ICIMOD NEWSLETTER

no. 30 summer 1998

Renewable Energy Technologies

Opportunities for Mountain Communities

From satisfying basic needs to promoting national economic development, the energy sector is of utmost importance to the Hindu Kush-Himalayas (HKH). The rural population depends nearly exclusively on firewood and other biomass for cooking, space heating, and illumination, while planners look at energy as an engine for economic growth; and in particular energy from electricity.

Within a relatively small area, the HKH is blessed with a diversity of renewable energy resources unparalleled in the rest of the world. Yet they have been either used in an inefficient way, e.g., firewood, or left underexploited, e.g., water resources for hydropower. In between, solar, wind, geothermal, and biogas have received scant attention in energy planning, while fossil fuels are making increasing inroads in the mountain areas.

Given this situation, ICIMOD, with its major mandate in poverty alleviation and environmental conservation, embarked on a programme to assess the suitability of different ***Renewable Energy Technologies*** (RETs) for mountain areas in 1996. This programme is guided by the overall mountain perspective formulated by the Centre for promoting sustainable mountain development. Overcoming the mountain specific constraint of inaccessibility to goods, services, and markets calls for decentralized planning and implementation of energy programmes that make full use of mountain-specific opportunities for energy development. There is no single blueprint for developing the energy sector in the HKH, but this Newsletter presents various options for different situations, taking into account the potential on the supply side and the aspirations on the demand side.

ICIMOD is particularly interested in promoting RETs that can reduce the drudgery and health risks of millions of mountain women and children engaged in fuelwood and biomass collection and in cooking on stoves without chimneys. Access to resources and improved end-use efficiency in the fuelwood sector is needed for the majority of mountain women, before they can be engaged in activities that increase their economic status. Alternative RETs are also available now and those producing electricity are of particular relevance to social and economic development.

The present Newsletter is a first attempt to bring these various issues and options together. We hope very much that it will contribute to a greater recognition of the role that various RETs play or can play in improving the livelihoods of the rural population of the HKH.

Egbert Pelinck
Director General

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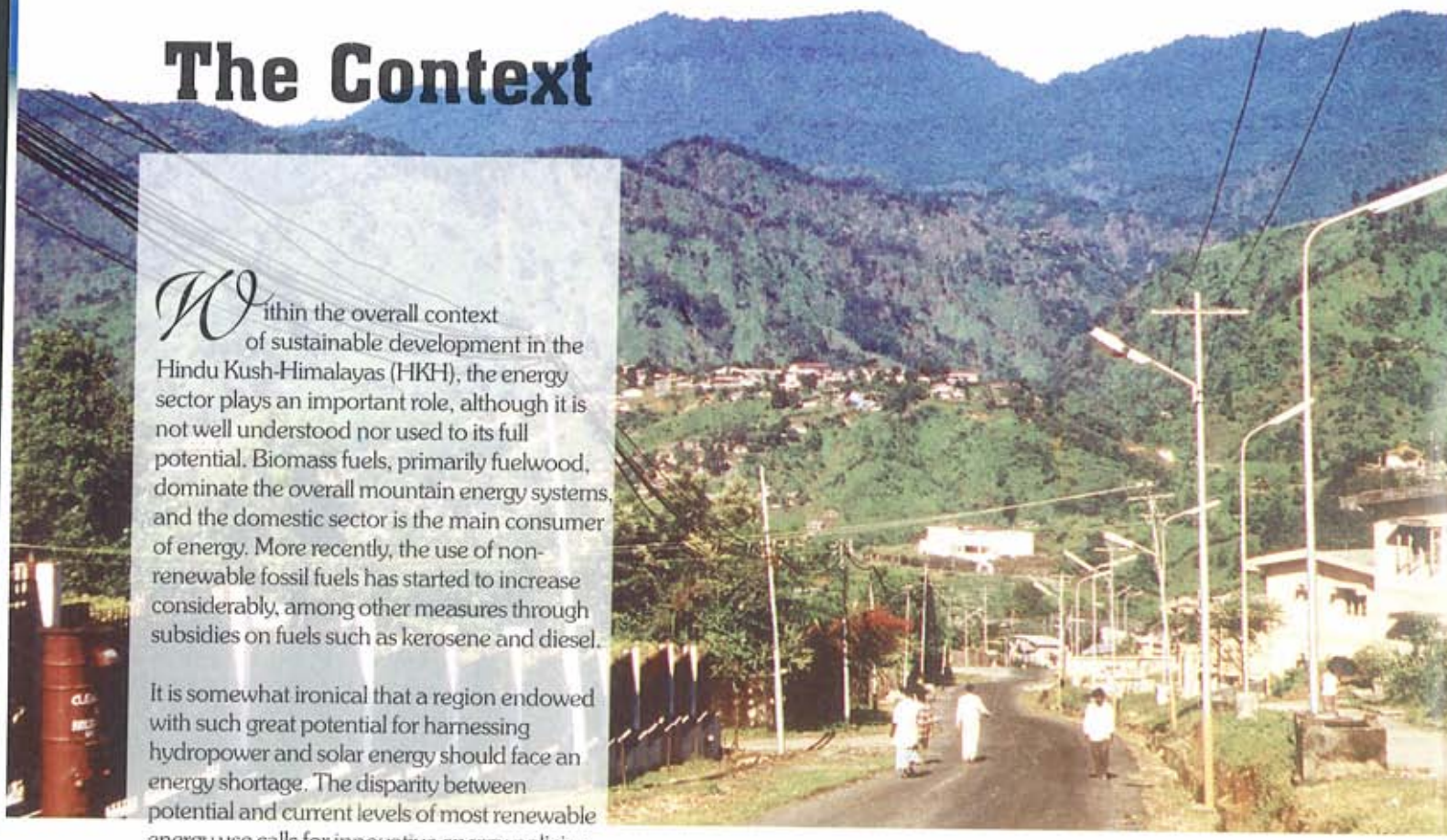
The Context



Within the overall context of sustainable development in the Hindu Kush-Himalayas (HKH), the energy sector plays an important role, although it is not well understood nor used to its full potential. Biomass fuels, primarily fuelwood, dominate the overall mountain energy systems, and the domestic sector is the main consumer of energy. More recently, the use of non-renewable fossil fuels has started to increase considerably, among other measures through subsidies on fuels such as kerosene and diesel.

It is somewhat ironical that a region endowed with such great potential for harnessing hydropower and solar energy should face an energy shortage. The disparity between potential and current levels of most renewable energy use calls for innovative energy policies, programmes, and technologies for the HKH. While there are several issues common to all the countries of the HKH, there are also considerable differences between the countries, as can be seen in Table 1.

An important aspect in developing the energy sector is the impact it will have on mountain women who have a disproportionate share of the burden to provide energy to their households and use it efficiently. Also the implications for the local, national, and global environment of different energy options have to be understood (Box 1). Therefore, an important dimension is to improve the efficiency of energy inputs without damaging the environment.

Table 1: Energy Potential and Production in the HKH Areas of Selected Countries, FY 1994/95

Descriptions	Unit	China	India	Nepal	Pakistan
Fossil Fuel Production					
- Oil	Million GJ/yr	12	219	0	0
- Coal	Million GJ/yr	315	35	0	50
- Natural Gas	Million GJ/yr	276	74	0	353
Hydropower					
- Potential	Million GJ/yr	3207	1007	1309	473
- Production	Million GJ/yr	22	36	4	75
Forest Situation					
- Total Forest Area	sq. km	215081	207484	42910	42240
- % of Geographical Area	%	13	37	29	5
- Fuelwood Extraction	Million GJ/yr	250	381	210	181
Total Potential/annum	Million GJ/yr	6713	1716	1519	1057
- Non-renewable	Million GJ/yr	3256	328	0	403
- Renewable	Million GJ/yr	3457	1388	1519	654
- Biomass	Million GJ/yr	250	381	210	181
- Hydropower	Million GJ/yr	3207	1007	1309	473

Source: Rijal, K. Energy Use in Mountain Areas (forthcoming).

Box 1: The Environmental Implications of the Production and Use of Energy

Energy Sector	Activity	Implications on the Environment
Fuelwood/ Twigs/Bushes	Burning	Indoor air pollution and health effects; deforestation; ecological impacts due to loss of wildlife habitats; erosion and watershed disturbances; increased flooding; low flows in dry season
Agri./Animal Waste	Burning as fuel	Loss of organic matter; local air pollution
Electricity	Large Hydro	Land subsidence; displacement of people; resource use conflicts; effects on natural aquatic and roverine habitats; local climate changes; ecological impacts; erosion and watershed disturbances
	Thermal Plant	Sulphur dioxide, nitrogen oxide emissions with effects on human health and possible crop damage; increased CO2 emissions and thus global warming through using coal
	Transmission/Distri.	Displacement of people along right of way; potential radiation impact on humans from high voltage lines
Gas and Oil	Production	Water pollution; toxic air emissions; air pollution in cities and towns (lead & CO; respiratory diseases; lead poisoning)
Coal Mining	Production	Land disturbance, resettling of residents; dust emissions; acid mine drainage and pollution of streams; destruction of wildlife habitat

Renewable Energy Technologies for the HKH: Opportunities and Limitations

The introduction and promotion of renewable energy technologies is determined by a number of factors, in particular the source of energy and the technology available.

Source of Renewable Energy

Renewable energy is energy that in principle can be used in perpetuity and without eventually exhausting the source. The main sources of renewable energy are biomass, streams and rivers, the sun, and wind. Among these, the sun and wind are sources of energy that are completely independent of human interference. Availability of biomass depends, to a large extent, on human action related to its management, in particular forest management, tree growing, and farming systems. The quality, quantity, and seasonality of water resources, sun, and wind largely depend on climatic and edaphic factors, but to a certain degree also on the management of watersheds from where streams and rivers originate. Within the context of the present Newsletter, other sources of renewable energy, such as man and animals, are not considered.

Renewable Energy Technologies (RETs)

A whole range of renewable energy technologies exist to transform raw energy into usable energy among which the most important ones are as follow.

Biomass-based technologies

(i) Different technologies to produce heat have been developed for cooking food and these range from tripods to improved cooking stoves that increase efficiency and/or remove the smoke from the kitchen. Most cooking stoves use fuelwood or agricultural residues, and are used by most of the HKH population. One of the main advantages of this technology is that it is widely used because it does not change normal household routines; however innovations in design for greater efficiency and improved air quality have not yet resulted in wide adoption. Sociocultural aspects and technical aspects of installation, repair, and maintenance have been the critical factors preventing their widespread adoption.

(ii) Space-heating stoves - Above 2,000 masl, the winter temperature calls for space heating in mountain homes and offices. Metal-based stoves were in use in the HKH, and some new designs have been introduced, which so far only hotels, restaurants, and richer individuals can afford. Others continue to have open fires for heating. In all cases, fuelwood is the main source of energy for these stoves, although, recently, briquettes made of agricultural residue have been introduced, in particular in urban areas.

(iii) Biogas plants - For rural households, where livestock is an important component of the farming system, the transformation of manure (and human waste) into gas is an opportunity for producing clean energy for cooking and illumination. The great advantage of biogas is that the energy is generated at the household level without having to collect biomass from elsewhere. The disadvantage is the high investment cost and sometimes cultural barriers. Also, they do not work efficiently throughout the year at altitudes higher than 1,500m as gas production is dependent on temperature.

(iv) Biomass gasifiers - A more recent phenomenon in the HKH is the biomass gasifier which transforms biomass into motive power and electricity. A disadvantage is the somewhat complicated technology, and its use should only be promoted in places

Solar water heater on the roof-top of an apartment building, China

where cheaper and/or more simple forms of electricity generation, such as micro-hydropower are not feasible.

Hydropower-based technologies

(v) Electricity generating hydropower plants - This is the most mountain-specific of all renewable energy technologies - and these have been in existence for over 100 years in some parts of the HKH. The great advantage of hydropower-generated electricity is its sustainability in terms of a permanent minimum level of kinetic energy available through water resources. The installation of hydropower plants may cause negative impacts also, and these usually increase with the size.

Usually the following hydropower types are distinguished.

Micro-hydropower	0 -100 kW
Mini-hydropower	100-1000 (3000) kW
Small-hydropower	1-3 (15) MW

Large hydropower more than 15 MW
However, in large hydropower, further classifications exist.

(vi) Water mills – Traditionally, water mills have been used for grinding grain and many other uses, including sawing wood. The direct transfer of water energy into mechanical energy produces an important renewable energy and requires relatively limited technical skills. Recent surveys and applied research have indicated that there is considerable scope for improvements in efficiency.

(vii) Hydro-rams - Although not widely used as yet in the HKH, hydro-rams have a great potential for providing water for drinking and irrigation in areas with agricultural potential situated above rivers and streams. The advantage of this technology is its relative simplicity and the disadvantage is the somewhat high investment cost. So far, where available, farmers seem to prefer diesel pumps for this purpose, but this might change if subsidies on diesel oil were to be abolished.

(viii) Solar water heater - Hot water has become more important because of the tourism industry as well as for the more affluent sector of society. The abundance of sunshine in the HKH guarantees a renewable, reliable source of hot water, although additional heating by electricity for cloudy days may be necessary.

(ix) Solar driers - While sunshine has been used traditionally to dry agricultural products, specially designed solar driers are now in use for processing vegetables, fruits, and medicinal plants and reducing their perishability.

(x) Photovoltaics - It is only the drastic reduction in prices over the last few years that has made photovoltaics a viable source of electricity for remote communities and/or individual households.

(xi) Solar greenhouses and other Plastic Film Technologies - Capturing the solar heat in the early spring and late autumn to extend the growing season for agricultural and horticultural crops has been possible through the introduction of transparent plastic sheets, which are used widely with different constructions.

Wind-based technologies

(xii) Windmill pump - In areas where there is an adequate level of consistent wind blowing during irrigation seasons, windmills can generate the energy to pump water from lower levels to irrigate farmlands. This can be a good alternative to the diesel fueled pumps presently being used for this purpose.

(xiii) Windmill generator - In areas with steady winds all year round, windmills are an option for generating electricity.

Geothermal-based technologies

(xiv) Although not available widely thoughout the HKH, geothermal energy is available on the Tibetan Plateau and in the Hindu Kush.

The heading ***'Solar-based Technologies'*** before section (viii) was inadvertently lost while formatting.

Improved cooking stoves, Nepal & China

and its use for generating electricity and for other purposes should be further explored.

(More detailed information on RETs can be obtained from the *'Manual of Rural Technology with Implications for Mountain Tourism'* published by ICIMOD in 1997.)

Technological Aspects of Renewable Energy

In general, renewable energy resources have the following characteristics: i) low energy density; ii) low calorific value; iii) high bulk density; iv) low grade of energy; v) low conversion efficiency; and vi) high conversion cost. Given these characteristics, RETs are: i) modular in nature; ii) need high upfront capital costs; iii) give intermittent energy supplies; and iv) are not transportable. As a consequence, they are more suitable in mountain areas for small-scale and isolated applications.

Present Status of RETs

The renewable energy systems operational within the HKH are primarily biomass-related technologies, hydropower, solar technologies, wind pumps, and turbines. Table 2 gives the number of installations in the HKH areas of selected countries. These are the cumulative numbers of plant installations, and it is difficult to identify how many of them are operational. Analysis of a number of evaluation reports indicates that some of these technologies are gaining momentum in certain areas but have failed in others. For example, the biogas programmes in Nepal and China are quite successful, but have been a failure in Pakistan and Bangladesh. Mini-and micro-hydropower development is gaining momentum in Pakistan and India whereas there has been a decline in the number of installations in Nepal. With regard to improved cooking stoves, mixed results have been experienced. Capabilities in manufacturing RETs do exist but, due to the lack of institutions to promote them and greater inaccessibility in the mountains, the rate of dissemination in the HKH area of any country is slower than in the rest of the country. In addition, development of RETs on a sustainable basis has not been possible to any significant extent due to i) the relatively free of cost availability of fuelwood and other biomass; ii) poor financial resources prevent investment in efficient renewable energy devices; and iii) barriers, such as inconvenience and conflict with social habits and traditional practices.

Table 2: Installation of Renewable Energy Technologies in the HKH Region

Descriptions	Unit	India 1/	China	Nepal	Pakistan
Family-size Biogas Plants	No.	245,067	82,624	32,000	1,134
Improved Cooking Stoves	No.	939,844	1,541,325	90,000	68,000
Solar Thermal Systems	Sq. m.	2,958	111,288	>10,000	N.A.
- industrial type	Sq. m.	1,176			
- domestic type	Sq. m.	1,782			
Solar Cookers	No.	14,371	60,000	Neg.	
Solar Greenhouses		N.A.	3,900		
PV Water Pumps	kWp	4		30	
PV Systems	kWp	372		300	234
Wind Turbines	MW				
Mini- & Micro-hydropower	MW	52	N.A.	9	19.8
Biomass Gasifiers/Stirling Engines	No.	16			

Source: Rijal, K. (forthcoming) RETs: Policy Options for Mountain Communities in the HKH and Action Agenda in Nepal. ICIMOD.

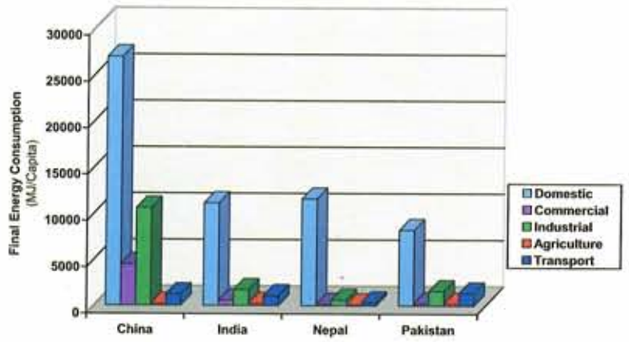
Note: 1/ Information on biogas and wind power is up to March 1996; on improved cooking stoves, PV water pumps, MMHP & biomass gasifiers up to April 1995; and on solar thermal systems, solar cookers, and PV systems up to March 1993. Uttarakhand, the Hill Districts of West Bengal, and Assam not included.

Small-scale briquette manufacturing unit, China.

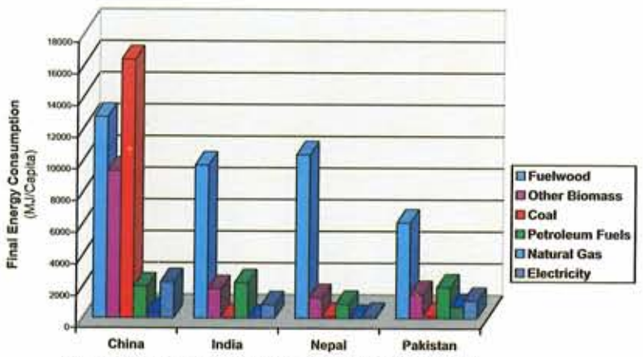
Energy Use in Mountain Areas
Present Trends & Emerging Issues

In general, the trend in energy use within the HKH region is as follows: i) use of biomass predominates, as fuelwood is the principal source of energy and will remain so for the foreseeable future; ii) the domestic sector is a major consumer of energy; iii) demand for energy is increasing as a result of agricultural diversification and intensification, rural industrialisation, and increasing numbers of tourists; iv) the need for heat, primarily for cooking and spaceheating, is comparatively greater than the need for draught power as an input into production; v) the demand for fuelwood exceeds the sustainable supply vi) fuelwood is becoming scarce and time taken to collect is increasing; vii) continuous extraction of fuel-wood from the forests results in a transition within the biomass resources, degrading the environment; and viii) access to and availability of energy technologies are improving but not enough to result in reduction in human drudgery and health hazards.

Final Energy Coonsumption Pattern by Sector, in the HKH Region of Different Countries, 1994/95



Final Energy Coonsumption Pattern by Fuel Type in the HKH Region of Different Countries, 1994/95



Source: Rijal, K. Energy Use in Mountain Areas (forthcoming).

Agro-processing with micro-hydro, Nepal.

The socioeconomic factors are crucial for understanding the energy use pattern. Some of these in the mountains are: population dynamics and urbanisation; rise in income and energy transition, process of industrialisation, diversification and intensification of agriculture, and improvement in living standards, although it goes without saying that many other factors could significantly influence energy use. These factors need to be clearly understood and taken into account for sustainable development of energy in mountain regions.

Final Energy Consumption Patterns

The main fuel resources in the HKH Region are biomass (fuelwood, agricultural residue, and animal dung) and commercial fuels (petroleum fuels, coal, and natural gas), although the degree to which these fuels are used varies drastically between the HKH Region of each country. The final energy consumption in the HKH region of India and Pakistan is lower than the national average (see charts), while it is comparable in China. The contribution of biomass fuels is substantially higher in the HKH region than in the country as a whole. For example, in India, the contribution of biomass fuels in the HKH is 79%, while it accounts for 47% for the whole country. A similar situation prevails in China and Pakistan.

Emerging Issues

What type of energy use pattern or mix is sustainable environmentally and financially in the mountains is a major policy issue being faced by the planners of the HKH Region.

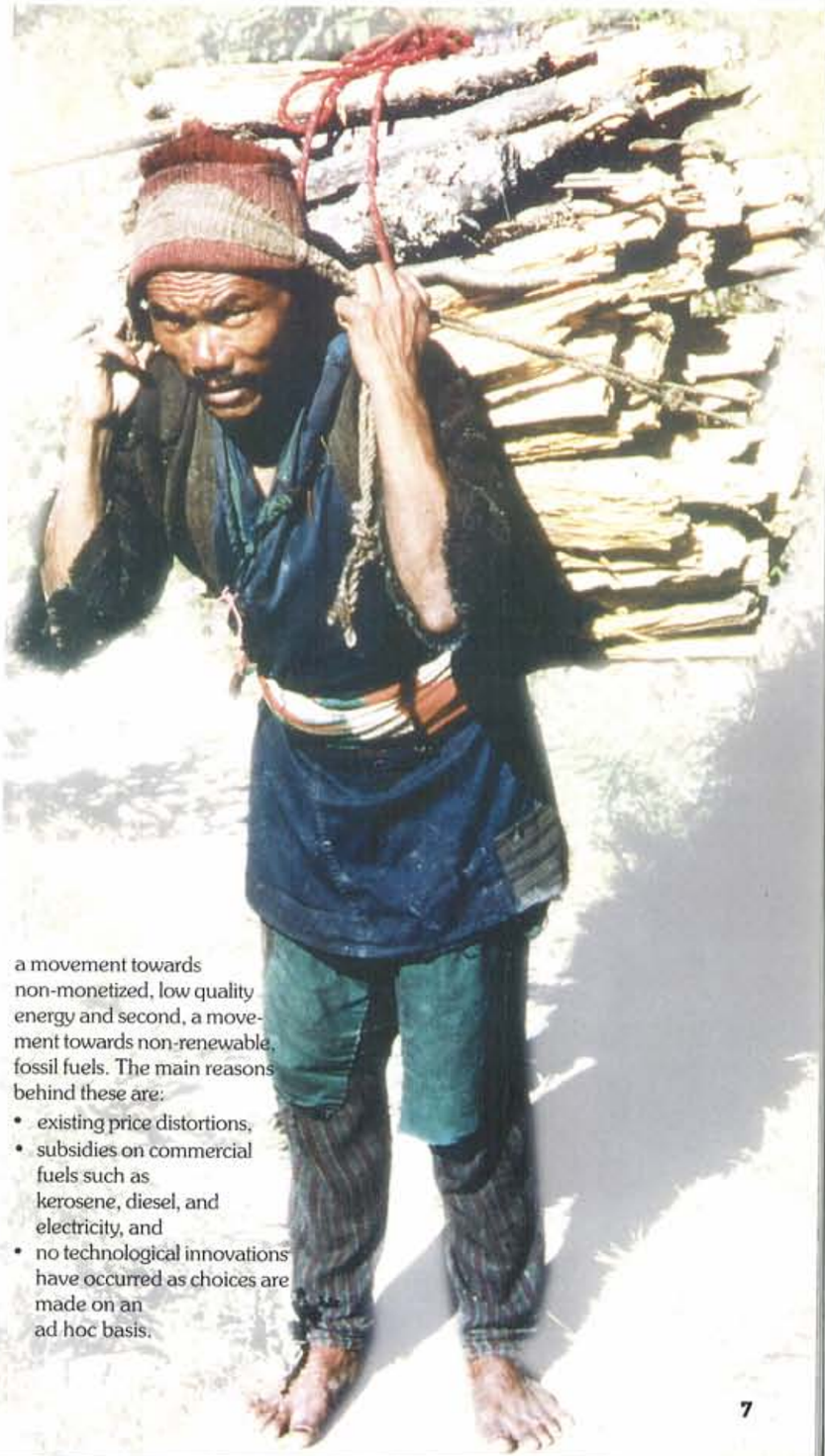
Unsustainable Trends of Energy Supply and Demand

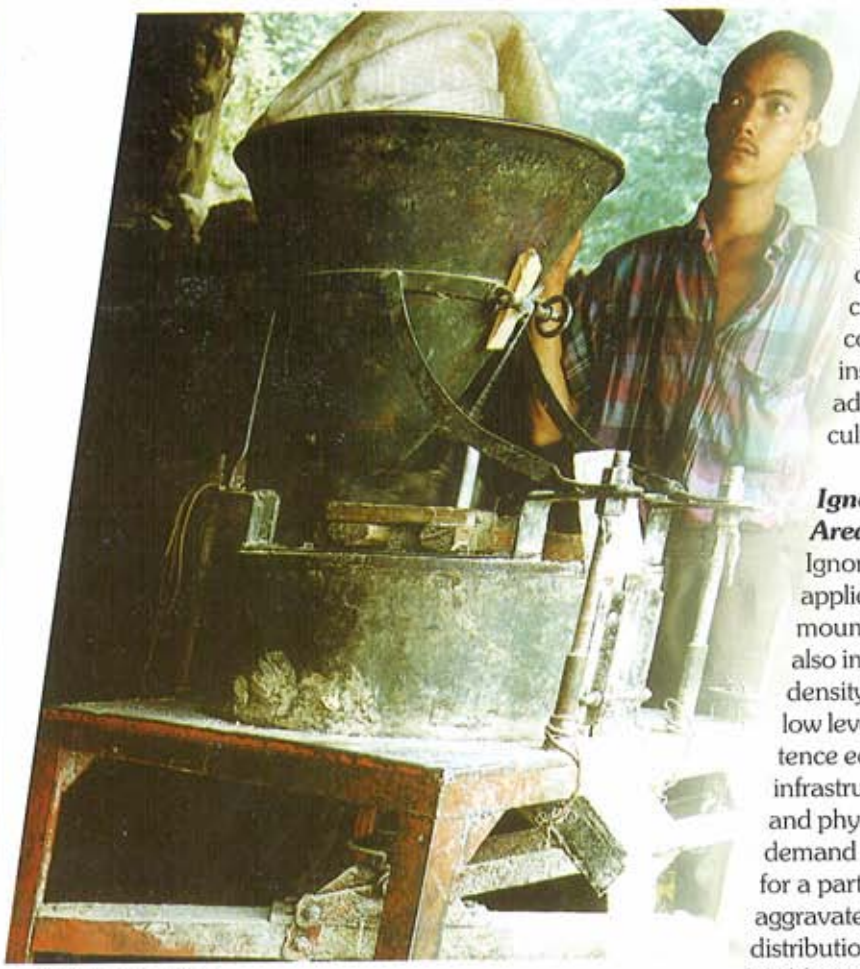
In most of the HKH Region, the demand for fuelwood exceeds sustainable supply (see Box 2). This is due not only to rapid thinning of forests close to settlements as a result of lack of appropriate management practices but also due to lack of suitable technologies for efficient use of fuelwood. There are also increasing demands for fuelwood to meet the needs of tourists and emerging cottage industries. Other reasons for this imbalance are: a) the high capital investments required for hydropower development; b) the energy demand structure favours low grade energy, i.e., heat energy; c) the financial cost of fuelwood extraction is much lower than the social cost; d) the opportunity cost of fuelwood collection is very low; e) the availability of subsidised petroleum fuels; and f) lack of efficient and reliable RETs.

Inharmonious Energy Transitions

Two distinct phenomena are identifiable in mountain areas; first, a movement towards non-monetized, low quality energy and second, a movement towards non-renewable, fossil fuels. The main reasons behind these are:

- existing price distortions,
- subsidies on commercial fuels such as kerosene, diesel, and electricity, and
- no technological innovations have occurred as choices are made on an ad hoc basis.





Oil-expeller, Nepal

Quality and Quantity of Energy

Understanding about the quality of energy and the amounts required is poor. This has led to a wrong choice of both resources and technologies and hence to the inappropriate scale of energy institutions and technologies. Generally, no distinction is made between fuelwood and electricity, forgetting the quality of energy supply, and it is considered that one can substitute for the other in all circumstances, primarily on the basis of their fiscal cost. No initiative is being taken by demand-side institutions in choosing energy mixes. The comparative advantages of energy synergism and the social and cultural implications are not understood at all.

Ignorance of the Biophysical Aspects of Mountain Areas

Ignorance of the biophysical aspects has led to the application of inappropriate energy technologies in mountain areas. Institutional and financing systems are also inappropriate. For example, the low population density caused by scattered settlement patterns and the low level of economic activities in predominantly subsistence economies with paucity of social and physical infrastructure (i.e., reduced accessibility to and from markets and physical and capital resources) results in a low energy demand density overall with concentrated energy demands for a particular time of the day and year. This situation is aggravated by the expansion of costly transmission and distribution mechanisms associated with the prevailing low load factors of mountain areas, thereby reducing the overall load factor of the power supply system, making these investments costly. The emphasis is always on expanding supplies without realizing the benefits of decentralized, community-based technological options using renewable energy, thus offering economic and social benefits.

Wrong Choice of Technology

RETs were demonstrated and disseminated in the mountains, before they had time to mature and the mountain people were forced to venture into unknown risks. Local manufacturing bases and service capabilities were ignored and the economic costs of alternative energy options were never considered (Box 3). The technologies introduced were not able to meet multiple user needs at affordable prices. Most of the time, government organizations were skeptical about the initiatives taken by the private sector and there was a lack of confidence among various stakeholders. One

Box 2: Examples of Unsustainable Trends of Energy Supply and Demand

- In Nepal, only about two-third's of fuelwood demand is met by a sustainable supply of fuelwood, at the national level. The fuelwood balance at district level shows different patterns. Fuelwood is in surplus in some of the districts in Western Nepal, while it is in short supply in central hills.
- In Pakistan, the total sustainable supply of fuelwood is less than 40% of the total demand, of which more than 90% is available in the Northern Mountains (i.e., NWFP, FATA, AJK, Northern Areas). If the fuelwood supply and demand balance is made for Northern Mountains, supply exceeds demand by 1.6 times. However, fuelwood is extracted to meet the demands of the plains as it fetches a good price.
- The traditional stoves though effective means as a heating device are less efficient for cooking. The direct smoke emission causes health hazards to the household members. The improved stoves that were disseminated in Nepal though efficient with regard to pot utilization efficiency are not suitable to meet the room heating requirements of the mountain households.
- There are several locations in Nepal, India, and Pakistan, where tourism is being promoted. The energy demand of the tourist is high compared to that of local residents. Most of these demands are in the form of heat energy which is being met by fuelwood in the absence of appropriate information and prohibitive cost of RETs.
- Increased agriculture and cottage industrial activity demands higher quantity of heat energy. These increased activity not only demands heat energy but also motive power for which high grade of energy in the form of mechanical and electrical energy is required. The energy options available for the provision of high grade energy is limited.

Source: Rijal, K. (ed.) 1997, Energy USe in Mountain Areas: Emerging Issues ans Future Priorities.

Box 3: Making the Wrong Choice

The decrease in availability of fuelwood is felt in many mountain areas and is manifest in the uprooting of vegetative covers, increase in time taken to collect fuelwood, increase in use of other biomass fuels, etc. There are no visible impacts of technological innovation despite this crisis. This is due to three reasons: a) women are responsible for cooking and managing the fuel supply, but they are not involved in household decision-making; b) the resource cost of fuelwood is not reflected while selecting fuel; and c) the opportunity cost of collecting fuelwood is never realised and thus fuelwood is treated as free goods.

party viewed the other with suspicion, and institutional innovation did not take place. This situation got worse as donors used technical assistance as a means of market promotion, and governments looked upon subsidies as social obligations, without properly understanding the dynamics of technology transfer in the context of mountain areas.

Overlooking Women's Role

The roles of stakeholders involved in the development and use of energy are not properly recognised and the active participation of women has neither been sought nor ensured. Promotional activities have not recognised these sociocultural implications of technology adaptation. There is no mechanism to ensure proper mobilisation of local resources and indigenous knowledge. Development of energy technologies is primarily based on the needs as perceived by experts and planners. No emphasis is given to ensuring that women are included in promoting new and renewable energy technologies in mountain communities, although they manage household energy systems.

Internalising Environmental Concerns

Increaseing forest areas and crown densities through afforestation and forest enrichment has a carbon sink advantage in terms offsetting global warming. Given this situation, there is a need to estimate the environmental costs of energy development and to internalise them while evaluating energy mixes suitable for mountain areas. However, methods for internalising the environmental costs imposed as a result of production and use of different energy resources are lacking. At best, a mitigative approach to project development is being adopted, and this is inadequate.

Financial Constraints

The choice of energy technologies is mostly based on the financially least cost approach ignoring the implications for low-income groups and the poorest of the poor. This approach favours non-renewable sources of energy, as the options for supplying electricity do not take social and environmental costs into account. It is observed that bilateral and multilateral donors are biased towards financing centralized energy supplies instead of multiple, decentralized energy projects because of the increased burden in terms of fund disbursements. This situation is exacerbated by the conservative lending practices of national and international financing institutions in terms of risk avoidance, preventing their investment in new energy materials. It is thus difficult for an entrepreneur to acquire venture capital and financing for initial market creation. The credit policies in most of the countries within the HKH are not sensitive to low-income groups since they require collateral.

Institutional Mismatch

The evolution of energy decision-making as a supply side activity has resulted in the creation of centralized planning institutions leading to lack of decentralized institutions and institutional capabilities at the local level. The quantity and quality of energy required by the mountain communities and availability of energy resources at local level favour however decentralized renewable energy systems. To implement them local-level decentralized institutions are needed. Also, the demand-side agencies (urban and rural development bodies) operating at local level do not see their roles in terms of managing the energy sector and believe that it falls under the purview of energy-related institutions such as government-owned electricity and forest departments, fuelwood supply depots, and oil depots. The private sector and NGOs do not have a say in the energy decision-making process, as the provision of energy is the prime responsibility of the government; thus rural electrification and renewable energy programmes are dominated by centralized public monopolies. At the same time, most of the financing institutions are guided by the principles of commercial lending and there are no financing institutions that cater to the development needs of mountain communities.

Factors Influencing the Adoption of RETs

Several factors have prompted the adoption of renewable energy technologies in mountain areas. Some of the factors which may be instrumental in promoting RETs are discussed briefly.

Favourable National Policies and Regulations
Favourable and consistent policies, acts, and regulations are required to promote the development of renewable energy resources and technologies. There are several acts (e.g., water resources, forestry) and legislations that dictate ownership over natural resources and intellectual property rights to various technologies, ensure standardisation and safety measures, and provide incentives that will be instrumental in developing RETs.

Understanding Mountain Specificities
The specific conditions prevailing in mountain areas, such as a high degree of inaccessibility, a fragile environment and, to a large extent, marginalised communities call for mountain-specific apoproaches. However, usually no distinction is made between energy planning for the plains and for the mountains, with too much emphasis on providing electricity by extension of the grid. This has seriously hampered the search for alternative options for provising electricity in mountain areas.

Matching Energy Needs with Locally Available Resources
Matching energy needs with energy systems is in itself a complex process and should be seen as an integral part of the matching process. First of all, one has to determine what are the most important needs and which particular activities require energy in order to match energy needs with renewable energy technologies. Continuous consultation with the communities is an essential step in preventing imposition of outside biases. Too often, energy planners decide autonomously what is needed for the people (e.g., cooking needs - forgetting space heating). If the communities do not play a significant role in selecting which of their needs must be met first, they are not likely to actively support the technology introduction process, assist in any necessary modifications, or maintain the energy system.

Failure of centralized photovoltaic installation owing to lack of technical backstopping, Northern Areas, Pakistan.

Choice of Technology
Renewable energy technologies have been demonstrated and disseminated without proper programme design and have lacked holistic approaches. RETs have not been capable of meeting the multiple user needs at affordable prices. Research and development for RETs have never received the requisite attention and no technological innovations have occurred. Economic and financial assessments and calculations are a prerequisite to technological choices, so that synergy of sectoral linkages is optimised and sustainability is achieved. The economic costs of alternative energy options have never been considered; on the contrary a blanket approach to disseminating technology has been followed. Most of the time, RETs have been disseminated before they have had time to mature and communities have been forced to venture into unknown risks. Also, components and parts were not standardised and this led to weak local manufacturing bases and service capabilities.

Integrating Gender Concerns
Every stakeholder should be involved in the development and use of energy and more emphasis should be given to ensure the active participation of women in the design and implementation of energy programmes, as women play key roles in managing, procuring, and using various energy resources and technologies at household level. Promotional activities do not recognise the sociocultural implications of technology adaptation as these programmes, in most cases, are gender blind. It seems that no priority is given to the specific needs of users (i.e., women) in promoting RETs. Indigenous knowledge and local women's institutions are not properly used for the management of energy systems.

Ghatta (traditional water mill), Nepal.

Recognising Social and Cultural Dimensions
Most of the mountain households meet many of their energy needs outside the monetary economy. These households still intend to maintain self-sufficiency within their own community if not within the household. However, money and markets are becoming more important. Cash is required to meet a growing number of needs, including the need for energy. The sociocultural aspects of RET intervention are of particular importance where the adopters of the technology lie mainly outside the cash economy. The following conditions appear to increase the chances of sociocultural acceptability with regard to RETs: a) compatibility with the existing work organization; b) integration with the social structure; and c) accommodation to authority.

Promoting Technical and Economic Acceptability
Several factors improve the technical and economic acceptability of RETs: structural simplicity and scale; reasonable cost of technology; use of a familiar technology; employment of a familiar technique; and integration with an existing technology. For example, structural simplicity lessens the risk of dependence on external support for operation, repair, and maintenance and minimises the need for extensive capital investment. Use of local mate-rials, craftsmanship, and familiar techniques will also increase diffusion and minimise the need for special training and for external supervision.

Role of Financial Intermediaries
The role of financial intermediaries is critical for successful implementation of RETs, as access to financial services to ensure sustainability of the services in the long run is needed. In most cases, the bank plays the role of the intermediary and finance is made available, but complaints have been heard about the loan disbursement procedure, valuation of collateral, and access to financial resources. The cost of intermediation should be borne by the beneficiaries themselves. A properly designed subsidy programme, along with a full-cost recovery based financial operation for RETs is a minimum prerequisite for attaining financial sustainability.

Choice of Institutions
The evolution of decision-making about the type of energy to be used as a supply side activity resulted in the creation of centralized planning institutions. This has resulted in a lack of decentralized institutions to manage the energy sector, so no institutional capability exists at local level. However, the quantity and quality of energy required by remote, mountain communities and availability of energy resources at local level favour decentralized renewable energy systems. This, in turn, means that local-level, decentralized institutions should be in place. Community-based participatory institutions are found to be more suitable to the promotion and development of decentralized, renewable energy systems in the hills and mountains, as the social fabric of these communities is such that they rely on interdependence; a factor missing from heterogeneous urban communities.

The Need for a New RET Focus in Mountain Policies

Water-heating device, Himachal Pradesh, India

Policy Issues

Choice of energy policies and programmes in the HKH countries is mostly dictated by urban and industrial needs for supplementing and sustaining economic productivity. In addition, the issue of environmental sustainability has never been seriously considered in developing, procuring, and extracting energy. These aspects become quite clear in carrying out a country-wise review of energy policies, programmes, and institutions (Box 4). Policies to promote forestry and energy development in the HKH were initially geared towards reducing the consumption of fuelwood through the intervention of improved cooking stoves. This failed in the absence of proper evaluation of the multiplicity of traditional technologies and regard of the sociocultural aspects.

In almost all national policies, the basic needs were believed to have been met with the provision of electricity. This did not fulfill the potential for motive power that would lead to economic transformation through productive units. Energy planning investments were for the most part biased in favour of large schemes. Adequate policy statements have been made to promote decentralized renewable systems and end-use appliances within the HKH. But these statements are not supported by appropriate research and development or by institutional and financial requirements in terms of programmes and budgetary allocations. Therefore, a substantial gap between policy statements and implementation prevails.

The role of women and the policies for women's development have direct implications on the development of decentralized RETs. Policies on women's development do not specifically address energy concerns, nor do they specify whether and how women's active participation will increase in planning and implementing renewable energy development programmes. Rapid and sustained growth of new and renewable energy technologies demands appropriate industrial, fiscal, as well as energy, hydropower and forest policies. At the same time, social and environmental policies play an important role in addressing the equity concerns of the poor in the mountains.

Box 4: Highlights on Implications of Energy Policy on RETs: Experiences from China, India, Nepal, and Pakistan

China: The national policy for developing rural energy in China states that policies should be framed according to local conditions and various forms of energy should be exploited based on their availability locally. This has provided impetus to the development of RETs. Strong political commitment at the highest level and establishment of decentralized institutions at village/county levels are excellent examples of this. However, such efforts have not been adequate in the context of the HKH Region of China. Therefore, the main constraints to the development of RETs are lack of regional focus, of technical personnel, of local-level financing institutions, of adequate attention from local governments, and public awareness.

India: The energy strategy proposed for India emphasised a gradual shift from non-renewable energy resources to renewable ones with increasing emphasis on demand management, conservation, and efficiency. The Eighth Five Year Plan (1992-97) and subsequent strategy and action plan specified the installation of RETs (1900-2000 MW), but the funds made available did not reflect this emphasis. However, the action plan for funding envisaged mobilisation of institutional financing and private sector investment through development of entrepreneurship and incentives. To facilitate this, major policy changes have been made to encourage market development, encourage women's participation, minimise subsidies for fossil fuels, and reduce the existing price distortion between renewable and conventional energy sources.

Pakistan: Energy development in the mountain areas of Pakistan is dominated by the extension of grid electricity and petroleum product supplies to rural areas. The plan document does not recognise the role of other sources of renewable energy (solar, wind, biogas, and geothermal) and no special effort has been made to formulate energy plans for mountain areas as such. The various issues in national and provincial level policies that hampered the promotion of RETs in Pakistan are the lack of a clear cut and comprehensive national policy for the development of RETs; the high initial costs of most RETs meant they were beyond the reach of most individual consumers or private enterprises; market distortions and imperfections made RETs appear more expensive than energy from conventional technologies; and the country lacks the institutional capacity for planning, developing, and financing more innovative RETs.

Nepal: The Eighth Plan Document (1992-1997) of Nepal allocated NR.1,650 million for RETs, of which 20% was to be met by the government to install various RETs. This amounted to less than 1.5% of the total fund allocated for the energy sector, excluding the investment in the forestry sector. Inconsistency in government tariff policies, for example, has raised the cost of micro-hydropower projects in Nepal since duties are levied on alternators required for micro-hydro generators, whereas there is no duty on diesel generator sets.

Source: Assessment of Implications of National Policies on RETs in China, India, Nepal, and Pakistan, ICIMOD.

Mountain-specific policies and programmes for the promotion and adoption of RETs are necessary in order to ensure the sustainability of biophysical resources as well as social and economic capital without a high dependance. Broad policy guidelines are discussed below and highlights on implications of energy policy on RETs from selected countries are given in Box 5.

A Framework for Policy Recommendations

Recognise and Measure the Benefits of RETs. It is crucial to recognise the long-term economic, social, and environmental benefits of renewable energy resources and technologies based on their comparative advantages and sustainability particularly in mountain areas.

Reform Energy-price Signals There is an urgent need to reform energy prices to reflect the real economic costs of resources, taking into consideration the environmental mitigation costs. This can be achieved by internalising the social costs of exploiting various sources of energy and thereby influencing energy supply choices.

Revamp the Decentralized Energy Decision-making Process. The existing centralized decision-making tends to favour large-scale energy investments. Involvement of beneficiaries and entrepreneurs engaged in developing RETs in making energy choices to fulfill a particular energy demand should be made mandatory. This will ensure both economic as well as institutional sustainability of the programme.

Change Energy Users' Investment Incentives. Entrepreneurs have to be attracted into manufacturing and marketing RETs to reduce the cost of production and generate awareness about its benefits. For this to happen, the energy price-signals should favour renewables and improve investment incentives for RETs, e. g., below market loans, grants, rebates, tax incentives and tax credits, exemptions, and deductions. Substantial improvements in policy implementation by integrating policy approaches, developing marketing strategies, providing technical support services and information, conducting training programmes, evaluating cost effectiveness, and systematic performance monitoring and evaluation of RETs are needed. The promotion of private entrepreneurs in the development of RETs by reducing financial risks and costs, realising the benefits of the modularity of RETs, reducing unforeseen risks, and relaxing resource rights are equally important.

Accelerate Investment in Renewable Energy Commercialisation. There is an urgent need to increase investment in commercialisation of renewable energy. This could be achieved by providing enough support to research and development (R & D) and establishing demonstration (D) units. Public investment in RD & D needs to be increased by allocating public funding, integrating RD & D into a broader context of economic gains for mountain communities, and improving the effectiveness of RD & D institutions. Investments in RETs can be increased by attracting private investment for which targetted incentive packages need to be devised.

Develop a Commercialisation Plan. Various incentives should be designed as part of a commercialisation plan for each RET so as to reduce investment risks. The efforts required may differ depending on the level of development that each technology has acquired in each specific country. Appropriate participation of each stakeholder in the development of RETs and consensus among them are crucial for the successful implementation of a commercialisation plan. The role of government is to create the right kind of policy atmosphere to attract reluctant entrepreneurs.

Box 5: Renewable Energy Technologies in Nepal: An Example of Policy and Institutional Measures

Define Ownership Rights: Legislation clearly defining ownership rights over various natural resources such as forests, water, wind, and sun, to reduce conflicts over resource use

Protect Intellectual Property Rights: Legislation to protect intellectual property rights to promote R&D through private and public sector partnerships to increase the level of funding for R&D activities related to RETs

Strong Political Commitment: Commitment at higher levels for the promotion of RETs, as most of the time decision-makers find it easy to supervise, evaluate, and monitor large-scale energy interventions

Develop Equitable and Rationale Subsidy Framework: Develop a framework for subsidies based on economic and social equity analyses as per the energy service they provide with respect to each RET

Simplify Banking Procedures: Develop simplified banking procedures and interest rates, and other conditions for loans must be made uniform for all RETs

Ensure Women's Participation: Women have to be involved in all aspects of renewable energy development so that sociocultural dimensions are properly reflected in the programmes as they manage, use, and procure energy.

Promote Private Entrepreneurs: Promote private entrepreneurs for the development of RETs by reducing financial risks and costs, reducing unforeseen risks through insurance, and improving investment incentives, e.g., below market loans, grants, rebates, tax incentives and tax credits, exemptions, and deduction.

Enforce Technical Standards and Quality Control: Development of standards incorporating safety guidelines for manufacture and construction of RETs. Enforcement of standards should be mandatory. Product warranty should be mandatory for manufacturers and service providers so that the quality of products and services is assured.

AEPC must Function as a Task Manager: The Alternate Energy Promotion Centre (AEPC) should function as a task manager in promoting RETs. AEPC should take the responsibility for coordinating, monitoring, evaluating, and technical backstopping functions as it is crucial for the commercialisation of RETs.

Source: Rijal, K. 1997. RETs: policy Options for Mountain Communities in the HKH& Action Agenda in Nepal.

ICIMOD & RETs: The Case of Mini-& Micro-Hydropower

The promotion and improvement of mini-and micro-hydropower (MMHP) in the HKH region is an ongoing programme of ICIMOD supported by NORAD. ICIMOD has been actively engaged in promoting MMHP in the HKH Region as a viable and ecofriendly source of energy for meeting the different energy needs of remote, inaccessible, underdeveloped, and sparsely-populated mountain areas.

Because of its important advantages (Box 6) and the specific needs of remote and underdeveloped mountain areas, ICIMOD has been working at various levels to generate support for MMHP; e.g., at the planning and policy level through interaction with government and international agencies; at the implementation level through improving the capacities of implementing agencies; and at the field level through training programmes, training materials, and other publications and networking.

As is the case with many technological endeavours aimed at the underdeveloped rural areas, private MMHP is also facing considerable problems related to feasibility and design, implementation/ operation/ maintenance, and repairs. These impediments have been analysed and some interventions have been devised to mitigate the former. These interventions are mainly in the form of equipment exchange, training (especially for the implementors and manufacturers). About 5 information-cum-training manuals have been prepared. In addition, exchange of information and expertise is also promoted through visits, consultations, and writings.

The implementing agencies in many countries are also occasionally advised about their implementation strategies, improvement of technology, subsequent back-stopping, and monitoring of the plants. Basically, the following are propagated as key ingredients for the success and sustainability of private MMHP in the inaccessible mountain areas: involvement and contribution of beneficiaries from the begining; indigenous technology and implementation; adequate and consistent financial support; adequate institutional arrangements; owenership and total management by the beneficiaries; and adequate monitoring and backstopping.

Box 6: Advantages of MMHP

- A sizeable potential exists in almost all the areas of the HKH Region.
- The plants are comparatively more viable for remote and inaccessible areas than other commercial fuel systems.
- They are easier to design and manufacture locally
- Sophisticated and expensive instrumentation and control systems can be avoided for small plants.
- The plants are cheaper to manufacture and install by a factor varying between two to five compared to imported plants, and they can be repaired easily using local facilities.
- The problems of transporting other fuels to such difficult areas can be offset
- The organization and management (O&M) costs of privately-owned/-operated plants are also much lower
- Indigenous design and manufacture of such plants contribute towards development of the local industrial base as well as technical expertise, which is useful for other development work
- Adverse environmental effects are minimal
- Mini/micro-hydropower (MMHP) is more suited to decentralized development, and this includes the design, manufacture, installation, and operation/management.
- MMHP can also be integrated with other rural water utilization schemes to increase benefits and reduce costs.

Energy Related Publications

ICIMOD (1995 onwards)

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Siraj, U.W. (editor) 1995, *Proceedings of the Pakistan National Seminar on Mini - Micro-Hydropower Development in the Hindu Kush-Himalayan Region* held on 26-27 Oct. 1994 in Islamabad, Pakistan.' 46pp.

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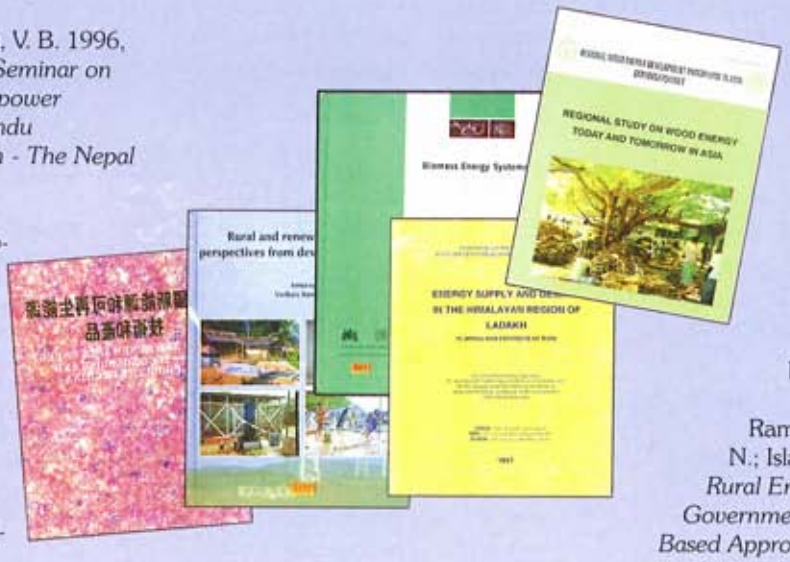

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Gipe, P. 1995, *Wind Energy Comes of Age,* USA: John Wiley and Sons Inc. 536pp.

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Prasad, S. S. R. (ed.) 1995, *Sun and Small Energy Needs.* New Delhi: Oxford & IBH Publishing Co. Pvt. Ltd., 293pp.

Ramani, K. V.; Reddy, A. K. N.; Islam, M. N. (eds.) 1995, *Rural Energy Planning: A Government-Enabled Market-Based Approach.* Kaula Lumpur: Asian & Pacific Development Centre & GTZ, 464pp.

SSTC et. al. 1995, *New and Renewable Energy - Technologies and Products in China.* Beijing, China: State Science and Technology Commission, State Economic and Trade Commission, Department of Environment Protection and Energy

Sulpya, K. M.; Bhadra, B. 1996, *Study and Documentation of Stoves for Cooking and Space Heating at High Altitudes in Nepal.* Bangkok: FAO-RWEDP, 58pp.

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A Profile

Arunachal Pradesh Energy Development Agecny Itanagar, India

Objectives

The objective of the Arunachal Pradesh Energy Development Agency (APEDA) is to promote, implement, develop, and diffuse knowledge in various fields of conventional and non-conventional energy, and in particular to assist the Government of Arunachal Pradesh and the Govt. of India, in the effort to develop and promote non-conventional, renewable, and alternative energy sources and technologies; evolve and promote energy conservation measures; develop the area of energy management as input to an appropriate environmental policy; and generally to deal with problems arising from depletion of conventional sources of energy and evolve suitable alternatives. APEDA is making efforts to encourage widespread use of renewable energy technologies through the dissemination of information and promotion of awareness among the masses.

Types of Activity

Policy Analysis and Planning, Promotional Activities, Information Dissemination, Subsidy Management, Programme Implementation/ Extension

Projects being Implemented

The agency is executing projects on integrated rural energy, development of biogas and improved *chulha*, solar thermal and photovoltaic installations, small hydropower (up to 100 kW capacity) in a decentralized, non-grid connecting mode, developing and upgrading water mills, biomass for thermal and electrical application, and wind monitoring and mapping.

Programme Implementation

All programmes are implemented by the field functionaries of the agency after they have been designed and prepared at the headquarters. The NGOs and the village *Panchayat* are also involved in projects on rural energy surveys, area-based planning, and operation and maintenance of renewable energy systems.

Number of Staffs

Professionals/managerial - 18; Others - 12

Contact Person & Address

Dr. K.C. Dhimole, Director
Post Box No. 141,
Itanagar - 791111
Arunachal Pradesh, India
Tel: 0360-22701
Fax : 00-91-360-22446

Regional RET Institutions

AIYI Energy Environment Technology Co.
Mr. Chen Xiaofu, General Manager
11 Nongthanguan Nanli,
Beijing 100026, P.R. China
Tel : 8601-65068238 **Fax** : 8610-65068238
Type of Activities: Research and Development, Manufacturers

Centre for Energy & Environmental Protection
Mr. Wang Gehua, Director
11 Nong Zhan Nanli Road,
Beijing 100026, P.R. China
Tel : 86-10-64193003 **Fax** : 86-10-64192468
Type of Activities: R & D and Promotion

Ladakh Ecological Development Group
Mr. Tsewang Rigzin, Director
Karzoo, Leh-Ladakh 194101, J & K State, India
Tel: 01982-53221 **Fax** : 01982-52284
Type of Activities: Promotional Activities, Information Dissemination, Facilitate Financing/Credits, Research & Development, Programme Implementation/Extension Activities, Manufacturers

Rural Development Department
Mr. Tshewang Gyachho,
Assistant Project Officer - NRSE, Government of Sikkim, India
Tel: 22652-55 EPX-320/321 **Fax** : 22659
Type of Activities: Policy Analysis and Planning, Information Dissemination, Facilitate Financing/Credits, Subsidy Management, Programme Implementation/Extension Activities

Forest Department
Dr. Kyaw Tint
Director General's Office, Forestry Dept.
Bayintnaung Road, West Gyogone, Yangon, Myanmar
Tel: 095-01-663409 **Fax** : 095-01-664336
Type of Activities: Research and Development, Programme Implementation/Extension Activities, Manufacturers

Development and Consulting Services
Mr. Bhawany Upadhyaya, Director
P.O. Box 8, Butwal, Nepal or
C/O UMN, P.O. Box 126, Kathmandu, Nepal
Tel: 071-40391/41391 **Fax** : 071-40465
E-mail: bhawany%dcs@umn.mos.com.np
Type of Activities: Research and Development, Programme Implementation/ Extension Activities, Consulting Firms

Centre for Rural Technology (CRT)
Mr. Ganesh Ram Shrestha, Executive Director
P.O. Box 3628, Tripureshwor, Kathmandu
Tel: 211919/241065 **Fax** : 977-1-225212
Type of Activities: Policy and Planning, Policy Analysis and Planning, Promotional Activities, Information Dissemination, Facilitate Financing/Credit, Programme Implementation/ Extension Activities, Consulting Firms

Pakistan Council of Appropriate Technology
Mr. Sheryar Khan, Chairman
1-B, Street No.47, F-7/1
P. O. Box No. 1306, Islamabad
Tel: 051-9201290; **Fax:** 9202073
Type of Activities: Policy Analysis and Planning, Information Dissemination, Subsidy Management

Aga Khan Rural Support Programme
Mr. Ainual Hazat, Electrical Engineer
P.O. Box 506, Babar Road, Gilgit, Pakistan
Tel : 0572-2480 **Fax :** 0572-2779
Type of Activities: Policy Analysis and Planning, Facilitate Financing/Credits, Programme Implementation/Extension Activities, Manufacturers, Rural Communities

Renewable Energy on the Web

http://www.solarenergy.net/tsenindx.html
The place in Cyberspace to obtain information about, advertise, buy, sell, or discuss solar energy related products and topics.

http://www.mtt.com/theSource/renewableEnergy/businesses/index.html
This Website provides world-wide information on renewable energy related business information by location, product type, business type, and by name.

http://www.oneworld/globalprojects/humcdrom/partners.htm#2
This Website provides information about and websites of organizations that are participating on Humanity CD_ROM Projects; most of them are active in promoting new and renewable energy source and technology.

http://www.jxj.com/dir/wdress - This Website provides database on World Directory of Renewable Energy Suppliers and Services. Recent publications on renewable energies are also posted with brief information.

http://www.ecn.nl/eil/main.html
The Energy Information on Internet (EII) database comprises 708 detail descriptions and characteristics of energy related information sources that can be accessed through Internet. It offers energy experts the possibility to make a qualitative selection in advance out of the growing amount of energy information services worldwide available through Internet.

This section of the Newsletter has been compiled by **Dr. Kamal Rijal**, ICIMOD's Energy Specialist. Most photographs used are his contribution unless credited otherwise.

Book Review

Rural and Renewable Energy

Perspectives from Developing Countries

Edited by
Venkata Ramana P.

This book is a compilation of 24 articles that have been written over the last five years by researchers at Tata Energy Research Institute (TERI) and also by professionals and academicians from different institutions in developing countries. Notably, articles covering experiences in Africa, China, etc, lend an international perspective on the rural and renewable energy scenario. It attempts to synthesise the experiences in policy formulation and programme implementation. The statistics presented in a few articles are slightly old, but the experiences and lessons learned are most relevant for policy makers, planners, programme implementors, and research professionals.

This book is broadly divided into four sections. The first section deals with the rural and renewable energy policies and implications for intervention programmes, technology development, and the environment. The second section covers the supply/potential of, and demand for, various renewable energy resources and use of analytical tools for resource assessment. The third section describes the experiences of various renewable energy programmes in India, China and Africa. Finally, the fourth section discusses the institutional aspects related to rural and renewable energy - including technology, financing, management, and the much-neglected role of women in planning and implementation.

Most of the articles in the book argue that the most important opportunity in the spread of RETs in rural areas lies in creating confidence and conditions whereby private initiatives would come into existence at a decentralized level. A major barrier identified in this respect is the attitude of electricity authorities and companies and decision-makers, who still pursue the conventional approach of favouring large-scale, centralized application of power generation and distribution and do not provide a level playing field for renewable and decentralized energy options.

Realising this, Dr. Pachauri, Director, TERI, a renowned expert, in his foreword, articulates, '*It has become increasingly clear that small incremental steps will not lead to optimality in the utilization of renewable energy resources. Hence, a major push is needed by which the institutional barriers inhibiting the movement towards optimality can be tackled.*'
The book has sought to cover a whole gamut of relevant issues along with successes and failures that RETs have experienced which could provide valuable feedback to formulate policies for better implementation of the programmes in the future.

Publisher
Tata Energy Research Institute,
New Delhi, 1997, 315pp.

Centre News

ICIMOD Celebrates Women's Week March 9-13

As made clear in the previous issue of ICIMOD News, the Centre attaches great importance to promoting gender fair development in the HKH through all its programmes. An interesting opportunity to examine whether ICIMOD itself "practices what it preaches" arose when ICIMOD participants in the training on 'Gender and Organizational Development for Sustainable Land Use in the HKH' reviewed gender relations in ICIMOD itself as part of the organizational research assignment. The preliminary results were presented at the Gender Committee Meeting of 6 February, 1998, where it was decided that the Director General would personally meet all female staff to hear their concerns and then discuss these concerns with all male and female staff at small meetings. The occasion of International Women's Day provided an opportune time for such meetings and the DG declared March 9-13 Women's Week at ICIMOD.

On March 10, the female staff gathered at ICIMOD's Godawari Farm to discuss first, amongst themselves, their experiences of gender inequality within the workplace. The issues raised were then presented to the DG and the Head of Administration and Finance under three categories, namely, organizational structure, human resources, and organizational culture. The DG proposed that a working group be formed from among the female staff to draft an internal gender policy for ICIMOD. During the following days, the DG held four meetings at the Centre with the professional staff, national officers, general services' staff, 3-7 level, and general services staff, 1-3 level, to share the issues raised by the women with all levels of staff. These meetings, also attended by the Gender and Development Specialist and the Asst. G & D Coordinator, provided a forum for frank discussions and responses by the male staff to the issues raised by the females.

While overall ICIMOD's approach to gender in the workplace was considered quite satisfactory, considerable scope for improvement was also identified, related , in particular, to information flow to female staff and more female staff to be recruited in the professional and senior management categories .

The gender working group, comprising of 14 women, named itself 'Gender and the Work Place Working Group', and agreed to meet frequently over the next three months to prepare the draft policy statement. A report of the issues raised, along with recommendations, has been prepared.

New Support to the Centre

Regional Collaborative Programme

Government of Germany : $2.0 million for 3 years
Government of Austria : $326,000 for 3 years

Projects

Biodiversity Conservation in the Eastern Himalayas-MacArthur Foundation ($75,000 for 3 years)

The Mountain Forum - Swiss Development Cooperation ($125,000 for 2 years)

Appropriate Technologies for Soil Conserving Farming Systems-ADB ($600,000 for 3 years)

Landslide Hazard Management - Government of Japan ($100,000 for 1 year)

Models for Ecosystem Management - UNEP ($25,000 for 2 years)

ICIMOD and the International University of Kyrgyzstan sign MOU

The President of the International University of Kyrgyzstan (IUK) and the Director General of ICIMOD met at the latter's office in Kathmandu on 12-14 January to discuss areas of mutual interest and cooperation. It was agreed that IUK and ICIMOD would cooperate in the following areas:

- Identifying Patrons of the Year of the Mountains
- Establishing an International Organizing Committee for the Year of the Mountains
- Canvassing for Preparatory Activities and an International Conference on Mountains to launch the Year of the Mountains
- Organizing a Workshop on Central Asian Mountains: Problems, Experiences, and Perspectives
- Organizing a two-week study visit to the Asia Pacific Mountain Network (APMN) at ICIMOD, by IUK staff responsible for establishing and managing mountain information systems, databases and Web pages at IUK.

ICIMOD's Second Regional Collaborative Programme for the Sustainable Development of the Hindu Kush-Himalayas (1999 –2002)

This April, after having gone through various review drafts, RCP-II was sent for printing and will soon be available for anybody interested in our vision on the Centre's future role in the sustainable development of the HKH. It is based on a consultation process with institutions and individuals in all of ICIMOD's Regional Member Countries and intensive interaction among the professional staff of the Centre, followed by a review by the 25th Meeting of the Board and the Seventh Meeting of the Support Group. We are happy to share the Focus Areas delineated in this document with our partners and potential partners who will be joining hands with ICIMOD in its implementation from 1 January 1999.

Poverty Reduction and Sustainable Livelihoods of Mountain Households

- Improving productivity on marginal lands: Soil-water-nutrient management on marginal farms and other related technology and management options
- High-value commodities and enterprises: Diversification and expansion of income and employment opportunities for marginal and landless households
- Marginal farms and common property resources: Dependency of mountain farms on CPRs in different agro-ecological zones
- Infrastructure: Balanced development of physical and social infrastructure and services, including various renewable energy technologies
- Integrated area planning: Development of isolated areas with emphasis on the roles of small town and market centres and participatory land use planning
- Policies for sustainable mountain development: Identification of the impact and appropriateness of national development policies and the global economic liberalisation process

Gender Balanced Mountain Development

- Mainstreaming gender: Integration of gender in decision-making processes and organizational development
- Children and mountain development: Exploring opportunities for improving their future
- Improved technologies for labour demanding options for mountain women: Reducing drudgery and workloads in mountain women's time allocation
- Women entrepreneurs and professionals in mountain areas: Promoting and facilitating the expansion of professional skills among mountain women

Sustainable Management of the Mountain Commons

- People and resource dynamics in mountain watersheds: Sustainable development in mountain watersheds by working jointly with the people
- Governance and participation in the management of mountain commons: Decentralizing decision-making processes and responsibilities for managing common property resources
- Management of forest resources: Developing measures and mechanisms for increasing the benefits from mountain forest resources to the rural poor
- Management of rangelands and pastures: Developing measures and mechanisms to improve productivity of rangeland resources and increase the benefits thereof to poorer households
- Sustainable development of mountain water resources: Understanding flow regimes of rivers and streams in mountain areas and increasing the contributions of water to farm productivity
- Conservation of biological diversity in mountain ecosystems: Reviewing the status of biodiversity conservation in the HKH and identifying options for its sustainable management - including the role of parks and protected areas

Capacity Building for Sustainable Mountain Development

- Regional training courses on sustainable mountain agriculture
- Regional training courses on gender and organizational development for sustainable land use
- Regional training courses on mountain hazard mitigation and risk engineering
- Regional training courses in integrated area development
- Regional training courses in the applications of GIS/RS to aspects of sustainable mountain development
- GIS/RS capacity building for national institutions
- Information management capacity building for national institutions
- Strengthening of selected HKH institutions

Information and Outreach

- Development of a geographic infrastructure for access to spatial data
- GIS/RS technology for classifying and monitoring mountain land use
- Documentation and information: Expanding ICIMOD's role as a 'knowledge bank'
- Communication and outreach: Reaching out to the people of the HKH and their representatives

Workshops, Seminars, and Training

With the objective of providing a mountain development forum and strengthening local and national institutions, ICIMOD organizes many workshops, seminars, and training courses on wide-ranging issues pertaining to mountain development. It is not possible to report on all of these, but selected ones have been profiled below.

The Y.S. Parmar University of Horticulture and Forestry, Solan, is a close partner of ICIMOD and also a focal node of ICIMOD's Mountain Environment and Natural Resources' Information Services' (MENRIS) programme in India. The University is well equipped to carry out GIS/RS programmes as part of its capacity-building activities. A three-day **Managerial-level Training Course on Remote Sensing and Geographic Information Systems** was conducted from 22-24 January. The Training Course was inaugurated by the Vice Chancellor, Prof. L. R. Verma. At the closing ceremony, Mr. Egbert Pelinck inaugurated the Natural Resources' Information Centre (NARIC)– a lab that incorporates GIS/RS and information management activities.

Altogether 35, mostly senior-ranking, persons from various forest and agricultural institutions in Delhi, Chandigarh, Jammu and Kashmir, H.P., and U.P. participated in this training. ICIMOD resource persons, Mr. Pramod Pradhan, Dr. Moe Myint, Mr. Peter Bitter, and Mr. Sushil Pandey, were available to impart the training, which was coordinated by Dr. Sudhir Mahajan, Coordinator of NARIC.

A one-day seminar on the **Application of GIS & RS for Policy Makers was conducted** at the Forest Research Institute, Yezin. Altogether 33 persons, mostly senior lecturers and researchers from the three Yezin-based centres of forestry, agriculture, and veterinary science, attended the seminar. A similar workshop, attended by 31 professionals based in various institutions in Yangon, was conducted at the Forest Department in Yangon. Mr. Pramod Pradhan, Dr. Moe Myint, and Mr. Peter Bitter went as resource persons and discussions on support and collaboration were also undertaken.

During the month of February, the second Regional **'Hands-on' Training for Application of GIS and Remote Sensing to Slope Instability and Hazard Mapping**' was organized by MENRIS/ICIMOD in Kathmandu. Sixteen geo-science professionals, including four female professionals, participated from six countries of the HKH region (Bangladesh, Bhutan, China, India, Nepal, and Pakistan) in this 4-week training course. Dr. C.J. van Weston from ITC, The Netherlands, and Mr. Pradeep Mool of ICIMOD were the leading resource persons.

The training mainly focussed on the use of GIS/RS tools for integrating biophysical and socioeconomic information on a spatial basis for mapping slope instability and hazard zones. The training has successfully brought about awareness amongst the participants about the use of technologies such as GIS/RS in addressing the common problems of slope instability and hazard mitigation in the HKH Region where the mountains are still young and numerous landslides and natural calamities occur every year.

The **Mid-Term Workshop of the People and Resource Dynamics' (PARDYP) Project** was held from March 2nd to 7th in Almora, Uttar Pradesh, India. It was attended by senior representatives of the three donor organiza-

Main Recommendations of the PARDYP Workshop

- The technical and finance/budget reports for 1997 be approved.
- PRA and gender awareness training for all teams needs to be organized in 1998
- Research priorities should emphasise applied or adaptive research that will build upon indigenous and local knowledge
- The hydromet and soils teams have done an excellent job in 1997, but more emphasis needs to be placed on the identification of indigenous, current, and improved management practices for both water and soil fertility management
- A senior social scientist should be hired by the project to advise and guide all the PARDYP teams in terms of meeting Output 3
- Identification of policies related to local institutions and resource tenures, and their alternatives, formal and non-formal organizational set-ups, and assessing the impact of interventions on productivity, income output, soil erosion, labour arrangements and gender aspects
- The field teams should continue to build up good working relationships with the involved communities, and further strengthen this aspect of the project
- Further attention is required on the conceptual aspects of the project, so that the physical and socioeconomic research components of the project are unified
- "Research for development" is the motto of the project, and more emphasis needs to be placed on on-farm participatory research, the agenda for which has to derive from the communities through PRA activities.

tions (SDC, IDRC, and ICIMOD), by members of the Hydrology Group at the University of Bern, by the PARDYP Country Coordinator and his deputy from China, and by large teams from India and Nepal. Two days were spent in the Indian watershed near Kausani, and the Nepal team spent a further two days after the workshop collaborating with their Indian counterparts.

A new initiative under ICIMOD's Participatory Natural Resources' Management Programme was, **'Widening Horizons - A Regional Workshop on the Role of Locally Elected Institutions in Community Forestry Management in the HKH'** which was held from 16-21 March in Kathmandu. The workshop was organized in collaboration with the Association of District Development Committees of Nepal and the Federation of Community Forestry Users of Nepal. It was supported by UNDP's Regional Governance Facility based at Islamabad, Pakistan, and the Ford Foundation's ongoing support to the PNRM Programme. It brought together multiple stake-holder groups, including elected representatives, community-based organizations, representatives of government agencies, NGOs, and academics and researchers. Approximately 80 women and men from Bangladesh, India, Nepal, and Pakistan participated.

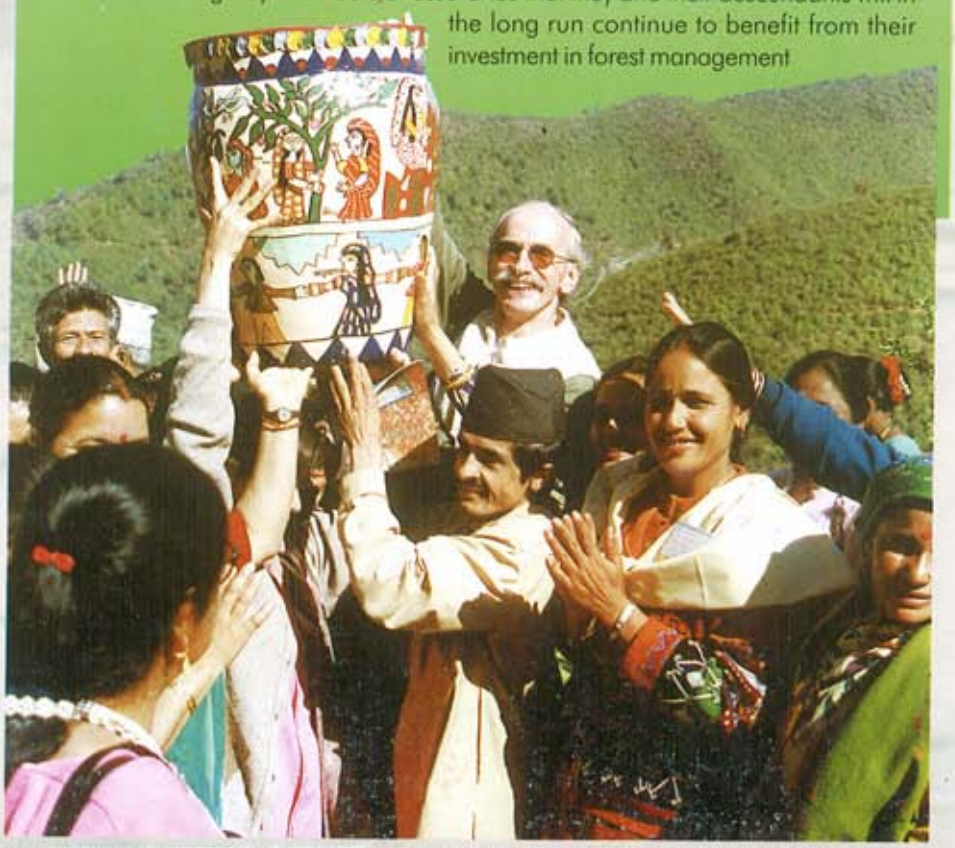
To symbolise the unity in diversity that the meeting was aiming to achieve, an Earth Ceremony was performed during which all participants poured the earth that they had brought from their own areas into a large clay pot brightly painted by women artists from Janakpur. The combined earth was later used in a tree planting ceremony at ICIMOD's demonstration site at Godawari. In addition, as a symbol of friendship and cooperation, every participant took away a farewell gift of a small hand-crafted box filled with the soil from the HKH.

The Hindu Kush-Himalayan Ethnobotany Programme organized a series of four training workshops during

Key Conclusions of the Workshop

The following are the foremost areas of concern identified by participants. These are issues to be acted upon at the local, state, country, and Hindu-Kush Himalayan levels.

- Lack of complementarity, coordination, and consistency between laws, rules, and regulations related to decentralization and the governance of the forestry sector
- Poor participation of women and disadvantaged groups in politics and in community forestry management / user groups
- Poor empowerment of community institutions, preventing them from fulfilling their responsibilities
- Lack of accountability and transparency of locally elected institutions, state forest administration(s), development organizations (both inside and outside of government), and community forest management / user groups
- Non-existent or low levels of involvement of community forest management institutions / user groups in planning, budgeting, implementation, and monitoring of development programmes undertaken by localing elected institutions and other development agencies
- Escalating conflicts and mutual distrust between locally elected institutions and community forestry institutions/user groups, especially in implementing programmes, schemes, and plans
- Duplication of efforts by different institutions and levels of institution, leading to poor use of resources
- Low allocation of resources for local development by locally elected institutions
- The need to influence locally elected institutions so that they can advocate on behalf of community forestry institutions / user groups and vice versa
- The need to strengthen community institutions at various levels, so that the political system can be influenced
- Neglect of issues relating to forest tenure and ownership, depriving current forest user group members of assurance that they and their descendants will in the long run continue to benefit from their investment in forest management



Participants proudly hoist the clay pot containing HKH soil before tree planting ceremony at the ICIMOD Godawari site.

1997. The **Subregional Workshop on Applied Ethnobotany** for participants from Bhutan and Bangladesh was held in the premises of the Bangladesh Forest Research Institute, Chittagong, from December 17-22, 1997. A total of twenty-nine participants and resource persons discussed various topics such as survey methods for ethnobotanical research in mountain areas, non-timber forest products and medicinal plant resources of Bhutan and the Chittagong Hill Tracts of Bangladesh, Bamboo and Rattan resources of the Himalayan region, and home garden family systems and shifting agricultural practices.

Two days were devoted to practical exercises and field exposure in the Paithong village of Banderban district and the Herbal Medicinal Centre in Rangamati district of the Chittagong Hill Tracts.

Two small studies have been supported as a follow up to the workshop (a) The Ecology and Indigenous Management Techniques of Tribal Home Gardens - A Case Study of a Chakma/Marma Tribe of Banderban Hill District, and (b) Ethnobotanical and Cultural Background of the Ethnic Communities in Forest Resources' Management in the Chittagong Hill Tracts. Publication of the workshop are also being compiled for publication.

The Fourth International Conference of the Asian Apicultural Association (AAA), jointly organized by AAA and ICIMOD and sponsored by the Ministry of Agriculture, HMG/ Nepal, was held from 23-27 March in Kathmandu. The objectives of the conference were to exchange scientific information on Asian bees, highlight beekeeping practices and science that are unique to Asia, help define the importance of bee products in Asia (including marketing aspects and strategy), and elicit the importance of beekeeping to a diversified environment.The themes covered aspects such as biology of Asian bees, beekeeping development and extension programmes, beekeeping with Apis mellifera, beekeeping management and economics, bee products and marketing, diseases and pests of bees, melliferous flora and pollination, and agroforestry and the environment.

The programme included two workshops on pests and diseases of bees and beekeeping extension, held on 23 and 24 March respectively. An exhibition was also organized from 25-27 March. Both the exhibition and the conference were opened by Dr. Prakash Chandra Lohani, Minister of Agriculture, HMG/Nepal.

The participants, numbering over 150 and, coming from 24 countries of Asia, Europe, and Australasia, presented about 100 papers and posters. Several resolutions were passed at the end of the conference.

Cheif Guest, Minister Prakash Chandra Lohani, inspecting the beekeeping exhibition

The proceedings will be published by the end of 1998. The Fifth AAA International Conference will be held in Chiang Mai, Thailand, in March 2000.

Call for Articles

Our forthcoming Newsletters, Nos. 31 and 32 will be published in August and December respectively. The former will focus on Biodiversity while the latter will be on Soil Conservation and Fertility Management.

We would appreciate receiving contributions to these two issues in the form of concise and comprehensive articles pertaining to the topics, with examples or statistics from the Hindu Kush-Himalayas, from ICIMOD's partner institutions or individuals from the region. The article should not be more than two pages at the most and should reach ICIMOD by June 15 for Newsletter No 31 and by October 15 for Newsletter No 32. ICIMOD reserves the editorial and publishing rights to the articles.

Staff on the Move

ICIMOD adopts a decentralized approach to programme implementation, functions as a facilitator for access to knowledge and advice, and provides a regional perspective to national and local activities. As such, the staff of ICIMOD are required to make frequent visits to the eight ICIMOD member countries. In addition, international travel is undertaken occasionally to maintain global linkages. It is not possible to recount every visit. Nevertheless, brief accounts of most regional and international visits are provided in this section.

Regional Linkages

BANGLADESH

In December, *Prof Pei Shengji* and *Ajay Rastogi* went to the *Chittagong Hill Tracts* to organize a Subregional Workshop on Applied Ethnobotany (see also programme news). Mr. Rastogi also visited the *Sylhet Sunamgunj District*. The visit provided him with an opportunity to see the north-east areas of Bangladesh that are contiguous with north-east India and face many conflicts, rooted in socioeconomic disparities, in common. He also was made familiar with natural resource sharing arrangements between the two countries.

The Marma Tribe of Bandarban District, the Chittagong Hill Tracts

CHINA

Dr. Tang Ya visited different parts of China from 24 January to 18 February. In *Ningnan*, he met and discussed the implementation of the 2nd Phase of Appropriate Technologies for Soil Conserving Farming Systems' (ATSCFS) Project with the National Collaborating Institutions. He visited several water harvesting, integrated agricultural development, and rural energy development sites. Construction of water harvesting facilities has led to rapid increases in crop yields and cash incomes in the area. In *Baoshan*, the possibility of introducing hedgerow system at the PARDYP (People and Resouorce Dynamics Project) site was explored, and it was recommended that plantation of hedgerow species, bioengineering control of erosion gullies, and the use of nitrogen-fixing plants be adopted for reforestation. In *Chengdu* Dr. Tang Ya discussed detailed work plan for the next phase of the ATSCF Project with the Chengdu Institute of Botany. He then visited the Ecological Experimental Station of Red Soil of the Institute of Soil Sciences in Nanjing with Prof Qiguo. The draft research guidelines for on-farm research of the ATSCF project were discussed with the scientists concerned.

During 9-20 December, *Mr. Anupam Bhatia* travelled to *Kunming* to participate in the National Social Forestry Training Workshop. He attended meetings with the Forestry Bureau of Yunnan and with the Ford Foundation to discuss support and planning for the ICIMOD workshop on Participatory Forest Management to be held in May 1998. On his inward and outward journeys, he had detailed discussions about the workshop with Dequn Zhou in Hongkong.

In March, *Dr. Mahesh Banskota*, the Deputy Director General, made a reconnaissance visit to *Urumqui* with regard to a proposed 'Conference on the Strategic Considerations for the Development of Central Asia' in collaboration with a number of other institutions. The tentative programme, respective responsibilities, list of participants, and the topics for presentation were discussed. While visiting various institutions, Dr. Banskota also took the opportunity to discuss ICIMOD's forthcoming four-year Regional Collaborative Programme.

INDIA

A large group of ICIMOD PARDYP staff, headed by *Mr Richard Allen*, the Project Coordinartor, went to Almora to conduct the PARDYP's 98 Mid-term Workshop (see programme news). The Workshop was opened by *Mr. Egbert Pelinck. MS Jeannette Gurung, Dr. Tang Ya, Mr. Pramod Pradhan,* and *Dr. Moe Myint* attended the workshop. During the visit, Mr. Pradhan and Dr. Moe Myint also met Dr. K. G. Saxena of Jawahar Lal Nehru University and had discussions with him on various RS/GIS-related projects in the HKH region.

From 2 to 4 February 1998, *Dr. N. S. Jodha* travelled to *New Delhi* where he had meetings at the Ford Foundation to report on the progress of the Policy Project and its future direction. At NCAP (ICAR), he discussed the work proposed for mountain areas and at WWF discussions focussed on government policies and recent initiatives in sharing NRM responsibilities with the people. He also had a brief meeting at the World Bank where the Social

Science Group indicated its interest in exchanging experiences and information with ICIMOD .

A team from MENRIS, comprised of *Mr. Pramod Pradhan, Dr. Moe Myint, Mr. Peter Bitter*, and *Mr. Sushil Pandey* visited Dr. Y.S. Parmar University of Horticulture and Forestry, *Solan*, in January to carry out manager-level training on Remote Sensing and Geographic Information Systems (see programme news). *Mr. Egbert Pelinck* attended the closing ceremony and - together with Mr. Pradhan and Prof. Verma, the Vice Chancellor of the University - met various important persons in Shimla: they included Srimati Rama Devi - Governor of Himachal Pradesh, Hon'ble Sri Vir Bhadra Singh – the Chief Minister, and Sri Vidyarthi - the Chief Secretary of HP. The Director General also met with prominent press representatives at the Chan-digarh Press Club.

From 14 to 19 December, a team from ICIMOD, comprised of *Mr. Milan Tuladhar* - Head of Administration and Finance, *Mr. CBS Kansakar* - Personnel Officer, *Mrs. Nira Gurung* - Distribution Officer, *Mr. Suraj Thapa* - Farm Manager and Horticulturist, and *Mrs. Tika L. Gurung* - Executive Secretary visited the International Crops' Research Institute for the Semi-Arid Tropics (ICRISAT) in *Hyderabad*. During the visit, the team members closely observed how the institute deals with various aspects in their respective fields, namely, administrative and financial management, personnel and human resources' management, distribution and dissemination policies and procedures, farm management, and secretarial support.


The DG and the VC of YS Parmar University at the opening ceremony of NARIC.

From 13 December to 7 January, *Dr. T. S. Papola* travelled to *New Delhi, Almora*, and *Triuvanthapuram*. He participated in the Annual Day Function of the G. B. Pant Institute of Environment and Development, Almora. This provided with an opportunity to meet several persons representing various institutions who were familiar with and interested in ICIMOD's activities. He then attended a Seminar on the Informal Sector: Emerging Perspectives on Development organized by the Institute of Applied Manpower Research (IAMR) and Institute for Human Development (IHD), in New Delhi. He then attended the 19th Indian Geography Congress and the Thirty-ninth Conference of the Indian Society of Labour Economics in Triuvanthapuram, Kerala.

From 30 November to 8 December 1997, *Mr. Richard Allen* visited *Almora, Kausani*, and *Dehradun*. The purpose of the visit was to review PARDYP/India's technical and financial status and progress; prepare for the PARDYP' 98 Mid-Term Workshop to be held in Almora in March; prepare the MoU, workplans, and budgets for 1998; and discuss the National Agricultural Technology Project (NATP) at the Central Soil and Water Conservation Research and Training Institute (CSWCRTI) in Dehradun. He also visited the Doon Valley Watershed Management Project where significant work had been carried out in this field. He visited three villages where community activities have taken place in erosion and landslide control, nursery establishment, and promotion of women's groups. Of particular impact was the one-year gender and community training course that was undertaken by both project and project-connected government staff.

From November 24-29, *Dr. Tej Partap* travelled to *Sikkim* to explore areas of mutual interest and cooperation between ICIMOD and various institutions/organizations in Sikkim. During his visit, Dr. Partap met various executives from different organizations. Energy, tourism, micro-hydropower and micro-enterprise development were identified as areas in which assistance from ICIMOD was desired. Another intervention suggested was in the field of Sea-buckthorn.

MYANMAR

Mr. Pramod Pradhan and *Dr. Moe Myint* conducted a one-day seminar on the application of GIS/RS for policy-makers at the Forest Research Institute, *Yezin*. A similar workshop was also conducted at the Forest Department in *Yango* (see programme news).

NEPAL

From February 13 to 14, *Dr. P. Tulachan* and *Mr. Arun Neupane* accompanied *Dr. Mohammed Rais* from IBSRAM to *Dolakha*. The purpose of this visit was to provide Dr. Rais with an overall perspective of sloping land agriculture in the mid-mountains and to meet district agricultural officers and local farmers. This visit provided them with an opportunity to gain insight into the socio-economic conditions of farming practices and to hear about experiences in sloping land agriculture from farmers themselves.

From 26 to 28 December 1997, *Dr. Pradeep Tulachan* went to *Pokhara* as a resource person to participate in a National Networking Workshop on Indigenous Technological Knowledge for Watershed Management (ITK/WM) in Nepal organized by SDC, IOF, and FAO PWMTA. Dr. Tulachan also presented a paper entitled 'Information/Database File for Indigenous Technological Knowledge for Watershed Management - Concepts and Methodology'.

PAKISTAN

Mr. Richard Allen visited *Peshawar and Manshera*, Pakistan, and *New Delhi*, India, from 5-15 January 1998. In Pakistan he met Dr. M. Ashfaque, the new Director General of Pakistan Forest Institute. Mr Allen reviewed the activities to date in the Hilkot watershed and prepared the workplan for 1998. In Delhi he met Dr. Kothyari to review the progress, on the organization of the Mid-term PARDYP Workshop in March 1998. Mr. Allen also gave a presentation on PARDYP to the PFI technical and teaching staff, inspected the ground and facilities at PFI to see if they were suitable for holding a PARDYP workshop at PFI. He had the opportunity of meeting with Mohammad Khan and other PFI-PARDYP staff to discuss progress and plans.

In January, *Dr. Pitamber Sharma* and *Dr. A. A. Junejo* visited *Islamabad* and *Abottabad* to facilitate the NORAD Evaluation Mission in their meetings with partner institutions (as well as trainers and participants) in relation to the NORAD-funded Mountain Tourism and Mini-Micro Hydro Projects. The preliminary observations and outcome of the evaluation were positive. A similar visit was also undertaken to *Pokhara, Birethanti*, and *Butwal* in Nepal and to *New Delhi* and *Roorkee* in India.

In February, *Mr. Shahid Akhtar* travelled to Pakistan to plan and participate in a meeting on the proposed Environmental Information Management Centre in *Peshawar*. The EMIC is expected to perform as a clearing house to empower people to make informed choices for sustainable development. The meeting agreed to create a Task Force to develop a concrete project proposal. Mr. Akhtar also went to *Karachi, Gilgit*, and *Islamabad* to have discussions regarding mutual cooperation, networking, and Internet feasibility study with the IUCN, the Aga Khan Education Services, the Aga Khan Rural Support Programme, the Aga Khan University, NGO research Centre, Sustainable Development Policy Institute, the World Bank, Sustainable Development Network- Pakistan, and the NWFP Agricultural University. All the institutions indicated a keen interest in collaborating.

MAINTAINING GLOBAL LINKAGES

Dr. Tej Partap participated as a resource person at a Study Meeting on 'Sustainable Farming Systems in Upland Areas' from 27 October to 1 November in **Japan**. He presented a paper that focussed on the state of sloping land agriculture. The meeting was organized by the Asian Productivity Organization together with two other institutions. The meeting provided Dr partap with a opportunity to exchange views on problems related to mountain agriculture and to see what various Japanese institutions were doing to solve them – largely through mechanization.

Mr. Pradeep Mool attended an International Symposium on the 'Application of Remote Sensing and Geographic Information System for Disaster Prevention in Tsukuba and Tokyo', **Japan,** in the first week of March. Mr. Mool presented a paper entitled 'Use of Multi-Temporal Data for the Study of Glacier Lake Outburst Floods in the Nepal Himalayas: A Case Study of Tsho Rolpa Glacier Lake'. The symposium was followed by visits to various institutions working in this field.

At the invitation of the Director of the Simmons Institute of Boston, Massachusetts, **USA**, *Ms. Jeannette Gurung* participated in their Case Conference in January 1998 on 'Diffusion of Learning and Implications for Our Theory and Strategies for Change'. The conference provided a forum in which to share ICIMOD's work as well as to discuss methodological and analytical issues for carrying out action research on gender and organizational change.

Dr. Mahesh Banskota, the Deputy Director General, attended a meeting in **Switzerland** to discuss the future of the Mountain Research and Development Journal. The discussion centred around the following: audience and content, production mode, economic aspects, and institutional set up. He then went to **Germany** to discuss the details of the forthcoming meeting on 'Mountains 2000 and Beyond' to be held in Feldafing in June with the German Development Foundation.

In December, *Dr. Li Tianchi* participated in the European 'Conference on Environmental and Societal Changes in Mountain Regions' in **England.** The objective of the Conference was to bring together individuals involved in natural and social science; to review, summarize, and assess the relevance of ongoing and proposed research activities; to identify opportunities and mechanisms that address key issues for global change; and to provide a basis for integrated networking of science and policies related to global change in mountain regions.

COLLABORATION BETWEEN ICIMOD AND ILRI

ICIMOD and the International Livestock Research Institute (ILRI) signed a Memorandum of Understanding to facilitate mutual collaboration in agricultural & livestock related research, development, training, and management activities in the mountainous regions of Asia. The two centers will jointly explore, design, and implement projects that may contribute to production improvement, poverty alleviation, and natural resources' conservation.

Forestry and Key Asian Watersheds *- A. K. Myint and T. Hofer, 70pp, 1998, ISBN 92 9115 7600 Price: US$ 20*

Six major rivers of Asia are studied for the forestry situations in their watersheds: the Indus, Ganges, Brahmaputra, and Mekong are international rivers, whereas the two other rivers studied are the Yangtze and Yellow rivers of the People's Republic of China. Basic information on the geography, climate, hydrological conditions, sediment and water quality, land cover, and socioeconomic conditions of these river watersheds are described. The importance of hydropower potential in the areas and the amounts of erosion and sediment loads are pointed out. Forest resources in each individual watershed are discussed. The main driving forces affecting the forest cover, which include national policies, population growth and poverty, economic development and industrialisation, infrastructure and hydropower production, climate change, and highland lowland interactions are classified and deliberated upon. Prospects for forestry towards the year 2010 assuming various scenarios are discussed. The implications for future action are assessed and recommendations for assessment of forest cover and analysis of the role of forestry in selected meso-watersheds are made.

Rangelands and Pastoral Development in the Hindu Kush-Himalayas- *Daniel J. Miller and Sienna R. Craig, 268pp, 1998, ISBN 92 9115 1580, Price: US$ 20*

The papers in these proceedings seek to address three principal areas of concern: biodiversity, range resource management and pastoral development, and forage development. The workshop itself focussed on identifying crucial issues and determining priorities in order to address rangeland concerns, especially in the light of managing such remote areas at high elevation, sparsely populated, and subject to such harsh climates. Many of the papers demonstrate that there is a need to identify issues and set priorities for action to address rangeland concerns. This unique collection of papers touches on the value of the unique flora and fauna of the rangelands and the need to preserve them in order to conserve biodiversity. Policies are also discussed in the context of their appropriateness to the rangeland systems and in the context of how poor perceptions have led to limited support for livestock husbandry. Strategies for range management are suggested.

NTFPs, Institutions, and Income Generation in Nepal: *Lessons for Community Forestry (MNR 98/1) - D Chandrasekharan, 52pp, 1998, ISSN 1024-7556 Price: US$ 15*

The need to strengthen existing institutions to effectively protect natural resources from exploitation and promote sustainable and equitable economic development for mountain communities, is imperative. There is increasing interest in generating income from forest resources in community forestry programmes. To do this effectively, the development approach must integrate the comparative advantages and constraints of mountain systems. Non-timber forest products, found in Nepal, present a potential means of promoting social, economic, and environmental welfare for rural communities. The increasing commercial demand for non-timber forest products promises profitable returns from collection and value-adding if the necessary institutional support is available. Similarly, the need for a healthy ecosystem to provide a sustainable harvest of non-timber forest products motivates resource conservation. This paper documents four institutional settings in Nepal using non-timber forest products to generate income. The objective is to examine the economic, environmental, and social benefits resulting from these four different approaches from the collectors' perspective. The analysis of these different approaches presents important guidelines for community forestry. The information in this paper is based on research of the literature, discussions with project coordinators, and field work.

Manual of Rural Technology with Implications for Mountain Tourism - ICIMOD and the Centre for Rural Technology *152pp, 1997, ISBN 92 9115 7740 Price: US$ 20*

This manual is a useful guidebook to rural technologies suitable not only for mountain areas involved in tourism but for other areas of the mountains also. It commences by examining tourism and its impacts and the relevance of alternative technologies in this context. The second chapter deals with energy-related technologies and the implications of their use in mountain areas. The third chapter deals with the disposal of human and other waste and institutional arrangements for application of disposal technologies. The final chapter deals with the management of tourist facilities such as campsites, hotels, and lodges. The Annexes give some of the current regulations for mountain tourism in Nepal. This volume has 58 useful, practical figures illustrating the rural technologies given.

Farmer-Led Integrated Watershed Management. This resource book has been prepared by a panel of authors from ICIMOD and FAO. It was put on trial at a regional trainers' training programme, and the comments have been incorporated. This book has been brought out for wider application in human resources' development for farmer-led watershed management programmes.

Mountain Tourism for Local Community Development in Nepal: A Case Study of Upper Mustang *(MEI 98/1) - Kamal Banskota and Bikash Sharma 84pp, 1998, ISSN 1024-7564, Price: US$ 15*

This case study examines the experience of a major NGO in its efforts to improve the possibilities of income generation and local community development through tourism in Upper Mustang.

Mountain Tourism for Local Community Development in Nepal: A Case Study of Phewa Lakeside, Pokhara *(MEI 98/2) - Kamal Banskota and Bikash Sharma 58pp, 1998, ISSN 1024-7564, Price: US$ 15*

This case study examines, the 'tragedy of the commons' as it is played out in the case of Phewa Lakeside, which is rapidly deteriorating through an excess of exploitation, and because there are too many actors planning its future at cross purposes.

Mountain Tourism for Local Community Development in Nepal: A Case Study of Syaphrubesi, Langtang *(MEI 98/3) - Kamal Banskota and Bikash Sharma 52pp, 1998, ISSN 1024-7564, Price: US$ 15*

This case study examines the role of the Quality Tourism Project of UNDP, Nepal, in the improvement of tourism services of Syaphrubesi, a well-known entry point to Langtang National Park.

All prices quoted include the costs of handling and shipping.

VISITORS TO THE CENTRE

Major General Ershad from Bangladesh

1. Dr. Joelle Smadja, CNRS, Paris
2. Prof. Monique Fort, Paris
3. Hameed Ullah Malik, BRSP, Quetta, Balochistan, Pakistan
4. Lobzang Tsering and colleagues, Ladakh Ecological Development Group, Leh- Ladak, India
5. Francis Turkelboom, c/o SNV Office, Thimphu, Bhutan
6. Roger Finan, IDRC, New Delhi, India
7. Prof. Aidaraliev Asylbek, President International University, Kyrgyzstan
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9. Mayumi Yamada, University of London, UK
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14. Susanne Burki, SDC, Bern, Switzerland
15. I.P. Abrol, Rice Wheat Consortium, ICRISAT, New Delhi, India
16. Mohammad Rais, IBSRAM, Bangkok, Thailand
17. Dr. B.S.K. Naidu, Director, (REPSO) Winrock International, New Delhi, India
18. Pat Devlin, Lincoln University, New Zealand
19. Mme Fu Shuqin, Chinese Academy of Sciences, Beijing, China
20. Rafiq Ahmad, Inspector General of Islamabad, Pakistan
21. Dr. A. Aleem Chaudhry, Director, Wildlife Research Institute, Faisalabad, Pakistan
22. Abio Shaban, Chairman, Aga Khan Housing Board for Pakistan
23. He, Shanam, Nanjing Botanical Garden, China
24. Stephen Kelleher, Biodiversity Support Programme, Washington, USA
25. Wendy King, BSP International Community Coordinator, Kathmandu
26. Rana B. Rawal, Team Leader, Ban Udyam, BSP/New Era EFEA Project, Kathmandu
27. H.E. U Tin Latt, Ambassador of the Union of Myanmar
28. Dr. Steve Reynolds, Senior Officer, Grassland and Pasture, FAO, Rome, Italy
29. Dr. Kunner Hansen, AIT, Bangkok, Thailand
30. J. Morki-Hokkonen, Senior Officer, Livestock Development, FAO, Rome, Italy
31. Dr. M. Matsuka, President, Asian Apiculture Association, Tamagara University, Japan (with 10 staff and students)
32. Mr. Rakesh Sharma, Additional Director, U.P. Academy for Administration, Nainital, India
33. Dr. R. M. Ashfaque, Director General, Pakistan Forest Institute, Peshawar, Pakistan
34. Haiden Khan, Member, Northern Areas' Council, Pakistan
35. Ali Gohar, Manager, Natural Resources' Management, AKRSP, Gilgit, Pakistan
36. Muhammad Iqbal, Deputy CCF, Northern Areas, Pakistan
37. Dr. John Cool, C/O The Mountain Institute, USA
38. Prof. Hans Bohle and Elvira Greiner, South Asia Institute, University of Heidelberg, Germany
39. Richard Jones, Director, International Bee Research Association, Cardiff, UK
40. Toni Hagen, Lenzerheide

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