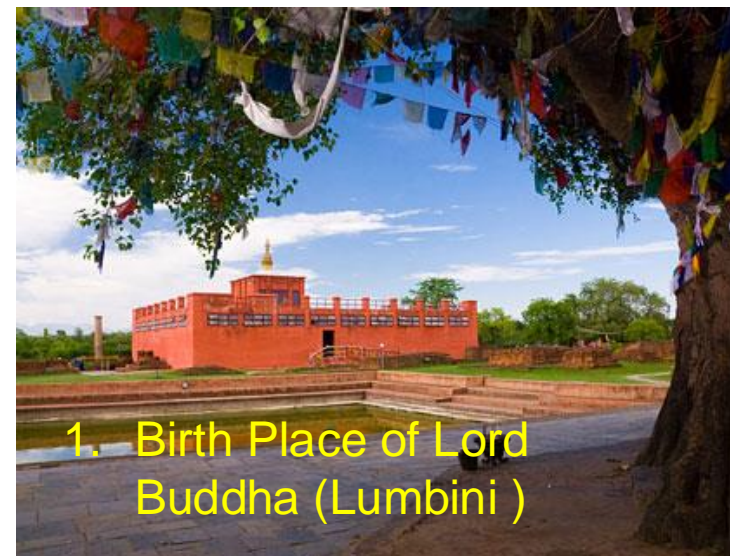




# Nepal : The country of Adventures

1. Total Population: 29,164,578
2. Annual Population Growth Rate: 0.92%
3. Sex Ratio: 95.59 male per 100 female

1. Population density: 198 per km<sup>2</sup>
2. Total Household: 6,666,937
3. Average household size: 4.37 person per household



# Nepal : Some Landmarks

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S. N.	World Heritage Sites
1	Hanumandhoka Durbar Square
2	Patan Darbar Square
3	Bhaktapur Darbar Square
4	Pashupatinath Temple
5	Swayambhunath Stupa
6	Bouddhanath Stupa
7	Changunarayan Temple
8	Chitwan National Park
9	Sagarmatha National Park
10	Lumbini

S.N.	Name of Peak	Elevation (masl)
1	Mount Everest (Sagarmatha)	8848
2	Mount Kanchenjunga	8586
3	Mount Lhotse	8516
4	Mount Yalung Kang	8505
5	Mount Makalu	8463
6	Mount Cho-Oyu	8201
7	Mount Dhaulagiri	8167
8	Mount Manaslu	8163
9	Mount Annapurna I	8091

# Survey Department: National Mapping Agency

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## 1. National Mapping Organization

- Responsible for Earth Observation
- Standardization of Surveying and Mapping
- Authorization of Specification for Maps and Data Prepared by Various Agencies
- Regulating of Surveying and Mapping Activities from other Agencies
- Works as a Secretariat of Surveying and Mapping Committee
- Issuing License for Private Surveyor

## 2. Precise Geodetic Observations and National Cadastral Surveying Organization

## 3. Organization responsible for technical works relating International Boundaries

## 4. Nodal Agency for the National Spatial Data Infrastructure



# Initiation in Earth Observation

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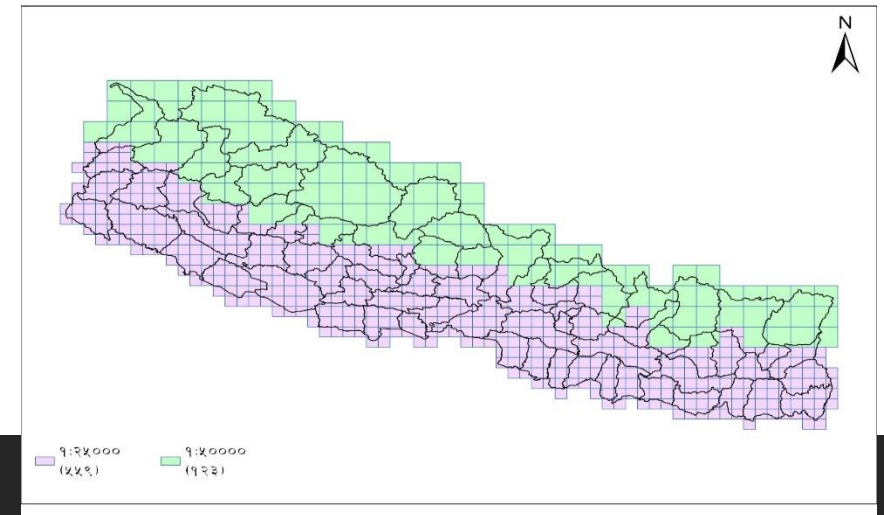
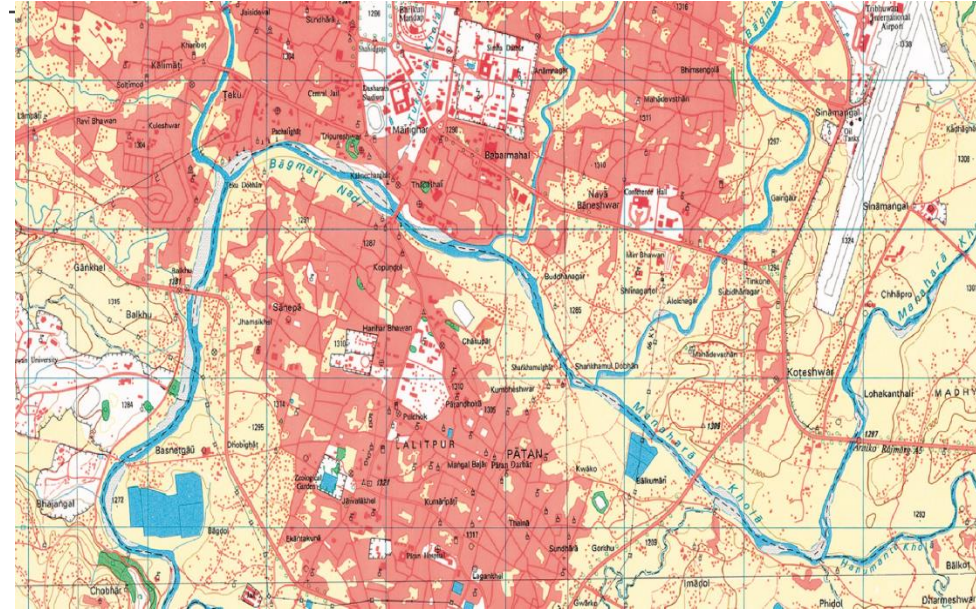
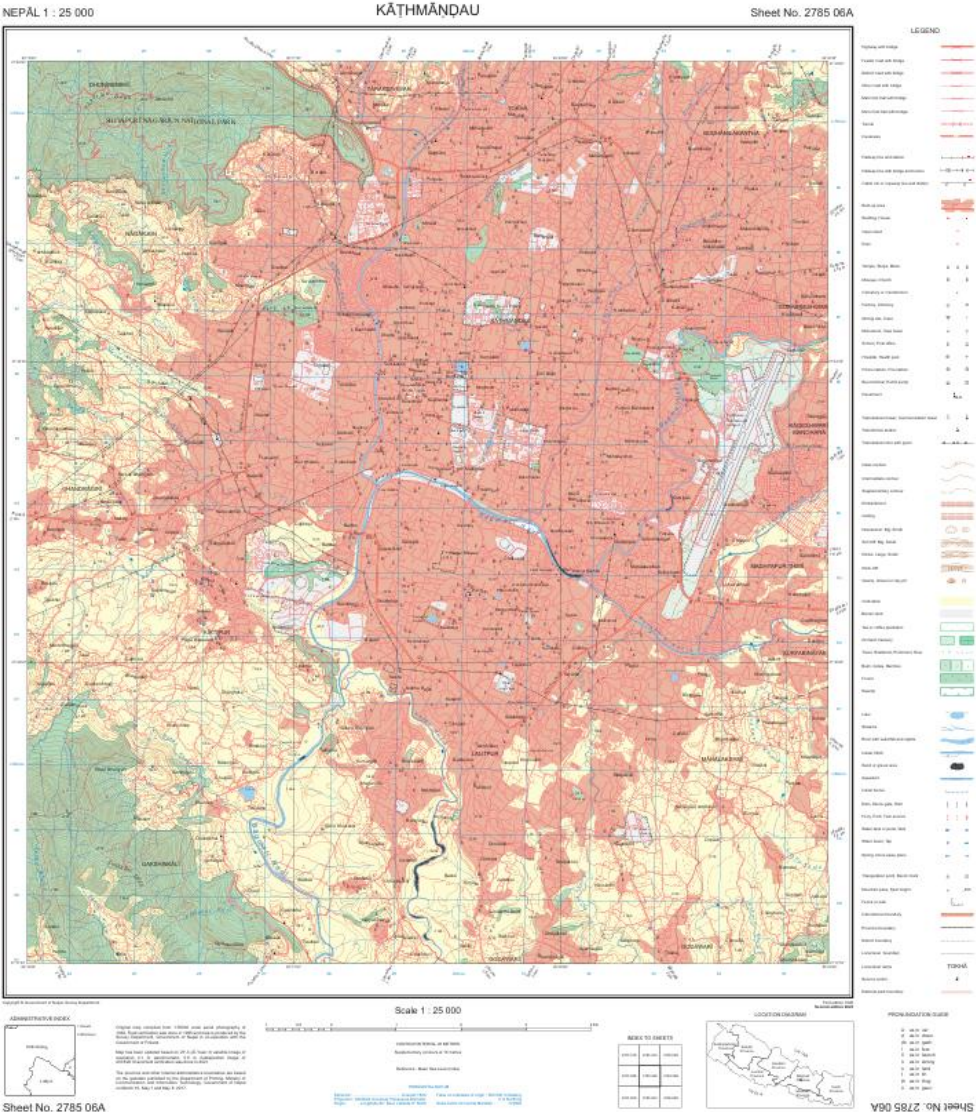
1. **Survey Department** , for Topographic mapping in 1990 's, land use planning since 2000, LiDAR and Drone Surveying
2. **Department of Mines and Geology** for mapping mines throughout the country
3. **Forest Research Training Center**, for Land Cover Mapping
4. **Ministry of Agriculture and Livestock Development**, for soil science Research, for Irrigation planning to increase the agricultural productivity, and for rice crop mapping for evidence based decision making
5. **Non-Government Organizations: ICIMOD, UN Agencies, USAID**

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# Topographical Base Map Update Using Satellite Images

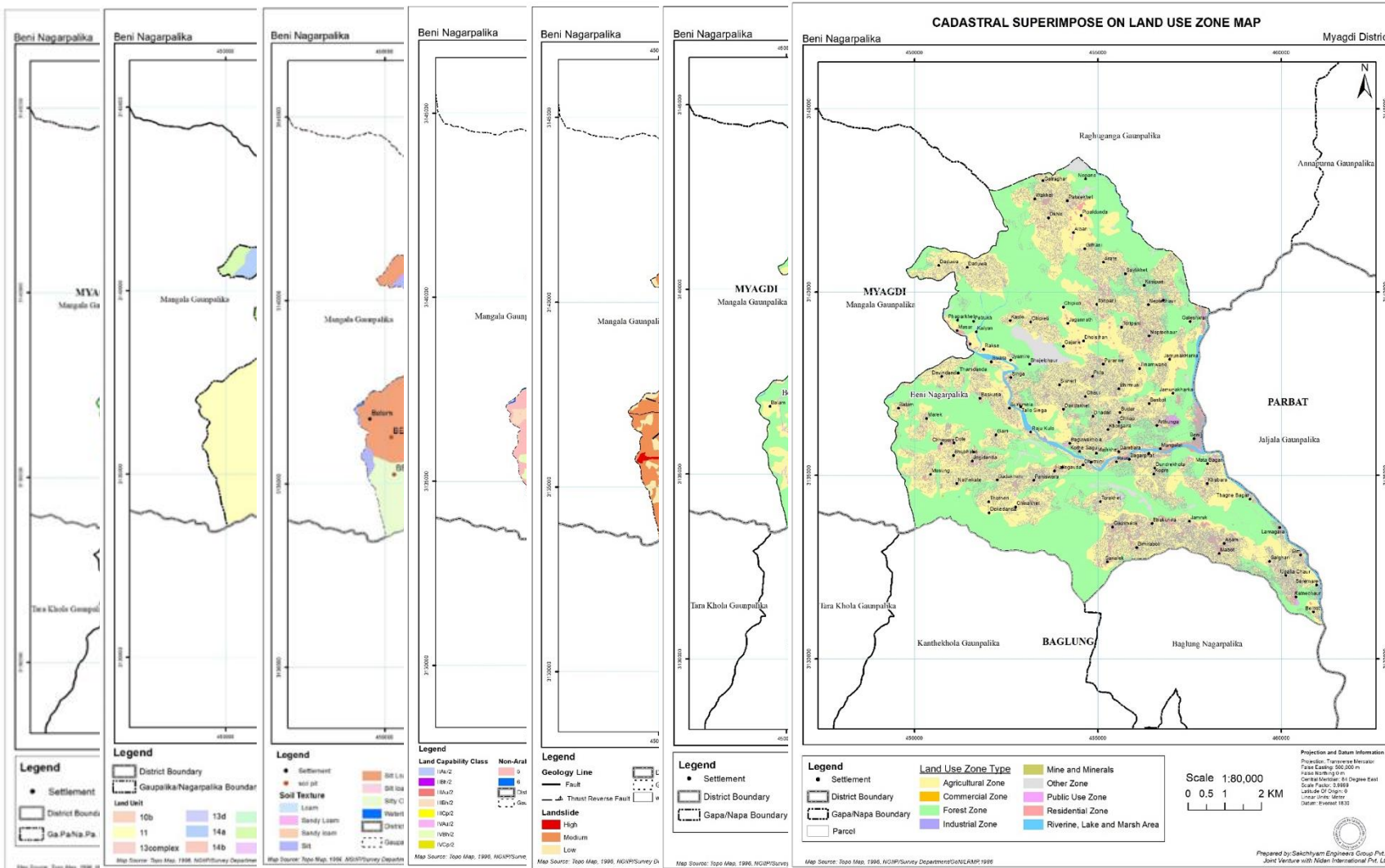
## Topographical Map Layers

1. Administrative Boundary
2. Land Cover
3. Transportation
4. Hydrography
5. Elevation
6. Settlement
7. Utilities
8. Designated Area
9. Building





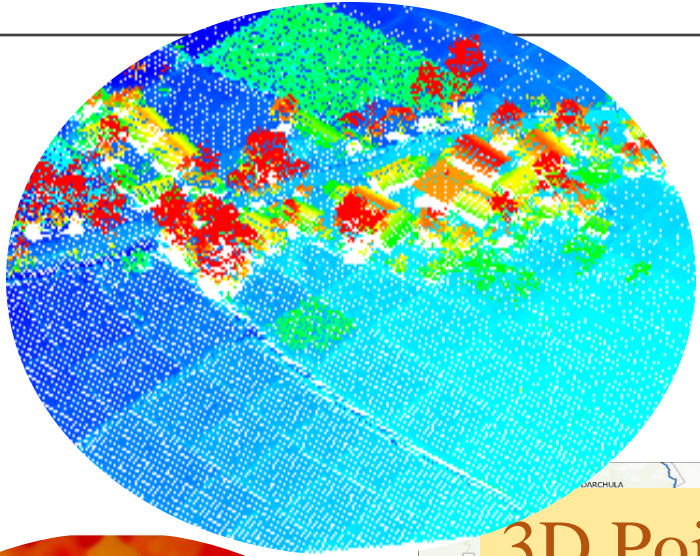
# Local Level Land Use Maps Using Satellite Images



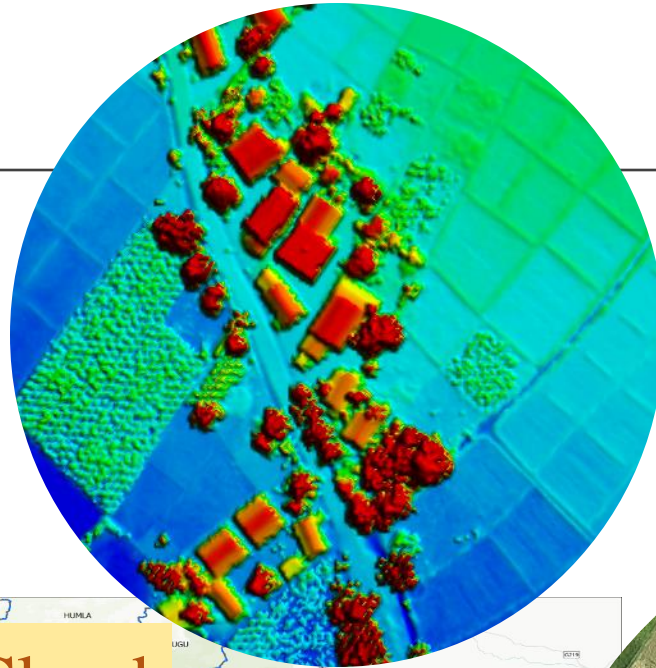
1. Present Land Use Maps
2. Land System Maps
3. Soil Maps
4. Land Capability Maps
5. Risk Layers Maps
6. Land Use Zone Maps
7. Cadastral Superimpose on Land Use Zone Maps



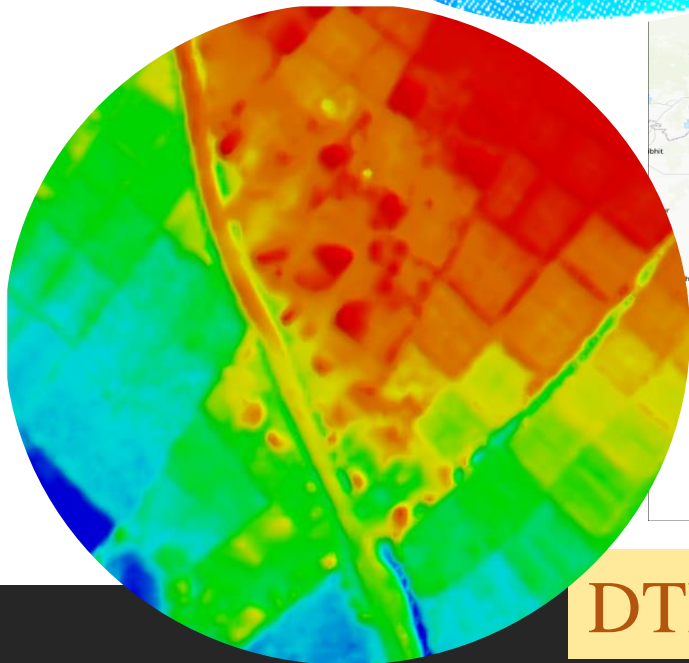
# LIDAR Survey



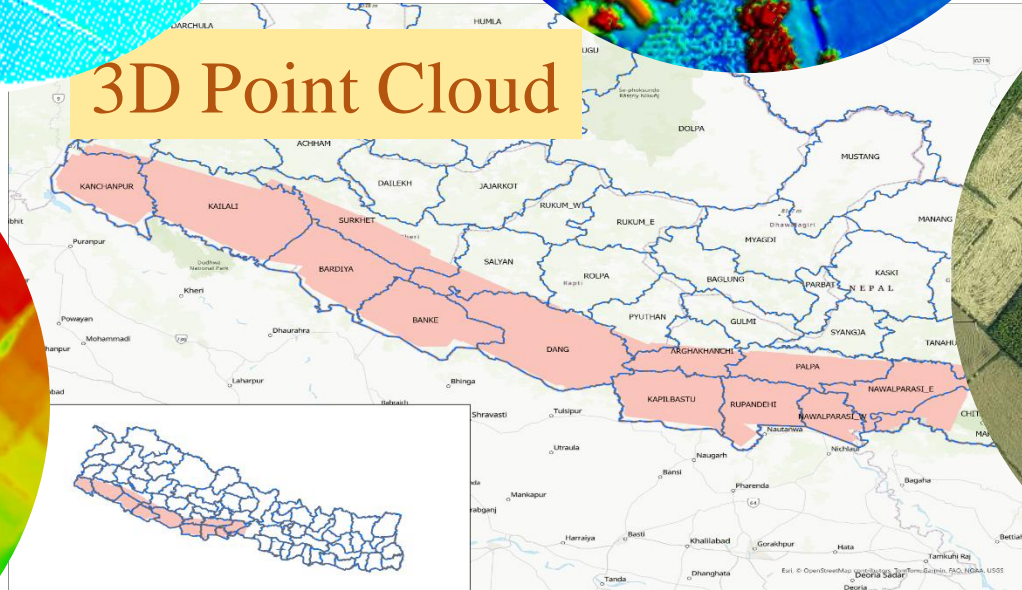
3D Point Cloud



DSM



DTM



Orthomosaic



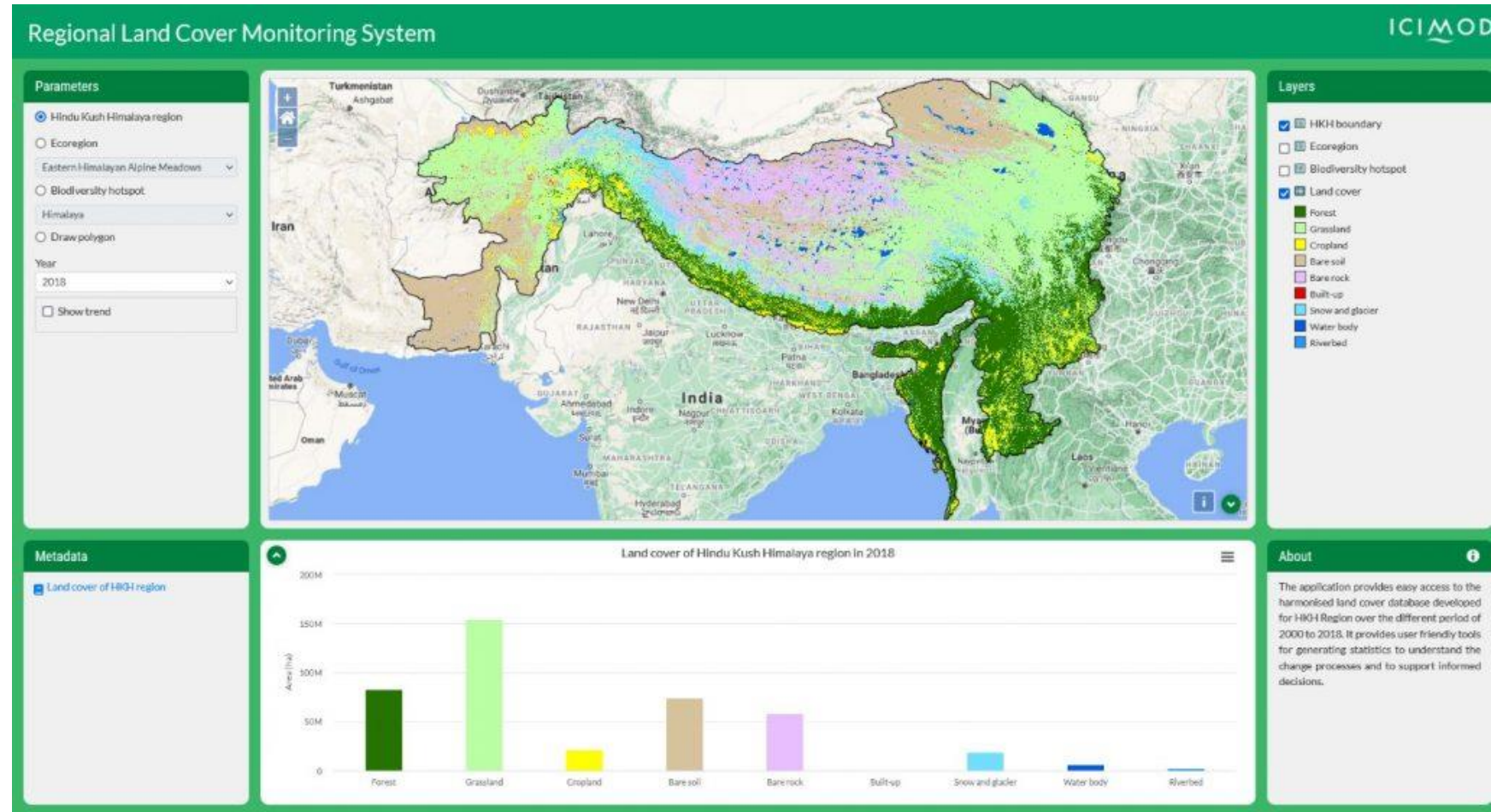
# Scientific Activity : EO for Everest Height Measurement





# Regional Land Cover Monitoring through Satellite images

1. Annual land cover mapping in Hindu Kush Himalaya region
2. Change analysis services
3. Supports Information based decision-making



# Disaster in Nepal: Need of EW

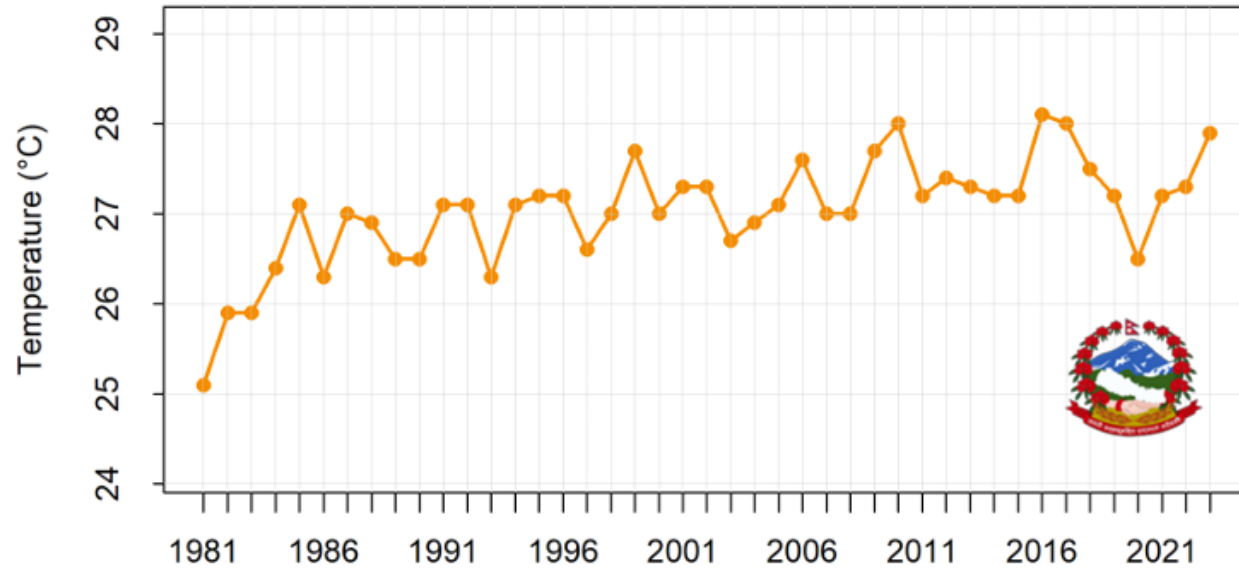
Impact Severity (%)						
Disaster	Very low	Low	Moderate	High	Very high	Total
Drought	33.3	18.1	27.4	17.3	4.0	100
Forest fire	53.9	20.2	12.9	11.1	1.9	100
Fire in settlement	60.7	22.3	7.8	4.1	5.1	100
Flood	26.1	23.0	20.3	25.3	5.2	100
Inundation	22.1	30.1	28.7	15.5	3.6	100
Wind storm	29.6	28.7	27.7	11.4	2.6	100
Thunderstorm	53.8	19.9	10.4	10.9	5.0	100
Hailstorm	23.3	34.9	25.1	12.3	4.3	100
Heavy rain	39.1	21.6	25.5	10.1	3.7	100
Sporadic rain	53.7	16.6	13.7	14.2	1.9	100
Soil erosion	18.6	30.3	26.4	16.2	8.5	100
Landslide	25.9	17.1	23.2	26.2	7.6	100
Snowstorm	18.4	34.1	22.2	25.2		100
Avalanche		14.3	35.7	50.0		100
GLOF	13.9	14.9	14.9	42.6	13.9	100
Hot wave	40.4	30.3	24.1	4.4	0.9	100
Cold wave	31.9	34.3	21.5	9.5	2.8	100
Diseases / insects	14.0	20.4	31.0	26.4	8.1	100
Others	35.3	14.7	10.6	23.9	15.5	100

Level of impact from Climate induced disaster over last 25 years

Source: National Statistics Office

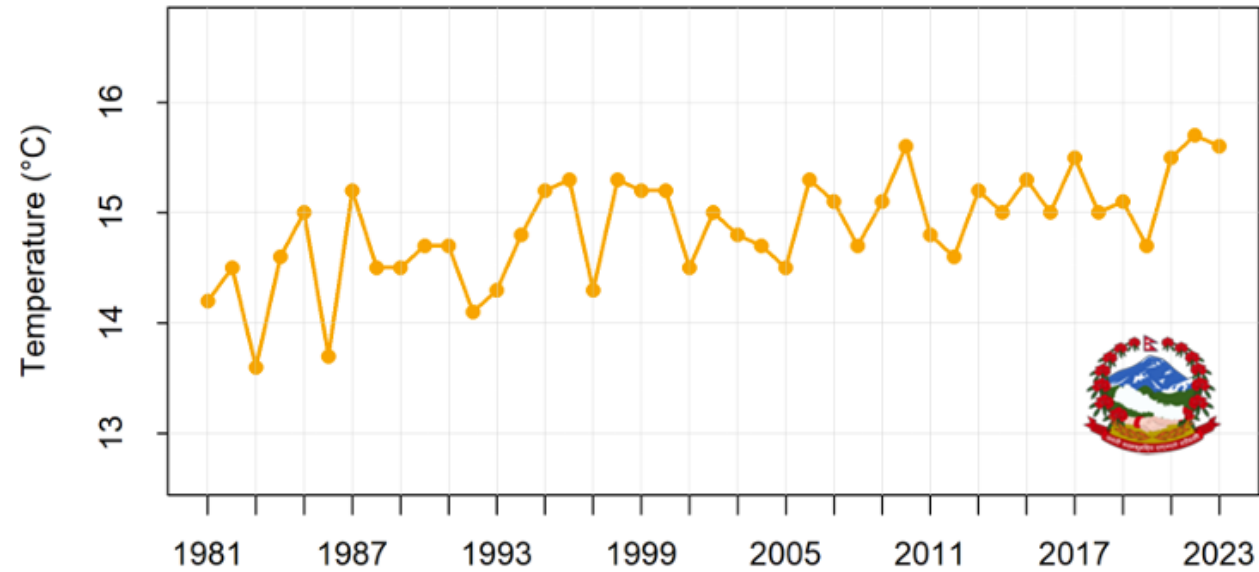
# Temperature Trend of Nepal

Annual Maximum Temperature of Nepal



- Increasing trend of temperature
- Climate change is probable reason

Annual Minimum Temperature of Nepal





# Disaster Risk Reduction Initiations: Towards EW

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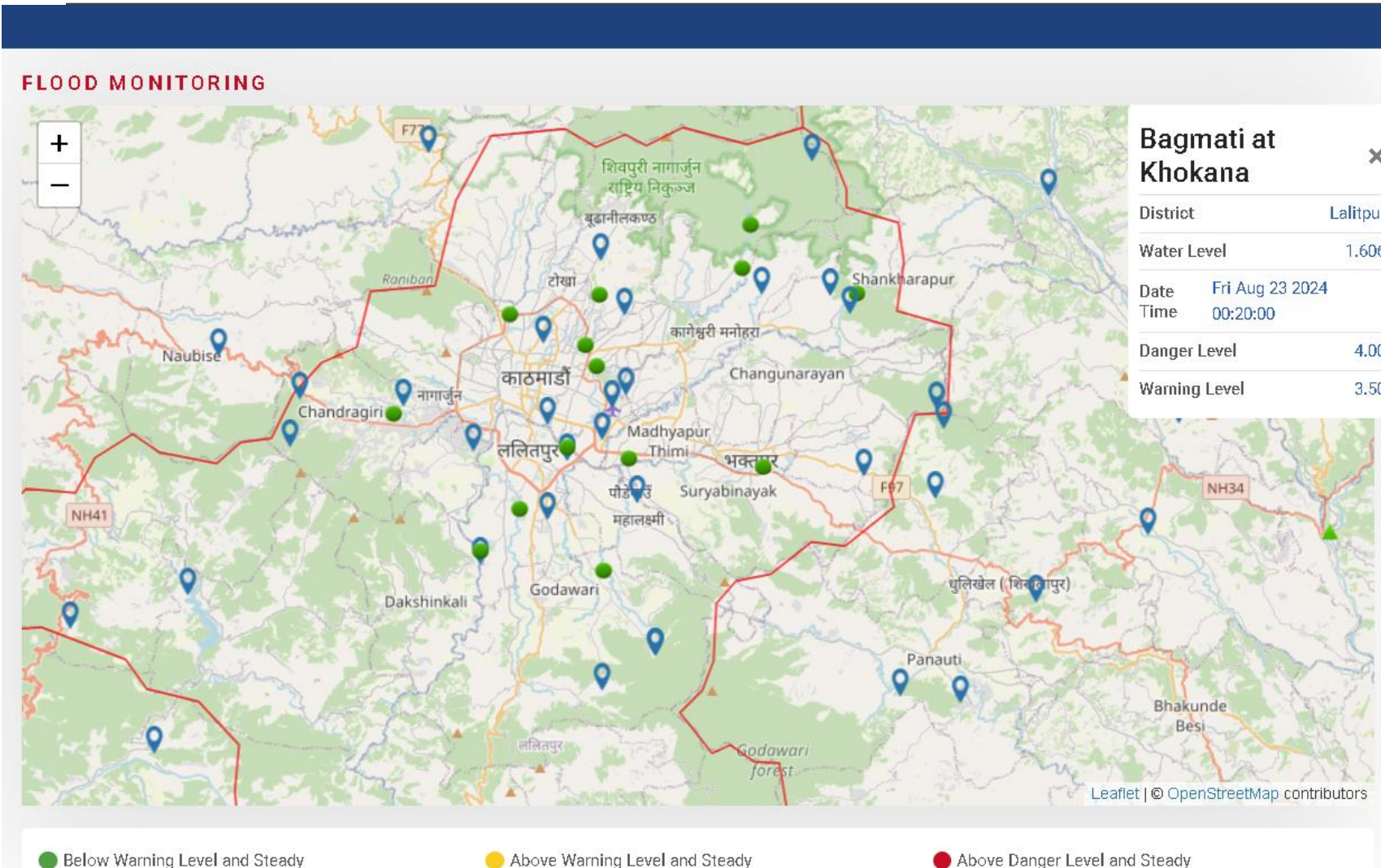
1. Nepal has made significant progress in policy regarding disaster risk reduction, setting up institutional structures and guidelines at national, sub-national, and local levels.
2. The government has a **Disaster Risk Reduction and Management Strategic Action Plan (2018–2030)** which prioritizes multi-hazard risk assessment and mapping at different governance levels.
3. Early Warning Systems have proven effective on the 2014 flooding, in the Karnali River, in the 2017 flooding in the Ratu River, and in the 2021 Melamchi floods.
4. Local radio and upstream-downstream informal communication were used for [messaging](#).
5. The World Food Programme and the Government of Nepal are implementing a [forecast-based financing project](#) to bridge the gap between early warnings and anticipatory actions for floods in the 14 most disaster-prone districts of the Terai region.

# Early Warning Initiations in Nepal

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1. **National Disaster Risk Reduction and Management Authority (NDRRMA):** Main pillar for EW4ALL: Disaster Risk Reduction Portal: <http://www.drrportal.gov.np/>
2. **Early Warnings for All - and WITH All - initiative in Nepal**
3. The Government of Nepal is at the final stage of finalizing its Multi-Hazard Early Warning System (MHEWS) framework, which acts as the coordination mechanism for EW4All in Nepal.
4. Adopting a "whole-of-society" approach that involves all stakeholders, including civil society, academia and the private sector , support from regional organizations and international development partners.
5. **National Emergency Operating Centre, District Emergency Operating Centre, Local Emergency Operating Centre**
6. **Department of Hydrology and Meteorology (DHM):** Provides weather and climate services with flood advisories and information on rainfall estimates, weather forecasts, and updates on the situation of significant rivers through flood bulletins and SMS alerts to targeted recipients,

# Flood Monitoring: Example of Early Warning by DHM



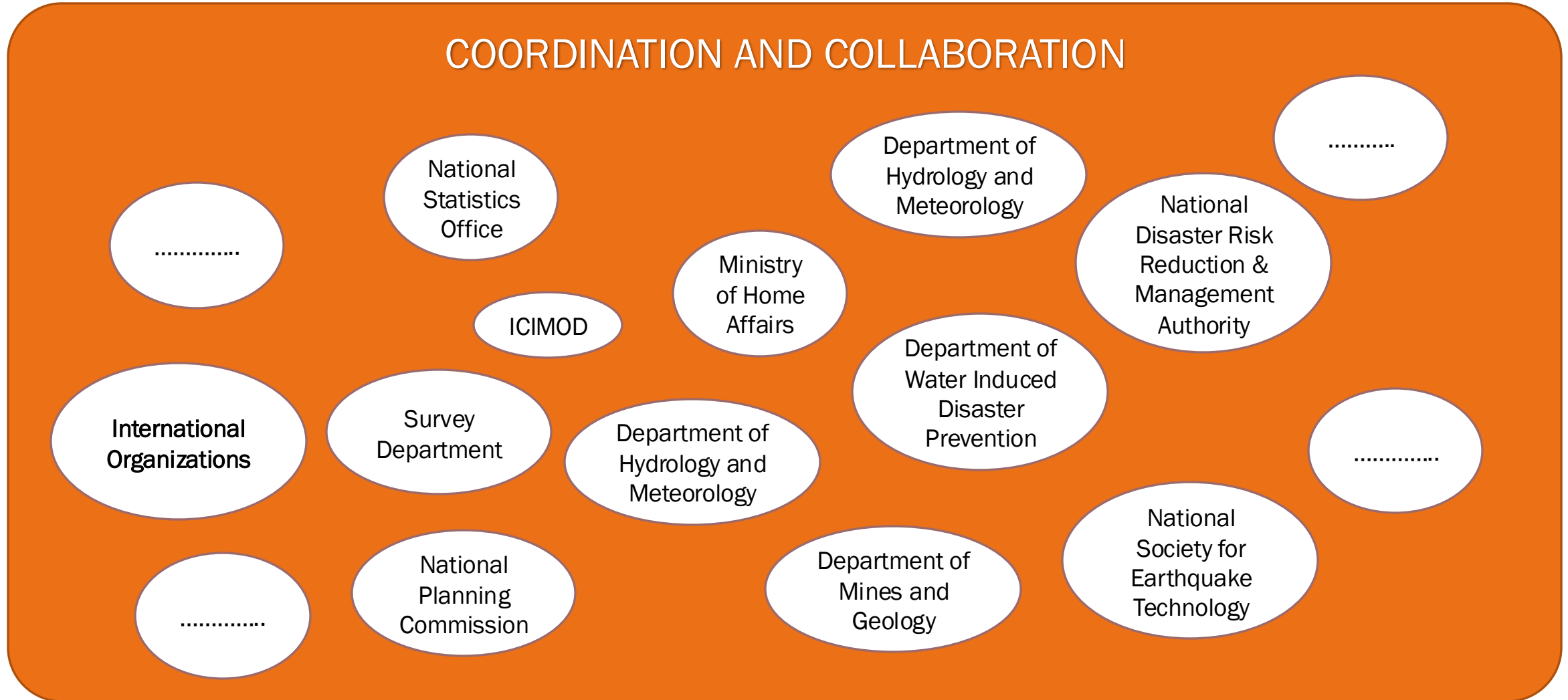
- Flood early warning portal
- Shows danger level and warning level of river discharge

Department of  
Hydrology and Meteorology



# Stakeholders in DRR towards Early Warning

## COORDINATION AND COLLABORATION



# Geoportal: Platform for Data Sharing to support EW

Government of Nepal  
Ministry of Land Management, Cooperatives and Poverty Alleviation  
Survey Department

About | FAQs | Citizen Charter | | Sign in or [Join Now](#)

Map | Data & Metadata | Geospatial Apps

Cadastral Data Contains grid sheet and free sheet cadastral data generally called Kitta Napi data.

**Topographic Data**   
Topographic Data Contains different topographic layers such as road, river, settlements etc.

**Social Infrastructure**   
Data of different social infrastructures are added under this category.

- Social Infrastructure**
- Health Facilities** Free
- Police Units** Free

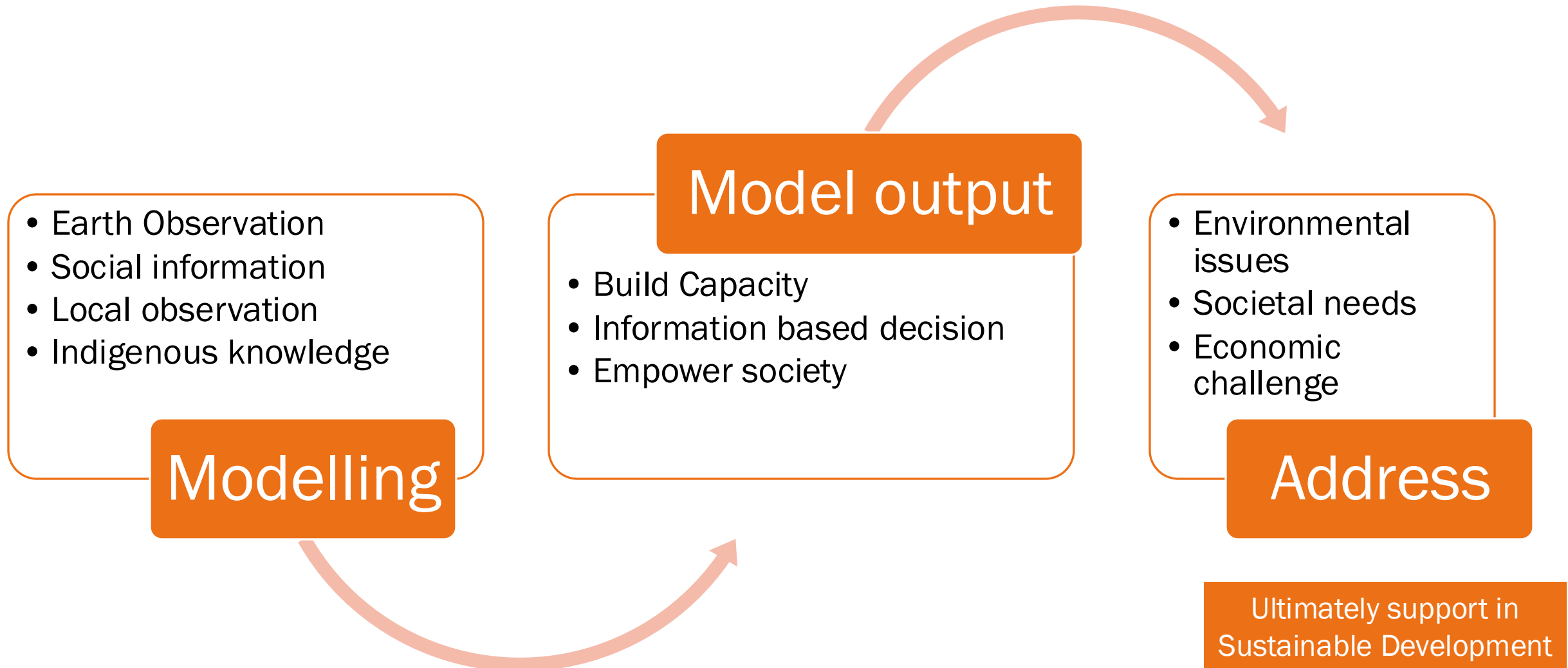
**LIDAR**   
LIDAR is used in a wide range of land management and planning efforts, including hazard assessment (including lava flows, landslides, tsunamis, and floods), forestry, agriculture, geologic mapping, and watershed and river surveys.

100 km

84.6927, 27.0528

# Earth Intelligence: Collaboration for Decision Making

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# Challenges

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- Variation in data standards creating incompatibility for data processing
- Rapid action in data capturing and information sharing
- Reluctancy in data sharing
- Lacking data sharing policy or SDI policy
- Capacity enhancement for using the available data and information
- Awareness in availability of information its use
- Empower society
- National and international cooperation mechanism

