SUSTAINABLE LIVELIHOODS OF MOUNTAIN HOUSEHOLDS

The focus in this programme is on poverty reduction in mountain households by introducing appropriate technologies for sustainable farming systems, marketing farm products, promoting opportunities for income generation and enterprise development, and integrating environmental and socioeconomic concerns of mountain households in a sustainable manner.

Himalayan farmers & honeybees

Apis cerana selection

More than 256 bee colonies in 14 apiaries in Nepal, India, Pakistan and China are maintained by the ICIMOD beekeeping project. The project staff are collecting selection data from three different sites in Nepal: Jumla, Dadeldhura and Kaski.

Dr. YS Parmar University of Himachal Pradesh, India, helped the project run an international course on *Apis cerana* management in Kulu for Bhutanese and Nepalese participants.

Beewax used for candles & cosmetics

ICIMOD's Beekeeping Programme in Jumla

The project raised awareness about the importance of conserving indigenous honeybees and biodiversity among beekeepers, farmers' organisations, Government Organisations (GOs), and Non Government Organisations (NGOs).

- Two farmer-led NGOs and 67 beekeepers' groups were formed through project facilitation and support - these groups and organisations are now involved in beekeeping research and development.
- A functional beeswax collection and processing centre in Jumla bazaar managed by 45, an organisation linked to beekeepers' groups, was promoted.
- A number of women farmers have been trained in beekeeping and are participating in various training programmes, meetings, and community development activities.
- One hundred and forty-three local farmers-trainers were trained in beekeeping management and conservation and are playing a very important role in capacity building of local beekeepers.
- The Project facilitated provision of various types of appropriate technologies with full participation of real beneficiaries. One of the successful appropriate technologies considered was the Jumla Top Bar Hive. Farmers were trained in the skills needed for sustainable beekeeping management.
- Awareness was raised about the importance of pollination through beekeeping.
- Farmers are trained on honey harvesting and processing, and producing value-added products like creams and candles. Production of processed and good quality honey is increasing, as is the demand for pure organic honey.
- Farmers have access to information related to beekeeping and there are organisations working together for better linkages.
- There are three selection and multiplication apiaries; farmers are managing the selection and multiplication programme.

Mass queen rearing

Pollination

Indigenous honeybees

Mass queen rearing

The technique of artificial queen rearing has been perfected for *Apis cerana* with the technical assistance of the Honey Bee Research Institute (HBRI), Pakistan Project. Partners from Jumla, Dadeldhura and Kaski were trained in *Apis cerana* management, selection and queen rearing. During the past year project information about and techniques of queen rearing were provided to grass root beekeepers (See Box text).

Net working of beekeepers and institutions

Apiculturists' Network (APINET) Nepal - a network of apiculturists, beekeepers and beekeeping institutions was established. It will provide a platform for sharing information and discussing issues related to beekeeping in Nepal (See Cameo).

Pollination

Studies on pollination issues of apple, citrus and buckwheat crops faced by farmers in India, China, Nepal, Bhutan and Pakistan were carried out. The project focused on raising the awareness of planners, policy-makers, and donors about managed crop pollination. Field demonstrations training and awareness camps were organised.

Indigenous honeybees

A detailed study of *Apis laboriosa* (Himalayas cliff bee), honey hunting communities and associated florae revealed interesting aspects of an indigenous system that could well disappear.

Beekeeping Network in Nepal

A larger forum networking meeting held on 26 & 27 September 2001 agreed unanimously to create an ApiNet - Nepal where 33 individuals and 9 organisations decided to be founder members. An eleven member ad hoc committee was formed that will take a lead in registering this organisation with the appropriate government offices of Nepal. The vision of ApiNet - Nepal is 'Conservation and Development of Sustainable Apiculture in Nepal through active participation of member organisations and individuals'. This new initiative facilitated by ICIMOD's indigenous honeybee project will surely help to bring stakeholders together to share experiences and information.

Participation in symposiums and international conferences

Dr. Farooq Ahmad attended the 37th International Federation of Beekeepers' Associations (APIMONDIA) Congress in South Africa. He spoke on the topic of indigenous honeybees and honey hunting communities.

The international biodiversity observation year (IBOY) took place in 2001 and the project tried to include awareness about biodiversity in its project activities. The Project Coordinator, Dr.Farooq Ahmad, participated in a symposium organised for core project leaders from around the world.

Livestock in mixed mountain farming systems of the Hindu Kush-Himalayas

In mid-2000 studies were carried out into smallholder dairying in the mixed farming systems of Nepal, Uttaranchal and Himachal Pradesh, and into smallholder dairy farming in Bhutan. A stakeholder's meeting was held in April 2001 to share the study findings, discuss information gaps, and study methodologies. Policy implications and advocacy issues were identified for each country. A common research agenda was identified with the major issues being to:

- promote the sustainable use of common property resources for improved livestock production;
- investigate prospects for the commercialisation of indigenous dairy products;
- characterise and identify the most suitable dairy breeds and species; and
- assess the impact of national dairy policies on smallholder dairy development in Nepal and Bhutan.

The findings of these studies will be published and the original study reports made available on CD-Rom.

Children helping with the farm work, Langtang, Nepal

ICIMOD's joint partnership with FAO and ILRI

ICIMOD, International Livestock Research Institute (ILRI), Food and Agriculture Organization (FAO), and the International Potato Centre (CIP) together held an international symposium on 'Livestock in Mountain/Highland Production Systems' in Pokhara, Nepal to address the critical issues facing research and the development of livestock in mixed farming systems in the mountain and highlands of Africa, the Andes and the Hindu Kush-Himalayas. This symposium brought together representatives

Smallholder dairy in Bhutan

Buffalo raised in Pokhara

A farmer feeding improved cows, Bhutan

from international research, development and donor institutions and also helped prepare for the 2002 United Nations International Year of the Mountains. In the 'Pokhara Call for Action' participants agreed to:

- prepare a global research and development agenda to improve livelihoods in livestock-dependent mountain and highland communities;
- prepare a livestock agenda for the International Year of the Mountains;
- encourage collaboration across the different mountain and highland eco-regions;
- encourage governments and donor agencies to give a higher priority to gender-balanced participation, empowerment and property rights of livestock-dependent mountain and highland populations; and
- encourage research and development organisations to undertake activities to improve livelihoods in livestock-dependent communities in mountain and highland eco-regions.

Further areas for research

The rapid transformations taking place in the HKH region have led to many new issues that need investigation including: conservation of genetic diversity of domestic livestock breeds; the economic profitability of livestock enterprises; gender balance in livestock-related work and the sharing of benefits; the sustainable use of common property resources – especially grazing lands; and the identification of appropriate feed resources, especially during winter.

Three-day Stakeholders' Meeting on Systems of Local Livestock Resource Planning

ICIMOD and FAO Rome jointly organised a three-day stakeholders' meeting on Systems of Local Livestock Resource Planning from October 11 to 13, 2001, in Kavre District, Nepal. The meeting provided an opportunity for different stakeholders from Bhutan, India, Nepal and Pakistan to share their study results, work experiences, limitations and gaps in the past and present systems of local livestock resource planning with due emphasis on linkages such as Natural Resource Management (NRM). The participants represented diverse groups of professionals: field-level livestock officers and directors at the centre, experts from I/NGOs working with local communities at the grass roots' level and local farmers, village leaders and the district chairman (elected by the people). At the end, the meeting produced a framework for community participation & empowerment in local livestock resource planning in the HKH region. After a fruitful 3-day meeting, Dr. Eklabya Sharma, Dr. Pradeep Tulachan and Juhani Maki-Hokkonen (FAO) agreed on a follow-up activity to further strengthen the collaboration between ICIMOD and FAO. It is to be noted that FAO-Rome has been providing both intellectual and financial support for addressing the critical issues of livestock as an integral component of mixed mountain farming systems under the ICIMOD programme. To this end, Dr. Tulachan visited FAO Rome in January 2002 to develop a follow-up proposal for field-testing and verification of the framework/ methodology in consultation with FAO experts.

Methodologies for assessing mountain agricultural systems in the Hindu-Kush Himalayan Region: an ecoregional framework

Framework for assessing mountain agricultural systems in the HKH region

A comprehensive, systematically stored and programmed interactive software, containing a set of methodologies and tools for assessing mountain agricultural systems is being developed. Included in this is the Mountain Agricultural System Information Files (MASIF) relational database and the user-friendly environment - the Land Use Analyst (LUA) – software. The MASIF enables access, storing, handling and integration of both spatial and socioeconomic data. The LUA is a functional digital platform integrating methodologies for retrieving, analysing and displaying both spatial and non-spatial information about agricultural systems. The LUA works with the MASIF database and forms a user interface through which planners and developers can interactively identify and evaluate mountain agricultural resources to support planning. The methodologies software are being tested and refined in three pilot areas. Once tested and validated, they will be made available for use in other mountain areas.

Comprehensive database development

The MASIF database is being developed for the whole of the HKH region: it has census data for one year for more than 450 districts/counties across the HKH region on crops, livestock and human population.

Coordinates and basic meteorological data for more than 280 meteorological stations, a digital elevation model, hydrology (rivers and basins) data, over 105,000 geo-codes and 16km and 1km resolution Normalised Differentiation Vegetation Index (NDVI) images are provided for the entire region.

A 1:50K scale digital Soil and Terrain (SOTER) database for Nepal has been developed.

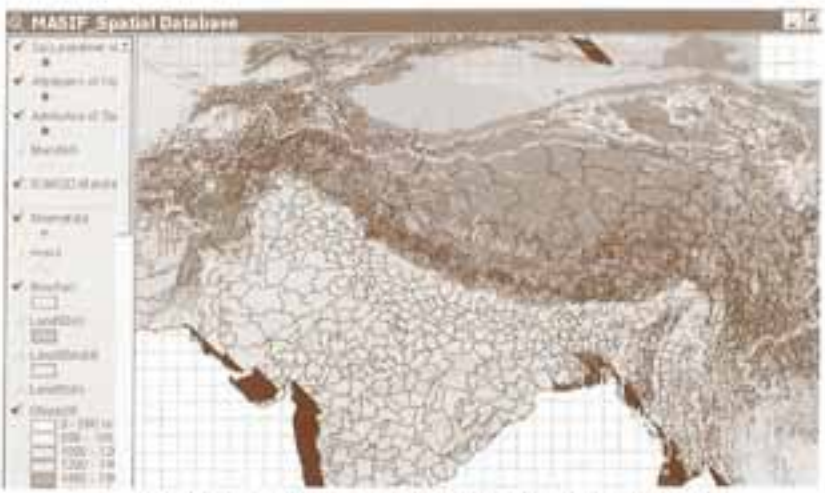

Fig. 1: MASIF digital maps and geo-referencing framework in GIS

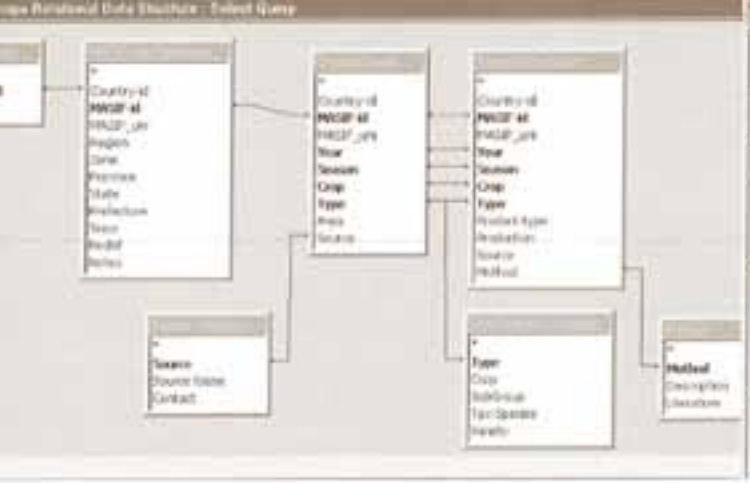

Fig. 2: MASIF relational agricultural time series database

Fig. 3: MASIF Land Use Analyst Version 1.0 main menu

Attribute data are systematically stored in Microsoft Access relational database format and all spatial data are in ArcView format with the same projection (Fig 1 & 2).

How we do it: user-friendly software development

LUA Version 1.0 was developed using ArcView software and Object Data base Connectivity (ODBC) access linkage. It identifies agricultural resources, evaluates them, characterises agricultural systems and supports agricultural planning. Under each main menu, several submenus are created by combining different modules of methodologies. These modules are based on integrating and programming theoretical and practical procedures of biophysical and socioeconomic analyses. (Figs 3 & 4)

Fig. 4: An example of MASIF Land Use Analyst version 1.0 submenu: Agro-meteorology

Remote sensing imagery process and intensive ground-truthing and field work

Weekly Advance Very High Resolution Radio Meter (AVHRR) imagery of 16 km resolution over a period of 15 years and 1 km resolution over 5 years are analysed for agro-meteorological analysis.

Changing NDVI trends over a 15-year period for Lhasa, greening pattern for one year, and monthly equivalent brightness temperatures of NDVI and crop growing periods for the whole HKH region are being analysed. (Figs 5 & 6)

Integrated analyses of temperature and rainfall data at nearly 300 meteorological stations were compared with National Oceanic & Atmospheric Administration - Advance Very High Resolution Radio Meter (NOAA - AVHRR) imagery and a digital elevation model.

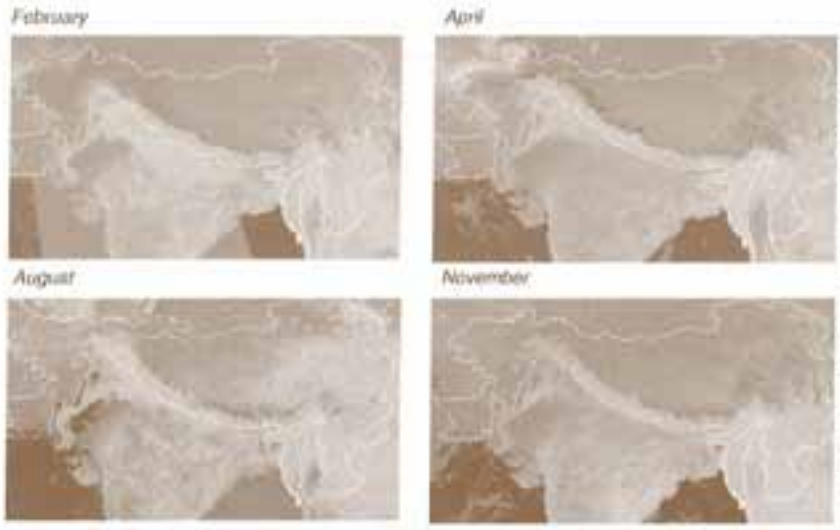

Fig.5: Variable greening patterns of the HKH at four distinct times of the year

Intensive field work and ground-truthing are important for the project. So far, over 150 Global Positioning System (GPS) points have been surveyed in Tibet, China; Himachal Pradesh, India; and for two districts in Nepal. The field information with GPS points is being used for land-cover/land-use mapping of the pilot areas based on high spatial and spectral resolution Indian Remote Sensing Satellite - Linear Imaging Space - Self-scanning Sensor (IRS-LISS III) imager (Fig. 7).

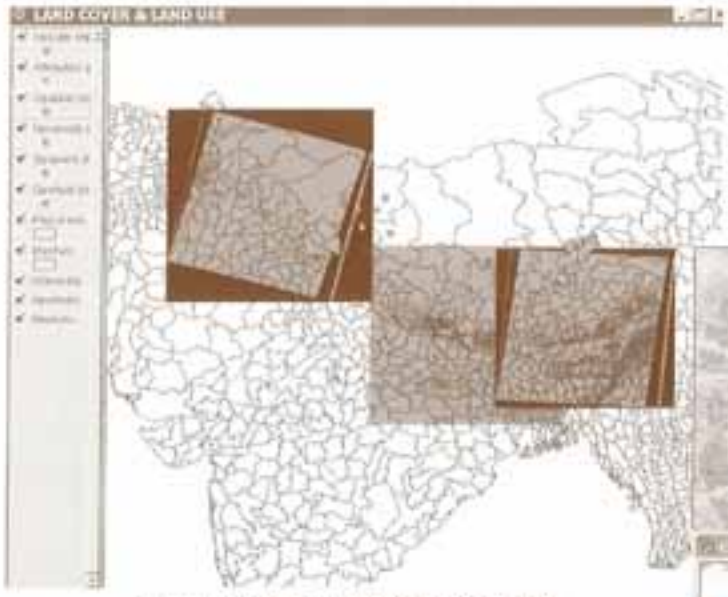
Fig. 6: Pilot areas and GPS ground-truthing

Partnership and testing methodologies in pilot areas

MASIF Land Use Analyst Version 1.0, is being tested with real examples in the pilot areas for characterising agricultural systems and for land use planning.

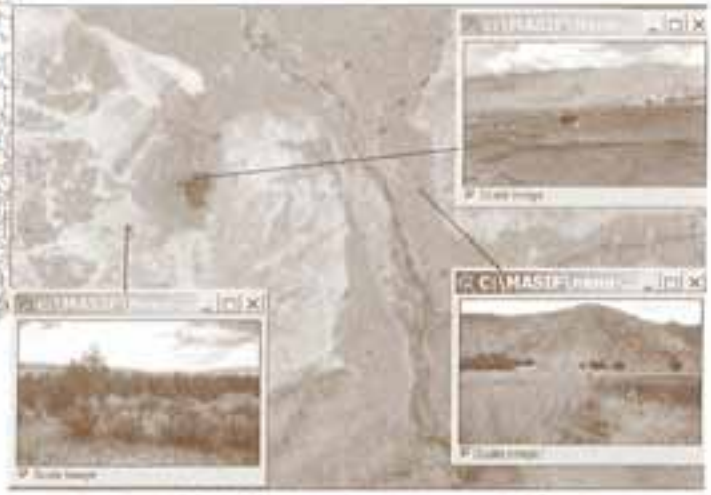
Fig. 7: IRS-LYSS III imaging process and GPS points collection and field work

Globalisation-led risks and opportunities-changing stakeholder perceptions

Two unique and unexpected results came out of an exploratory research project supported by the MacArthur Foundation on repercussions of globalisation for fragile mountains and their communities. Frequent and prolonged interaction with different stakeholders (e.g. policy people, NGOs, communities, researchers and media groups) and sharing of inter-country experiences led to concurrent generation and use of the findings in a policy-programme context by agencies dealing with World Trade Organisation (WTO) and other globalisation issues, and a visible change in the stakeholders' perspectives took place. The former is reflected by the use of even tentative findings, understanding and inter-country comparative experiences on the topic by groups both directly or indirectly associated with negotiations with WTO committees.The second result is shown by the fact that two years' previously stakeholders perceived globalisation only as a source of risk for fragile mountains. Over time their views moved towards the positive repercussions of globalisation. Accordingly stakeholders began to perceive globalisation as a source of potential opportunities (besides risks). They, however, emphasised the need to evolve adaptation strategies to harness opportunities and minimise risks.

'Stakeholder Conversations'

- "Sharing and enhancing of understanding of potential consequences of globalisation for mountain communities is appropriate, useful and very timely when the country is preparing to join WTO" - (a statement of the team from China collaborating in the project work).
- Globalisation is not a source of gloom and doom, but a creator of potential opportunities besides risks - (posting by a senior mountain specialist, endorsed by most of the participants in the E-Conference on Globalisation and Fragile Mountains).
- "The synthesis of multi-country evidence on emerging issues due to globalisation and approaches to address them in a mountain context has strengthened our agenda as well as advocacy role in the global discourse on the subject." (statement of an NGO representative in a South-Asian NGO Meeting in Kathmandu)

Forests are sources of fuelwood and fodder, Nepal

Promoting sustainable energy use

Impacts and highlights

Outputs of ICIMOD's work to promote sustainable energy use have been mainly focused on raising levels of awareness: the publication and dissemination of documents; seminars, workshops, training events, and regional consultations; production of audio visual aids; and equipment support to partner institutions.

National workshop on wind energy

A two-day 'National Workshop on Wind Energy' was organised by the Ministry of Science and Technology, ICIMOD, and Intermediate Technology Development Group (ITDG) Nepal on the 7th and 8th of March 2001 with the twin objectives of sharing the Sri Lankan experience of 200-watt, small windmills developed by ITDG and developing a national course of action for the development of wind energy in Nepal.

A 6-member task force (including the Renewable Energy Specialist, ICMOD) was formed to set priorities and bring into effect the recommendations prepared by the participants. The task force made the following recommendations.

- Publish proceedings of the workshop
- Select sites and run pilot projects on small-scale wind energy plus wind pumping
- Conduct wind mapping in most potential areas
- Prepare guidelines for private sector participation in wind energy development
- Develop a methodology for data generation and analysis
- Document Nepalese experiences and experiences of Bihar/Gujarat in India on wind pumping and of Mongolia on wind energy through field visits by a team
- Conduct a National Workshop on Wind Energy in 2002 to discuss the experiences from 2001 and make further plans
- Form a Coordination Committee under the Ministry of Science and Technology to facilitate coordination and follow up on planned activities

National dissemination seminar of the 'Asian regional research programme on energy, environment and climate

The 'National Dissemination Seminar of the Asian Regional Research Programme on Energy, Environment and Climate' jointly organised by the Asian Institute of Technology (AIT) and ICIMOD was held on 9 February 2001. Representatives from AIT, Dr. Ram M. Shrestha, Dr. Rabin Shrestha, and Professor S. C. Bhattacharya, and from the Swedish International Development Agency (SIDA), held technical sessions on 'Assessment of Energy Efficient Options for Mitigating Emission of Greenhouse Gases from the Electrical Sector' and 'Study of Biomass as an Energy Source and Technical Options for Greenhouse Gases' Emission Reduction'.

Wind generator installed at wind research station, Badaling, P. R. China

Solar water heaters on the roof of an apartment building in Kunming, P R. China

Strengthening organisational capacity of 'Ghatta' (traditional water mill) owners in Makawanpur and Kavre District, Nepal

Moderate support has been provided to the Centre for Rural Technology (CRT), Kathmandu, to carry out activities with traditional water mill owners.

The initiative taken by ICIMOD along with CRT resulted in attracting the Netherlands Development Organisation and His Majesty's Government, Nepal's (SNV and HMG/N) interest to promote the improved water mill programme from 2002.

ICIMOD has facilitated the Renewable Energy Technologies (RETs) initiatives of partner institutions. The roles of Aga Khan Rural Support Programme (AKRSP) in promoting passive solar building technologies, and Uttar Pradesh Academy of Administration (UPAA) and Society for Promotion of Wasteland Development (SPWD), in India, in promoting micro-hydro have particularly been notable. The following impacts mainly resulted from the active roles played by partner organisations .

- The increasing commercialisation of RETs by government agencies and donors
- Nepal, India and Pakistan are now encouraging private sector participation in hydropower development. In Nepal, some of the revenue generated from the sale of electricity is set aside for the electrification of rural mountain areas.
- The acceptance of a need-based rather than a technology-driven approach to energy programme implementation; community-based energy planning has been incorporated in Nepal's Ninth Five Year Plan (1997-2002) and in UNDP-Nepal's Rural Energy Development Programme,
- The capabilities of village-level extension workers to implement RETs in parts of Nepal, India, and China have been improved.
- RETs such as improved cooking stoves, biomass briquettes and solar panels, are being introduced in Nepalese communities through rural energy programmes.
- More attention is being given to the social objectives of energy development in remote areas.
- Manuals on Mini- and Micro Hydropower (MMHP) have been translated into the national language and adopted by Development and Consulting Services (DCS) in Nepal; the Alternate Hydro Energy Centre in India; and the Aga Khan Rural Support Programme (AKRSP) in Pakistan.
- Asian Development Bank (ADB) supported the Pakistan Council of Appropriate Technology in establishing 200 micro-hydropower plants in the Malakand Watershed, and this was facilitated by a report prepared by ICIMOD.