

## Workshop Discussions

---

The International Workshop on District Energy Planning and Management for Integrated Mountain Development explored the concept of energy - centred integrated mountain development. As shown in the Workshop Programme (Annex I), presentations and discussions were divided into five sessions : (1) District Energy Planning Framework : Problems and Issues, (2) Fuelwood Crisis and Solutions, (3) Non - Wood Energy Options, (4) Energy Intersectoral Relationships, and (5) Planning and Policy Issues (Refer Annex 5 : Summaries of Papers).

### District Energy Planning Framework

The first paper in this session, presented by T. M. Vinod Kumar, argues that district energy planning provides a bridge in overcoming limitations posed by micro and macrolevel planning. Systematic and decentralised planning and management are necessary and must be supplemented by flexible procedures for release and transfer of funds, coordination with state and sectoral plans, and monitoring, review and evaluation. The methodology is aimed at changes in resource flows by application of additional sources of energy to improve access to basic needs, increase employment opportunities and promote equitable distribution of income. A multilevel spatial planning approach is advocated to take into account the hierarchies of market service centres and dependent villages, while emphasising supply - receipt relations of various components.

Supplementing the above framework, Dr. Deepak Bajracharya advocated in his presentation the need to incorporate users' perspectives in district energy planning. He highlighted, through field experience, how villagers' perceptions are influenced by subsistence living conditions, existence of inequality, agro - ecological variation, and sociocultural diversity, and how energy may not be perceived as the highest priority when compared with other problems. Participatory action research is suggested as an approach for implementing innovative alternatives in harmony with indigenous knowledge systems and local organisational strengths. The role of the catalytic agent is emphasised in the process of transformation to foster interactions between external resource agents and village residents and to promote active negotiations among them. He concluded that this type of approach presents opportunities for overcoming politico - administrative constraints as manifested by existing top - down biases, technological determinism and inflexible and uncoordinated bureaucratic structures.

In the discussions following the presentations, the issue of whether energy is the top priority in rural development emerged. Though energy is not perceived as a pressing problem in some areas, rapid environmental deterioration throughout the Region calls for raising awareness and taking immediate actions. The existing dichotomy between energy and other problems is not beneficial to meeting the overall challenge of rural development. A holistic, integrated approach is essential, and must be implemented systematically.

Questions were raised regarding how broad the topic of energy should be. The argument was made that while it should include food, human energy, and draught power, the risk of becoming so comprehensive as to lose focus for implementation must be avoided.

The availability of energy technologies generally poses no problem. The challenge is to determine the right mix of technologies to fit location - specific conditions and disseminate them in accordance with villagers' aspirations and priorities. Fixed packages resembling those of the "green revolution" are not suitable.

It was agreed that people's participation should not be pushed so far as to suggest that every action ought to be decided by an opinion poll. Implementation with regard to village - specific problems can be participatory, but planning might have to be done at the district level to meet administrative requirements. The important challenge is to provide a bridge between micro - and macro - approaches so that interaction can take place.

### **Fuelwood Crisis and Solutions**

Dr. S. P. Singh presented the first paper, which emphasised the need to take an ecosystems approach. The author argues that the Central Himalaya has become ecologically unsustainable. A protective system is advocated to encourage additional forest cover and discourage pastoral systems and crop cultivation. In terms of productivity in energy units, the model advocated above is demonstrated to be much more efficient. The major prerequisite is to develop mutualistic relations between the populations in the mountains and the plains. The latter would, in this model, provide food energy in exchange for the revival of forest cover in the mountains, thereby providing protection from hazards of peak floods and siltation of water bodies. Alternative energy schemes such as solar cookers and pumps, improved cooking stoves, microhydel installations, and geothermal energy are also deemed necessary in this endeavor.

Wang Shizhong, in the second presentation, showed how relevant energy techniques are developed in China through fundamental research in laboratories with inputs from scientists and engineers from different institutes. Selected techniques are subsequently tested in "energy villages" to see whether they can be incorporated for comprehensive use in the villages

and how they fit local conditions. If they should prove successful under field conditions, commercialisation of the product is promoted on a large scale. Local manufacturers and entrepreneurs are provided with technical information including drawings and design specifications through special training programmes. Rural household members are at the same time educated and encouraged to adopt new products.

In Dr. Kk. Panday's paper, he emphasises the need to reconsider the fodder problem, stating that there is a tendency to overlook this aspect while considering deforestation. The paper highlights the important role of rural people in planting forest and fodder trees. Examples are cited from Nepal, to show how farmers have successfully organised locally to protect natural systems. The need to bring community forestry from the village panchayat level to individual communities is stressed. Considering the projected increase in ruminant animal population by the year 2000, emphasis is placed on the need for active and effective government response to people's programmes. Case studies concerning the manufacture of dairy products are described to show how fuelwood requirements led to deforestation. This has not, however, impressed planners sufficiently to encourage appropriate measures.

The last paper of the session was presented by Dr. T. B. S. Mahat. The paper highlights the role of hill farmers in preserving and improving the fragile environment of the Himalaya, emphasises that forest biomass is the main source of energy, and argues that it will remain so for several decades to come. Alternatives suggested so far are too expensive to be taken seriously as viable substitutes. The confusion caused by widely varying data on forest and forest biomass was also mentioned. The need for a reliable data base is stressed, and the need to extend community forestry programmes to government - owned land from common land is emphasised. The speaker also advocated promotion of better management of existing forests. Considering the gross inadequacy of the resource base for meeting rural needs, the paper highlights the role of agroforestry in solving rural energy problems.

A lively debate took place concerning the proposal that the exchange of wood from the mountains with food from the plains must be promoted. Objections were raised that this ignores sound practices regarding agroforestry and agricultural systems practised in the mountains. It was argued that greater dependency of the mountain people on the plains people would be created. Mountains are not homogenous. There are areas where specific types of cropping are suitable. Valleys and sound terraces do exist where efficient agricultural systems have been practised for ages. Selective choice of areas where the proposal would be implemented is clearly necessary. Given the vulnerability of the mountain ecology, however, radical alternatives might have to be considered. Suggestions were made that pilot projects utilising action research methods be tried out, particularly with respect to marginal agricultural areas.

The point was raised during the discussions that exotic fast - growing species, such as *Leucaena Leucocephala*, have not done well in the mountain

region. Greater emphasis should be given to systematic scientific studies on indigenous fast - growing species under various climatic and soil conditions. The use of these trees for producing hydrocarbon is debatable. A systematic study on indigenous fast - growing species was reported from Tata Energy Research Institute in India. Exchange of information and sharing of experiences between countries would be valuable in this regard.

An important issue was raised concerning reluctance of donor agencies to invest in agricultural development in the mountain / hill areas. Their perception is that much of the agricultural land is of marginal nature and hence the return is less promising. This is most unfortunate, given the increasing problems caused by the inability to produce enough food crops to cope with mounting population pressure.

Questions were asked about the importance given to fuelwood production in China. In general, greater emphasis is placed on the use of animal waste for fuel production and the forests are preserved for maintaining ecological balance. The situation in mountain regions such as Tibet may be different. The Seventh Five - Year Plan includes the extension of energy testing villages to Tibet.

People's participation was again discussed. It was felt that village - level activities should be increased and that governments be more responsive to people's programmes. This will help change top-down planning approaches in efforts to improve rural quality of life, including satisfaction of energy needs. Local people's knowledge of local resources, particularly of indigenous fast - growing species, must be utilised and greater efforts should be made to identify suitable local species for fodder and forest plantations.

### **Non - wood Energy Options**

Two papers on micro and minihydro were presented in this session, along with one on geothermal energy. Dr. D. P. Sen Gupta pointed out that despite great potential and obvious benefits, micro and minihydro projects have received low priority. Big hydel projects continue to get attention, as evidenced by the increase in capacity from 2300 MW in the late 1940's to 46,000 MW today. The proportionate increase of small projects is much lower, (e.g. from 40 MW to 168 MW). The apparent reasons are that decentralised small hydel projects are expensive because of problems of access and absence of infrastructure in mountain areas. In addition, the load factors tend to be low. Most importantly, however, the Central Electricity Board gets much less return from small projects than from big schemes. This points to the need for a separate small hydel board whose primary task should be to promote small projects. An important factor to be considered in their promotion are the social benefits derived.

Dr. M. Abdullah focused on the proven benefits of small hydropower. He stressed the need to adopt a nonconventional approach to such development, whereby maximum efficiency and high costs are compensated by moderate efficiency and much lower costs. The nonconventional approach emphasises community involvement, greater innovations and use of local materials. A case in point is the efforts of the Appropriate Technology Development Organisation of Pakistan to develop and disseminate hydropower technology in the villages of the Northern and North West Frontier Provinces. By relying on people's participation and local resources, benefits such as increased awareness of the development process, employment generation ; and low costs accrue. Experience suggests that small microhydro schemes, if implemented along nonconventional lines, offer the best solution for remote areas.

Zhang Mingtao reported that approximately half of the national hydrothermal zones lie in the Himalaya - Hengduan Region. Geothermal resources have been exploited in Yangbaijan field, northwest of Lhasa, since 1975. This provides 60 - 70 per cent of Lhasa's energy needs during winter. Potential is high for geothermal development for Xigaze, Shiquanhe, Naggu and twenty other residential areas. Power for processing livestock products at Ganzi, wool products at Kangding Wool Mill, and tea and rubber processing in southern and western Yunnan are examples of how geothermal energy has been used.

During the discussions it became clear that a common characteristic in rural areas of the Hindu Kush - Himalaya is very low load factors, which indicates the tremendous subsidy required for rural electrification. Furthermore, grid extension is not always possible and is often cost - prohibitive for mountain villagers. Along with open subsidies are hidden subsidies and this is true for urban electrification as well. However, for harried government officials, electrification is an easier option than development of alternative energy sources. For national planners, small isolated projects attract little attention. For these reasons alone, other options are often ignored.

To overcome low load factors, an approach is to start with end use planning. Microhydel installation then should include concurrent development of other schemes for increased agricultural activities and horticulture, and promotion of small - scale industries. Such an approach would require credit arrangements and other incentives for comprehensive schemes.

### **Energy Intersectoral Relationships**

Dr. Pachauri began by presenting an approach for examining energy-employment interrelations. He suggested a time allocation approach would be suitable, as it permits examination of changes in household labour time allocation on account of changes in other variables like travel time, wages, prices of raw materials, and resource availability. As far as time allocation to energy is concerned, it was pointed out that the growing fuelwood crisis would

result in shifts from other activities, with consequences for household income and output. More work is required to understand these relations.

Other issues raised were the possibility of increasing agricultural employment based upon expanding the coverage of the "green revolution" and the significance of off - farm activities in general, and particularly for women, whose nutritional status is relatively low compared to that of men. The need for greater understanding of the consequences of growing energy scarcities in hill economies, the role of forests in sustaining employment generation in the hills, the need for investments in development of technology and skills, and the search for measures to improve the socioeconomic status of women were emphasised as issues deserving greater attention in the future.

Dr. Sharma and Dr. Bhadra argue that changes in energy - based inputs per unit of land and outputs for some hill areas indicate substantial increases in energy consumption with little change in output. The increasing energy intensity of agriculture has significant implications for deforestation, substitution among energy inputs, distortion in choice of technology, and financial liability for the government. It is argued that measures to remove market distortions, promotion of research on intercropping, and enhancing efficiency of energy use are critical. The appropriateness of the extension system must also be evaluated.

The second part of the presentation emphasised the need to examine the potentials for multiple use of any energy technology. Given the problems of access in the hills and the consequent transport costs, it is necessary to explore the potential for production of fertiliser using electric power. Although initial experiments in Nepal have not been encouraging, further work is needed in this critical area.

Dr. Huang Zhijie explained that biomass is the major source of energy for rural areas and will continue to play a critical role in the future. It is therefore necessary to identify ways by which available biomass can be used as efficiently as possible. Direct use of biomass as energy or as fertiliser is not as efficient as when it is used to diversify rural production through integration with livestock, fisheries, and even useful insects. Examples of such diversification using the biogas system currently in practice in China were highlighted. It was pointed out that all available energy inputs should be used efficiently so they are mutually complimentary.

A detailed analysis of *jhum* (slash and burn) agriculture as practised in northeastern India was provided by Dr. Ramakrishnan. A 10 - year cycle was argued to be the most desirable in terms of sustainability. Population increase and dispersion have, however, been instrumental in reducing the *jhum* cycle to four or five years. The ecological balance is consequently distorted. Serious and urgent attempts are needed to bring about an appropriate transformation. Economic activities need to be diversified through the promotion of horticulture and plantation crops, intensification of animal husbandry practices and improvement of agroforestry systems. The challenge lies in

public intervention for development programmes in which government agencies act as catalysts and the local people take part in design and implementation. The importance of using the village as the focal point and involving the people as much as possible in any decision making affecting the development of the area was emphasised.

Questions were raised during the discussions about the sustainability of the slash and burn system to support a growing population. It was argued that despite its efficiency in using natural processes to restore soil fertility, it is fundamentally a low - density system, increasingly unable to cope with growing demands.

The point was made that it is insufficient to concentrate on shortages of water and nitrogen in hill agriculture ; shortages of other non - nitrogen nutrients exist. The availability of organic manure is critical for providing these nutrients.

The fact that China has started energy schools where children are being exposed to energy problems, options, and potentials is an innovative approach which aroused much interest among the participants.

### **Planning and Policy Issues**

The first presentation, by Wang Hai, illustrated the fact that the traditional fuels of animal dung, fuelwood, and grass account for three - quarters of the energy consumption in Tibet. Eighty per cent of the energy is used in the domestic sector. This pattern poses a continuing threat to ecological balance. Absence of coal, oil, and gas contributes to a 70 per cent dependency on external energy resources. The plan is to orient energy development to parallel economic development. Policy guidelines include : creation of a prosperous economy, reliance on private and collective enterprises according to market trends, open door policies, and maintenance of autonomous status. Emphasis is on development of agriculture and animal husbandry, as well as mining, tourism, and service industries. Low education levels and difficulties in disseminating scientific and technical advances need to be overcome.

Priorities are accorded to establishment of electricity supply facilities for use in the domestic sector and light industry. The region has the highest hydropower potential in the country, and geothermal and solar potentials. These resources, plus wind energy, should be exploited. Emphasis is on small - scale construction to suit local conditions. Together with efforts to improve technologies, the government will continue to provide assistance for energy development. The application and popularisation of fuelwood forests, improved stoves, and biogas generation should be promoted.

Ganesh Ram Shrestha emphasised the urgent need to develop cheap and reliable sources of alternate energy including microhydro plants, biogas plants, and improved cooking stoves. Water and biomass constitute the major sources of renewable energy in Nepal. Decentralised energy planning can be adopted as the means of involving local people's participation, mobilising local skills and resources, and strengthening private sector enterprises, which are all important for successful alternative energy development. The experience of the Agricultural Development Bank of Nepal in relation to the Small Farmers Development Programme and Appropriate Technology Unit was explained in this context.

One fundamental question which emerged repeatedly during the discussions is, "Energy for what?" Energy development is not synonymous with development; it is a part of the process. This process must be strengthened and made flexible for decentralised planning and management. Major public sector resources are required for energy development. Currently, national and local levels of administration are emphasised; a middle level must now be sought. It may be most appropriate to call this "decentralised level planning" rather than "district level planning" given the variation existing in the Region.

Many considerations complicate the relatively straightforward goal of supplying energy in an economically and ecologically sound manner to promote rural development. The lack of planning capability at the district level, restrictive sociopolitical structures, power and resources in central line agencies, absence of sectorial interlinkages at all levels, and limited private sector investment capacity are a few examples. Regarding district level energy planning and management, it is idealistic to have energy specialists in each district. Concurrently, planners in central energy development institutions are unable to accurately assess the needs for appropriate development. Integrated extension workers, who can judge needs at the village level, obtain technical assistance from a variety of sectoral agencies, bypass mid-level bureaucratic procedures, and identify ongoing trends and local efforts deserving of government support, provide a possible solution to some of these constraints. Another fundamental question is, "How can political will be influenced?" It is not enough to stress the importance of energy development, or to raise awareness. Demonstration - cum - production centres such as China's energy villages, in areas with high potential, can effectively prove the importance of energy within the socioeconomic system. Although conflicts of interest may exist between national, district, and local level planners, planning needs to be carried out at all levels. Conflicts should be anticipated and diffused.

Existing programmes are highly fragmented within relevant agencies. Lack of integration within and between agencies confuses villagers and has led to fiascoes such as increased and improved goat herds eating all the increased and improved fodder. Rural development planners need integrated extension training; involvement of non-governmental organisations is recommended. Research and planning for animals and fodder production are often ignored in national planning, and should be included.

People's participation at the local level is essential. Means to mobilise local level involvement include credit allocation, profitable employment opportunities, and discussion with local leaders. Provision of credit on a package basis (e.g. livestock and biogas plants) has proved effective in Nepal. This credit is extended to farmers through Appropriate Technology Units made possible by Nepal's Decentralisation Act. Also, the Small Farmers Development Programme has proved that small farmers can effectively organise themselves for credit extension and programme implementation.

Training is an important part of successful decentralisation. As people in rural areas often regard government planners with suspicion, it must be ensured they perceive that their well - being is of major concern. Education of young people is effective. Monitoring and evaluation are critical for feedback to improve technology and management systems; existing village studies need to be analysed and district level planning experiments carried out.

In order for rural energy planning to benefit a majority of the population, local incomes need to be raised to allow investment in energy. Provision of indirect subsidies (e.g. at the manufacturing level) can be effective. While localised successes such as energy villages cannot be expected to have a spread effect without central level planning toward this end, it is important for specific actions to be taken for particular areas. Waiting for the best approach or searching for the right preconditions may stand in the way of development of extension programmes necessary for integrated rural development.

#### RESEARCH

#### TRAINING

- Policy Analysis and Planning
- Energy Linkages with Other Sectors
- Monitoring and Evaluation

*Policy Analysis and Planning.* A more effective planning and policy framework requires a multilevel spatial planning approach through participatory methods. Applied research is needed to understand the role of catalytic agents in promoting participation and determine the needed training of such analysts. Another important research area relates to the integrated approaches of technology development and dissemination, as exemplified by the Chinese energy village approach. How can these approaches be transferred elsewhere to diverse conditions and complementary to local types of multilevel energy planning? What are the institutional and organizational innovations necessary for large-scale commercialization of appropriate energy technologies? An appropriate applied research programme can help answer these questions. Similarly, impacts of energy pricing and subsidy policies constitute another priority area for policy research.