

# ICIMOD – An Introduction

*GIS Technology and Applications in the  
Hindu Kush-Himalayan Region*



Associated Institute of the  
UNITED NATIONS UNIVERSITY



Workshop/Training on

**“Earthquake Vulnerability and Multi - Hazard Risk Assessment:  
Geospatial Tools for Rehabilitation and Reconstruction Efforts”**

13-31 March 2006, Islamabad, Pakistan

Organized by  
National Centre of Excellence in Geology (NCEG)  
Peshawar, Pakistan, and  
International Centre for Integrated Mountain Development (ICIMOD)  
Kathmandu, Nepal

In collaboration with  
Institute of Geo-information and Earth Sciences (ITC)  
Enschede, the Netherlands  
associated Institute of the United Nations University (UNU)  
Tokyo, Japan and  
Asian Disaster Preparedness Center (ADPC)  
Bangkok, Thailand



# A regional forum for Sustainable Mountain Development in the Greater Himalayan Region

[www.icimod.org](http://www.icimod.org)



- Eight member states:**
- Afghanistan
  - Bangladesh
  - Bhutan
  - China
  - India
  - Myanmar
  - Nepal and
  - Pakistan

# ICIMOD's Vision

*... shared with its partners and regional member countries*

*'prosperous and secure mountain communities committed to peace, equity and environmental sustainability'.*



Afghanistan



Bangladesh



Bhutan



China



India



Myanmar



Nepal

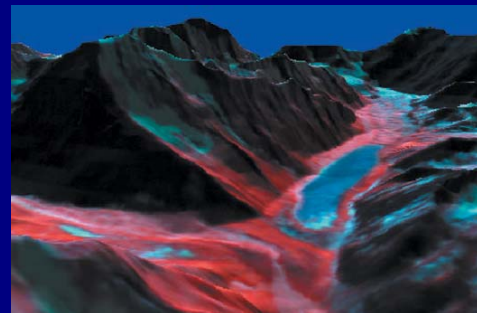


Pakistan



## ICIMOD's Mission

Develop and provide integrated and innovative solutions, in cooperation with national, regional and international partners, which foster action and change for overcoming mountain people's economic, social and physical vulnerability.



## Mountain Perspective:

### Inaccessibility

- World's highest peaks and deepest gorges and with very high degree of inaccessibility;

### Verticality

- Extremely rugged terrain with high topographic variations within short distances

### Fragility

- Youngest geological formation and fragile mountain ecosystem;
- Prone to natural disasters: earthquakes, landslides, flash floods and GLOFs;

### Diversity

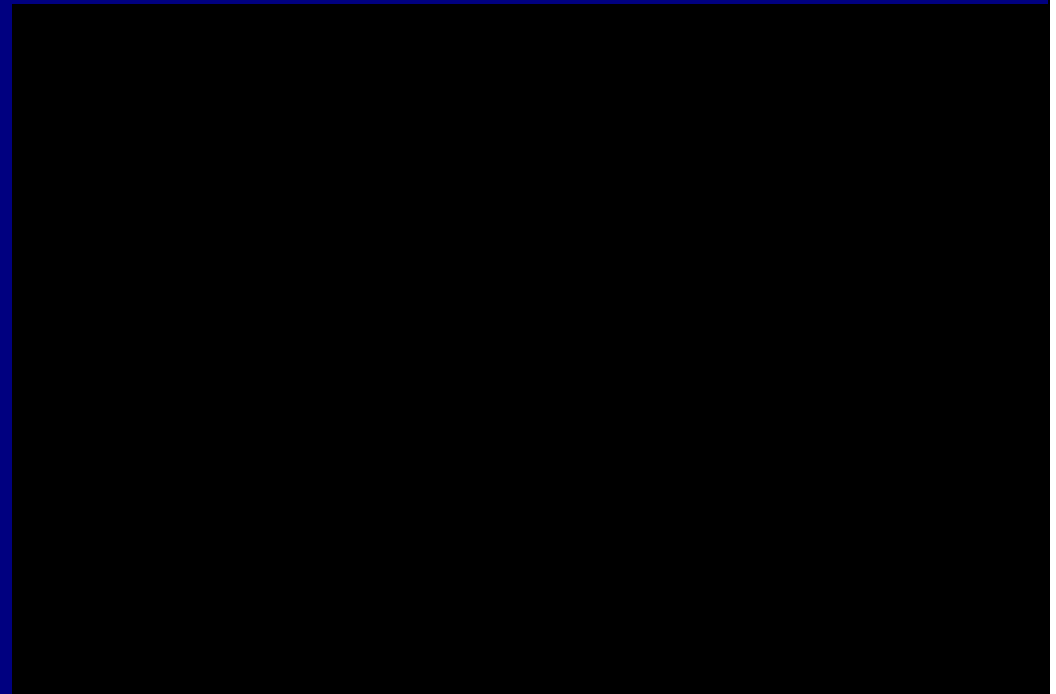
- Diverse physical, climatic and social conditions;

### Marginality

- One of the poorest region of the world and often marginalised by main development mainstream

## The Grater Himalayan Region

Extends over 3500 km from  
Afghanistan to Myanmar and  
Home to 150 million People





## **Mountains Provides Important Ecosystem Services...**

- Fresh Water
- Medicinal Plants
- Biodiversity
- Energy
- Minerals
- Air / Atmosphere
- Spectacular Views
- Diverse Culture
- ...



**... Anchor to the Plains**



## High Pressure on Mountain Ecosystem

Twin Challenges

Population Growth

Infrastructure Development

Natural Resource Exploitation

Climate Change, Natural Hazard

Minimizing Pressure on Natural Capital

- Biodiversity
- Forest
- Water
- Climate
- Energy...

Improving Livelihoods

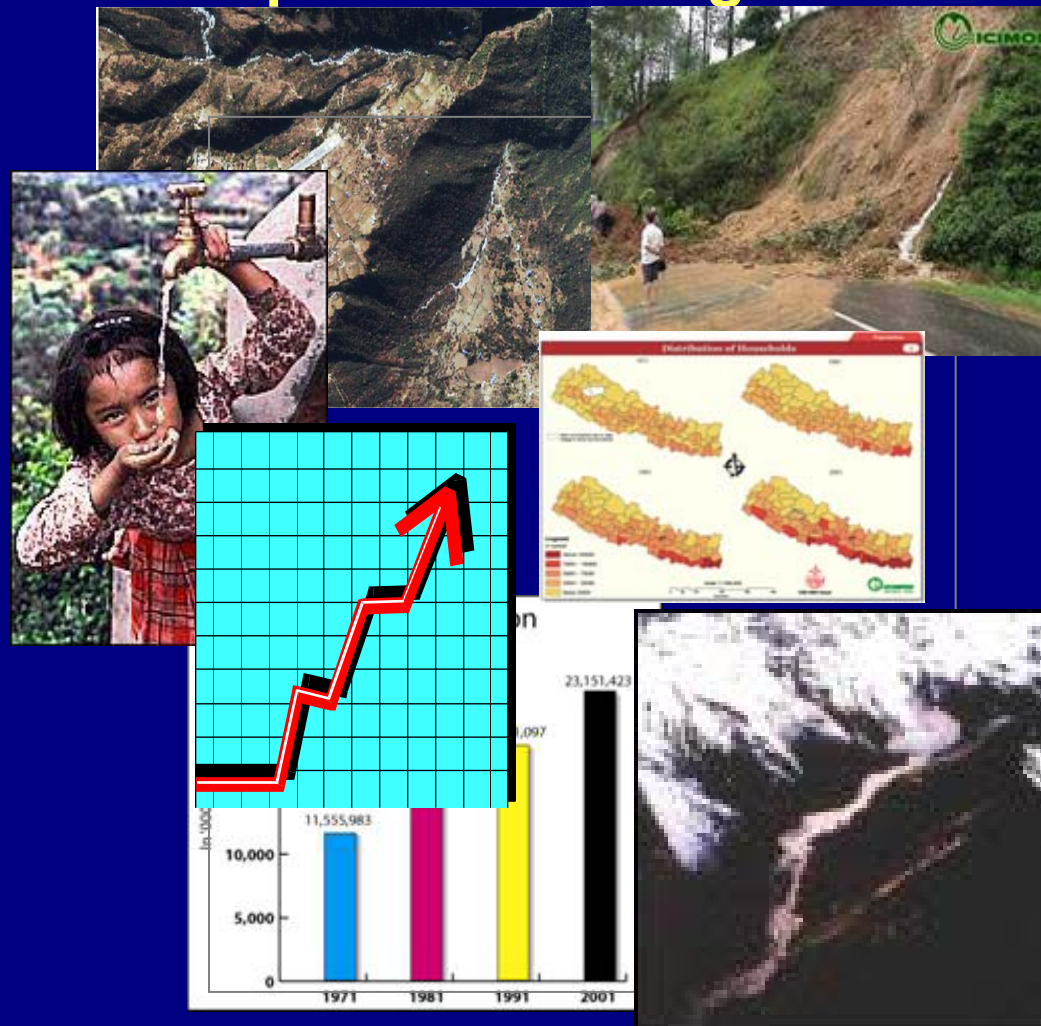
- Socio-economic Conditions
- Cultural Heritage
- Land Use
- Pollution...

Natural Processes: Self-Regulating

Human-led Processes: Unsustainable

## Sustainable Mountain Development Challenges

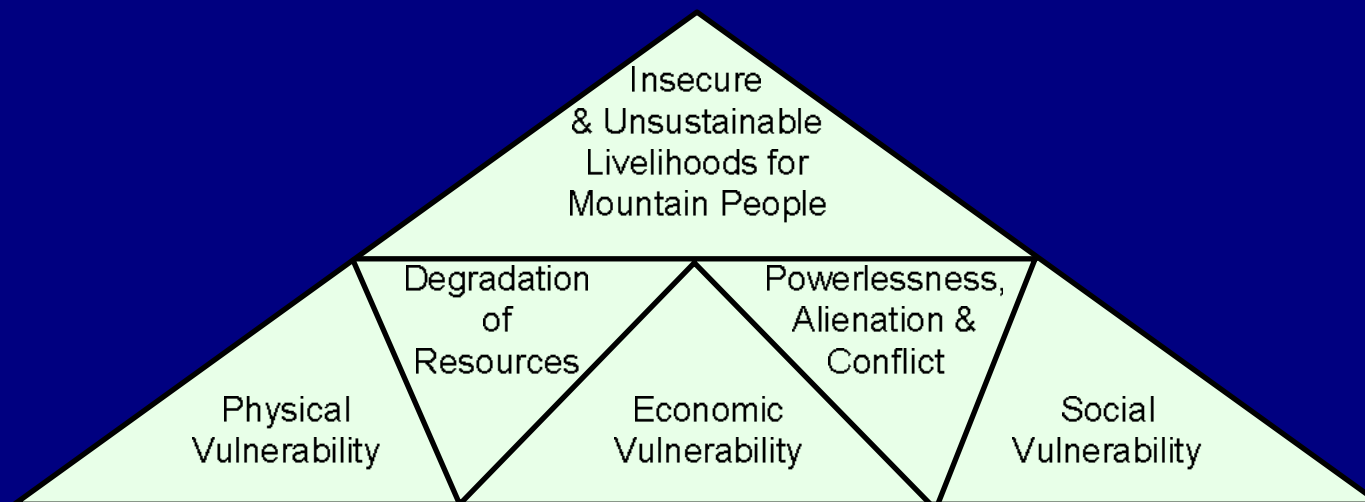
- Physical Vulnerability
- Social Vulnerability
- Economic Vulnerability
- Lack of mountain-friendly policy





## What is the context for ICIMOD's Programmes?

- Unique opportunities for solutions
  - Understanding the dynamics of poverty and the vulnerability triangle



# What is the context for ICIMOD's Programmes?

– Transforming vulnerabilities into securities





## Programmes at ICIMOD

- Natural Resource Management
- Agriculture and Rural Income Diversification
- Water, Hazards and Environmental Management
- Culture, Equity, Gender and Governance
- Policy and Partnership
- Information and Knowledge Management
  - Mountain Environment and Natural Resources Information System (MENRIS)

## Integrated Programme 1:

### Natural Resource Management (NRM)

- Watershed management
- Rangeland, pasture and livestock management
- Transboundary biodiversity management



*Cont'd ...*



## Integrated Programme 2:

### Agriculture and Rural Income Diversification (ARID)

- High Value Products and Sustainable Agriculture
- Rural Enterprises and Mountain Tourism
- Decentralised Renewable Energy Options



Cont'd ...

## Integrated Programme 3:

### Water, Hazards and Environmental Management (WHEM)

- Flood and Disaster Mitigation
- Glacier, Glacial Lakes,  
Glacial Lake Outburst Floods  
and Climate Change
- Highland-Lowland Economic  
and Environmental Linkages



*Cont'd ...*



## Integrated Programme 4:

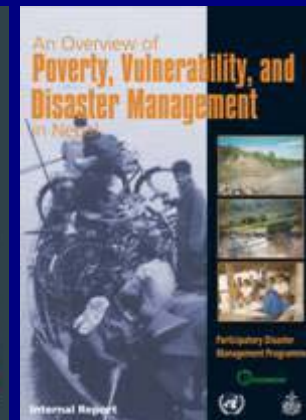
### Culture, Equity, Gender and Governance (CEGG)

- Gender, Mainstreaming
- Equity and Rights
- Community Institutions/  
Decentralisation, and Local  
Governance



## Integrated Programme 5: Policy and Partnership (PP)

- Policy Development
- Partnership Development





- **Integrated Programme 6:  
Information and  
Knowledge Management  
(IKM)**

- Information Management,  
Communications and  
Outreach

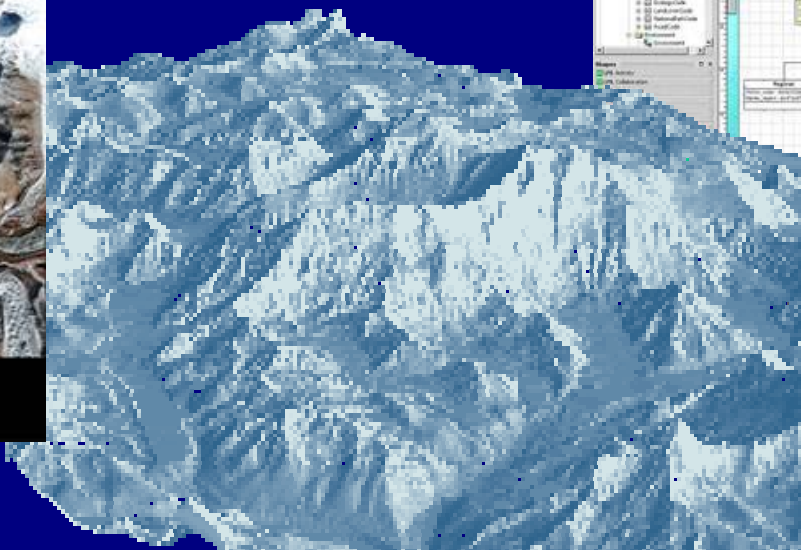
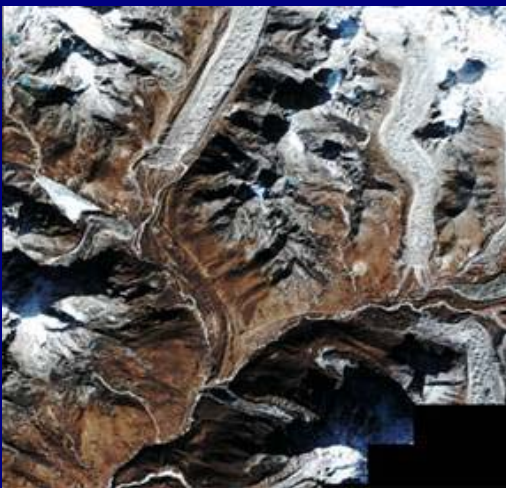
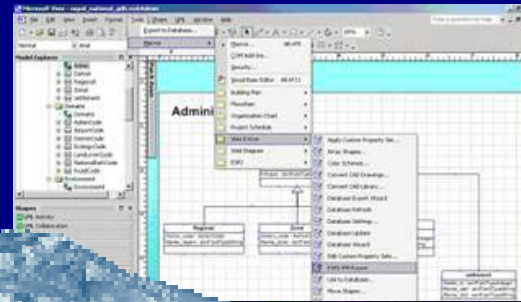
- Mountain Environmental  
and Natural Resources  
Information Systems

- Global Mountain Forum



## MENRIS Programme at ICIMOD

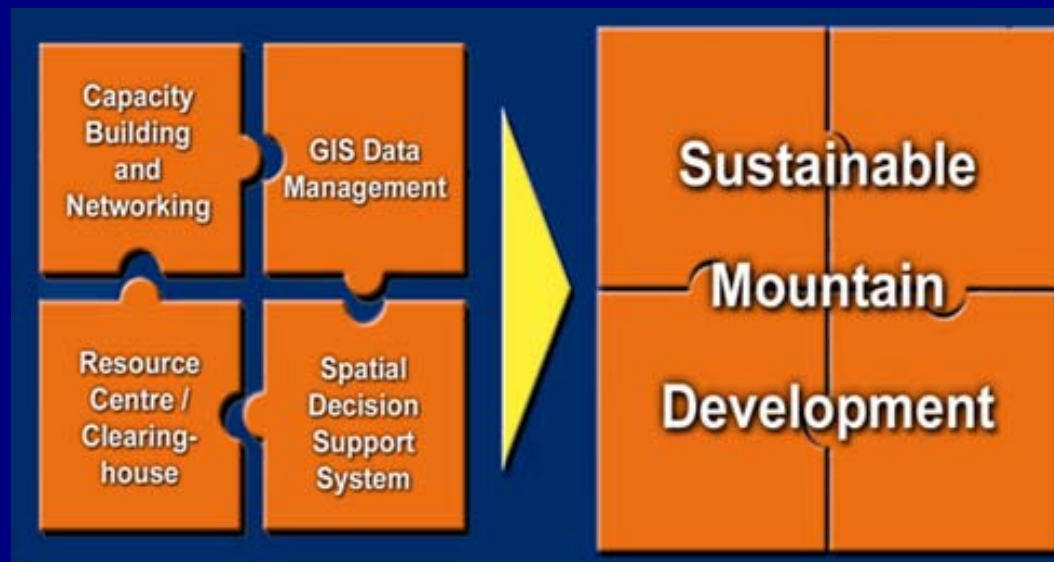
- To promote the use of Geospatial Science, technology and application for ICIMOD and its partners for mountain information and knowledge management;
- To provide analytical and decision support system tools and methods for sustainable mountain development; and
- To act as a regional mountain geo-information resource center in the Himalayan region.





## MENRIS Strategy

- Stress in scientific tools, methods and analysis
- Information for sustainable decision-making
- Decentralised network of “users” and “providers” of information

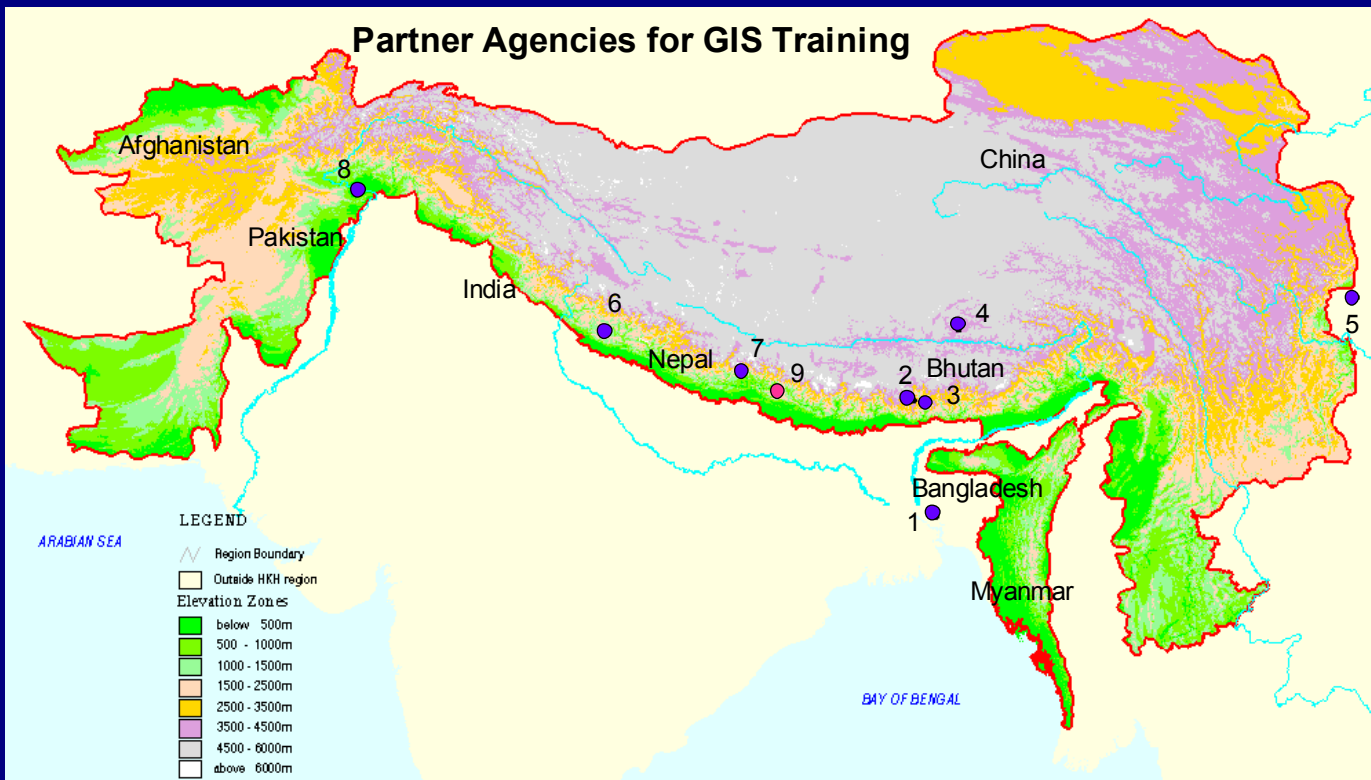


Strategic Alliances: UNEP, ESRI, ITC, CSSTE-AP, JAXA, ESA, UNOOSA, UNOSAT

Donors: UNEP, ADB, GTZ, ODA (DFID), UNITAR, The Government of Netherlands, NUFFIC, UNESCO, APN-Japan, IDRC, USAID, Italian Government and national partners,

## Capacity Building and Networking

- Regional and National Training Course
- Exchange of Scientists and Internship
- University GIS Network
- GIS E-learning System





# Capacity Building and Networking

- Training Courses on Thematic Applications

**ICIMOD GIS Training Modules**

### Geo-Informatics for Rangeland Resources Management

**Course Overview**  
This 2 weeks course is designed to provide a basic understanding of Geographic Information System (GIS) modules and use of satellite data for rangeland resources management. After completing this course, the participants will be able to use ArcView software to solve common rangeland resources problems. The skills and techniques presented in the course provide an effective and efficient means of carrying out rangeland resources management planning.

**Intended Participants**  
The course is designed for the those who want to learn how to use ArcView to analyze rangeland resources data. It is also recommended for college and university students interested in rangeland resources management.

**Goals**  
After completing this course, the participants will be able to:

- Understand the basic concepts of GIS and remote sensing technologies.
- Understand the various sources of data capturing methods in a GIS.
- Understand the concepts of rangeland management systems.
- Understand the concepts of spatial analysis and spatial modeling techniques.
- Use spatial analysis techniques for monitoring and assessment of rangeland resources.
- Use spatial analysis techniques for trend analysis and change detection of rangeland resources.
- Assess rangeland resources productivity.
- Identify zones areas for rangeland land assessment.
- Identify soil and vegetation distribution areas within rangeland.
- Analyze spatial relationships between wildlife and land use, and
- Use ArcView software to display and visualize development and planning.

**Duration**  
Two weeks

**ICIMOD**  
Mountain Development and Natural Resources Information Systems and International Centre for Integrated Mountain Development (ICIMOD)  
P.O. Box 528, Kathmandu, Nepal  
Tel: 977-1-4233761 Fax: 977-1-4233762  
E-mail: training@icimod.org

**ICIMOD GIS Training Modules**

### GIS for Conservation Management Planning

**Course Overview**  
This 2 weeks course is designed to provide a basic understanding of Geographic Information System (GIS), agricultural land use planning concepts and how they can be managed using GIS. After completing this course, the participants will be able to use ArcView GIS software to solve common conservation problems. The skills and techniques presented in the course provide an effective and efficient means of carrying out conservation management planning.

**Intended Participants**  
The course is designed for those who want to learn how to use ArcView GIS to analyze conservation data. It is also recommended for college and university students interested in conservation management.

**Goals**  
After completing this course, the participants will be able to:

- Understand the basic concepts of GIS and remote sensing technologies.
- Understand the various sources of data capturing methods in a GIS.
- Understand the concepts of habitat management systems.
- Understand the concepts of habitat analysis and spatial modeling techniques.
- Use spatial analysis techniques to analyze land use trends over time.
- Analyze spatial relationships between wildlife and land use, and
- Use ArcView software to display and visualize conservation management planning.

**Duration**  
Two weeks

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**ICIMOD GIS Training Modules**

### GIS for Agricultural Land Use Planning

**Course Overview**  
This 2 weeks course is designed to provide a basic understanding of Geographic Information System (GIS), agricultural land use planning concepts and how they can be managed using GIS. After completing this course, the participants will be able to use ArcView GIS software to solve common agricultural land use planning problems. The skills and techniques presented in the course provide an effective and efficient means of carrying out agricultural land use planning tasks.

**Intended Participants**  
The course is designed for the participants with agriculture background and land use planning. It is also recommended for college and university students interested in agriculture and land use planning.

**Goals**  
After completing this course, the participants will be able to:

- Understand the basic concepts of GIS and remote sensing technologies.
- Understand the various sources of data capturing methods in a GIS.
- Understand the concepts of agriculture management systems.
- Understand the concepts of spatial analysis and spatial modeling techniques.
- Understand the basics of agricultural land use planning concepts.
- Determine the underlying data sets for agricultural land use planning.
- Use spatial analysis techniques to determine a suitable site for high value crops and
- Use ArcView software to display and visualize agricultural land use planning tasks.

**Duration**  
Two weeks

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- Training Manuals and Materials

**Geo Informatics for Forest Data Management**

**Hands-on-Exercise**

Mountain Development and Natural Resources Information Systems (MNRIS) International Centre for Integrated Mountain Development (ICIMOD)

June 2004  
Kathmandu, Nepal

**Inventory of Glaciers and Glacial Lakes and Identification of Potential Glacial Lake Outburst Floods**

**Spatial Data Input and Attribute Data Handling of Rolwaling Valley, Nepal**

Prabhu Kumar Neupane  
Nepal's Forest Department

Mountain Development and Natural Resources Information Systems and International Centre for Integrated Mountain Development (ICIMOD)

**Tailor-Made Training on**

**Application of Geo-Informatics for Integrated Water Resources Management in the Hindu Kush-Himalayas**

7 June - 2 June 2004

**CD 1/2 COURSE MODULES**

**CD 2/2 Software & Reference materials**

Supported by UNEP, ICIMOD, and other partners.

## GIS in Academia

- University Level GIS, GIS for Schools

**Directing its capacity building activities towards universities and schools**



**GIS for Beginners**

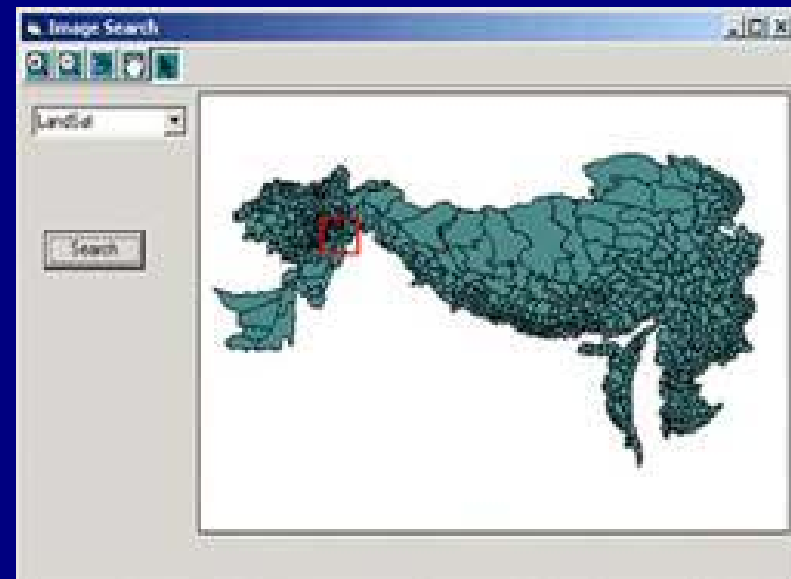


**Computer Based Training CD ROM**



## Mountain Databases, Tools and Methods

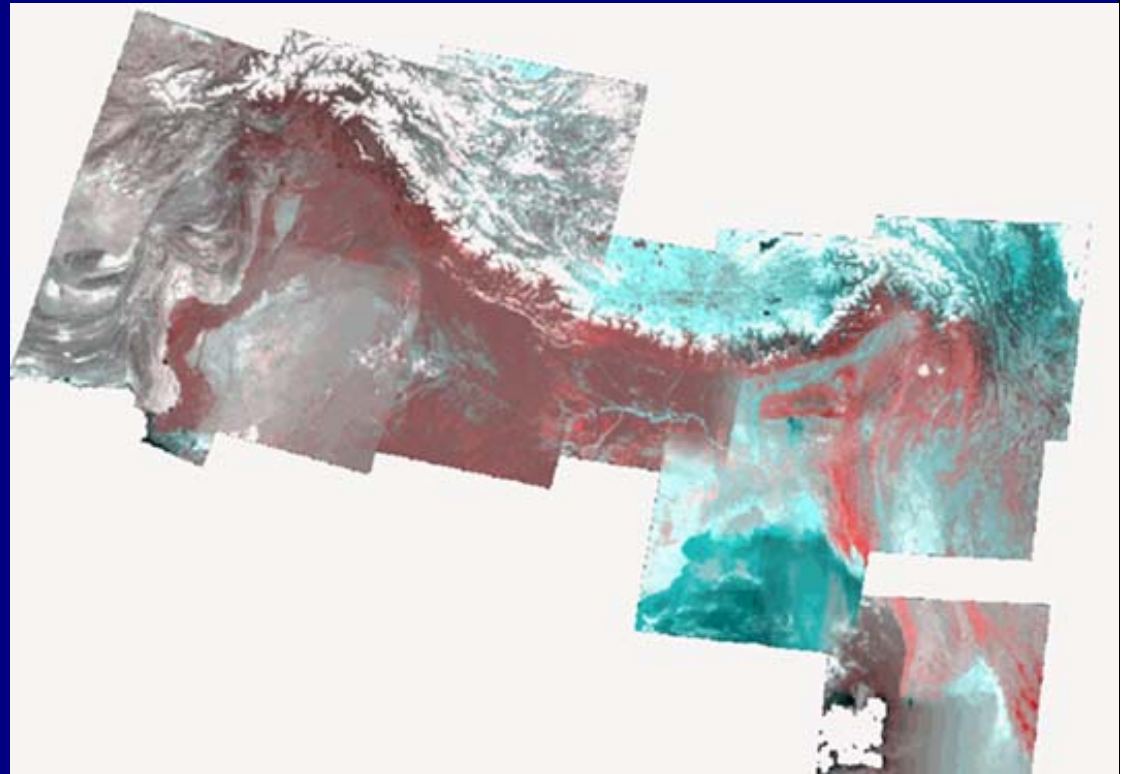
- Geo-database models
- Standardized Metadata System
- Image Catalogue System
- Map Catalogue



Spatial Search on Image Catalog database

## Thematic Application and Decision Support System

- Land cover Change
- Vegetation Monitoring
- Glaciers and Climate Change Impact
- Decision Support System for Protected Area Management
- Agriculture and Landuse Planning
- Urban/Municipal Planning
- Socio-economic Indicators Mapping
- Transboundary Biodiversity
- Air Pollution
- Participatory 3D Modeling



## **Mountain Geo-information Resource Centre**

### **Mountain GIS Portal**

- A step towards Regional and National Geographic Information Infrastructure (R/NGII) in the Hindu Kush-Himalayan (HKH) Region

### **Underlying Principles**

- Platform for sharing geographic resources for both “Users” and “Providers”
- Distributed Geographic Data Network and decentralized ownership
- Leverage GIS based Resources in the region through the Internet

**[www.icimod-gis.net](http://www.icimod-gis.net)**



## Mountain GIS Portal – Main contents

- GIS and Sustainable Mountain development Issues
- Data and Metadata Resources
- Image and Map Resources
- Applications Resources
- Training and Educational Resources
- Publications and Other Resources



## Conclusions

- Advancing Geospatial Science, Technology and Application for integrated mountain development
- Enhancing Capacity of Partners and Mountain Geo-Information Network in the HKH for sustainable development
- Strengthening Strategic alliances and Linking to global/regional geo-information network initiatives
- Platform for Mountain information and Knowledge resources and Sharing through a decentralised approach
- Apply state-of-the-art Geo-ICT tools and methods for the benefit of wider geospatial community
- An important step towards realizing the vision of a Regional Geographic Information Infrastructure (RGII) and National Geographic Information Infrastructure (NGII)





**Thank you for your attention**

**Namaste !!**