Use of Earth Observation and Allied Tools – Operational Challenges, and Lesson Learned from 2015 Nepal Earthquake

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Kathmandu, Nepal

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ICIMOD: International Centre for Integrated Mountain Development

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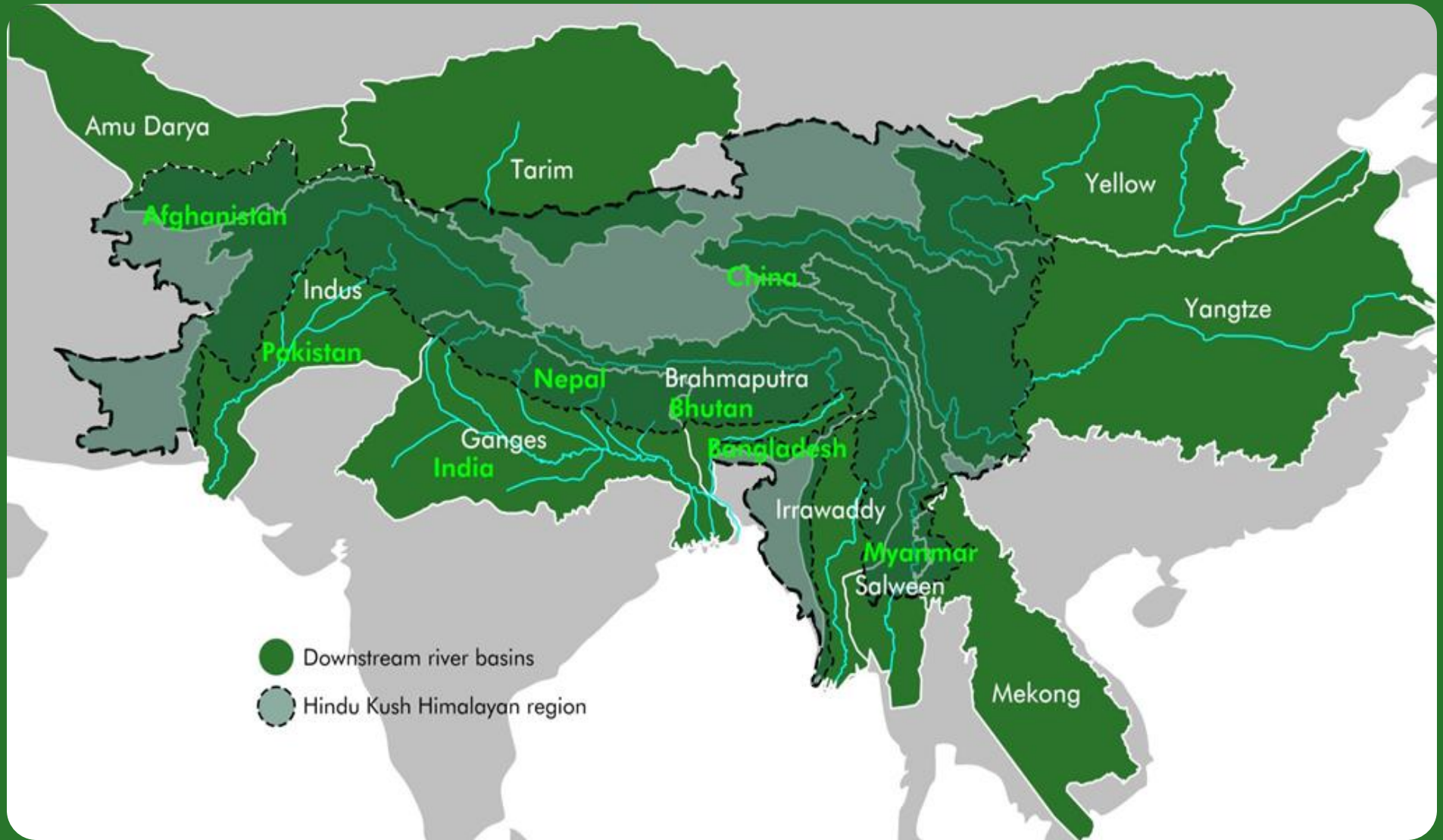

Nepal Earthquake 2015

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~ 9000 lives lost;

~ 22000 people injured

~ US$ 7 billion in loss/damage

Managing expectation – a critical challenge

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Responder in the field

Sunny and clear day.

The day is reported to be sunny. Can you take image now and send it to me.

Decision maker

Data provider /technician

Incomplete communication resulted in over expectation.

Miss-directed priorities

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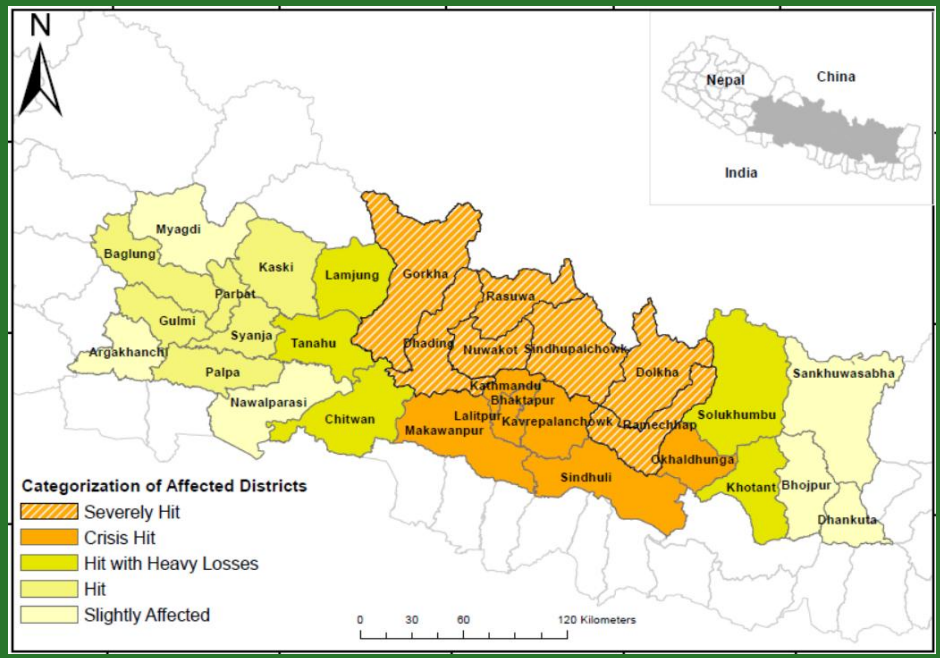
The nomenclature of the event (earthquake) was partly responsible for miss-directed priorities.

Thus both ways communication between suppliers and users is critical for coordination.



PDNA, 2015

Satellite data – availability Vs. accessibility

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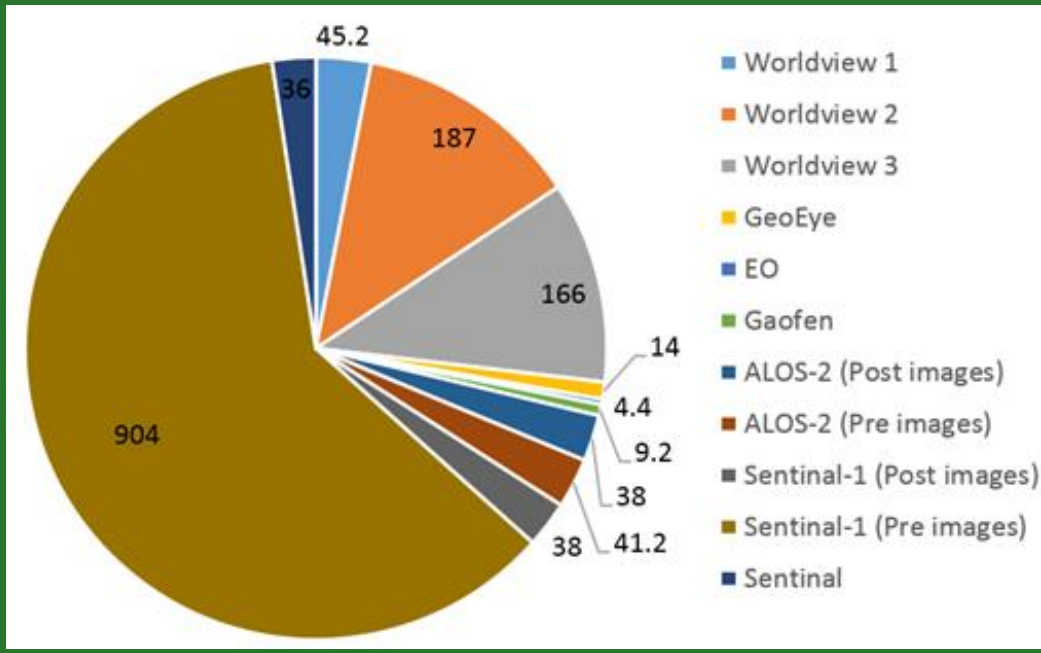
Accessibility and not availability of satellite data was a biggest challenge during Nepal Earthquake.

About 1.5 TB data accessed by ICIMOD team immediately after the Nepal Earthquake.



In case of Haiti Earthquake, USGS provided 54 TB of data (Duda and Jones, 2011).

Data transfer – a challenge

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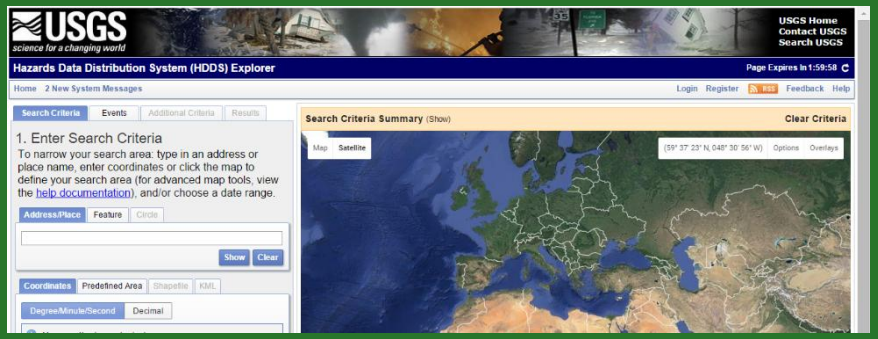

SERVIR GLOBAL

- Tiling
- Compressing

Cloud server

Physically transferred

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Data management system

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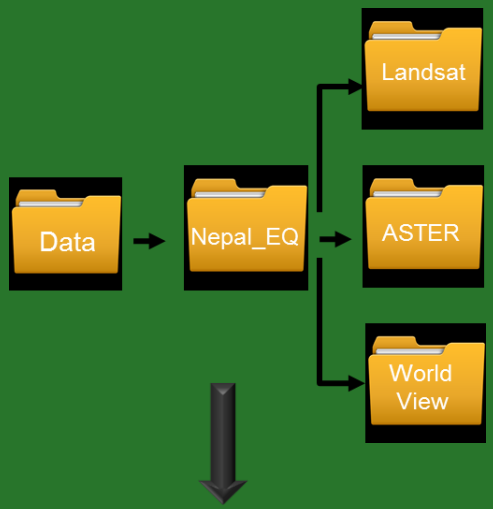

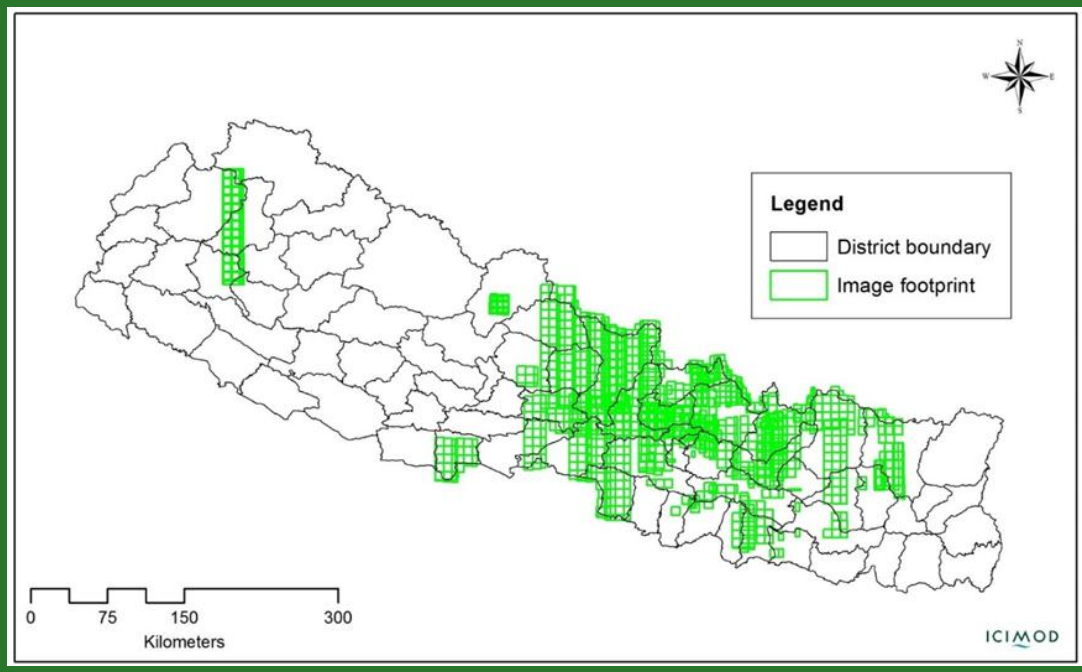

python™

Image footprint

Mosaic raster file ensured mapping of all the satellite data within a single frame, easing mapping for gap identification and location based searching.

Mosaic Raster datasets in geo-database

Rapid mapping support

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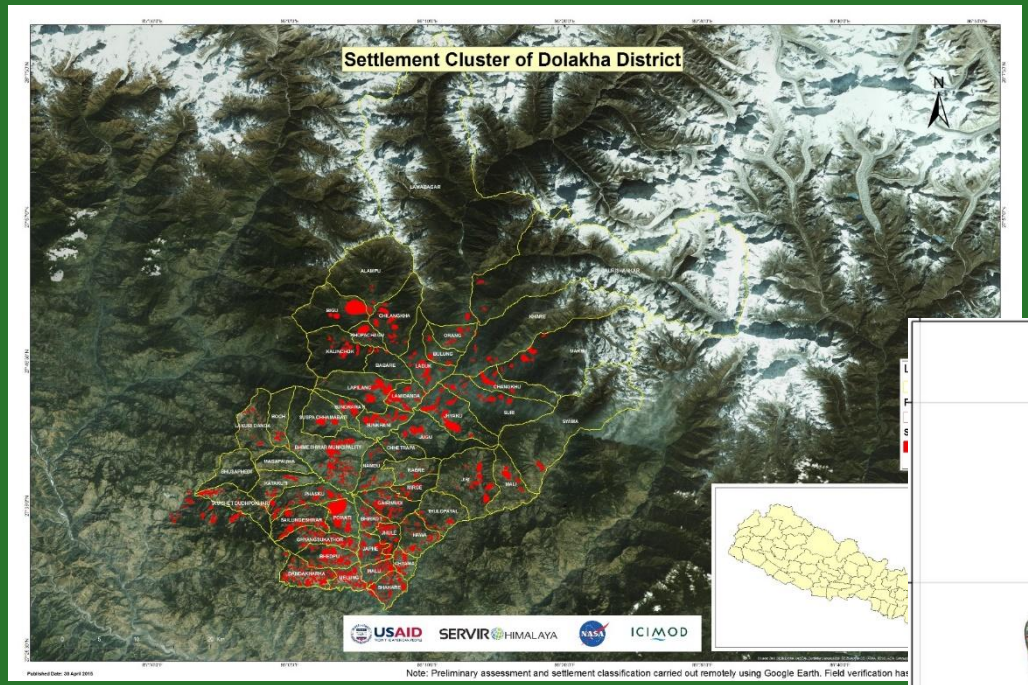
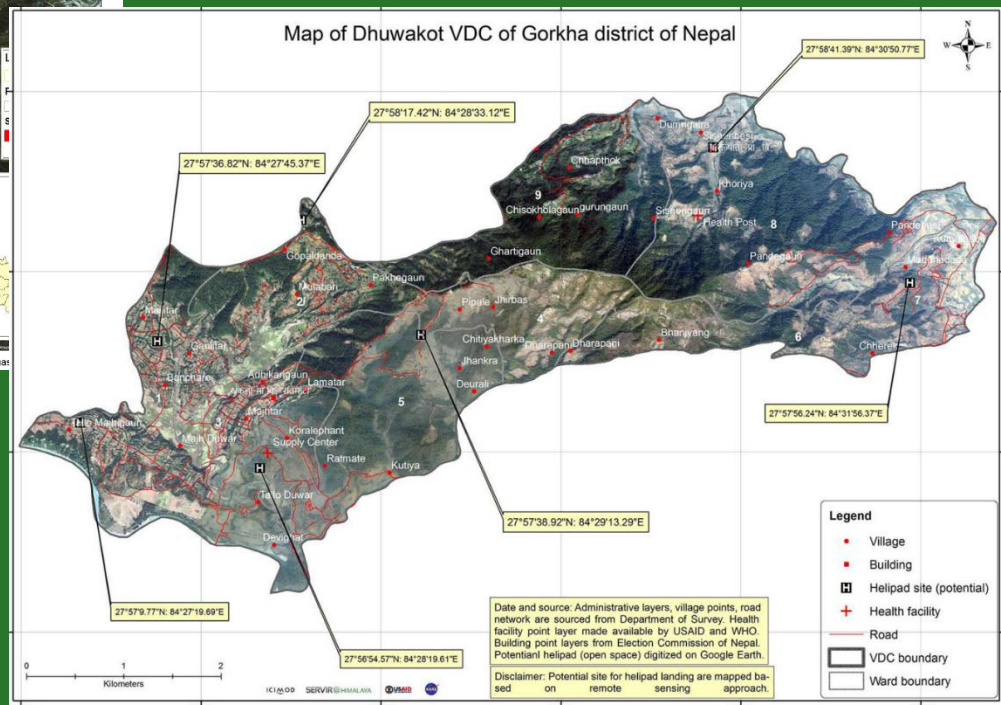
Settlement cluster mapping



Mapping of helipad sites



Polling station database

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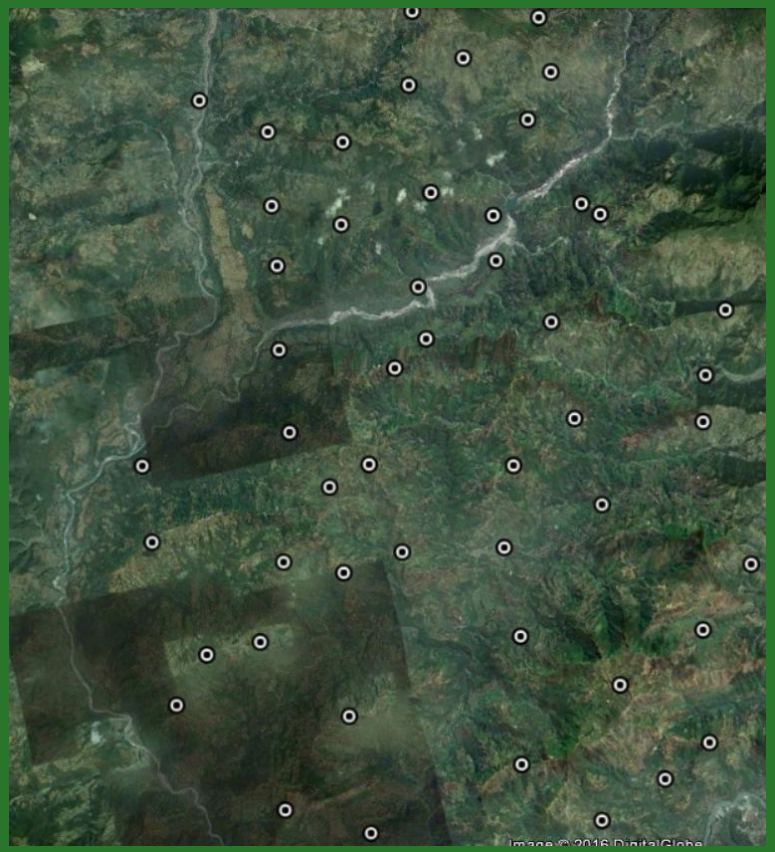

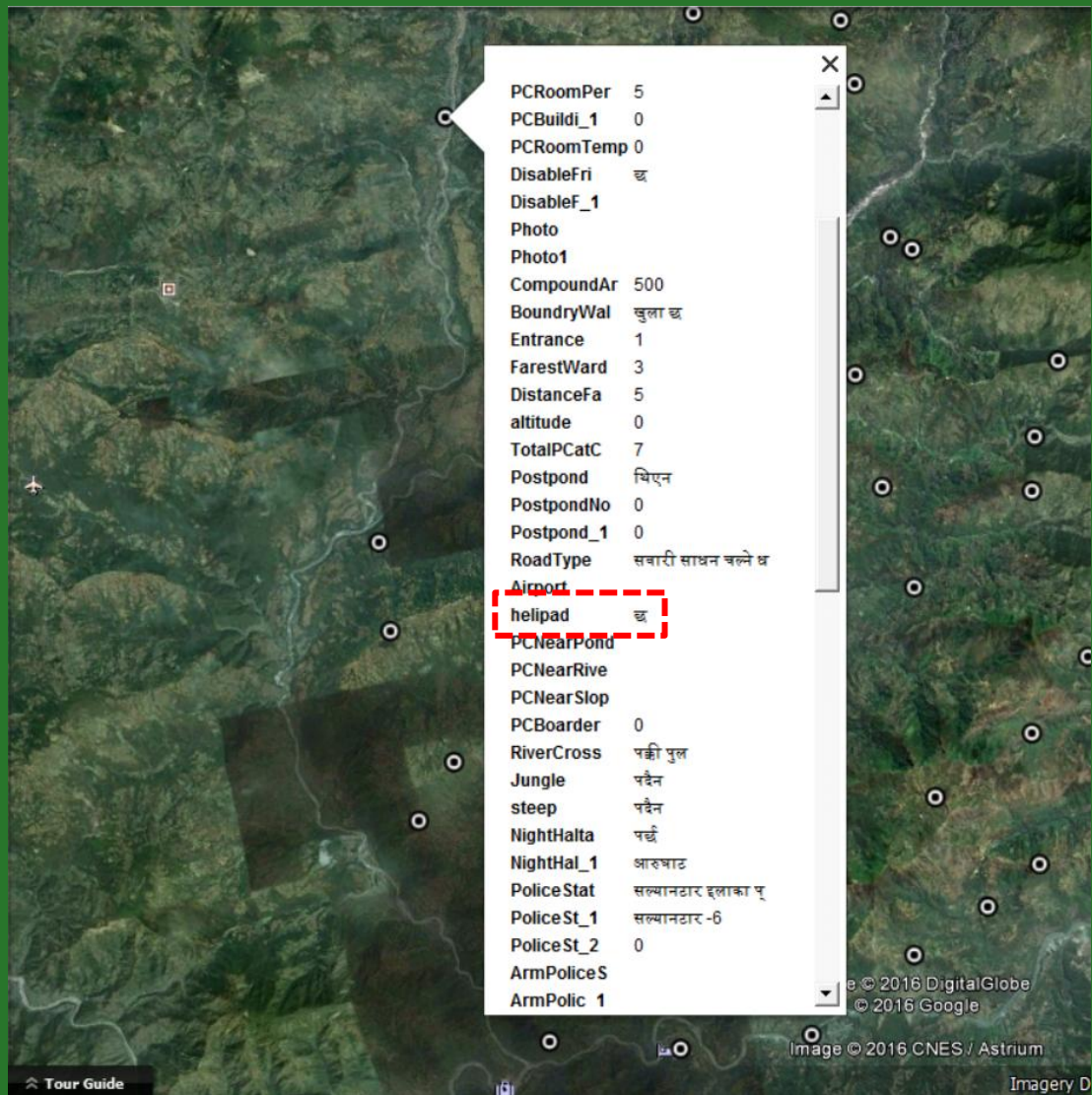

Damage survey – Remote sensing based (satellite data)

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Image of Barpak - epicenter

Limitation:

- Cloud;
- Resolution;
- View angle;
- Distortion;

Damage survey – Remote sensing based (satellite data)

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- Accuracy of EO for damage assessment is influenced by factors such as sensor type, ground sample distance, off-nadir angle, and spectral resolution that (Boccardo and Tonolo, 2012)

- Accuracy of remotely sensed damage assessment is reported to vary from 60% to 70% (Corbane et al, 2011; Ajmar et al, 2011)

Damage survey – Remote sensing based (UAV)

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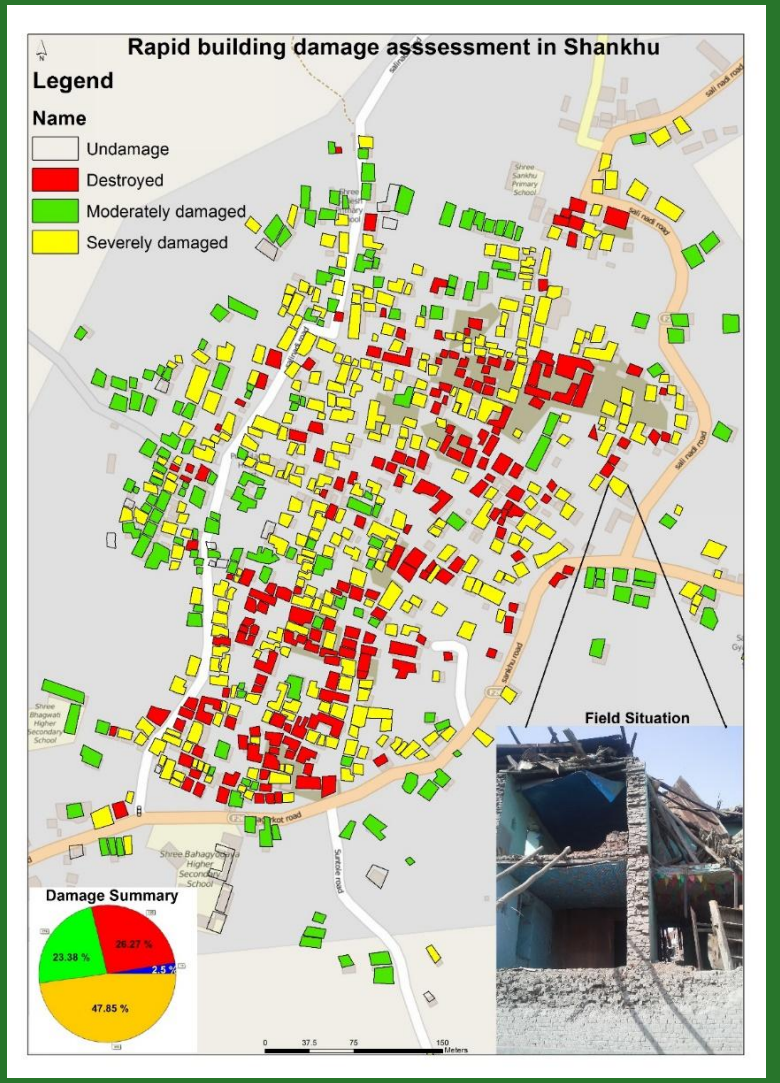

Damage proxy map

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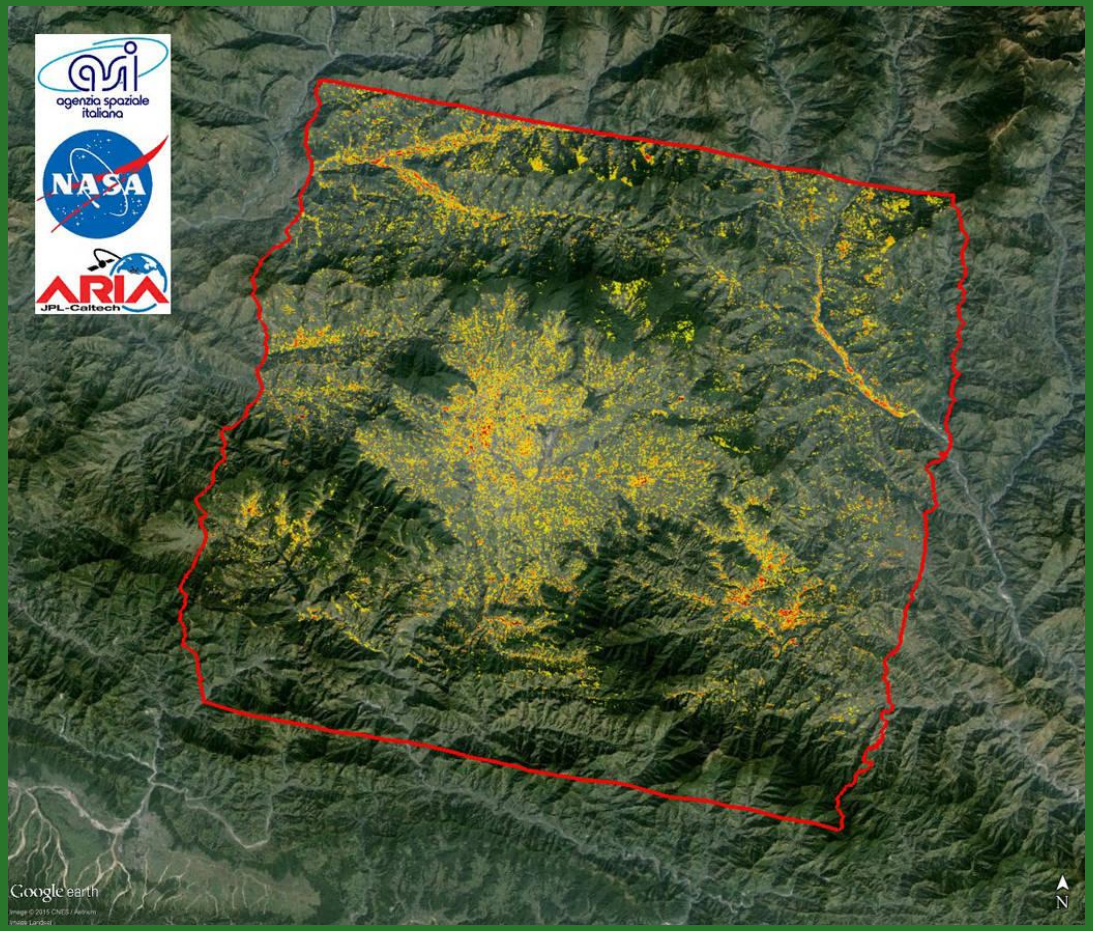

- Over estimates;
- Base line database – building footprint was not readily available.

Damage Proxy Map (DPM) generated using synthetic aperture radar (SAR) interferometric by NASA and Caltech scientists.

Field based survey
- Rapid assessment

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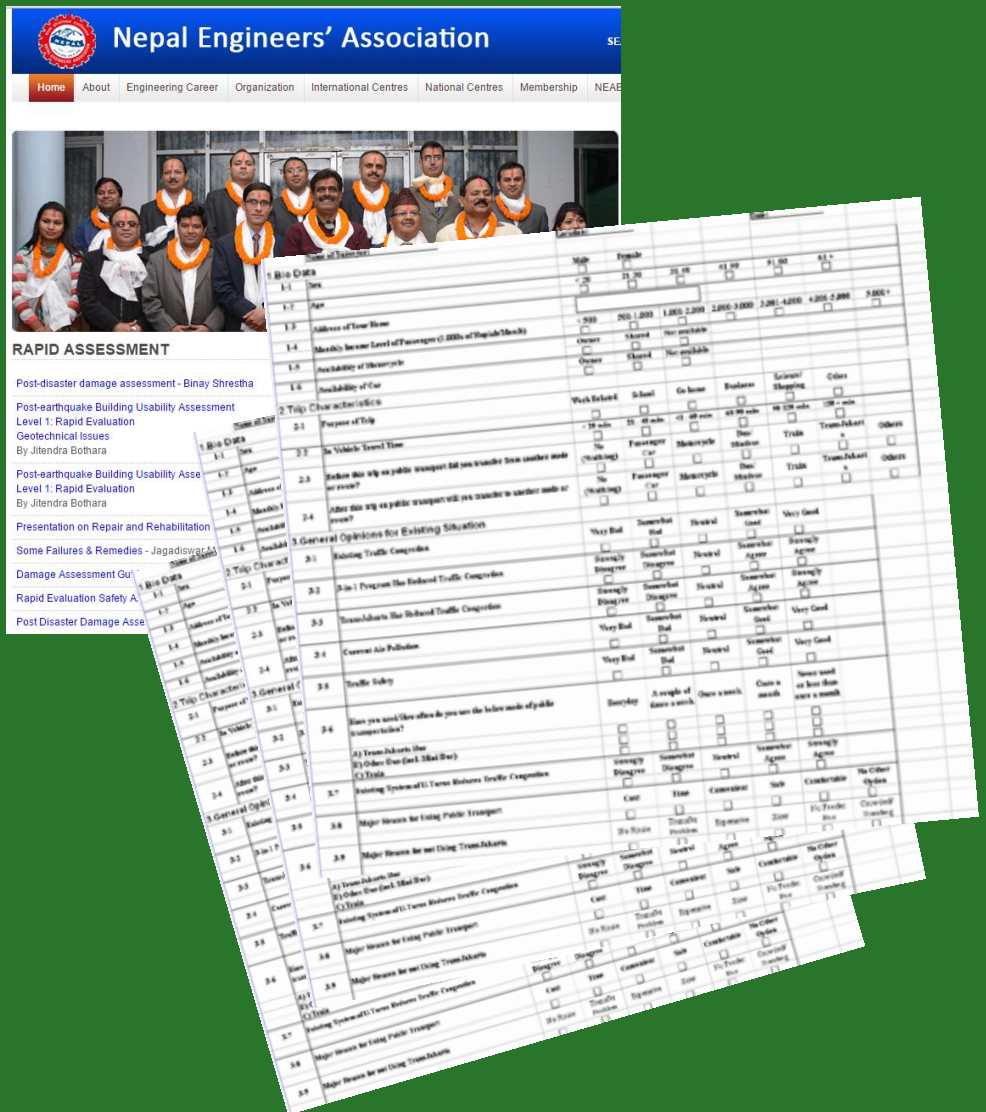

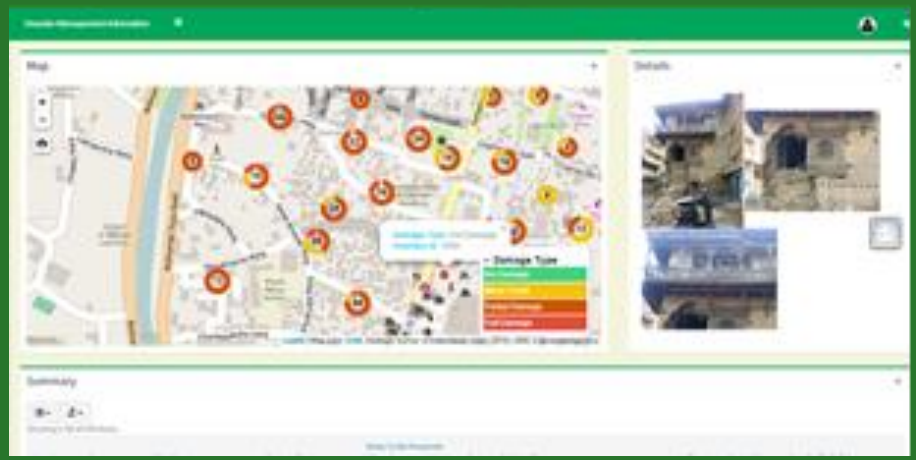

Landslide mapping

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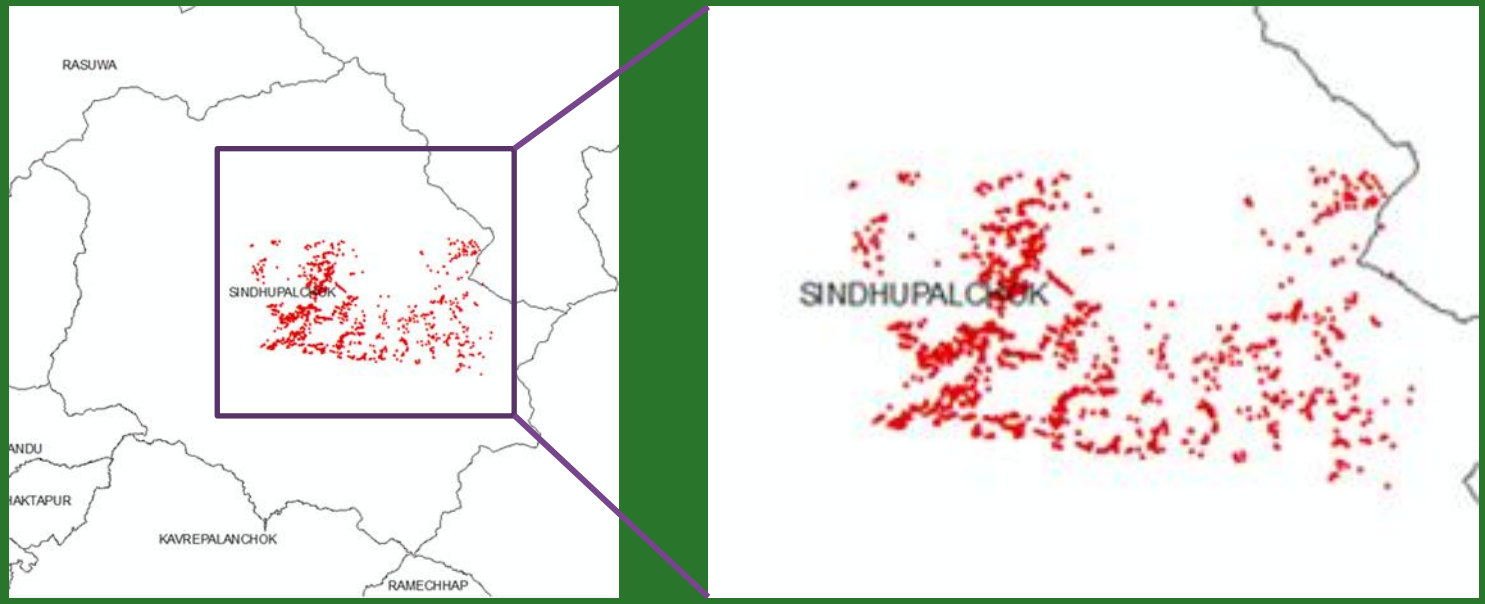
One of the sort after data layers in post Nepal EQ was of landslide



1422 landslide, Sindhupalchowk district (Source: ISRO)

Many parallel landslide inventories:

NASA, USGS, BGS, ISRO, IIT, ICIMOD, CAS, JAXA

Rapid landslide mapping

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Result:

- Inconsistent landslide database (point and polygon)
- Landslide figures ranging from 3000 - 10000

Reason:

- Lack of uniform expertise – volunteers
- Lack of mapping guideline
- Mapping in silos – lack of coordination

Dissemination challenges

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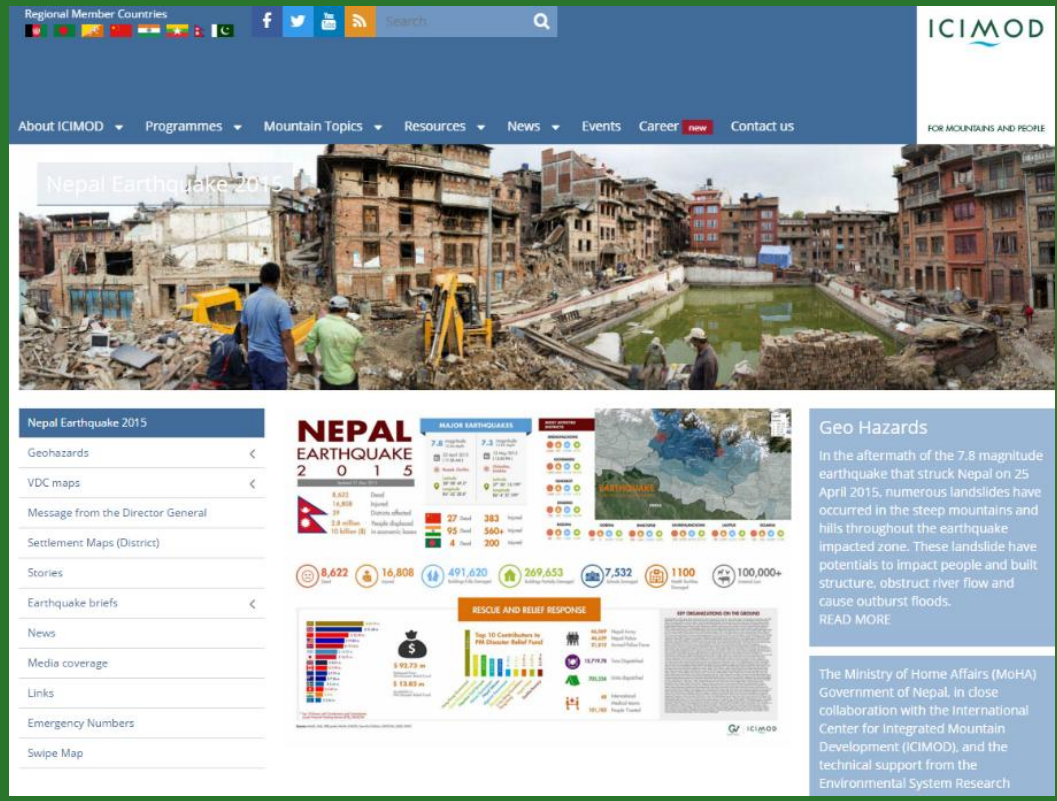
- Lack of systematic dissemination protocol/SoPs
- Lack of single gateway for share, discover and access data layers
- Lack of feed-back mechanism



http://www.icimod.org/nepalearthquake2015

Nepal Earthquake 2015: Disaster Relief and Recovery Information Platform

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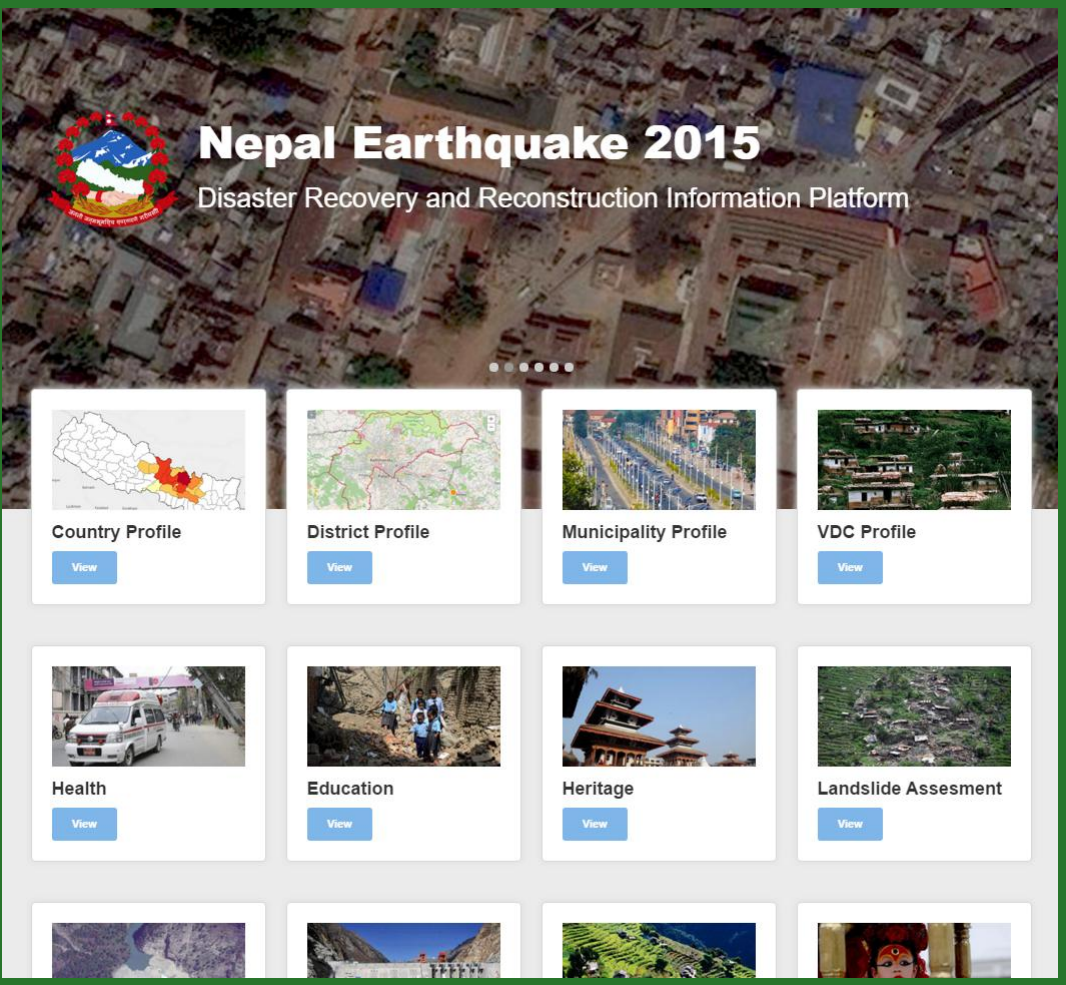
http://drrportal.gov.np/



- One uniform system for data assimilation
- Knit data/information from different sources/teams to paint a larger picture
- Help data discover, share, and use.

Crowd sourcing – how good is open ended system

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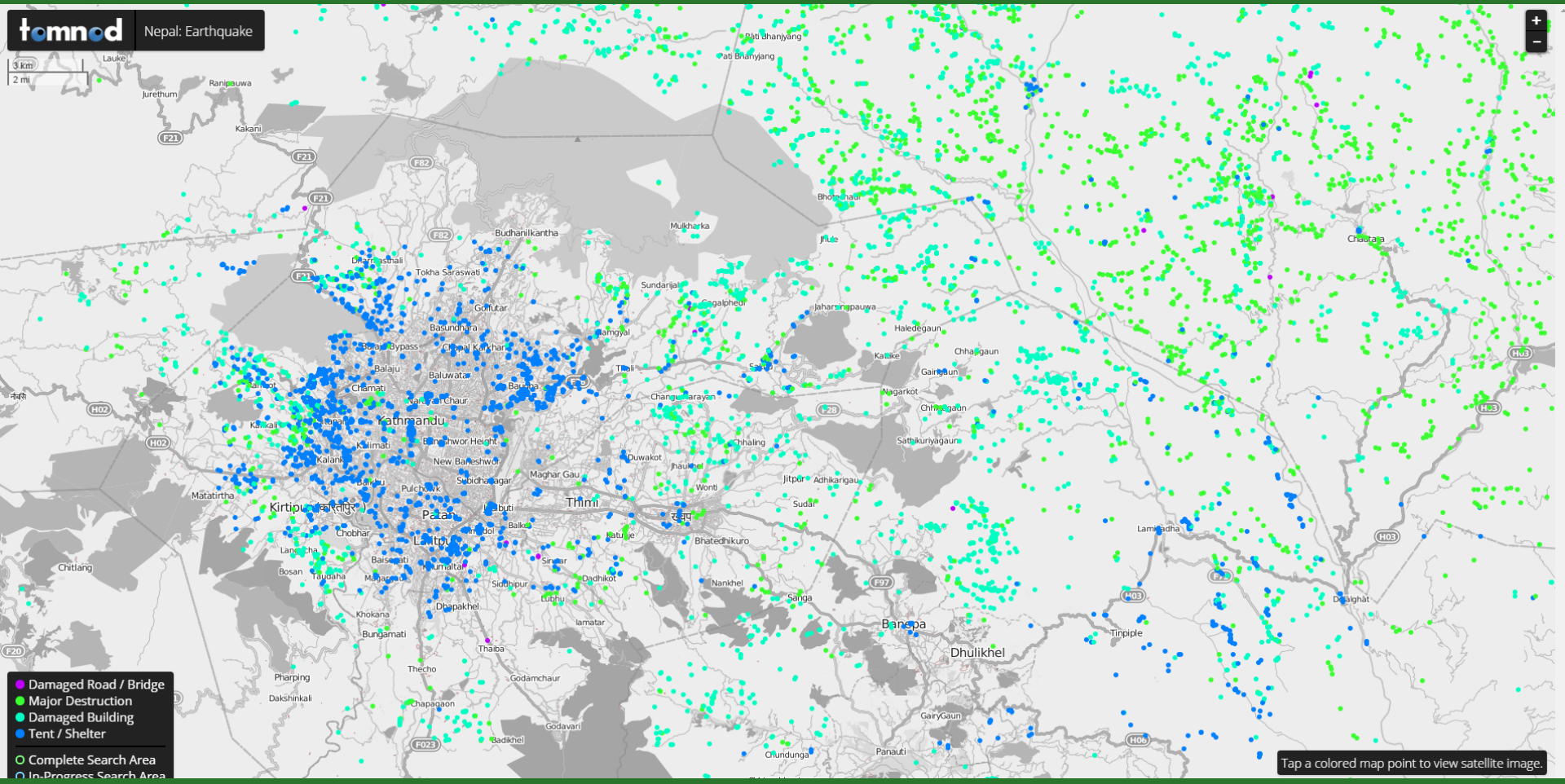
http://admin.tomnod.com/campaign/nepal_earthquake_2015/results



Conclusion

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- Data sharing and two way information flow (demand & supply) is essential to generate actionable information , share and use
- Need for stronger role from Govt. agency to anchor coordination amongst multi-sectoral agencies should translate to information gathering and dissemination domain
- SOPs, guideline & mechanisms should be established, awareness build & familiarized well ahead of the event on mapping, access, dissemination, & should include feedback gathering.