

INTRODUCTION AND OBJECTIVES

Introduction

In Nepal, pressure on natural resources, caused primarily by an increase in population but also augmented by the demands of economic development, has reached a point where serious concerns regarding the environmental sustainability of the process are being voiced. The pressure is more serious in the case of forests because the demand for fuelwood, fodder, timber, and other forest products has led to a use of forest resources that is far beyond their regenerative capacity. The pressure is further accentuated by the demand for additional land for cultivation, which in most cases is procured at the expense of forest land. The end effect of these pressures is felt in terms of the disturbance in the symbiotic relationship between man and nature leading to a resource use pattern which is at variance with the long-term sustainability of the environmental system.

While the pressure on natural resources is one side of the consideration, the other side, which is equally important if not more, concerns the well-being of the Nepalese people. Because of the agrarian nature of the economy and its subsistence orientation, a continued dependence on natural resources is necessary for material well-being and for the attainment of an improved standard of living. The latter cannot be visualized under the existing conditions of low level energy consumption derived primarily from forest-based biomass sources. Technological inflexibilities and inadequacies in the utilization of biomass energy further aggravate the problem.

The spatial distribution of the demand for energy adds one more dimension to the issues at hand. The majority of the population resides in rural areas; the urban population in Nepal constitutes less than 10 per cent of the total population, and this is where energy supply needs to be enhanced. However, apart from forest-based biomass fuel, agricultural residue, and animal dung, the rural population has very limited access to commercial energy. It is not possible to visualize a significant increase in the supply of commercial energy in the short run as this would not only entail energy imports on a larger scale but would also require a better and more efficient distribution network inside the country, and this is not possible with the present level of transport infrastructure. Forest-based biomass supplies, as already observed, are on the decline. Thus, the only attractive option left is to exploit those alternative energy technologies which exhibit promise in similar conditions. It is in this context that rural energy and related technologies occupy an important place in the management of the energy sector in Nepal.

Nepal is estimated to have consumed about 9 million tons of coal equivalent energy in the fiscal year 1989/90. The forests, which provide the bulk of the energy used in the domestic sector, accounted for slightly over three-fourths of the total. Petroleum products, coal, and electricity together contributed only 5 per cent. The remainder comes from agricultural residue and animal dung. The continued heavy reliance on the forests to meet

energy needs, especially in view of the increasing population and decreasing forest area and density, is likely to impair Nepal's ability to promote environmentally sound and sustainable development strategies. Evidently, there is a need to gradually move away from forest-based energy sources to other renewable forms of energy in order to maintain the environmental health of the nation.

With a predominantly rural population, the shift from forest-based energy to other forms cannot be easily attained. To some extent, petroleum products can substitute fuelwood use in the domestic sector. But, since they are not available domestically, they have to be imported and thus are subject to external exigencies. Periodic oil shocks are difficult to absorb and affect the economy of small nations adversely. Moreover, imports of petroleum products involve convertible currency and are an unattractive proposition when trade and payment balances are negative. Finally, situations of uncertainty, such as the one created by the recent Gulf War, further emphasise that too many factors interplay to make the oil supply situation extremely volatile.

Electricity is not accessible to a large number of rural households. It is unlikely that grid electricity can be made available to the rural population residing in scattered hill villages in the near future. Extending grid coverage to the rural hills is extremely costly. Besides, the generation costs and system losses are also very high in Nepal. However, in the rural *Terai*, the area covered by the electric grid can be increased.

While there are constraints, there are also opportunities. There are numerous rivers and streams that can be a source of power; both mechanical as well as electric. The mountains and hills of Nepal receive sufficient solar radiation to be transformed into power. Similarly, the *Terai* and lower valleys have enough biomass and organic waste to use in the production of biogas. As potentials are location specific, exploitation must also be within the same location. This calls for a strategy based on the framework of decentralised energy planning and management. Alternative energy technologies, that prove to be technically and economically feasible as well as socially desirable, should be an integral component of this decentralized framework.

ICIMOD's own experience in this respect clearly shows that such an approach is essential in addressing location-specific problems in a heterogeneous mountain environment and in building local capacity to absorb new alternatives for increasing energy input as well as for adopting energy conservation practices. District energy planning programmes, conducted in some of the member countries of ICIMOD, have also highlighted the need for investment in the learning process before definitive and replicable plans and programmes are possible. Existing institutions were seen, by and large, inadequate for promoting a decentralized approach. Thus, a fresh look at policy analysis and planning, energy linkages with other sectors, and monitoring and evaluation of various energy projects were seen to be necessary.

Nepal already has some experience in the use of these technologies. Micro-and mini-hydropower technology, biogas technology, the tapping of solar and wind energy ,and improved cooking stoves are promoted in Nepal through various agencies. These agencies are in the private as well as in the public sector. Numerous donor agencies and local organisations are involved in promoting alternative energy technologies through financial and technical support. While considerable progress has been made in promotion and dissemination of such technologies, still more could be done by sharing experiences of successful and problematic cases. To achieve this, a periodic exchange of views on energy programmes is essential. It is for this purpose that the Agricultural Development Bank of Nepal (ADB/N), the Water and Energy Commission Secretariat (WECS), and the International Centre for Integrated Mountain Development (ICIMOD) collaborated to sponsor and conduct a seminar on rural energy and related technologies.

Objectives of the Seminar

The overall objective of the seminar was to explore alternative approaches to energy development that are sustainable and which are guided by the principles of decentralised development with emphasis on the use of renewable resources. More specifically, the seminar aimed to:

- (a) examine the energy sector and its components in the context of the sustainability or unsustainability of the present approach;
- (b) examine and evaluate technologies and institutions that exhibit the potential to promote alternative energy development based on renewable resources;
- (c) analyse the existing policies, investment priorities, and funding arrangements in order to identify areas that are compatible with the new approach;
- (d) create awareness and promote dialogue among various agencies working in Nepal- international agencies/donors, national institutions, and local organizations-in the context of the issues, options, and possibilities that exist to promote a sustainable energy pathway; and
- (e) arrive at broad consensus on a future programme and plan of action for the involved agencies.

The Seminar initiated discussion on the above issues among policy-makers, researchers, planners, and implementers involved in energy-related areas. Donor agencies and financing institutions also participated in the seminar.

The Seminar Programme and the Participants

The seminar programme is in Annex 1 and the participants' list in Annex 2.

The seminar was inaugurated on March 26th and the technical sessions took place the next day. Three papers were presented during the morning session and two more during the afternoon session. The first paper to be presented was 'An Assessment of the Energy Sector in Nepal'. This was followed by a paper on 'Development of Micro-Hydro Systems in Nepal'. 'Application of Biogas Technology in Nepal' was the last paper to be presented during the morning session. During the afternoon session, a paper on 'Biomass Production and Conservation of Energy through Improved Cooking Stoves in Nepal' was presented followed by a paper on the 'Role of Solar and Wind Energy in Nepal'. Each presentation was followed by a commentary on the paper and then discussion was open to the floor. This provided scope for discussion on issues of relevance to the seminar. The chairman of the morning and afternoon sessions briefly summarized the main points presented and the discussions that took place thereafter for respective sessions.

The third day of the seminar began with two video shows, one depicting alternative energy technology in action and another showing an Energy Village in Chengdu, China. The participants were then divided into four groups. The first group discussed a 'Rational Approach to Rural Energy Planning'. In all 12 participants took part in this discussion. The second group, composed of 12 members, discussed 'Planning and Implementation of Micro-Hydro Technology.' 'Planning and Implementation of Biogas Technology' and 'Planning and Implementation of Energy Conservation Measures' were discussed by the third and the fourth group respectively. There were 11 members each in the third and the fourth group. The group discussion and preparation of group reports took place during the morning session. The group chairmen presented their reports when the seminar reconvened for the plenary session in the afternoon. These reports were then discussed and approved with minor additions or modifications.

Before the conclusion of the seminar the heads of the three sponsoring institutions briefed the participants regarding future plans of action and/or the lines of thinking of their respective institutions.

A total of 64 participants attended the seminar.