



Building Capacity to Use Earth Observations in Addressing Environmental Challenges in Bhutan

Day 2 – Disasters: Floods, Landslides, Fires

Agenda: May 13 – 16, 2024 Thimphu Tech Park

- https://appliedsciences.nasa.gov/sites/default/files/2024-04/Agenda_Bhutan_1.pdf
- **Day 2 – Tuesday, May 14 – 8:30am – 5:00pm**
 - Session III: Disasters – Floods, Landslides, Fires
 - Assessing Landslide Hazard Probability
 - Extreme Weather and Flood Monitoring
 - Surface Inundation Monitoring
 - Pre-Fire Risk Assessment
 - Active Fire & Post-Fire Assessment
 - Monitoring Pre- and Post-Fire Conditions



Session 3 Objectives

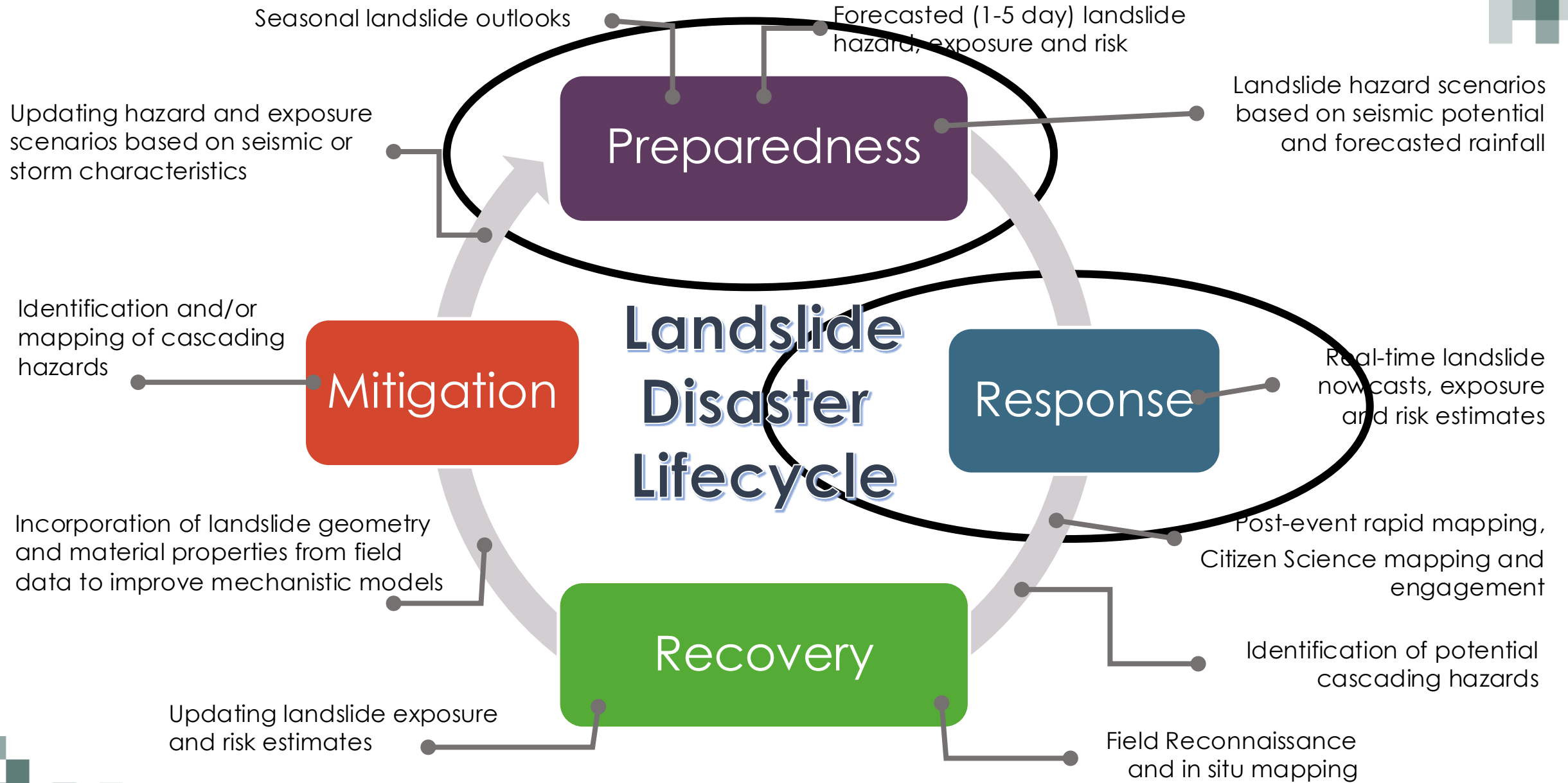
By the end of Day 2, participants will be able to:

- Identify the different remote sensing (passive [optical] and active [microwave]) data for monitoring disasters (fire, flood, landslide)
- Demonstrate the applications of remote sensing and modeled data for monitoring disasters
- Develop case studies using remote sensing data for disasters in Bhutan



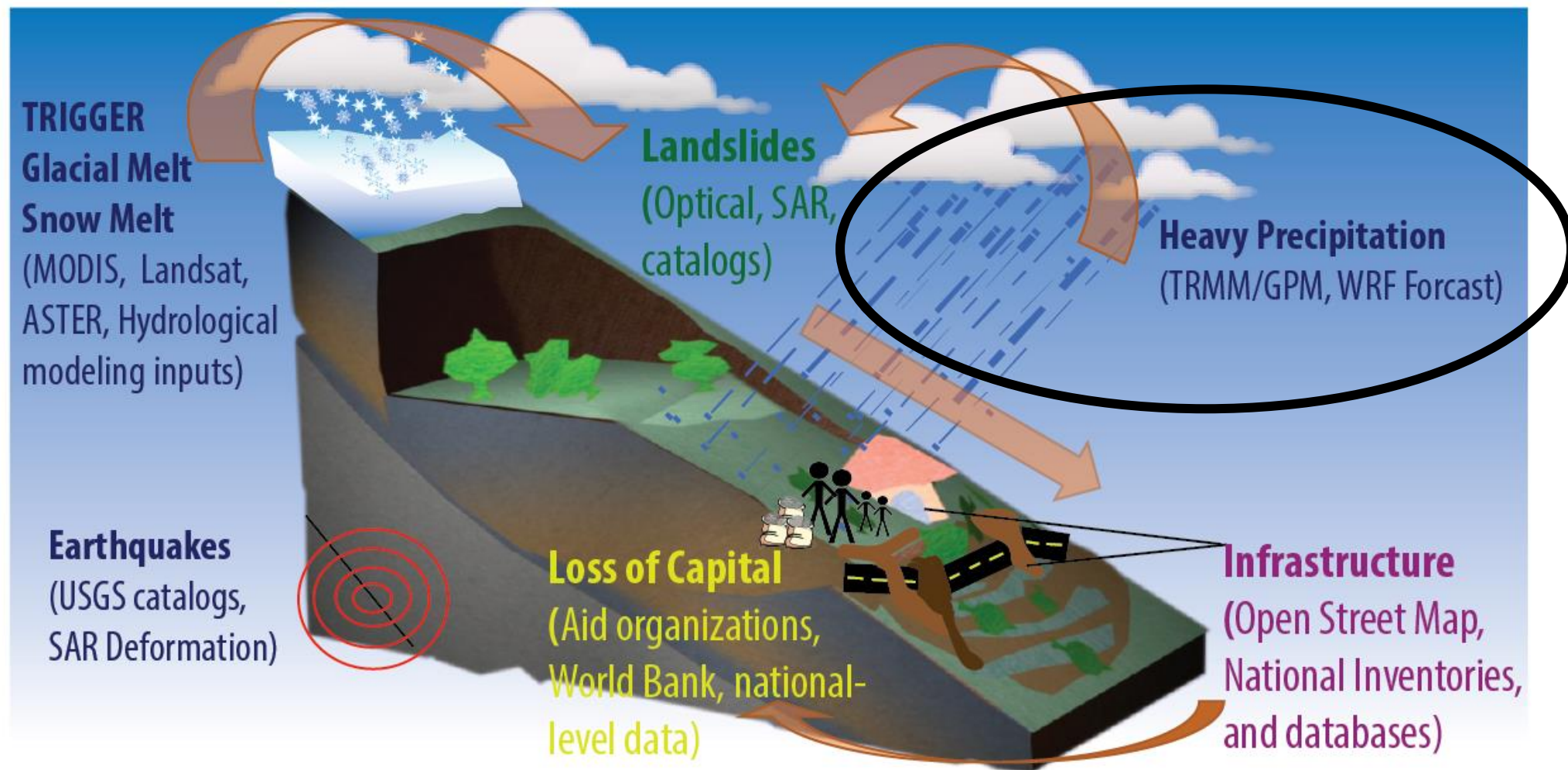


Assessing Landslide Hazards Before and During an Event



Landslides are a major problem...

And they have many causes.



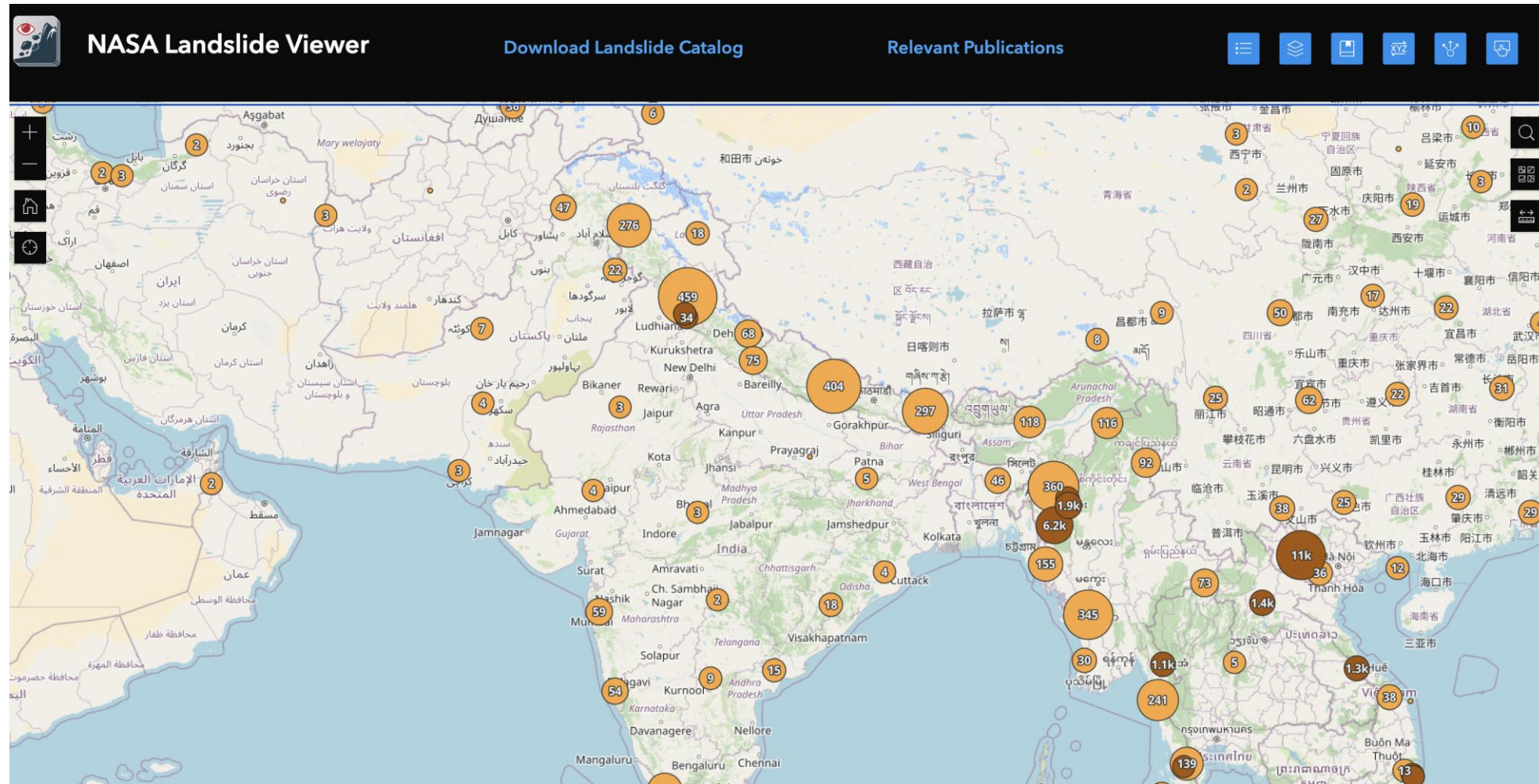


Some Resources for Assessing Landslide Hazard
Before an Event

Global Landslide Catalog (GLC)



At Landslide Viewer (landslides.nasa.gov/viewer)



More from the Cooperative Open Online Landslide Repository (COOLR)

At Landslide Viewer (landslides.nasa.gov/viewer)

The screenshot displays the NASA Landslide Viewer web application. At the top, there is a navigation bar with the title "NASA Landslide Viewer" and two main links: "Download Landslide Catalog" and "Relevant Publications". To the right of these links are several utility icons for map navigation and data handling. The main area is a map of Bhutan, showing various administrative divisions and geographical features. A popup window is open over a specific landslide point, displaying the following information:

COOLR Reports Point - COOLR Reports (Point):	
Antara News	
Administrative Division	Chhukha
Associated Storm Name	
Closest Gazetteer Point	Getta Dzong
Country Code	BT
Country Name	Bhutan
Distance to Gazetteer Point	10.49
Estimated Size	Medium
Event Comments	

Below the popup, there is a "Zoom to" button and a page indicator "2 of 5". On the right side of the map, a "Basemap" panel is open, showing a list of map styles: Imagery, Imagery with Labels, Streets, Topographic, Dark Gray Canvas, Light Gray Canvas, National Geographic, and Terrain with Labels. The "Imagery" style is currently selected.

Download All the Data in COOLR

At Landslide Viewer (landslides.nasa.gov/viewer)



Global Landslide Catalog Downloadable Products Gallery

Global Landslide Catalog Downloadable Products

The Cooperative Open Online Landslide Repository (COOLR) is a worldwide database of landslide events from NASA, scientists, and citizen scientists. You can download the COOLR catalog as a file geodatabase (.gdb), shapefiles (.shp), or comma-separated values (.csv). Learn more about the data and citizen science at landslides.nasa.gov.

Tags

617 catalog coolr csv file geodatabase gic global landslide landslide inventory landslides nasa point polygon shapefile

- NASA Cooperative Open Online Landslide Repository (COOLR) (File Geodatabase)**
File Geodatabase
The NASA Cooperative Open Online Landslide Repository (COOLR) points and polygons, downloadable as a .gdb file.
- NASA Cooperative Open Online Landslide Repository (COOLR) Reports Points (Shapefile)**
Shapefile
The NASA Cooperative Open Online Landslide Repository (COOLR) points, downloadable as a .shp file.
- NASA Cooperative Open Online Landslide Repository (COOLR) Reports Points (CSV)**
CSV
The NASA Cooperative Open Online Landslide Repository (COOLR) points, downloadable as a .csv file.
- NASA Cooperative Open Online Landslide Repository (COOLR) Reports Polygons (Shapefile)**
Shapefile
The NASA Cooperative Open Online Landslide Repository (COOLR) polygons, downloadable as a .shp file.
- Global Gridded Landslide Inventory**
CSV
Count of landslides mapped within each 1-km grid cell. This file contains most of the landslide inventories used for training "Data-Driven Landslide Nowcasting at the Global Scale."

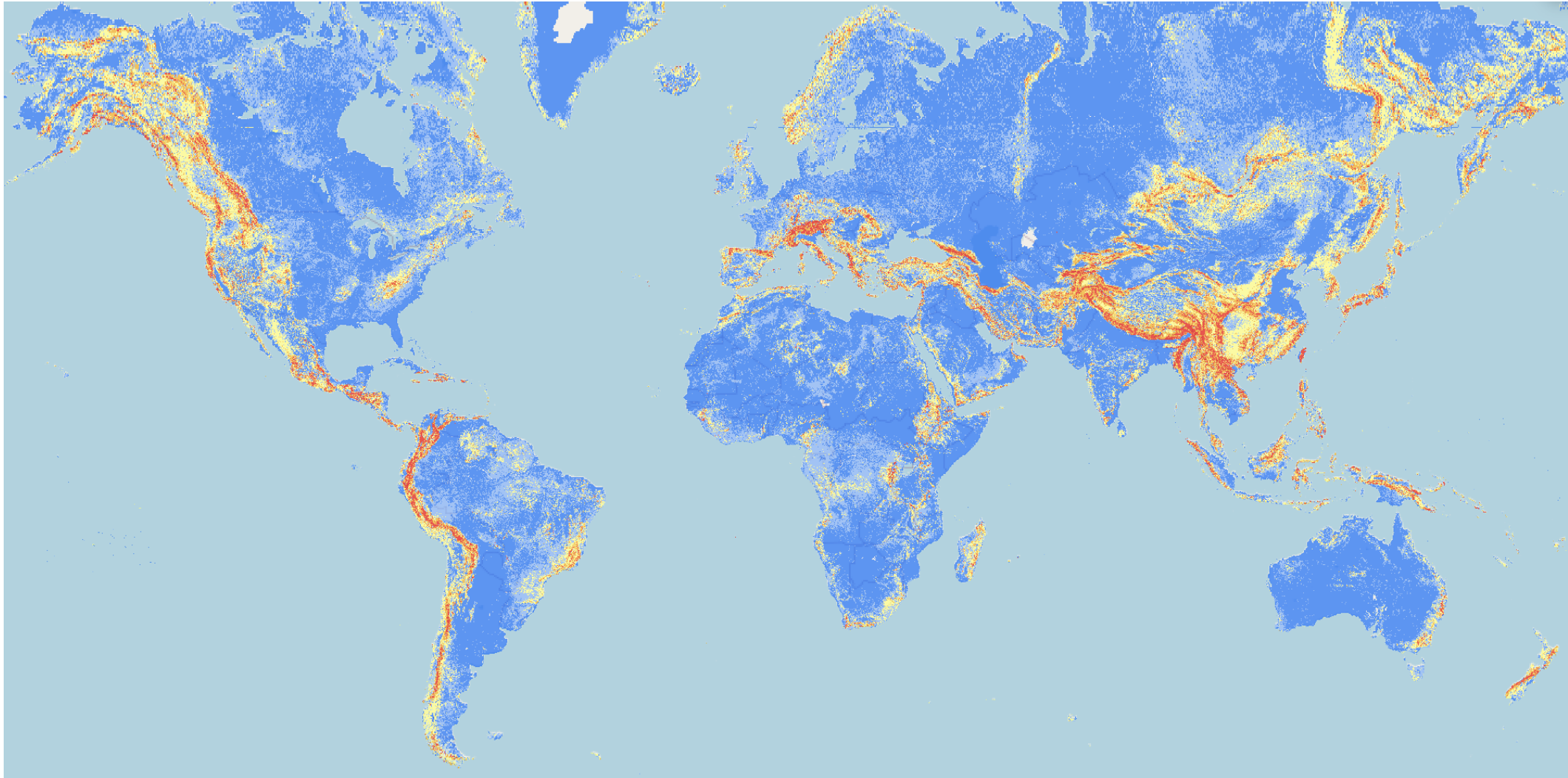
A screenshot of the NASA Landslide Viewer web application. The top left corner shows the NASA logo and the text "NASA Landslide Viewer". In the top right corner, a button labeled "Download Landslide Catalog" is circled in red. Below the header is a map of a region in China, showing various geographical features and labels in Chinese characters. The map includes a search bar and navigation controls.



Global Landslide Susceptibility Map

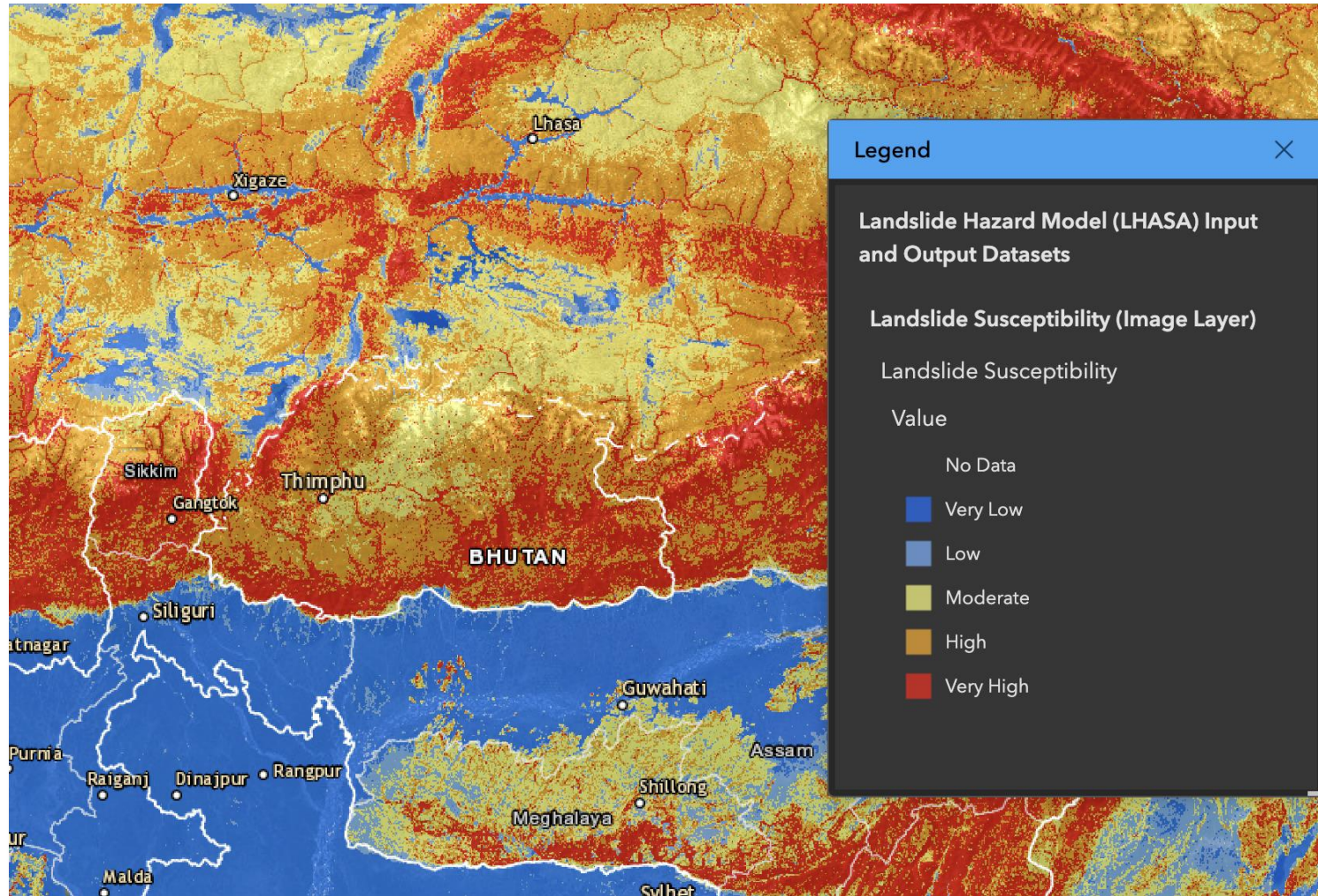


At Landslide Viewer (landslides.nasa.gov/viewer)



Global Landslide Susceptibility Map

At Landslide Viewer (landslides.nasa.gov/viewer)



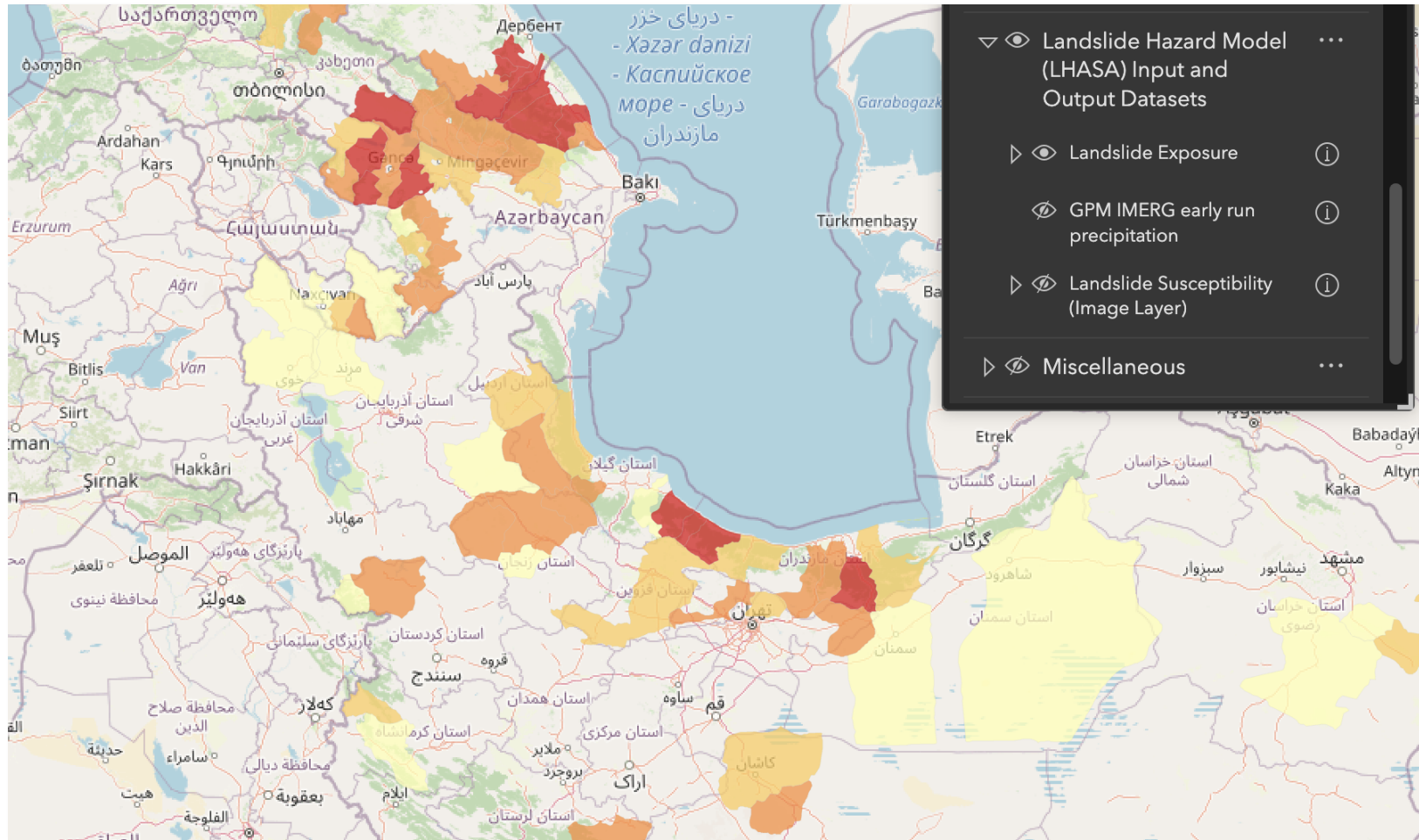


Some Resources for Assessing Landslide Hazard During an Event

Global Landslide Exposure



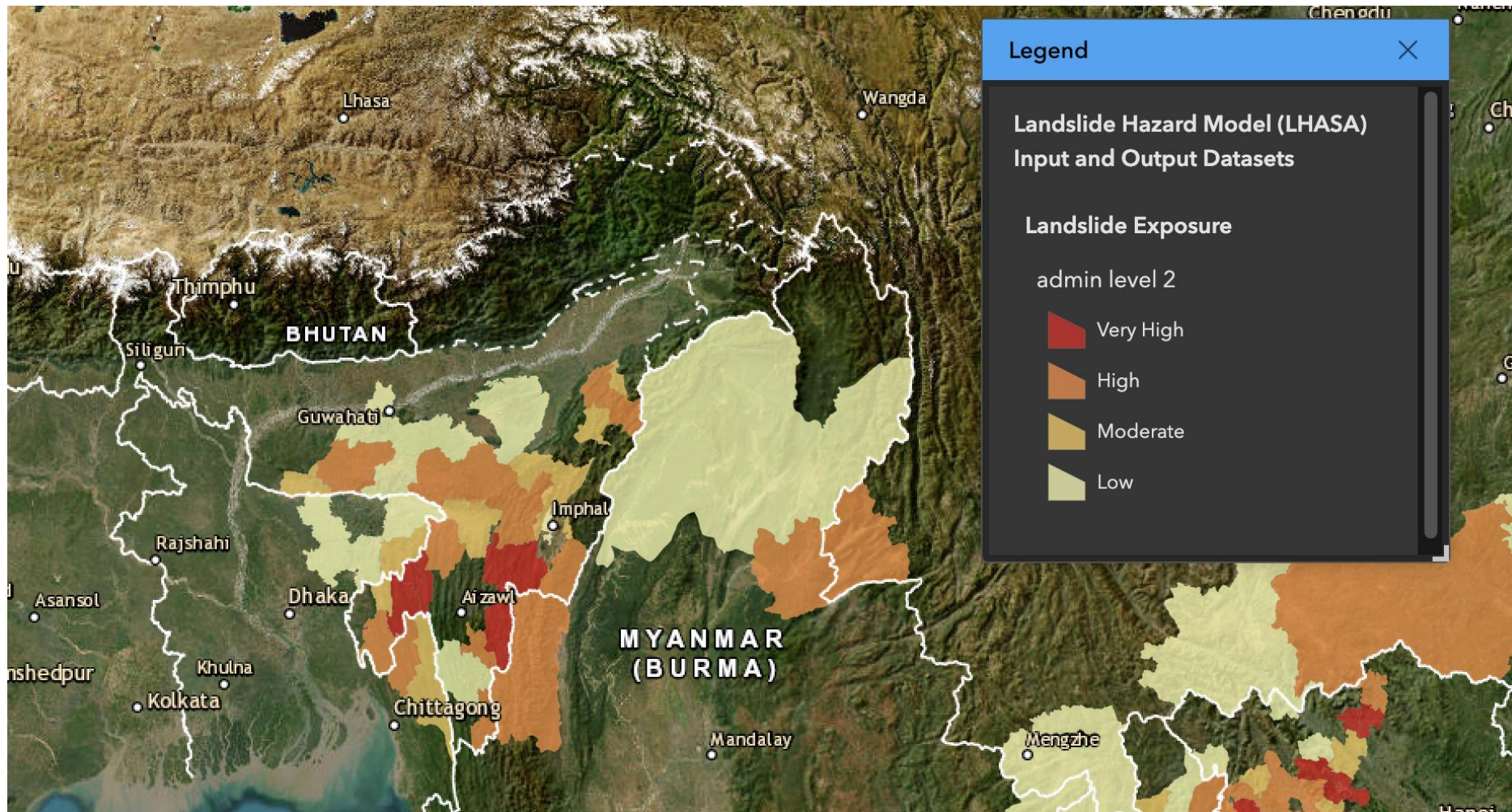
At Landslide Viewer (landslides.nasa.gov/viewer)



Global Landslide Nowcast

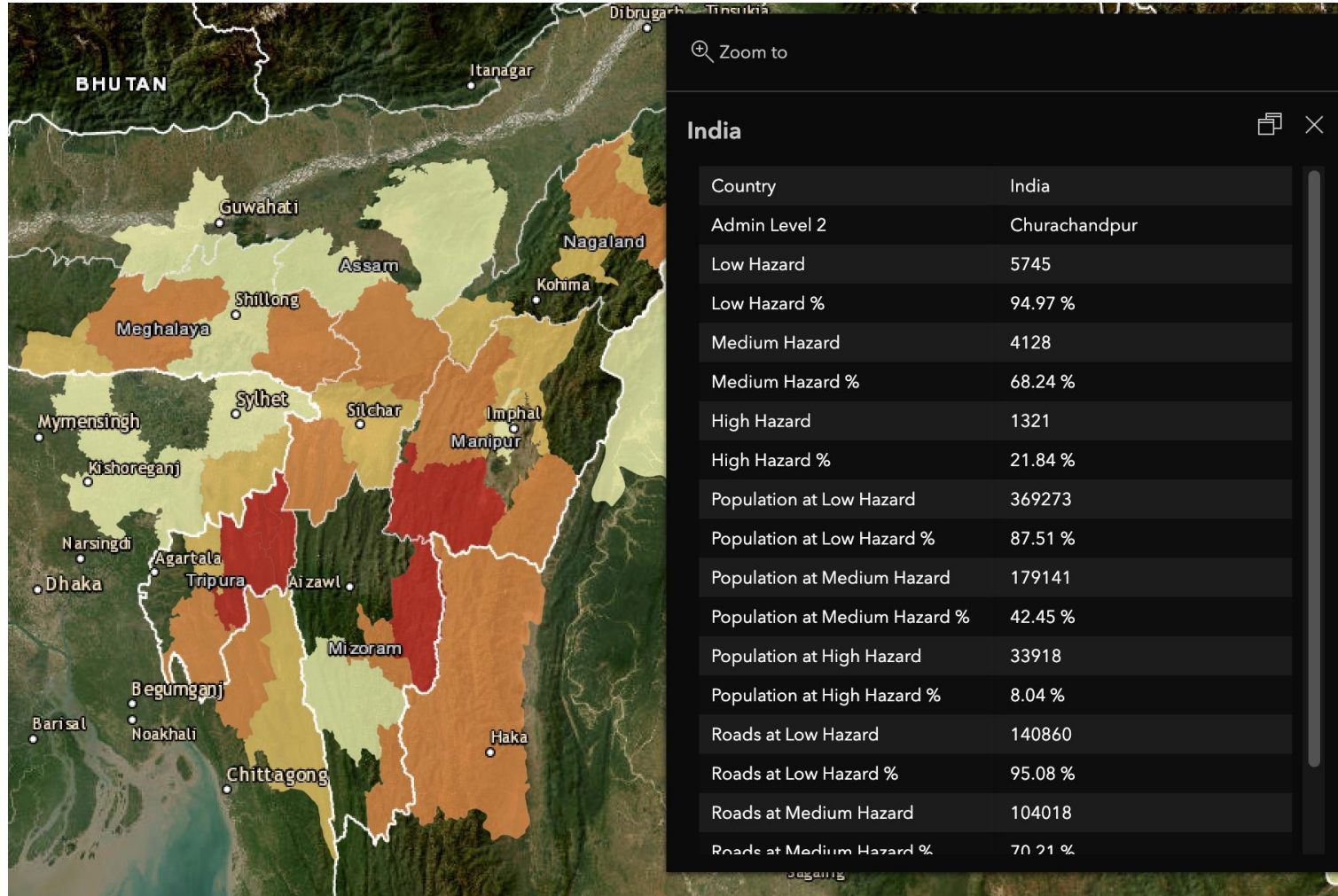


At Landslide Viewer (landslides.nasa.gov/viewer)



Exposed Population and Roads from the Global Landslide Nowcast

At Landslide Viewer (landslides.nasa.gov/viewer)



New Features in the Global Landslide Nowcast (LHASA 2.0)

- Probabilistic, rather than categorical outputs
 - Due to the use of machine learning
 - Incorporates soil moisture and snow mass
- Increased accuracy
- Exposure analysis
- However, version 1.1 is still published at <https://pmmmpublisher.pps.eosdis.nasa.gov/> and <https://gpm.nasa.gov/data/visualizations/precip-apps>.
- Both sites allow you to view the “classic” model output:



Pacific Disaster Center

DisasterAWARE (<https://www.pdc.org/disasteraware/>)



Summary

- Information on landslides can be useful at all stages of the disaster life cycle.
- NASA has several online resources:
 - At [Landslide Viewer](#)
 - At [Landslide Reporter](#)
- The LHASA model uses IMERG precipitation to produce global landslide nowcasts.
- You can implement [LHASA version 2.0](#) with open-source code and open data.
 - But customizing it for your region is recommended.



Resources

- Global Precipitation Measurement → Landslides
 - <https://gpm.nasa.gov/applications/landslides>
- GPM Precipitation and Applications Viewer
 - <https://gpm.nasa.gov/data/visualizations/precip-apps>
- Landslide Hazard Assessment for Situational Awareness (LHASA) Model
 - LHASA 2.0
 - <https://gpm.nasa.gov/landslides/projects.html#LHASA>



References

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