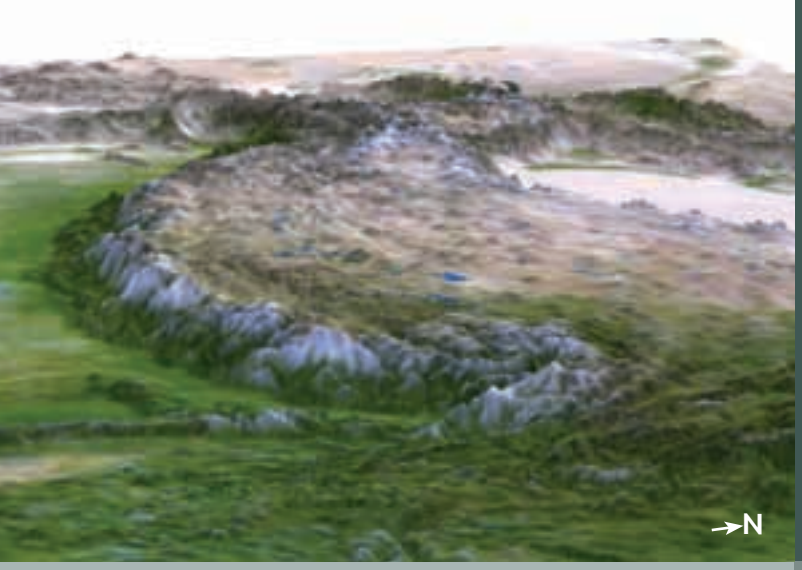


ICIMOD

FOR MOUNTAINS AND PEOPLE

Information series on geographical information and remote sensing systems in mountain environments

Geographical information and remote sensing systems play a special role in the Hindu Kush-Himalayan region in support for informed decision making. This series of information sheets presents information on basic technologies, approaches, and applications related to geographical information and remote sensing, and used or developed by ICIMOD, as a background for understanding for policy makers, development workers, and others.

Regional Geo-data Sharing Initiative in the Hindu Kush-Himalayan Region

GIS/RS #1

To be effective, policies, plans, and activities to support sustainable mountain development need to be based on knowledge derived from accurate and reliable data and information that captures the specific characteristics of the mountains in terms of place and time (i.e., including spatial and temporal dimensions). Geo-referenced data – data with specific information included that defines the geographical location – are particularly useful. But to use such data in multidisciplinary approaches they must be available in a form that allows different data to be compared and combined. There is a clear need for standardisation and harmonisation of spatial data in the Hindu Kush-Himalayan (HKH) region to enable systematic development of a regional database combining information from different sources and covering transboundary mountain areas. Increasingly, the countries of the region are also feeling the need to develop a common regional approach and standardisation that will enable data sharing. Open access to and sharing of geo-referenced data and information requires an interoperability that allows different systems to communicate with each other. To address these issues, ICIMOD has been promoting a 'regional geo-data sharing network initiative' with the aim of enabling a wide community of spatial information users in the region and beyond to have easy and timely access to spatial data and thematic maps that support informed decision making.

Mountain GeoNetwork for the HKH region

One of the major challenges facing the Hindu Kush-Himalayan region today is the limited availability of geo-information – data and information with a clear spatial reference – and of affordable tools and methods for using such information that are adapted to mountain specific situations. There is also a growing recognition of the need for quality databases, and ways of sharing them among stakeholders, to help improve scientific understanding. ICIMOD has been promoting regional geo-data sharing for many years and has now developed a distributed decentralised metadata management system as part of a regional geo-data sharing initiative to promote access, use, and sharing of geo-information resources in the region. The system is based on the GeoNetwork platform developed by the Food and Agriculture Organization (FAO) in an open source software environment. The GeoNetwork system facilitates systematic development of metadata that adhere to international standards and has been adopted by many United Nations organisations. ICIMOD's Mountain GeoNetwork system is being developed as a step towards standardisation and sharing of geo-information resources in the Hindu Kush-Himalayan region forming a virtual community of practice network. It is designed so that ownership of data is clearly defined, proprietary rights to databases are protected, and data policy issues are addressed and is integrated into the overall framework of the Mountain GeoPortal as a regional gateway to geo-information resources in the region.

What are metadata and how are they used in the Mountain GeoNetwork?

Metadata are 'data about data'. The metadata are a structured set of information about the content, purpose, quality, and location of the dataset. Potential users can find out what is available, in what form, and where, by browsing a catalogue of metadata, and users of a dataset can find information about how, when, and where the data was collected and validated by looking at the accompanying metadata. Access to metadata facilitates the process of data sharing.

The Mountain GeoNetwork allows users to search a metadata catalogue that describes numerous collections of spatial data in the Hindu Kush-Himalayan region. Currently, the catalogue provides more than 3,900 sets of metadata related to vector datasets, thematic maps, satellite images, papers, posters, CDs, and Google Earth Footprints (which allow direct visualisation of satellite images). The metadata catalogue is the key to finding different categories of spatial and non-spatial data

The purpose of the Mountain GeoNetwork is to create an open network environment platform for both users and providers of data and information. The metadata management system allows users to search local and shared information put into the system by partner organisations (nodes) of the Mountain GeoNetwork. An advanced search option helps users to narrow down the search and get more specific results. Authorised users can add, edit, or delete metadata online.

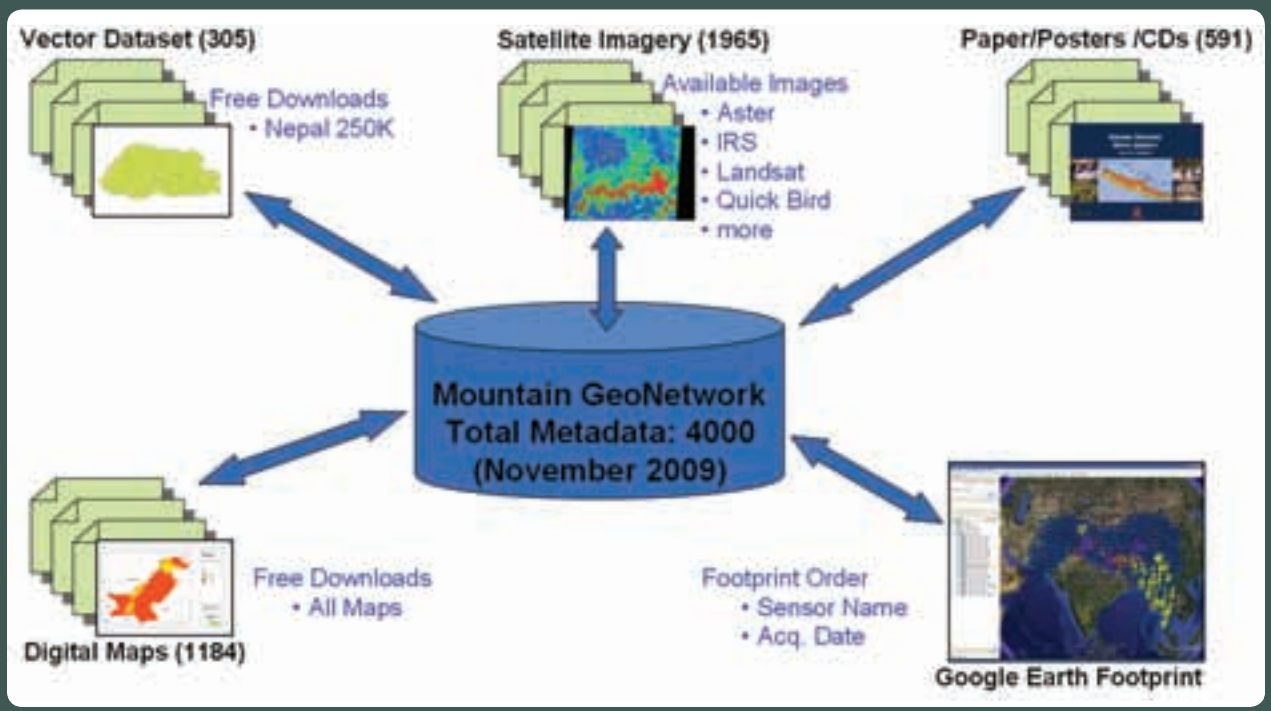
Key applications

The metadata management system contains two built-in applications that enable visualisation of the geo-information resources on the Internet: Map Viewer and Google Earth Footprint. The **Map Viewer** allows users to access interactive mapping applications from any OGC (Open Geospatial Consortium) standard mapping servers like GeoServer and University of Minnesota (UMN) Mapserver. These servers provide different types of services, for example a web mapping service to visualise various datasets, metadata catalogue services, and simple tools to query information like identify, zoom, and pan. **Google Earth Footprint** allows users to view information on available satellite images in the Google Earth environment. All the satellite images available in the Mountain GeoNetwork are visualised as an image footprint in a single window with information on acquisition year, metadata information, and access to the images themselves by sensor.

Regional Geo-Data Sharing Network

A network of nodes has been established in ICIMOD's regional member countries and beyond, that provide access to their metadata in a common standardised ISO 19115 format, the geospatial metadata standard of the International Organization for Standardization (ISO). The China Node – the Institute of Geographic Sciences and Natural Resources Research (IGSNNR) of the Chinese Academy of Science (CAS) – is a good example of how this works. It provides metadata in both Chinese and

Metadata resources available at ICIMOD



English, currently more than 300 in various categories. The collaboration was initiated under the overall framework of the Data Sharing Infrastructure of Earth System Science of IGSNRR-CAS and ICIMOD.

Capacity building

ICIMOD is focusing on building the national capacity of regional member countries to form a larger network of users and providers of geo-data in the region. A one week training curriculum and manual have been developed and used in courses in Afghanistan, Bhutan, Bangladesh, Nepal, and Pakistan. The main aim is to expand the Mountain GeoNetwork. Trainees learn to understand the concept of metadata and its application in the mountain context; become familiar with international metadata standards and interoperability through hands-on experience using the software tools and methods; learn about approaches to disseminate spatial datasets through web mapping techniques; and learn how to customise the GeoNetwork system in order to be able to establish a node.

Metadata for thematic areas

The system has been extended and customised for use in the two thematic areas of wetlands management and protected area management.

A metadata management system with web mapping features has been integrated into the Greater Himalayan Wetlands Information System (GHWIS), the basic information management system of the wetland inventory in the Himalayas. All the metadata information has been structured to adopt the Ramsar Convention standard which is the basis for information exchange on wetlands in the Himalayas. The metadata entry and querying interfaces provide the users with records describing individual inventory datasets, while the web mapping tool provides an interactive map display and querying capability to access a pre-processed spatial database including maps and satellite images.

The metadata management system has also been used for protected area management data under the HKKH Partnership Project. This 'knowledgebase system' is a part of the Decision Support Toolbox developed by the project to support effective decision making. More than 1500 metadata in different categories like bibliography, working papers, spatial data, satellite images and system dynamics models have been included in the collection.

Interactive map services

Indexing of satellite images with Google Earth

Metadata information from IGSNRR-CAS

Geo-data sharing in the greater Himalayan wetlands

The way ahead

Mountain GeoNetwork is a standardised and decentralised geo-data management environment, designed to enable access to geo-referenced databases, thematic maps, satellite images, and related metadata from a variety of sources, and to enhance sharing and exchange of spatial information among organisations and users, using the capacities of the Internet. The concept of developing a spatial data infrastructure (SDI) at the national, regional, and global levels to promote the use of geospatial science and technology for effective decision making is gaining prominence. The Mountain GeoNetwork adheres to the international standard for spatial data infrastructure. ICIMOD would like to encourage national partners to join the regional geo-data sharing network and contribute to the increased access and use of geo-data and information for planning and decision making, and attaining the goal of a spatial data infrastructure for the Hindu Kush-Himalayan region.

ICIMOD is looking forward to expanding its institutional nodes in the region and will provide needed technical support to establish the GeoNetwork system

References and additional resources

ESRI (2002) *Metadata and GIS*, An ESRI White Paper. Redlands (USA): ESRI

ICIMOD (2009) *A Manual for an Inventory of Greater Himalayan Wetlands*. Kathmandu: ICIMOD

Moellering, H; and others (2005) *World Spatial Metadata Standards*. Oxford: Elsevier

NISO (2004) *Understanding Metadata*. Bethesda (MD): National Information Standards Organization Press

Rhind, D (ed) (1997) *Framework for the World*. Cambridge: Geo-Information International

Knowledge base in HKKH partnership portal

Websites

Data sharing infrastructure of earth system science of IGSNNR-CAS and ICIMOD	http://www.geodata.cn/Portal/index.jsp
GeoNetwork	http://geonetwork-opensource.org/
GeoServer	http://geoserver.org/
Greater Himala yan Wetlands Information System	http://ghwis.icimod.org:8081/wetlandsnew2/
HKKH Partnership	http://hkkhpartnership.org
IGSNRR-CAS metadata	http://159.226.111.8:8080/geonetwork
ISO website	http://www.iso.org/
Fed. Geog. Data Comm.	http://www.fgdc.gov/metadata/
Mountain GeoPortal	http://geoportal.icimod.org

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Current geo-data sharing network

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Front image: Digital elevation model of the Hindu Kush-Himalayan range rising between the Tibetan Plateau and the Gangetic Plains. Source: Atlas of the Himalaya, ICIMOD, 2005

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