MENRIS CASE STUDY SERIES

No. 2

Applications of GIS to Rural Development Planning in NEPAL

Mountain Environment and Natural Resources' Information System (MENRIS)

INTERNATIONAL CENTRE FOR INTEGRATED MOUNTAIN DEVELOPMENT (ICIMOD)

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FOREWORD

The starting point for sustaining life is the land and its resources. As has been observed in the recent past, the supply of these natural resources is decreasing in absolute terms both in quality and quantity. These natural resource concerns are widespread throughout the mountain region and are often referred to as 'environmental problems'. Relevant and precise information is the key to managing the land and its resources wisely. In the past our resources were managed quite simply in relation to the availability of other resources. Information needs were correspondingly simple and separate. But our population increases and the demand for a diversity of resources grows. Our understanding of the intricacies of ecosystems evolves. In this complex environment, especially in the mountain areas, we must have the means to collect, store, and use the information that will support quality decisions.

Information technologies employed thus far have a critical deficiency - the inability to spatially reference and manage resource data. The deficiency is a serious impediment to managing resources on an ecosystemic level. Powerful tools are now available to overcome that deficiency - a computerised Geographic Information System (GIS). The strength of GIS is its ability to integrate data from a variety of resource disciplines, using a common geographical frame of reference. The advancement of hardware/software technologies (as well as the relative reductions in cost) has brought GIS within our reach. GIS applications will support complex, spatial decision-making. We expect better decisions to arise from these capabilities. GIS can place this capability at the fingertips of decision-makers at every level of an organisation - from field-workers to policy-makers.

Realising the need for harmonised biophysical and socioeconomic information for assessing the development of the Hindu Kush-Himalayan Region, the International Centre for Integrated Mountain Development (ICIMOD) initiated discussions with and subsequently signed a Memorandum of Understanding (MOU) with UNEP in 1989 with the approval of its Board of Governors. ICIMOD established the Mountain Environment and Natural Resources' Information System (MENRIS) with funding from the Asian Development Bank and technical assistance from UNEP. After the successful establishment of the MENRIS Programme, ICIMOD embarked on its implementation phase of dissemination in early 1990. Dissemination activities include human resources development, through training, and institution building by carrying out collaborative GIS case studies with appropriate hardware/software. The Programme has been fully implemented in Nepal. Implementation activities have started in Bangladesh, China, India, Myanmar, and Pakistan. Formal arrangements are being made to include Afghanistan and Bhutan.

ICIMOD has received funds and technical support from many agencies and individuals. The Asian Development Bank has provided two Technical Assistance Grants and is the founding sponsor of the Programme. UNEP-GRID and UNITAR have provided both direct funds and technical support for the Programme. The German Technical Agency (GTZ) has provided additional funds to disseminate GIS and Remote Sensing knowledge in three additional ICIMOD Participating Countries (IPCs). Other agencies that have provided complementary support include SEADD/ODA, UNDP, DANIDA, CDG, and the USAID.

The notion of capacity building and institutional strengthening in the IPCs, which has been cultivated by MENRIS since its commencement, is being generously nourished by UNEP, the principal body within the United Nations' System in the field of environment on a global basis. UNCED, through its Agenda 21, had enjoined UNEP to assume greater responsibility in world decision-making and action. Accordingly, UNEP has established the Regional Environment and Natural Resources' Information Centre (RENRIC) to help bridge the data gap and improve the availability of information, by working in partnership with sub-regional institutions already operating in the region in order to establish a network on environment and natural resource information. RENRIC's major task is to assist in building up and strengthening the capacities of national environment ministries in the formulation of environmental policies based on an integrated and multisectoral analysis of biophysical and socioeconomic data. It is envisaged that a decentralised network of key sub-national agencies/institutions, individually involved in the collection and maintenance of these data, will be established at the national level for better coordinated acquisition of information and for dissemination. The affiliation between MENRIS and the RENRIC, based on common endeavours, is envisioned to bring about long-lasting accomplishments in the field of GIS and remote sensing technology dissemination in the HKH Region.

Prior to this second case study series, the first one was published in 1992. The first case study series illustrated basic concepts and the use of GIS, through case examples, to demonstrate how data integration enables decision-makers, project design officers, and development practitioners to improve the management of natural resources. This publication is also aimed at these professionals (with or without GIS orientation). The illustrations present both basic and advanced usage of GIS and Remote Sensing applications in natural resource management. Each case study has been undertaken by staff members, in cooperation with the collaborating agencies' professionals: Assessment of Livestock Carrying Capacity and Development Strategy (Kabhre Palanchowk District) - Hubert Trapp (M. Kayastha, P. Kharel, and H.J. Dahl - PLBP/HMG-Nepal); Spatial Analysis of a Rural Service Delivery System (Lalitpur District) - Pramod Pradhan (Puskar Pradhan and Paul Lundberg - SDP/UNDP); Comparative Assessment of Water Transfer Modes in Hilly Terrain (Bagmati Zone) - Eric Bournay and Pramod Pradhan (K.M. Amatya and Dr. Peter Hoppe, Department of Mines and Geology); and Settlement Mapping in the Hills Using the Global Positioning System (Dhankuta District) - Basanta Shrestha (Keith J. Virgo, WS Atkins International Ltd., and Ramesh Shrestha, Metcon Consultants). Other staff members in the team who have assisted with the case studies include Pradyumna Kotta, Ma Sein Mya, Govinda Joshi, Anirudra Shrestha, Umesh Pradhan, Susan Ranger, Mona Thapa, Philippe Rivas, and Sabina Pradhan. Technical and methodological details will be published in separate project reports. As GIS is a new strategy for resource managers, we welcome information relating to the ways in which users have been able to solve problems or to increase their effectiveness in planning natural resource management through GIS.

Pramod Pradhan
Coordinator
MENRIS/ICIMOD

Dr. E.F. Tacke
Director General
ICIMOD

		Page
1.	Assessment of the Livestock Carrying Capacity and Development Strategy (Kabhre [*] Palanchowk District) <i>Hubert Trapp</i>	1
2.	Spatial Analysis of a Rural Service Delivery System (Lalitpur District) <i>Pramod Pradhan and Pushkar Pradhan</i>	19
3.	A Comparative Assessment of Water Transfer Modes in Hilly Terrain (Bagmati Zone) <i>Eric Bournay and Pramod Pradhan</i>	47
4.	Settlement Mapping in the Hills Using the Global Positioning System (Dhankuta District) <i>Basanta Shrestha and Keith J. Virgo</i>	69

* Please note **bh** and **v** are interchangeable transliterations of a Devanagiri letter. In some places (notably among the bibliographies) **v** is used.

ABBREVIATIONS and ACRONYMS

ARC/INFO	ARC/INFO (GIS software from the Environment Systems' Research Institute, Redlands, USA)
CDG	Carl Duisberg Gesellschaft e.V.
CDRPO	Central Development Regional Planning Office
DANIDA	Danish International Development Agency
DEM	Digital Elevation Model
DM	Dry Matter
GIS	Geographic Information Systems
GPS	Global Positioning System
GTZ	Deutsche Gesellschaft fuer Technische Zusammenarbeit (GTZ) GmbH (German Technical Agency)
HDOP	Horizontal Dilution of Precision
HKH	The Hindu Kush-Himalayas
HMG	His Majesty's Government (of Nepal)
IBRD	International Bank of Reconstruction and Development
IBM	International Business Machines, USA
ICIMOD	International Centre for Integrated Mountain Development
KHDP	Koshi Hills Development Programme
LRMP	Land Resource Mapping Project
LU	Livestock Unit
MENRIS	Mountain Environment and Natural Resources' Information System
NPC	National Planning Commission
ODA	Overseas Development Administration
PC	Personal Computers
PDOP	Positional Dilution of Precision
PLBP	Promotion of Livestock Breeding Project
RISC/6000	IBM RISC/6000 work stations
SDP	Strengthening Decentralised Planning
SEADD	South East Asia Development Division
SPSS	Statistical Package for Social Sciences
TDOP	Time Dilution of Precision
UNCED	The United Nations' Conference on Environment and Development
UNDP	United Nations' Development Programme
UNEP-GRID	United Nations' Environmental Programme - Global Resource Information Database
UNITAR	United Nations' Institute for Training and Research
USAID	United States' Agency for International Development
UTM	Universal Transverse Mercator Projection System
VDC	Village Development Committee
VDOP	Vertical Dilution of Precision
WHO	World Health Organisation