

### Introductory Remarks

**Dr. A.A. Junejo**, Project Coordinator of the MMHP Project welcomed the participants and outlined the background and purpose of the Consultative Meeting. He stated that this was a very important occasion for ICIMOD and proponents of private/decentralised MMHP in the region, because the participants were going to review the status of MMHP within the region as well as the associated problems and issues. He stated that the Consultative Meeting was being organised under the auspices of a NORAD-sponsored project on MMHP being implemented by ICIMOD, the main objective of which was to assist the countries in the Region to facilitate the growth of MMHP, especially in remote and inaccessible areas. Dr. Junejo also gave some details of the activities and outputs under the project. He further explained that experts in the field having working experience in the Hindu Kush-Himalayan Region were participating in the Meeting.

**Dr. Mahesh Banskota**, Director of Programmes of ICIMOD, spoke next and welcomed the participants and the Chairman of the Session, Dr. Binayak Bhadra. He then gave a brief overview of ICIMOD, its main concerns, and its various energy-related activities and programmes and explained that ICIMOD's main thrusts were to support the development of national capacities; since, ultimately, the task of integrated mountain development has to be accomplished by national institutions. International agencies, such as ICIMOD, provided assistance so that these agencies could achieve the desired goals. Dr. Banskota also stated that ICIMOD accorded high priority to energy for mountain development. In fact, one of the first programmes introduced in 1984 was an assessment of the rural energy situation and available options. This was followed by a comprehensive programme on 'District Energy Planning and Management for the Mountain Districts of the Hindu Kush-Himalayan Region' and involved a major training programme for planners and implementers at the district level. Energy was a very important input for economic activities in mountain areas, such as sustainable agriculture and cottage industries, and decentralised development of indigenous resources, such as MMHP, which also has clear environmental and local socioeconomic advantages, could play a significant role. However, it was also necessary to demonstrate its viability, both economical as well as technical. Dr. Banskota hoped that the experts attending the Meeting would look at the pros and cons of MMHP thoroughly and put forward practical recommendations to make MMHP an important energy resource for alleviating the energy crisis in mountain areas of HKH Region.

**Mr. Odd Hoftun**, from Butwal Power Co. (a private enterprise), then gave a brief perspective of MMHP as a useful energy resource based on his 30 years of experience in Nepal. Mr. Hoftun stated that even the smallest Micro-Hydropower (MHP) Plant was a fully-fledged power plant having most of the traditional components and prone to the usual hazards, e.g., floods, landslides, etc. If the engineering was faulty and the components failed then the consequences were also similar to those of larger plants; although the resulting damage might not be so serious for the area or the people, and it could be redressed more easily. This was an important advantage of MMHP over larger HP plants. Nevertheless, failure would cause serious loss and distress to the owners and the beneficiary community. Therefore, mistakes or short cuts in design, construction, and operation should be avoided. This could be done by referring to design books, of which some excellent ones were available. Another

important factor about hydropower sites, including MHP, was that each site was different. Therefore, standard designs must be adapted and modified to suit each site. Technical problems were perhaps the easiest to deal with, whereas other problems, especially economic ones, were more difficult. Mr. Hoftun stated that, in the case of MMHP, it was usual and practicable to cut costs through using simpler equipment and using less gadgetry. However, one must be careful not to compromise performance and expected life. It was accepted that MMHP was very practical. However, in order to make it succeed in a given situation, something more than practical smartness was needed, and this was vision: the vision of local entrepreneurs, community leaders, promoters, and installers.

Mr. Hoftun went on to add that rural electrification was rarely economically viable in the short run; unless a well-developed cash economy already existed which made electricity affordable for ordinary people, and not just for lighting. In order to make rural electrification work, its distribution must also be given full attention, in optimising costs, inculcating safety, and promoting proper and productive use. The latter was perhaps the most important factor in determining the economic viability of plants, especially in economically weak rural areas.

Mr. Hoftun explained his own vision concerning rural electrification. He believed that electricity could influence the unhealthy trend of migration to larger cities. Apart from the lights shining from hill villages, it was also necessary to facilitate the productive use of electricity for irrigation, agriculture, and light cottage industries. The Government could assist by establishing a framework of regulations to encourage private entrepreneurs to move their businesses to rural areas. Other agencies, such as NGOs, could also play a part in decentralising the economy through rural industrialisation, development of utilities, and establishment of infrastructure. In this way, the population pressures on big cities could be reduced and the waters of the Bagmati could become clean once more.

### **Keynote Speech by Mr. Ueli Meier**

Mr. Ueli Meier<sup>1</sup>, former Director, SKAT (Switzerland), and currently managing a development and consulting firm dealing with energy-related technologies, then delivered the keynote address. Mr. Meier noted that, in order to achieve sustainable development, assessing the real needs of the ICIMOD member countries was a sound strategy. The same criterion must apply to mini- and micro-hydropower development; i.e., assessing the need for and applicability of its output. Unfortunately, this was not being done at present; therefore, only a fraction of schemes were sustainable. One must work towards long-term sustainability of MMHP schemes. At present, various influencing factors were not so clear in this respect. Therefore, ICIMOD's initiative in organising the current meeting in order to exchange ideas and experiences was very welcome. Mr. Meier then elaborated upon two key issues related to the success of MMHP, (i) the basic philosophical concepts and (ii) the implementation aspects, including technology. Touching upon the first category, he suggested that it was important to avoid a major risk of failure and to start with smaller (micro) installations for learning and experience. One should also be careful about reliability standards and the ensuing costs. Unfortunately, it was not easy to make decisions on the drawing boards and the most optimum mix could be arrived at for a given area through experience only. Usually, as more experience is accumulated and plants become popular,

---

<sup>1</sup> Mr Meier has many years of experience in developing countries of the HKH Region and has contributed towards development of indigenous technologies for MHP, especially in Nepal.

technology and sizes could be upscaled. Thus, the basic issue to be addressed was what should be the level of quality control and safety standards for MMHP for a given area/sub-region. With regard to the financing and economic concepts, Mr. Meier stated that, in order to satisfy private investors or communities about reasonable returns or benefits from their investments, local opportunities for the sale of energy must be assessed along with the willingness and capacity to pay the bills and, of course, the total consumption. The economic feasibility of plants must be computed in this way. Subsequently, the level of amortisable capital may be established on this basis and the remaining (non-amortisable) component may be computed for the project and arrangements should be made to secure the non-amortisable investment from other sources. Government support through policies and fiscal assistance were also necessary, including delicensing, waiving water royalties, and facilitating feeding into national grids. There were signs that some governments had taken steps in the right direction, but more needed to be done especially in those countries that have not made much progress. Governments could also help by enacting and implementing legislation on environmental controls.

Mr. Meier then touched upon the reliability issue; explaining that keeping investment costs very low might be desirable for planners but could compromise the reliability of a plant. This may only be tolerable in the case of lighting applications. However, if viable plant factors, which were necessary for reasonable economic returns, were to be realised, efforts must be made to promote more productive power uses for business and industry. For such applications, supplies must be regular and reliable in terms of time, quality, and quantity. Ingenious efforts were needed in this respect, both in the generation as well as in the use of power.

In the context of isolated or grid-connected schemes, Mr. Meier remarked that, although the latter had more sophisticated equipment and were more expensive, they were easier to operate since the main aim was to produce maximum power, 24 hours a day. Isolated schemes, on the other hand, were more difficult in terms of operation, management, and supply. He, therefore, suggested that the ultimate objective should be to interconnect all the isolated units eventually, and, for this, the electro-mechanical design should have such a provision. While suggesting standardisation of MMHP equipment, the diversity of sites and the number of units being produced must be given due consideration. Generators, turbines, and other electro-mechanical components should be standardised if they were being produced in sufficient numbers.

With regard to design and implementation issues, Mr. Meier stated that the training of managers and operators was very important. However, actual working experience with a plant could not be fully replaced by training. The training aspect should, therefore, include implementation of some MMHP schemes in a given area for the purpose of training-cum-demonstration. It was also important to determine and match optimum plant capacity with the potential demand during planning. Availability of adequate discharge during the dry season must also be given due consideration in determining the plant size. Over-designed schemes were unnecessarily expensive and inefficient. Mr. Meier further explained that cost saving was an important and desirable aspect of MMHP schemes; however reliability and performance should not be compromised. On the contrary, in order to make the plants more reliable and efficient, additional expenditure was a better option.

Mr. Meier also noted that, in the case of private MMHP schemes, many diverse parties were involved. Therefore, coordination between them and assignment of responsibilities were

important tasks for the main implementing agency. It was better to put things down in writing. In the case of management and operation also, it was important to delineate duties and responsibilities clearly.

### Chairman's Closing Remarks

The Chairman of the Session and the Chief Guest, Dr. Binayak Bhadra, then addressed the Session. He stated that achievements in this field in Nepal were encouraging; however the question of the role of MMHP in overall power sector development and utilisation must also be addressed. The general feeling amongst planners was that '**small may be beautiful, but large is cheap**'. At the same time, it was also accepted that the answer was neither completely small or large; but each size should be area-specific and MMHP was clearly the answer for meeting the energy needs of the more disadvantaged, remote and inaccessible communities. Another important aspect was competition for MMHP installations, amongst both manufacturers and implementers. Many governments in the Hindu Kush-Himalayan Region had now allowed the private sector to compete in power generation and distribution. This had opened new avenues for indigenous MMHP plants. Institutional set-ups had also to be developed to cater for decentralisation and the ensuing aspects such as tariffs, improvement of efficiency, and so on.

Dr. Bhadra also pointed out some other pertinent issues that had recently emerged, such as conflicts in water uses, including irrigation. He suggested that, in due course, the overall development of a watershed needed to be considered, including water resources development and usage. End-use diversification and enhancement was another important issue. Dr. Bhadra believed that, if attempted properly, MMHP could contribute significantly towards diversification of the rural economy. Thus, the development of MMHP should follow the bottom-up approach; i.e., working out and promoting the demand and end-uses and then developing MMHP sources accordingly. The costs of indigenous MMHP should also be given due consideration. Research and Development and other efforts needed to be increased to bring about a breakthrough in this area. Training was also a very important contributor to the success of MMHP. The current efforts in this area were not so successful. Training aspects for various groups needed to be planned properly with clearly defined objectives. ICIMOD could also play an important role in this area by developing and conducting such programmes for the region. Finally, Dr. Bhadra thanked ICIMOD for organising the Consultative Meeting and for inviting him to share his views and concerns with the participants.

Concluding the Inaugural Session, Dr. Junejo thanked the Chief Guest, the resource persons, and other participants for attending the Meeting.

Session Two of the programme was taken up with discussions on the structure of the meeting and the expected outputs. The participants suggested that group discussions for one full day were probably too long and that certain delegates might like to move from one group to another. Therefore, it was decided that the groups would hold discussions for two hours initially and then report to the plenary session for discussions or suggestions. After lunch, the groups would be reformed and continue their deliberations to formulate conclusions.