

# Mountain Environment Regional Information System (MENRIS)

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International Centre for Integrated Mountain Development

Kathmandu, Nepal

May 16, 2016

# HINDU KUSH HIMALAYAS

## A Global Asset and a Disaster Hotspot



ICIMOD

FOR MOUNTAINS AND PEOPLE



One of the most vulnerable regions of the world due to environmental and climate change

# MENRIS

SERVIR-Himalaya  
Initiative



Regional Database  
Initiative



Regional Programmes

## Goal

Policies and programmes related to mountain livelihoods and ecosystems effectively implemented through support from a regional information system in the greater Himalayan region

## Outcome

Strengthened information networking and regional capability, facilitating adoption of evidence-based mountain development policies and practices by the regional member countries



SERVIR  
Global at NASA



SERVIR  
West Africa

SERVIR-Mekong

SERVIR  
Eastern & Southern Africa

SERVIR is an earth observation, monitoring, and visualization system that integrates satellite and other geospatial data for improved scientific knowledge and decision-making by managers, researchers, students, and the general public.

# Information Products and Services – Thematic Focus

ICIMOD

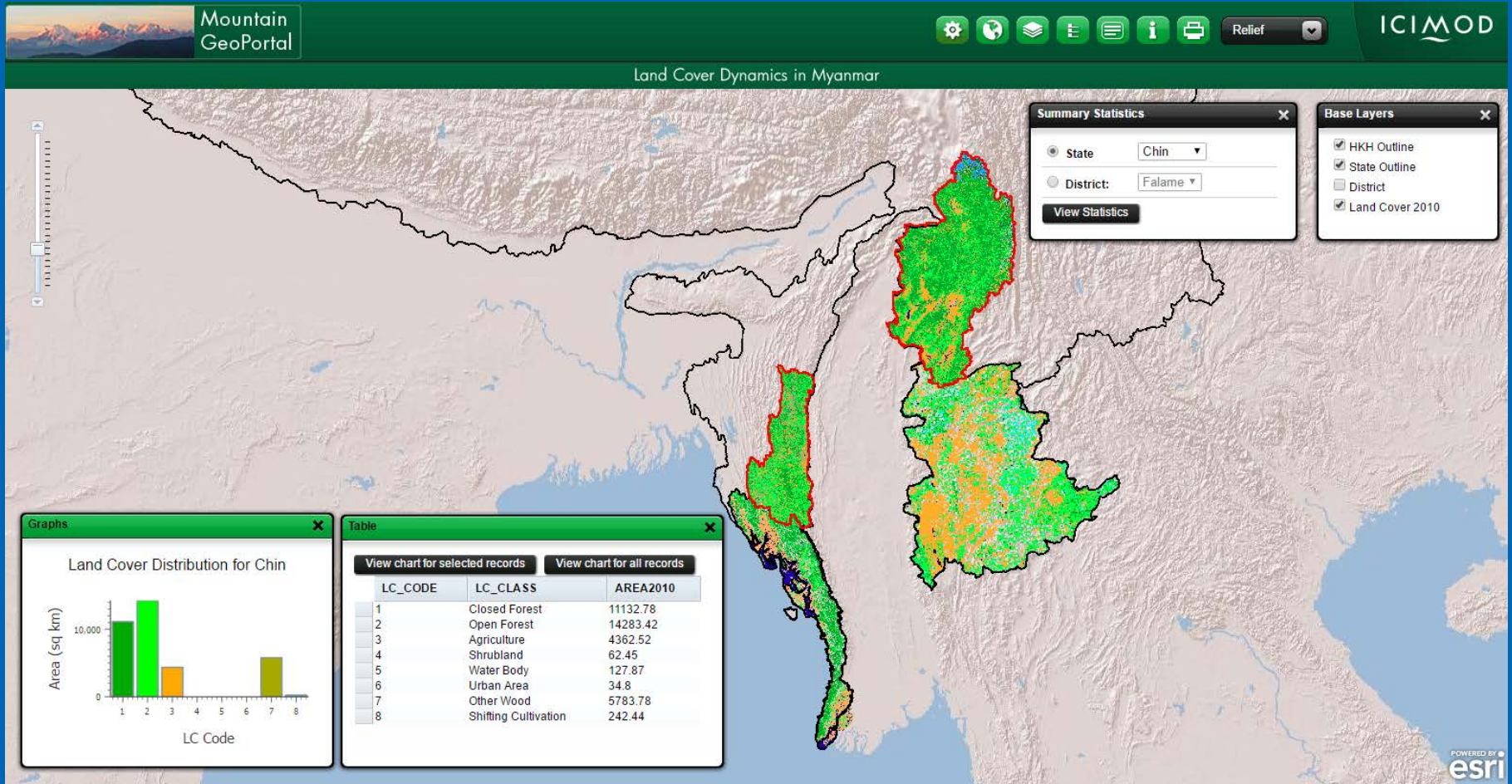
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- Climate Information Services
- Integration of social, economic and environmental information
- Improving environmental and developmental decision-making

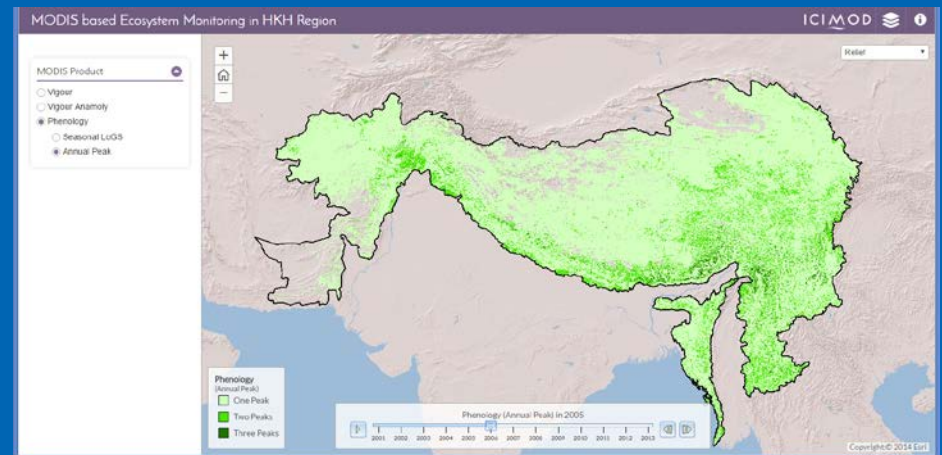
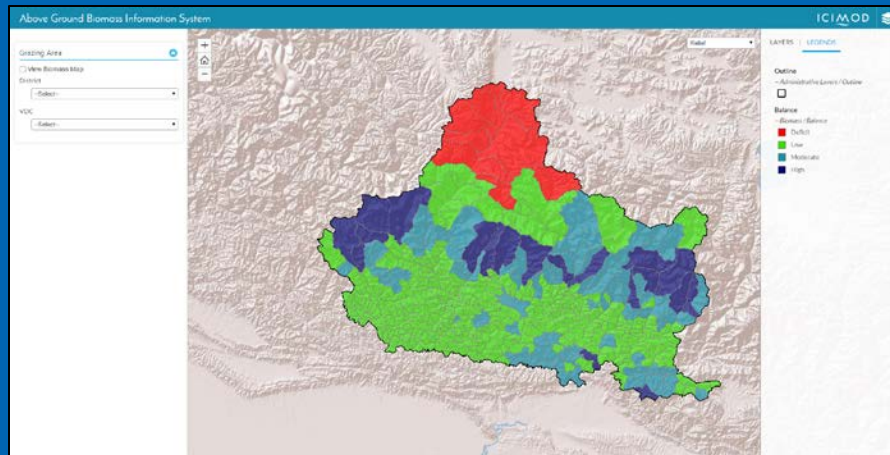
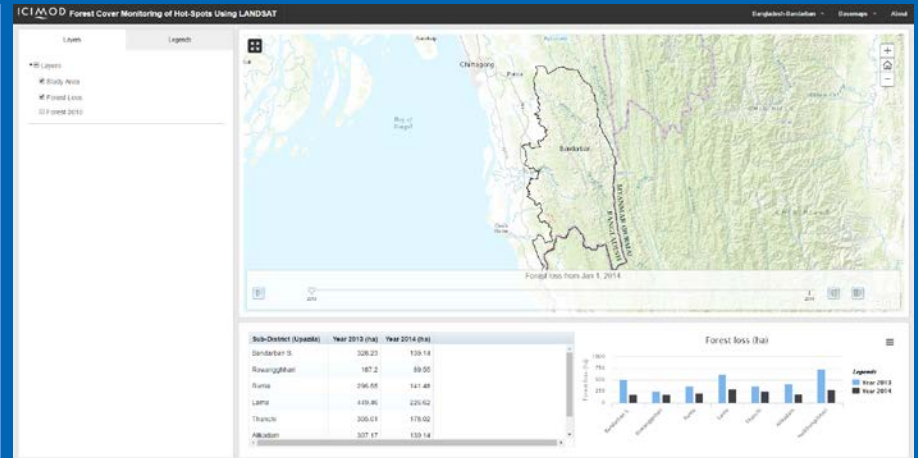
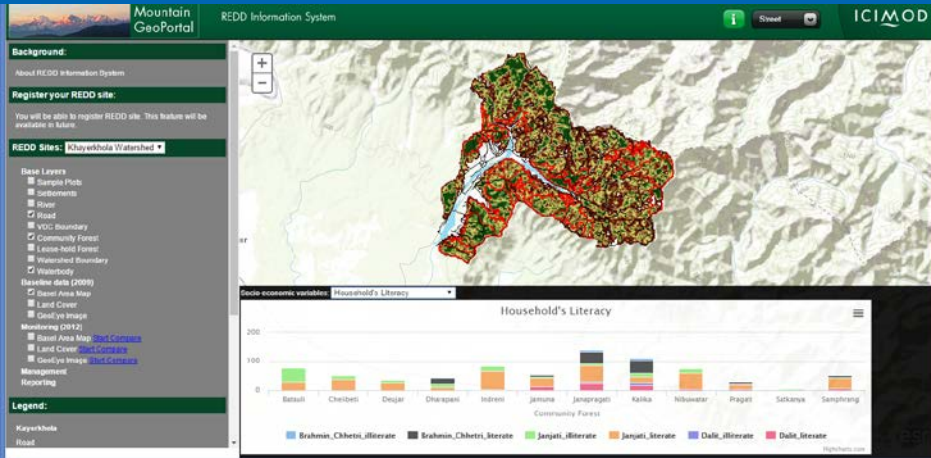


Country Consultations and Needs Assessment

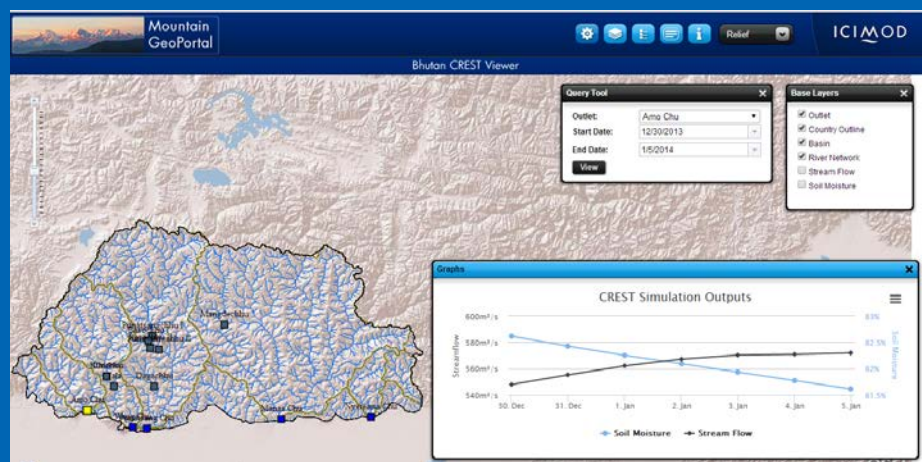
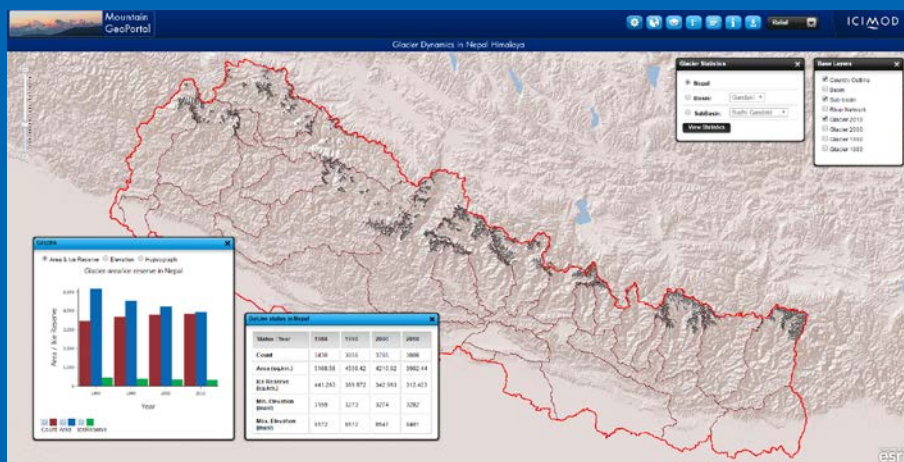
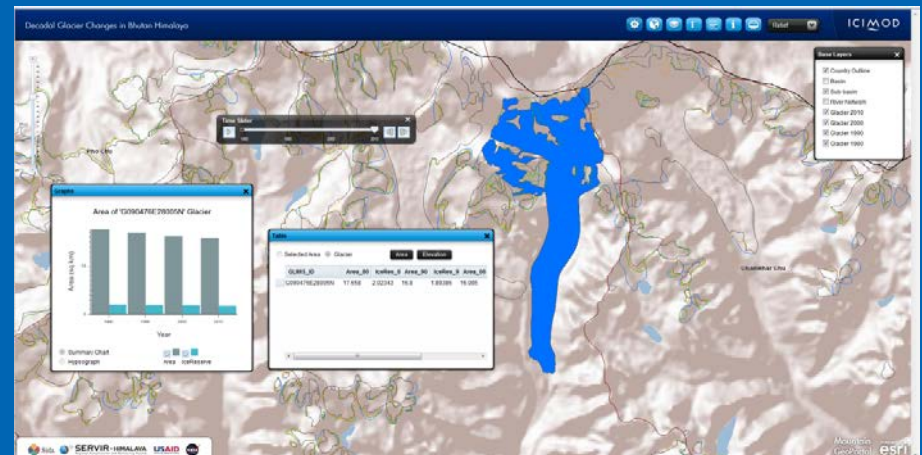
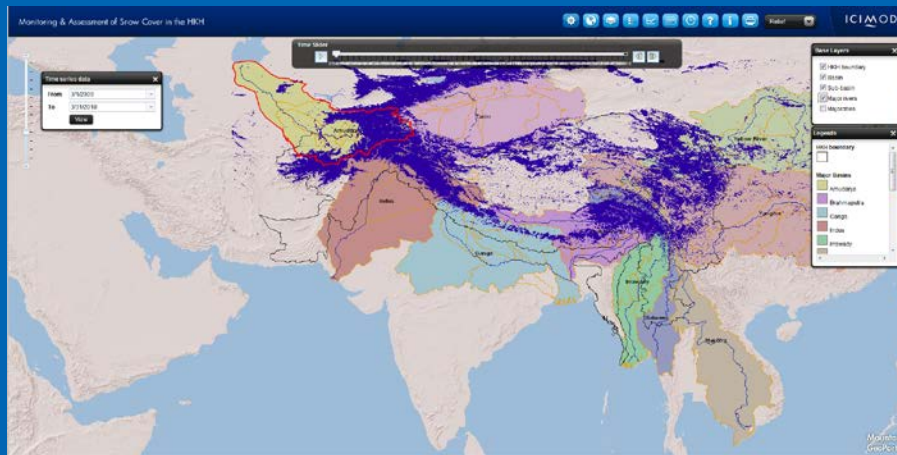
# Ecosystem/Biodiveristy



# Ecosystem/Biodiversity

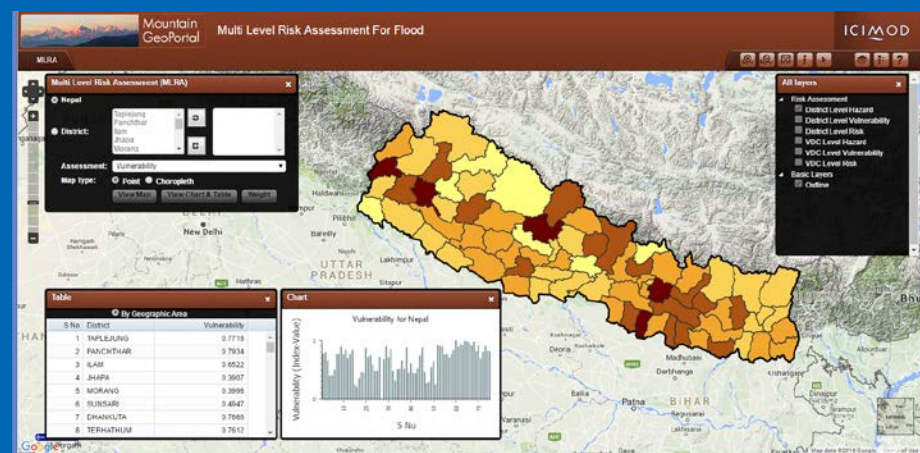
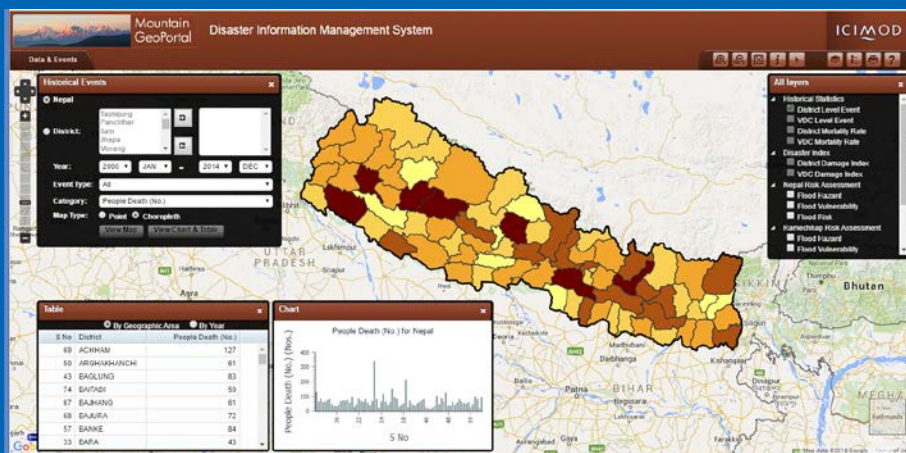
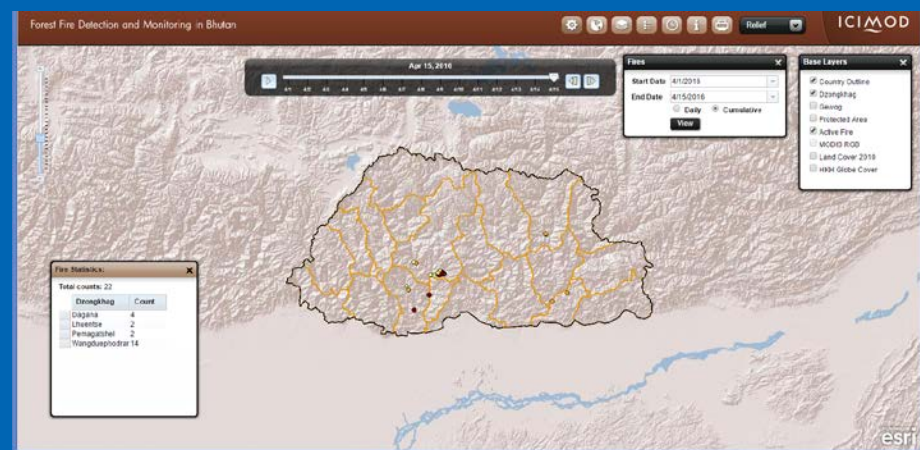
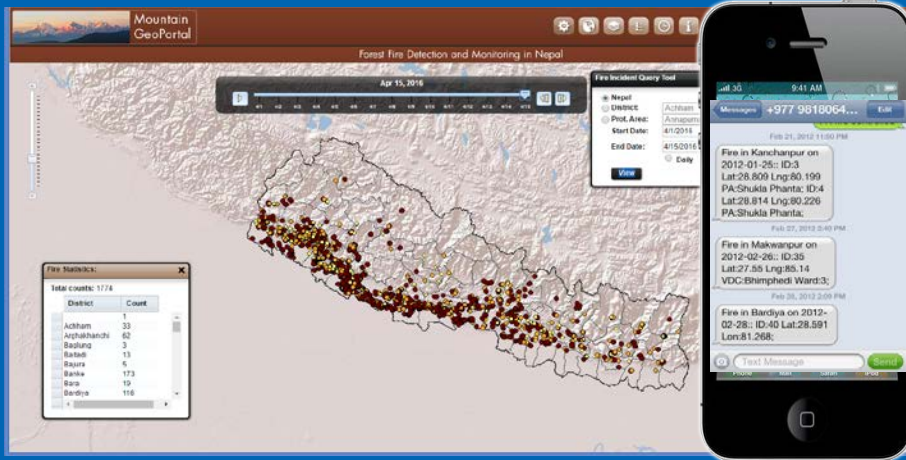


# Cryosphere





# Disaster & Natural Hazards



# Disaster Recovery and Reconstruction Information Platform

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**Nepal Earthquake 2015**  
Disaster Relief and Recovery Information Platform

EN ने

- Country Profile
- District Profile
- Municipality Profile
- VDC Profile
- Health
- Education
- Heritage
- Landslide Assessment
- Geo-Hazard
- Infrastructure
- Agriculture/Livestock
- Culture/Tourism
- Industry/Commerce
- EQ Journal
- Swipe Map
- Live Feed

- Integration of data and information at the national level
- Interactive Profile, story map journal and visualization
- A single Gateway for timely and credible information for decision support
- Transparency, Accountability and Social Audit
- Information and as “public good”

# Disaster Recovery and Reconstruction Information Platform

# ICIMOD

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**Nepal Earthquake 2015: Country Profile**

**Layers**

- Administrative
- Facilities
- Earthquake
  - Recent EQ (INSC)
  - Recent EQ (USGS)
  - Shake Intensity
- Others
  - Berspak Hazard
  - Landslide Susceptibility
  - Landslide Location
  - Event Time

**Loss/Damage**

Bar chart showing Total Deaths (approx. 8,844) and Injury (approx. 22,307).

**People**

Total Death	8844
Injury	22307
Missing	-

**Infrastructure Damage**

Fully damaged govt. buildings	2673
Partially damaged govt. buildings	3757
Fully damaged private houses	595728
Partially damaged private houses	279828
Fully damaged health facility	503
Partially damaged health facility	460
Affected schools	8308
Fully damaged classrooms	19708
Major damaged classrooms	11046

**Figures from Census 2011**

No. of houses	4627318
Total population	26494504
Male population	12851608
Female population	13642896
Livestock (Big)	9604787
Livestock (Small)	11598222
Livestock (Bird)	20000000

**Damage Index**

1 2 3 4 5

**Map Journal**

- Kathmandu Map Journal
- Earthquake Journal
- Heritage journal

**Drone Map: Bafra/Arif**

**Places of Interest**

- Bayin
- Laqun
- Chamshin
- Basantpur Dohar Square
- Patan Dohar Square
- Sarathi
- Chauri
- Kyamb-Sampal
- Kolben
- Balidhar
- Chaudhry Park

**Rapid Landslide Assessment**

**Layers**

- Country Outline
- District
- Crack
- Landslide
- Proposed Rehabilitation Site
- Affected District
- Area at Risk

**Nepal Earthquake 2015: Country Profile**

**Building**

- Fully Damaged Govt. Buildings
- Partially Damaged Govt. Buildings
- Fully Damaged Private House
- Partially Damaged Private House
- Total Private Damaged Building
- Total Affected Building

**Application Layer**

- Application Layer
- Emergency Aid

**Map Journal**

- Earthquake Journal
- Heritage journal

**Fully Damaged Private Houses**

Bar chart showing the number of fully damaged private houses across various districts.

**Nepal Earthquake 2015**

Major earthquake hit Nepal on April 25 and May 12, 2015 at magnitudes of 7.8 and 7.3 respectively.

As far as 17 districts were severely affected in the Western and Central regions.

14 districts were hit heavily: Bardiya, Banke, Bhanu, Bhojpur, Butwal, Chitwan, Dhanu, Dhulikhel, Durbhuja, Gorkha, Kathmandu, Lalitpur, Bhaktapur, Chitwan, Siraha, and Sindhuli.

**Damages and Losses**

Number of people killed: 8,772

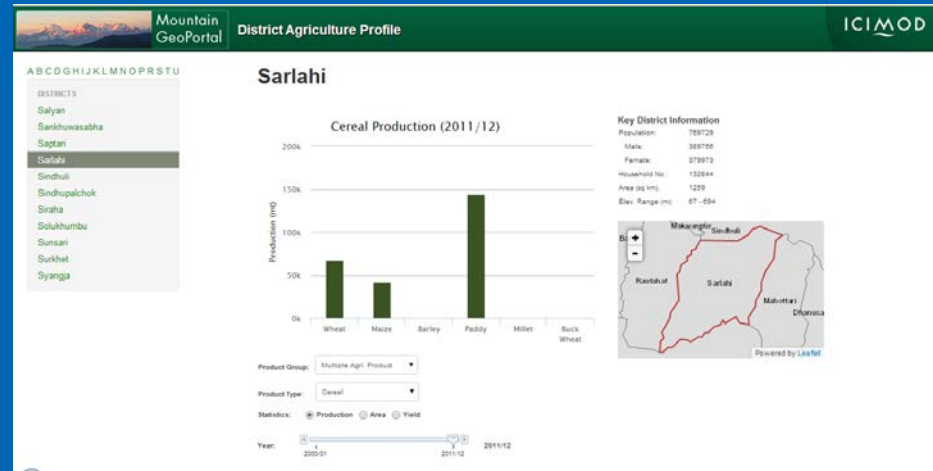
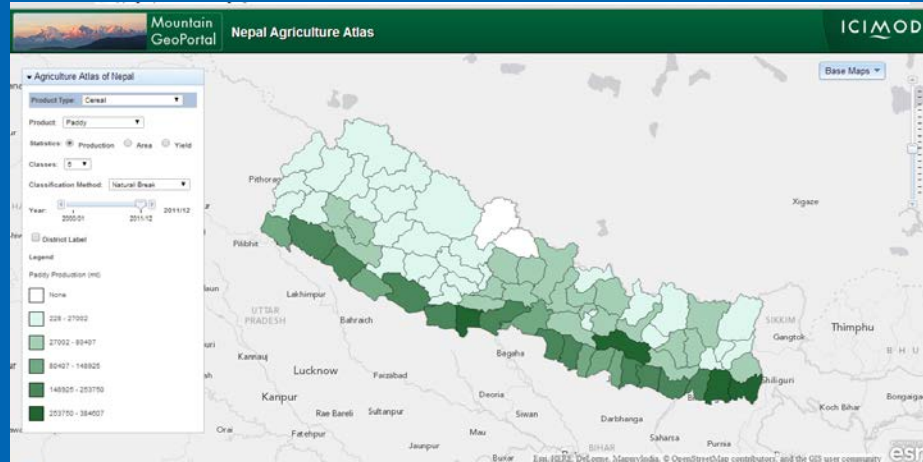
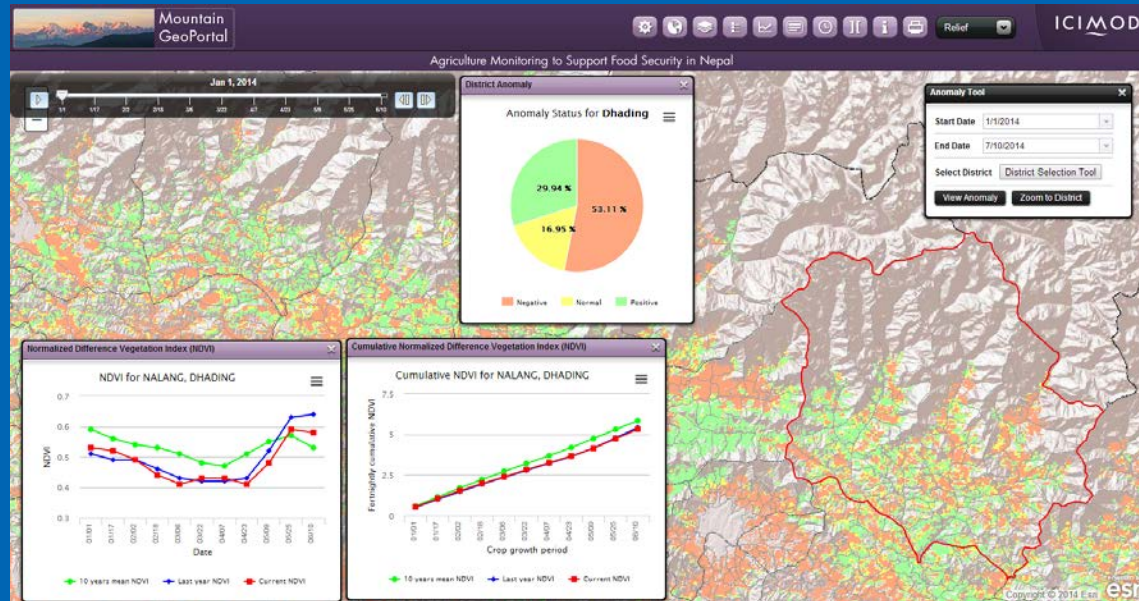
Number of people injured: 22,307

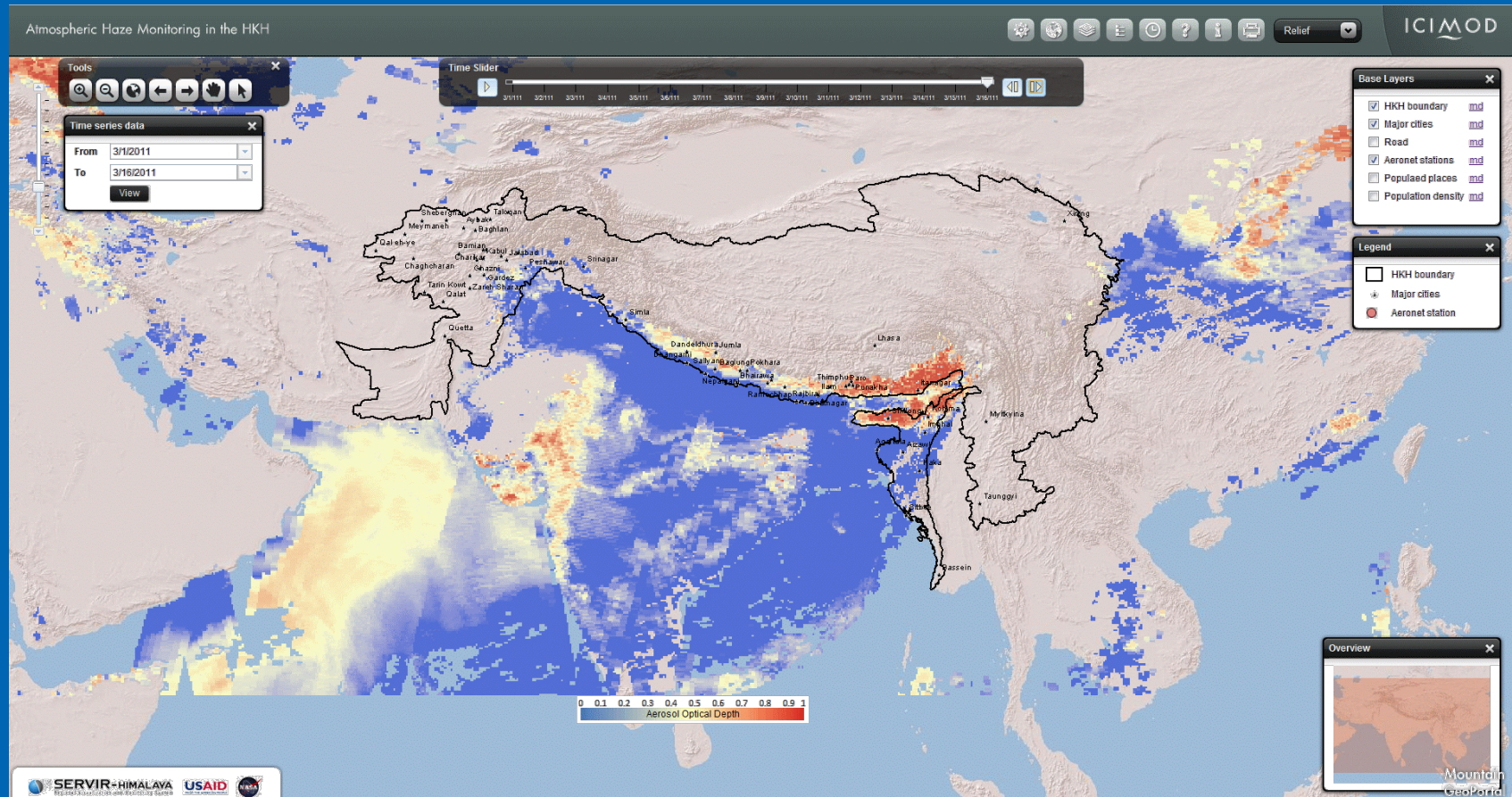
Number of government houses fully damaged: 2,673

Number of government houses partially damaged: 3,757

Number of private houses fully damaged: 595,728

Number of private houses partially damaged: 279,828





# Mountain GeoPortal

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## Mountain GeoPortal



### Featured Applications

Nepal Earthquake 2015 Disaster Recovery and Reconstruction Information Platform

Potentially Dangerous Glacial Lakes of Nepal

Imja lake - Fastest growing glacial lake of the HKH region

The World's 14 Highest Mountain Peaks



### Science Applications

A collection of innovative and interactive web mapping applications that provides dynamic visualization of spatial data along with the tools to support informed decision making.



#### Status of Glaciers in the HKH Region

Comprehensive glacier inventory and status of the entire Hindu Kush Himalayan region



#### Land Cover Dynamics in Bhutan

Statistics on the harmonised land cover database of Bhutan for 1990, 2000 and 2010



#### Nepal Disaster Information Management System

Historical disaster events data and information on multi-level hazard, vulnerability and risk assessment

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# Science Applications

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## Status of Glaciers in the HKH Region

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## Nepal Disaster Information Management System

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## Phobjikha Valley Resource Inventory

Resources inventory for supporting the conservation efforts of Phobjikha wetland ecosystem in Bhutan

[View Details](#)



## Bhutan GNH Index 2010

District-wise visualization of Gross National Happiness Index of Bhutan for 2010

[View Details](#)



## Historic Changes in Snow Cover in the HKH Region

Weekly snow cover statistics for major river basins and sub-basins in the Hindu Kush Himalaya region

[View Details](#)



## Atmospheric Haze Monitoring in the HKH

Daily MODIS Aerosol Optical Depth product for regional atmospheric haze monitoring

[View Details](#)



## Agricultural Monitoring to Support Food Security

Assessments of phenological patterns in agricultural areas across Nepal using time series anomalies in NDVI

[View Details](#)



## Nepal Census Indicators & Trends

Nepal Census Indicators & Trends District-wise mapping of census indicators and trends in Nepal for 1971, 1981, 1991 and 2001

[View Details](#)



## Climate change Vulnerability and Adaptation Strategies of Forest Ecosystem

The web app on climate change vulnerability of forest ecosystems provides information about the current relationships between climate variables and biophysical variables depicting functioning of forests.

[View Details](#)



## Forest Cover Monitoring of Hotspots Using LANDSAT

The application allows viewing forest loss area in plot sites for different years along with the forest loss statistics in the form of charts and table.

[View Details](#)



## Glacier Dynamics in Nepal Himalaya

Interactive mapping of glacier dynamics in Nepal for 1960, 1990, 2000, and 2010

[View Details](#)



## Glacier Dynamics in Bhutan Himalaya

Interactive mapping of glacier dynamics in Bhutan for 1980, 1990, 2000, and 2010

[View Details](#)



## Nepal Land Cover 1990 and 2010

Land cover data of Nepal for 1990 and 2010 with crowd feedback system for validation.

[View Details](#)



## HKH Glacial Lake Inventory of the HKH Region

Detail mapping and inventory of glacial lakes in five major basins of the HKH region

[View Details](#)



## Flood Forecasting for Bangladesh

Experimental eight day JASON-2 satellite flood forecasting for Bangladesh

[View Details](#)



## Land cover dynamics in Myanmar

Land cover statistics for Chin, Kachin, Rakhine and Shan states of Myanmar, and for their corresponding districts

[View Details](#)



## Decision Support Tools for Central Karakoram National Park

A collection of tools and methods to support key components of the decision making process for CKNP.

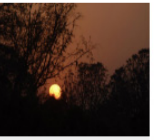
[View Details](#)



## Forest Fire Detection and Monitoring in Bhutan

MODIS based active fire detection and monitoring system in Bhutan with SMS and email alerts

[View Details](#)



## Above Ground Biomass in Nepal

ICIMOD under SERVIR Himalaya has developed Above Ground Biomass (AGB) dataset for Nepal using multi-sensor satellite data.

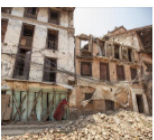
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## MODIS based Ecosystem Monitoring in HKH Region

The application allows interactive visualization of 13 years of vegetation and phenology data layers of HKH region.

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## Multi-Disaster Information System

This application has been developed under SERVIR-Himalaya initiative.

[View Details](#)



## Agriculture Atlas of Nepal

Visualization of district based agriculture statistics for agriculture products in the form of map atlas

[View Details](#)



## CREST Model Viewer for Bhutan

Climate change impact on hydrological flows of Wangchu Basin in Bhutan

[View Details](#)



## Forest Fire Detection & Monitoring in Nepal

MODIS based active fire detection and monitoring system in Nepal with SMS and email alerts

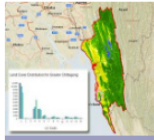
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## Land cover dynamics in Pakistan

Harmonised land cover database for three of the four provinces of Pakistan that lie in the HKH region for 1990, 2000 and 2010

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## Land cover dynamics in Greater Chittagong area

Visualization and querying of land cover data of Greater Chittagong area

[View Details](#)



## Emergency Management & Response System

GIS based emergency management & response system for Kathmandu valley, Nepal

[View Details](#)



## DSS for Flood Management

A collection of tools and methods to support key components of the decision making process for Rapti river.

[View Details](#)



## REDD Information System

REDD Information System

[View Details](#)



## Rangelands Decision Support System in Pakistan

This application has been developed to help decision makers in rangeland management in Pakistan.

[View Details](#)



## Multi Level Risk Assessment For Flood

This system built on open source architecture provides interactive interface to analyze historical disaster event and loss data base to draw policy relevant information.

[View Details](#)



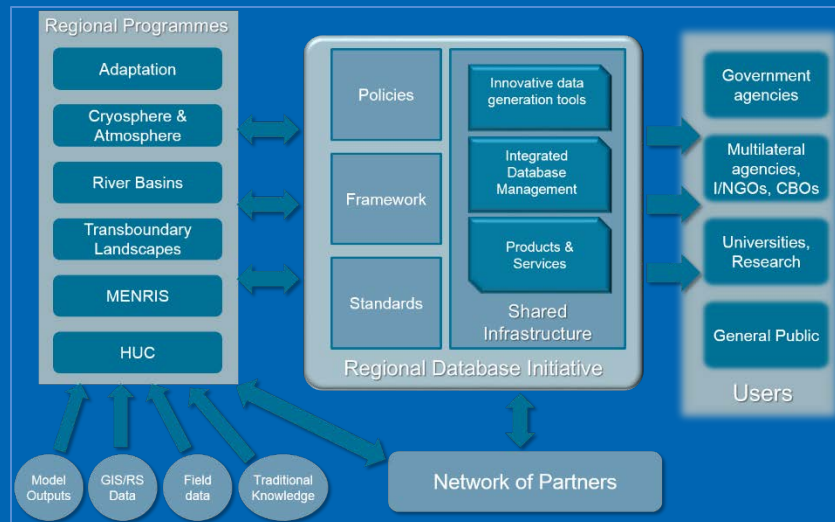
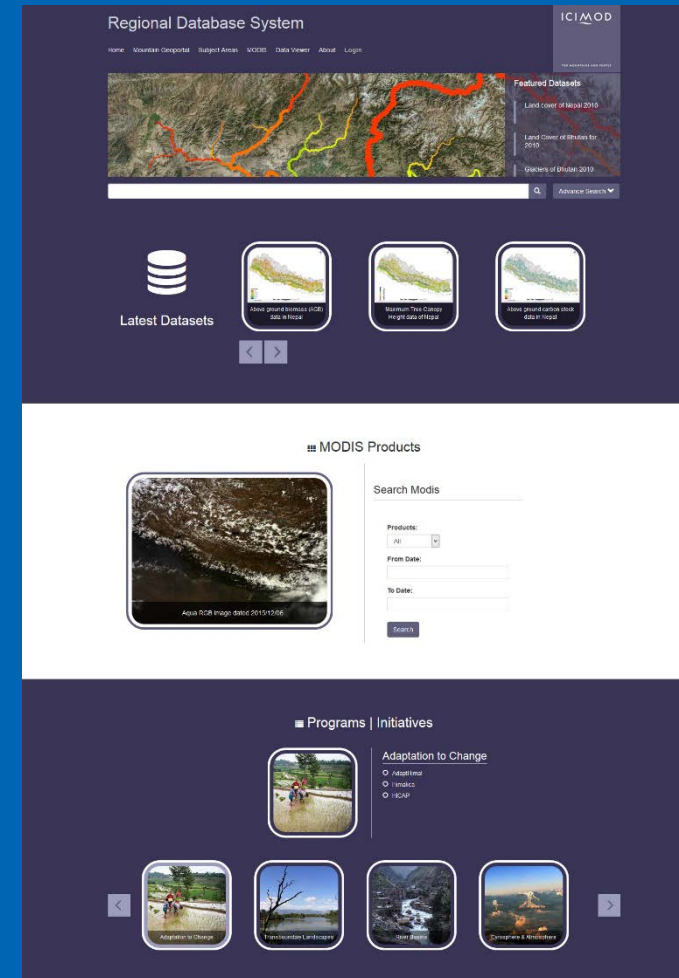
## Nepal Earthquake 2015 Disaster Recovery and Reconstruction Information Platform

The NDRRIP acts as a unified hub for earthquake-related information for use by government ministries and departments and other stakeholders engaged in disaster recovery and reconstruction.

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# Regional Database System

- A central data repository for different thematic areas in the Hindu Kush Himalayan (HKH) region
- Provides easy access to the data through a web-based portal.
- As part of establishing the RDS, ICIMOD has put in place:
  - Infrastructure to facilitate storage and management of data
  - Adoption of data and metadata standards
  - Data sharing policy and operation guidelines



Regional Database Framework





Advance Search ▾

### Filters

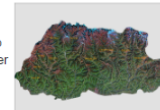
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[imageryBaseMapsEarthCover \(52\)](#)  
[Everest \(35\)](#)  
[Khumbu \(33\)](#)  
[ENVISAT \(33\)](#)  
[HKH \(31\)](#)  
[Glacier \(27\)](#)  
[Nepal \(25\)](#)  
[Bhutan \(24\)](#)  
[Climate change \(23\)](#)  
[Basin \(21\)](#)  
[Glacier Status \(19\)](#)  
[India \(17\)](#)  
[Cryosphere \(15\)](#)  
[China \(14\)](#)

115 Record(s) found

#### Decadal Glacier Change in Bhutan Himalaya

The Landsat 7 ETM+ images of 1980, 1990, 2000 and 2010 with least snow cover and no cloud cover were selected and acquired. The SLC-off was corrected with two images either SLC-off and SLC-on images ..



#### Glacier Area Change of Nepal from 1980 to 2010

Digital polygon data of Glacier area inventory of 1980, 1990, 2000 and 2010 of Nepal. This dataset is created using Landsat MSS, TM and ETM+ imageries of four respective decades. The glacier outline..



[View Map](#)

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#### Status of Glaciers in Yamuna Basin

The comprehensive baseline information on the glaciers of the HKH region was generated semi-automatically using more than 200 Landsat 7 ETM+ images of 2005 ± 3 years with minimum cloud and snow cover..



[View Map](#)

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#### Status of Glaciers in Upper Ganga Basin

The comprehensive baseline information on the glaciers of the HKH region was generated semi-automatically using more than 200 Landsat 7 ETM+ images of 2005 ± 3 years with minimum cloud and snow cover..



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# Bhutan GeoSpatial Portal

one stop access to geospatial data and application

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- National Consultation Workshop
  - To discuss on the conceptual framework of the national geospatial portal and ways of building collaboration
  - To assess requirements of the functionalities, extent of customization and level of user support for effective implementation of the portal.



# Bhutan GeoSpatial Portal

geo.gov.bt

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Bhutan GeoSpatial Portal

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Enter text to search data

### Featured Dataset

- MODIS Active Fire Data of Bhutan**  
This dataset is created using Moderate Resolution Imaging Spectroradiometer (MODIS) data. The data shows the locations of fire incidents within Bhutan on various dates in the period between 2000 to 2013 along with the confidence level information of such incidents.  
[View details](#)
- Glaciers of Bhutan 2010**  
Digital polygon data of Glaciers of Bhutan in 2010. This dataset is created using Landsat TM and ETM+ imageries of 2010. The glacier outlines were derived semi-automatically using object-based image classification (OBIC) method separately for clean ice and debris cover and further editing and validation was done carefully by draping over the high resolution images from Google Earth.  
[View details](#)
- Dzongkhag Boundary of Bhutan**  
The Dzongkhag boundaries of 20 districts are delineated from Topographic maps mostly using the natural features for administrative purposes.  
[View details](#)
- Road Network of Bhutan**  
It contains the road network of Bhutan picked up by using DGPS in 2006
- Protected Areas and Biological Corridors in Bhutan**  
It shows national Parks, Nature reserves, and Biological corridor
- Location of Hydropower Plants in Bhutan**  
The dataset shows the location of hydropower plants that are

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### Glaciers of Bhutan 2010

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**IDENTIFICATION INFO**

**DATE** 2014-02-04  
**DATE TYPE** publication

**ABSTRACT**  
Digital polygon data of Glaciers of Bhutan in 2010. This dataset is created using Landsat TM and ETM+ imageries of 2010. The glacier outlines were derived semi-automatically using object-based image classification (OBIC) method separately for clean ice and debris cover and further editing and validation was done carefully by draping over the high resolution images from Google Earth.

**PURPOSE**  
Locational base data for general purpose and Glacier inventory completed

**STATUS**  
completed

**DESCRIPTIVE KEYWORD**  
Glacier, Glacial Lake (theme) Bhutan (place)

**MAINTENANCE AND UPDATE FREQUENCY** NotPlanned

Bhutan GeoSpatial Portal

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### 6 APPLICATIONS

- Bhutan Data Viewer**  
An interactive web mapping application to view geospatial data arranged in various thematic areas.  
Last updated Monday, October 13, 2014
- Road Planner**  
An interactive web mapping application to support planning of farm road construction in Bhutan.  
Last updated Monday, October 13, 2014
- Bhutan Cadastral Mapping**  
A web mapping application for locating land parcels in a given Gewog and Dzongkhag based on Thram and Plot Id information.  
Last updated Wednesday, October 8, 2014

Road Planner

### Road Longitudinal Profile

Elevation (m) vs. Change (km)

Change (km)	Elevation (m)
0+0	2240
0+24	2240
0+64	2000
0+88	2000
0+107	2000
0+126	2000
0+147	2000
0+166	2000
0+175	2000

### Road Planning Tool

Right of Way: 10 meters

Draw Road:  Polyline  Freehand

KML, Road:

### Base Layers

- Country Outline
- Building
- Road
- Parcel
- Landscover 2010
- Affected Building
- Affected Area
- Affected Parcel

### Affected Parcel, Building and Landscover

Summary	Parcel List	Building List	Landscover Area
Length of Road (km)	No of Parcels	No of Buildings	Total Affected Area (sq. m)
0+175	0	0	1572.40

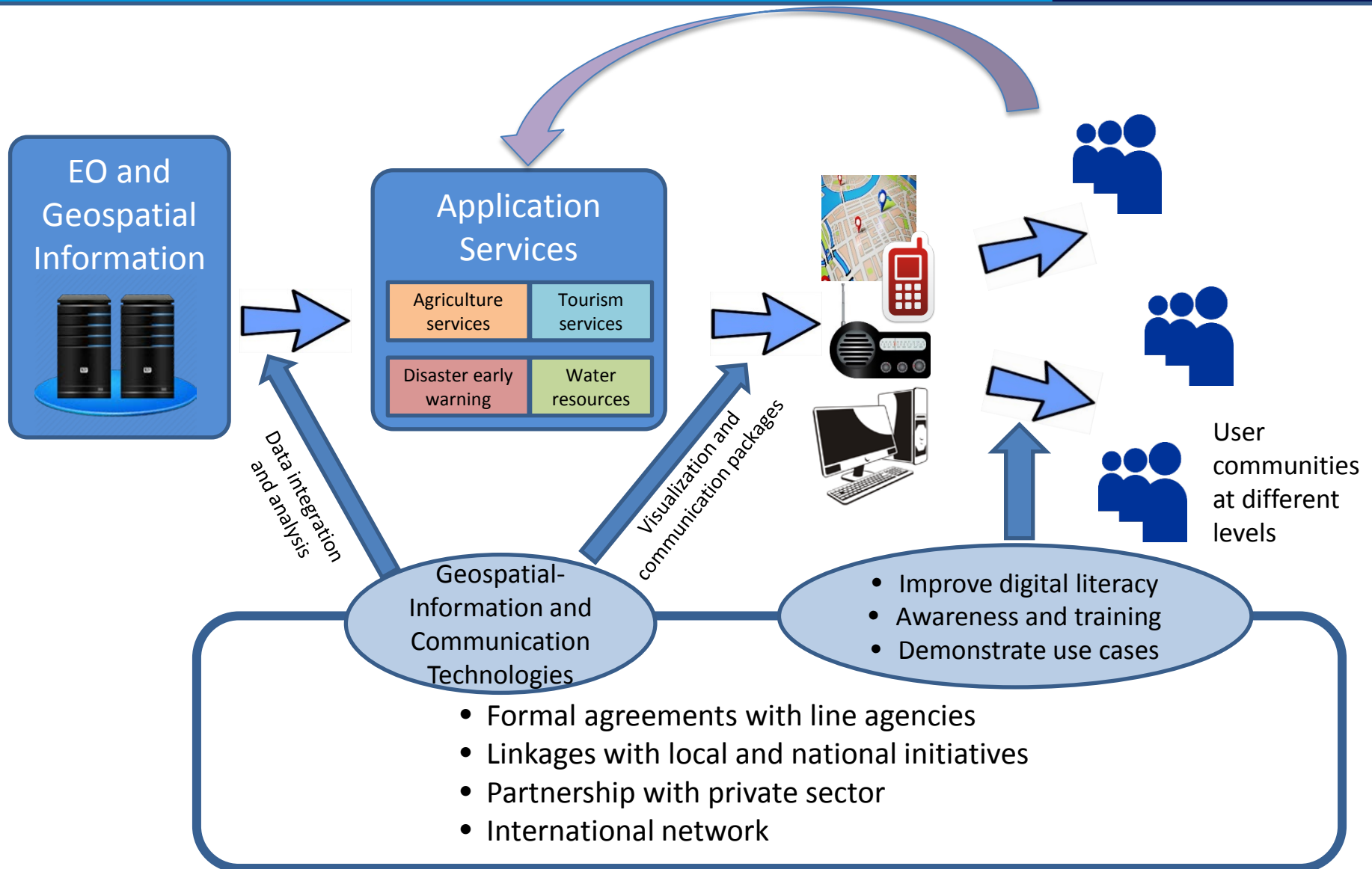
# Nepal GeoSpatial Portal

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The screenshot shows a web browser window with the URL `apps.geoportal.icimod.org/ngp/`. The page header features the Government of Nepal logo and the text "Government of Nepal Nepal GeoSpatial Portal". The navigation menu includes "HOME" (underlined), "DATA", "APPS", "ABOUT", "CONTACT", and a "LOGIN" button. The main content area displays a photograph of a mountain range with a prominent snow-capped peak and stone structures in the foreground. At the bottom, there is a search bar with the placeholder text "Enter text to search data" and a blue "SEARCH" button with a magnifying glass icon. Below the search button, the text "Advance Search" is visible with a dropdown arrow.

# Enabling Systems



# Thank You

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