

# Chapter 3

## Institutional Framework for MMHP Development

### 3.1: Introduction

It is now well known that the mountainous areas of the HKH Region have adequate potential for MMHP which can be exploited to meet the energy needs of the population, as well as to contribute towards the development of these areas. However, given the specific conditions of this region, i.e., very low level of development, poverty, scattered and sparse population, inaccessibility, and overall lack of infrastructure, physical and institutional, development of this appropriate and indigenous resource has not really taken off.

While grid extension is a standardised approach to electrification of rural areas, and favoured by the principal utility agencies, it is usually not economical under the specific conditions mentioned above, mainly because of widely scattered demand centres and very low levels of demand per capita. Therefore, isolated, indigenous, and relatively small MMHP plants, preferably initiated and managed by individuals or groups from the user communities, have been shown to be quite competitive with other available options. Many other countries, such as China, have actually made sizeable achievements in this area. Promotion and installation of such plants have also additional advantages with regard to environment, local development of the technical as well as managerial capabilities, and so on. It is also likely that, as the local economic, technological, and institutional systems develop and improve, some of the MMHP plants will be abandoned, replaced by bigger ones, and eventually connected to a grid system; either a local isolated grid or the national one. However, considering the current level of development and economic conditions of most of the sections of the HKH Region, isolated MMHP is the most cost-effective resource.

Given the unique type of resource and its implementation aspects, the required institutional arrangements are also quite different and, at present, inadequate or even non-existent in the region. For example, the local user communities are expected not only to use the available energy properly, but also to manage/operate the plants, to distribute electricity, to collect revenue, and so on. In order to enable them to accomplish all this efficiently and on a long-term basis, they have to be motivated, trained, and supported. Since these communities are living in isolated rural areas, having very few educational and technical skills or facilities at their disposal, except, perhaps, community cohesiveness and the will to survive under extreme conditions, this job becomes more complex. Consequently, the institutional structures have to have the requisite capabilities, especially in terms of decentralisation, flexibility, and capacity, to work with such rural populations.

In addition to electrification of different mountain areas, there has been a significant movement to invite the private sector to participate in the generation of electricity meant for the mainstream population. This advancement has caught on both in the developed as well as in the developing countries, and processes of 'deregulation' have been set in motion to encourage the introduction of the private sector in a formerly 'sacred' field. Many developing countries, including Chile, Malaysia, and Nepal, have introduced novel legislation and

policy declarations in this respect to provide adequate assurances to private investors and to minimise or abolish the licensing/approval requirements. Appropriate institutional arrangements are also being considered for introducing similar measures in other countries of the HKH Region.

The small investor from a rural mountain community is likely to have some expectations regarding returns on his investments, in fact, similar expectations to the more resourceful city-based or international investor. Although, in the case of the small rural investor, he will have far fewer facilities at his disposal, e.g., technical, financial, legal, or administrative. This would necessitate the ready-made availability of institutional support, preferably on his doorstep, to sustain his endeavours and to meet at least some of his expectations. In fact, the rural community leaders or entrepreneurs have to be convinced, persuaded, and assisted to initiate, plan, install, and manage the plant.

The wide variation in income levels in the mountain areas is another important factor that needs to be given due consideration in planning and selecting energy options for such areas. While one community may be able to support a fairly expensive electrification scheme, another may only be in a position to sponsor and patronise a mechanical agro-processing plant. Given time to develop its economic system further, the other, poorer community may progress in subsequent years to be able to support an electrification scheme also. Thus, wide-ranging flexibility in the institutional system would really have to be inculcated, in order to enable it to play its role effectively.

### **3.2: Aspects Needing Institutional Arrangements**

Considering the different nature of MMHP promotion and development, the required institutional structures have to be tailored accordingly. A number of different tasks and aspects, for which institutional arrangements are necessary, are listed in Table 3.1.

The above Table lists important aspects related to the development and efficient performance of MMHP plants for which adequate inputs have to be provided in a properly planned and consistent manner. Additionally, other related issues need to be debated and decided upon; for example, the size or level of sophistication of a plant, level of subsidy, etc. Quite often, a small community, or a cluster, may only be in a position to use a few kW of electric power, and, for them, micro-range plants may be the most suitable, given their current economic status and the available capability in terms of management and operation. Both the economic as well as the management capabilities would improve with time; and the same community may need a larger plant after a period of, 10 years, for example. However, the prevalent situation influenced by the affordability and capability factors would well justify the installation of a smaller MHP plant. In fact, installation of such smaller plants would assist in capacity building in the communities. Such decisions need to be taken within the appropriate institutional structures. Considering these factors, it is desirable to elaborate on some of the development aspects delineated in Table 3.1.

#### *3.2.1: Policy and Legislation*

Policy support and the accompanying legislation have been perhaps the most important contributory factor to the accelerated development of MMHP in Nepal. This included delicensing, subsidies, and loans and some concessions to the manufacturers. Other incentives for improving energy efficiency and the power factor and introducing special programmes for rural development, in turn, would enhance energy consumption. Similar

**Table 3.1: Aspects and Tasks Needing Institutional Arrangements\***

Aspect	Tasks to be Performed	Affected Personnel/ Agencies	Types of Implementing Agencies
1. Policy & Legislation	<ul style="list-style-type: none"> <li>- Subsidies, soft loans, revolving funds</li> <li>- inclusion of MMHP as a viable option in overall energy planning</li> <li>- delicensing and/or procedures, concerning:               <ul style="list-style-type: none"> <li>• installation</li> <li>• tariff fixing</li> <li>• water &amp; land use</li> </ul> </li> <li>- Tax concessions</li> <li>- Environmental protection controls and incentives</li> <li>- Terms and conditions to buy back rates and wheeling</li> <li>- Rural industry promotion incentives</li> </ul>	<ul style="list-style-type: none"> <li>entrepreneurs, rural communities, implementing agencies, manufacturers, suppliers</li> <li>- as above</li> </ul>	<ul style="list-style-type: none"> <li>- Govt. Dept./ Ministry</li> <li>- as above</li> </ul>
2. Finance	<ul style="list-style-type: none"> <li>- Mobilisation of funds from different sources</li> <li>- Fixation of level of subsidies, interest rates, recovery periods, etc</li> <li>- Formulation of efficient and judicious procedures for disbursement of funds</li> <li>- Proper disbursement</li> <li>- Formulation of adequate systems for loan recovery and their implementation</li> </ul>	<ul style="list-style-type: none"> <li>- implementing agencies, recipients</li> <li>- entrepreneurs, recipients</li> <li>- rural communities, lending agencies</li> <li>- as above</li> <li>- ending agencies, overall programmes</li> </ul>	<ul style="list-style-type: none"> <li>- specialist agency</li> <li>- as above</li> <li>- disbursement agencies</li> <li>- as above</li> <li>- disbursement agencies, responsible specialist agencies</li> </ul>
3. Beneficiary Participation	<ul style="list-style-type: none"> <li>- Awareness raising and dialogue with beneficiary communities re merits/ demerits of MHP plants, their expected contributions and responsibilities</li> <li>- Formation of village committees and identification of main factors from communities</li> <li>- dialogue with communities re.;               <ul style="list-style-type: none"> <li>• project planning</li> <li>• community contribution</li> <li>• fund procurement from other sources</li> <li>• land procurement</li> <li>• end-use development and utilisation</li> <li>• tariffs, incomes, and expenditure</li> <li>• integration/replacement of other energy sources</li> <li>• management of plant and income, loan repayment</li> <li>• saving for maintenance, repairs, future expansion, etc</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- communities/leaders, overall programmes</li> <li>- as above</li> <li>- as above</li> </ul>	<ul style="list-style-type: none"> <li>- promoting/ implementing agencies</li> <li>- as above</li> <li>- as above</li> </ul>

\* See Section 3.2

4.Coordination	- Coordination among different agencies to minimise costs, overlap and conflicts and to avoid making similar mistakes.	- implementing agencies, overall programmes	- Specialist agency, suitable association
5. Promotion	-Sponsoring studies to assess/propagate potential, status. problems, new initiatives etc for entrepreneurs, as well as financial decision-makers/donors -promotion of end uses	-implementing agencies, recipients. overall programmes  -communities, entrepreneurs	- specialist agency(ies)  - promoting agencies
6. Technology	-Indigenous R & D <ul style="list-style-type: none"> <li>• component standardisation</li> <li>• cost reduction</li> <li>• efficiency improvement</li> <li>• technology transfer and assimilation</li> <li>• end-use appliance development</li> </ul> -Manufacturing methodology and quality improvement -Guidelines/manuals for equipment selection and manufacture -Training of manufacturer	-recipients, manufacturers, overall programmes  -as above  -as above  -manufacturers, overall programmes	- specialist agency, manufacturers, R & D organisations  - specialist agency, manufacturers - as above  - specialist agency, promoters
7. Technical Implementation	-Capability and needs' assessment of beneficiaries  -Surveying and site selection -Planning and designing of the plant -Community participation in: <ul style="list-style-type: none"> <li>• information transfer</li> <li>• planning &amp; feasibility</li> <li>• plant design</li> <li>• tariffs &amp; revenue management</li> <li>• construction and management</li> </ul> -Appraisal of feasibility studies  -Training of managers/operators  -Quotations, invitation/processing  -Installation and commissioning -Warranties, after-sales' services -End-use equipment selection and installation -Operation and maintenance manuals	-recipients  -as above -as above -as above  -implementing agencies  -managers/operators  -recipients, implementing agencies -as above -as above -as above  -as above	- manufacturers/contractors, implementing agencies - implementing agencies - as above - as above  - implementing agencies, promoters - specialist agency, lending/promoting agencies - specialist agency, promoting agencies - implementing agencies - as above - as above
8. Repairs	-Preparation of a plan and methodology to identify locations and workshops/ technicians, requisite materials, capabilities, minimum tools/ equipment and training -Development of field repair facilities (implementation of above plan)  -Working out agreements with workshops	-communities, plant owners, workshops/ technicians  -communities, plant owners, workshops/ technicians -communities, plant owners, workshops/ technicians	- specialist agency  - as above  - as above

9. Monitoring & Backstopping	Preparation of monitoring procedures & documents  Preparation of backstopping manuals Training of personnel Carrying out monitoring & backstopping  Reporting	concerned personnel, implementing agencies, plant owner/managers  as above concerned personnel concerned personnel, implementing agencies, decision-makers concerned personnel, implementing agencies	specialist gency consultants/manufacturers  as above as above implementing agency  specialist agency, promoting agencies
10. Training	Preparation of training materials and regular organisation of training programmes for: <ul style="list-style-type: none"> <li>• surveyors</li> <li>• plant designers</li> <li>• equipment manufacturers</li> <li>• equipment selectors/procurers</li> <li>• plant designers</li> <li>• feasibility preparers and evaluators</li> <li>• decision-makers, planners &amp; financiers</li> <li>• owners/managers</li> <li>• operators</li> <li>• repairers</li> <li>• transmission and wiring technicians</li> </ul>	as in preceding column	specialist agency, promoters, educational institutions

deregulatory measures have also been introduced in other countries such as Chile, Malaysia, Britain, and Norway. The examples of the last two industrialised countries are worth elaborating upon since they hold important lessons for developing mountainous regions.

During the late thirties, it was realised in **Norway** that the rural areas had lagged far behind the urban settlements in terms of electrification. Therefore, Parliament approved a special levy on the existing consumers to pay for electrification of rural areas. An equally important policy decision was decentralisation, whereby the county administration was made responsible for initiating plans for installations, although the electricity administration was responsible for overall planning and implementation of the schemes. Subsidies were also allowed for plants owned/implemented by cooperatives, share-holding companies, municipalities, and so on wherever such agencies were considered to be more appropriate (e.g., in more remote areas). Results of the achievements were reported to Parliament which approved the budget for the subsequent year. Thus, the involvement of the Government was at the highest level. The subsidy programme was later extended to cover grid system development. One other factor considered to be the backbone of local involvement in the electrification programme was the preferred recruitment of local people which improved local technical capabilities and accelerated the process. Thanks to this support programme, the whole country was receiving electricity by 1965, i.e., in just about 30 years. Today, more than 99 per cent of the electricity is generated through hydropower. In addition, the major-

ity of trains run on electricity and many energy-intensive industries, such as aluminium and special alloy manufacturers, use electricity. Most of the cooking and heating are also carried out using electricity, and some power is even exported to neighbouring countries. There is no gas distribution system for cooking, in spite of the fact that Norway is a producer and exporter of natural gas as well as petroleum. Some private MMHP plants, which were closed down in the 50s and 60s, are now being rehabilitated by the owners as the government provides support in terms of expertise/advice and loans. Private producers can also easily sell their electricity to the grid or to customers directly using parts of the grid.

Recent policy and institutional changes introduced in the **United Kingdom** are also worth noticing as they can provide considerable guidance to renewable energy development in the developing world. Britain became, in World Bank terminology, 'unbundled' in 1990; i.e., electricity generation and distribution were no longer the exclusive function of a parastatal agency, but an open market activity. The private sector was invited to install and operate power plants as well as to sell electricity to the grid, or even to consumers, using a common transmission grid. Private entrepreneurs were also allowed to generate electricity in off-grid areas and sell it to consumers, while allowing for progression to grid connection at a later stage. However, this feature is being realised in stages, i.e., until 1994, only consumers of one MW or above could freely negotiate with any supplier, but, after 1998, every consumer will have this freedom. This model, therefore, should be of special interest for the HKH Region where the prevalent level of development requires off-grid generation, but where there is a possible future option of grid connection.

This deregulation process also applies to the MMHP sector which has been given some additional incentives: i.e.,

- local taxes and annual charges for water abstraction have been reduced or removed;
- subsidies to the extent of half the cost of feasibility studies (by accredited and approved consultants) have been allowed; and
- quality standards and guidelines for feasibility studies have been prepared and issued to the county authorities to assist them in assessing the proposals.

In order to ensure that everybody plays by the rules of the game, an electricity regulatory body has been set up. Its main task is to make sure that competition works towards the desired end of optimised performance and minimised cost. The regulator has the power to impose penalties wherever necessary and to arbitrate in case of disputes. The regulator also sets targets for emissions from power stations and enforces them. He also imposes levies to collect funds for subsidising renewable power stations. Thus, private producers have also to obtain licences that bind them to follow the electricity pooling. The licences cost very little and they are not needed for installations below 200kW not connected to the grid. Each supply company is also legally obliged to buy a certain amount of electricity from renewable sources (calculated so that the target of generation of 600MW from renewables is achieved by 1998). A subsidy is also available to bring down the cost of electricity from renewable sources to a level on par with other options. However, this subsidy will only be available up to 1998.

As mentioned earlier, the MMHP sector has benefitted considerably from these policies and incentives and the private sector has been encouraged to install small hydropower plants. The main point worth noting here is that there can be many types of approaches and inputs to provide for the energy needs of rural areas. The governments in the HKH Region may

also consider imposing a levy on urban consumers to facilitate the provision of electricity to rural areas. This would mean reversing the current trend of subsidising electricity supplies to urban areas. One important input is an adequate and efficient institutional structure.

### 3.2.2: Finance

Although it is generally stated that MMHP, especially indigenously developed MMHP, is a low-cost option, its capital costs are still quite high compared to diesel generators. Also, considering the very low income levels of the people in most of the HKH Region, the provision of a sizeable proportion of the funding from external resources is unavoidable for the foreseeable future. Some of the financing systems are grants, subsidies, loans, and expert inputs (contributions in kind).

The institutional arrangements needed would have to undertake/oversee the following tasks in this respect.

- To procure fund allocations from different agencies (government[s]), donors, banks, etc).
- To formulate and oversee implementation policies and methodologies for funding (e.g., level of subsidies in different areas, interest rates, pay back periods/procedures for approval of loans, feasibility assessments, collateral and recovery of loans, etc).
- To identify and authorise different financial agencies to disburse loans, preferably from appropriate locations
- To implement procedures to recover loans from defaulters.

Thus, the main function of the principal specialist agency overseeing funding is to ensure adequate and consistent sources of funding and to facilitate its disbursement to deserving and capable recipients. In the long run, commercial loan financing is likely to be a better option, since it can become self sustainable in a few year's time. However, the prerequisite for this is the proper repayment or recovery of loans. Considering the current situation in Nepal, whereby loan non-repayment is at a level of 60 to 80 per cent, some other options may also be examined. For example, a higher level of subsidy may be allowed (e.g., 40% instead of the current 20%), if the entrepreneur does not take out a loan. It would be desirable for the various donor agencies to agree to follow the same rules in providing special grants to some communities. The current practice of providing grants of up to 90 per cent or more of the plant costs could help MMHP in a better way, if these grants were channelled through an agency already working in this field, such as ACAP (Nepal), by means of a predetermined methodology. Otherwise, if subsidies are provided to individual schemes at varying rates of up to 100 per cent of costs, this may actually impede the overall programme; since potential entrepreneurs may actually wait for such a windfall rather than subscribe to the on-going normal programme.

Some funding support is also necessary for manufacturers (equipment, quality improvement and control, training), for decision-makers, and for potential financiers to apprise them of the comparative viability and other advantages of MMHP, in addition to the other training programmes outlined in Chapter 13. Similarly, funding has to be secured and appropriate arrangements made to disburse it to establish or upgrade local workshops to enable them to undertake repairs of MMHP plants in surrounding areas.

Thus, a specialist agency, having a fairly independent mandate to solicit and procure funds and develop a methodology for disbursement, is needed. Whereas many other smaller agencies may be identified and strengthened to disburse the funds in a decentralised manner in appropriate locations.

### 3.2.3: *Beneficiary Participation*

Participation of beneficiaries in the installation of MMHP schemes is a very important aspect, and might make a difference between success and failure. Local villagers or an entrepreneur knowing about MHP plants may realise the need for one, locate a suitable water resource, and approach the implementing agency to support the installation. As is the case in Pakistan, the community may have to approach the concerned authorities many times until the approval is obtained. Clearly, they know fairly well that MMHP plants are quite useful for them, therefore such persuasion is justified. On the other hand, if an implementing agency approached a village offering them a plant, many villagers might not realise all of its implications, yet agree to the installation; and in these cases usually their commitment to such a collaboration might not materialise and waver at different times. The job of the promotional agency, therefore, would be to provide information to these villagers and organise a trip to some successful nearby plant, as well as providing them with written material. However, after this, they should be left to make their own decisions and finally approach the implementing agency determined to go ahead with the installation or to hold further discussions. It has also been suggested from more than one quarter that a written agreement should be signed between the implementing agency and the recipient. Another suggestion is that 'Rural Electrification Support Units' dedicated to assisting such entrepreneurs or communities should be set up at appropriate locations in different valleys or development regions. Such units could also undertake preliminary surveys of sites, assess demands, and consider other possible end uses in close collaboration with the villagers. The unit should inform them about the advantages and limitations of MMHP plants and guide them on how to get further information. The same unit, after due training of its employees, should also provide backstopping services to managers and operators and assist them in organising repairs .

### 3.2.4: *Coordination*

Coordination between different agencies engaged in rural electrification of mountain areas is almost completely lacking, and the overlapping or adverse effects of one scheme on another have been frequently reported. For example, the following five agencies are engaged in rural electrification in the northern mountainous part of Pakistan.

- WAPDA, a federal government agency, is mostly engaged in grid extension, as per its own plans, based on the philosophy that the transmission line may be extended to the next nearest and accessible demand centre.
- SHYDO, a provincial government agency is installing small- and medium-level hydropower plants, mostly in the Swat region for local consumption and grid connection.
- NA-PWD is installing isolated MMHP and SHP plants in Gilgit for local consumption of electricity.
- PCAT is assisting in the installation of privately-owned MHP plants in the whole area.
- AKRSP is also installing private MHP plants in the Gilgit and Chitral areas.

Thus, in any given locality, at least two or more agencies are working. However, they do not regularly communicate with each other or exchange plans. Even AKRSP and PCAT, which are carrying out similar work and in the same areas, are not communicating regularly. The usual result is that a new plant installed in some locality may affect the business of another. This is obviously a waste of resources. Therefore, there is an important role for a central specialist agency to play in coordinating the efforts of different agencies, in organising regular meetings, in exchanging future plans, and possibly in resolving some of the conflicts among such agencies. The central specialist agency may also coordinate between local donor (e.g., embassies) and implementing agencies to avoid various problems.

Another important aspect of coordination is that of the normal rural development programmes and rural electrification of the same areas. It is almost certain that tasks could be performed together to get better results and even reduce costs. Installation of an MMHP plant, for example, could be one of many activities under a larger rural development project to provide power for other economic development initiatives such as irrigation schemes, cottage industries, processing of local produce, and so on.

### *3.2.5: Promotion*

It is usually necessary to prepare some promotional materials, e.g., posters, calendars, booklets, and reports, for various purposes. For example, posters can be prepared and distributed to existing MMHP installations, rural schools, VDC offices, etc for awareness raising among the local people and to provide a clear contact address for interested clients. Some informative booklets or short reports should also be prepared for public representatives, donors, investors, and so on. This type of work could best be undertaken by the central specialist agency or a larger development agency such as AKRSP or ACAP.

### *3.2.6: Technology Improvement*

Most countries of the HKH Region with sizeable MMHP potential have, by now, acquired adequate manufacturing capabilities to meet almost all the needs of the sector. Obviously, having a local manufacturing capability is a necessary ingredient for the types of programme implemented in the HKH Region. For example, locally-produced equipment is usually much cheaper, ordering and procurement are easier, and the manufacturer can be reached or called to the site easily in case of a serious problem. Additionally, maintenance as well as supply of spare parts and access to the knowhow needed for operation, maintenance, and repair services can be achieved easily.

However, it is also known that the quality, performance, and reliability of locally-produced equipment are quite low. Therefore, improvement in quality is recognised to be necessary for improving MMHP in terms of the performance, life, and economic returns. Quality can be improved by using better raw materials, better manufacturing equipment and processes, adopting stringent quality control procedures, and through research and development to improve designs. All these operations are components of the manufacturing establishment; except perhaps the R & D which can be undertaken by specialist R & D organisations. Therefore, in order to improve the technology, the capabilities of the manufacturers have to be improved through training, especially on-the-job training, and through improvements in manufacturing machinery. Larger manufacturing establishments usually develop and adopt their own quality standards. However, in the HKH Region, the manufacturers need assist-

ance in this respect, through, e.g., guidelines for manufacturing, quality control, and testing of finished components.

The specialist agency would be required to evaluate the capabilities of manufacturers and assist in their improvement by organising training programmes, preparing guidelines or standards, facilitating transfer of technology, and so on.

### *3.2.7: Technical Implementation*

Technical implementation of MMHP schemes, right from site identification to commissioning and training of managers and operators, is currently being undertaken by different agencies in different countries. These agencies, especially the manufacturers in Nepal, have been criticised to some extent for not acting in the best interests of the clients; perhaps due to the very low emoluments involved, or to other reasons. Therefore, it has been suggested that the initial survey, plant capacity determination, and commissioning and testing should be assigned to some other independent agency or to a consultant. Unfortunately, no such agency exists in Nepal at present. Perhaps the best possible agency would be the Rural Electrification Support Units discussed earlier, but non-existent at present. Alternatively, NGOs such as ACAP or the Centre for Rural Technology (CRT) could take up some or all of these assignments after their personnel have been adequately trained in this field. In fact, such training may also be needed for the staff of PCAT and AKRSP. It may also be appropriate to assign the job of final testing and certification regarding the performance of a plant to some other independent agency such as the Nepal Micro-Hydropower Development Association (NMHDA), the Royal Nepal Academy for Science and Technology (RONAST), or even ITDG/Nepal. All the other functions could be performed most suitably by the installers, whether the manufacturers or some other capable party.

### *3.2.8: Repairs*

The importance of establishing and strengthening repair facilities in appropriate locations, within the easy reach of plant owner/managers, cannot be over-emphasised. Identifying such locations with requisite facilities in Pakistan would not be too difficult: although more efforts are needed in Nepal to identify such locations, i.e., towns and prospective workshops and/or technicians who could be trained. In case no such technician can be found, young people could be selected from a suitable town/village and trained and assisted in establishing workshops. All this (search and implementation) has to be undertaken by the specialist agency but with appreciable assistance from other agencies working in that area.

### *3.2.9: Monitoring and Backstopping*

This aspect has been described along with the institutional support involved in some detail in Chapter 12. Institutions are almost non-existent at present, although some expertise for monitoring and backstopping that can be called upon to develop regular facilities does exist. In Nepal, many commercial consultant agencies have been established for many years; some of which have also accumulated considerable knowledge and expertise in the field of MMHP. Experts from such firms could receive further training to undertake monitoring and backstopping more professionally and efficiently.

However, the central specialist agency has also to play an important role by preparing the necessary materials, identifying experts and/or establishments, training them, and allocating their assignments.

### 3.2.10: Training

Various training needs, priorities, and the current level of availability have been discussed in Chapter 13. Here, only the institutional aspects have been outlined. Almost all the training programmes have to be organised under the overall sponsorship/leadership of the specialist agency. However, the actual training programmes can be organised/conducted by some other agency such as the DCS Butwal. Similarly, an international agency, such as ICIMOD, could organise orientation for decision-makers from the region. The National Specialist Agency has also to play its part in coordination, capability assessment and/or strengthening, preparation and assessment of training materials, and, above all, in finding funding for such programmes.

### 3.3: A Suggested Institutional Framework

The tasks outlined in the previous sections might create an unsettling impression that a sizeable number of new institutions has to be established and the allied manpower, equipment, and facilities acquired, involving considerable expenditure. In fact, many organisational set-ups already exist, although they may vary significantly in their extent and effectiveness from country to country. For instance, in Pakistan, PCAT and AKRSP look after all the stages of implementation, while, in Nepal, the WECS formulates policies and programmes and the ADB/N manages financial aspects, but with little capacity to contribute professionally during the implementation. Therefore, in some countries, e.g., Pakistan, very few additional institutions would be needed. However, this may not be the case for Nepal.

Referring to Table 3.1, various tasks were listed and some suitable agencies were suggested. In the following Table, 3.2 (p. 40), the process has been reversed and agencies considered necessary to look after various tasks have been listed along with their present (existence) status in Nepal and Pakistan where many private MMHPs serve remote communities. The main reason for this second Table is to present the institutional framework more clearly.

Several agencies in Nepal are engaged in promotion of MMHP, and they sometimes also organise useful inputs such as training programmes, technology transfer, sponsoring of studies, seminars, etc. Examples are ITDG, DCS, and ICIMOD. Although no such specialist agencies exist in Pakistan, the two implementing agencies are also doing promotional work, and by now almost every community in the northern part of the country is aware of MHP. Therefore, special efforts to raise awareness are not needed. The existing agencies can take adequate steps in this respect. Due to this reason, no recommendations have been made to establish additional promotional agencies.

One thing which needs to be given serious attention is that the rate of installation has to increase considerably in order to have a desirable effect on the overall rural energy scene. The current rates of installation are too low to contribute significantly towards improving the energy situation in rural areas; or, indeed, to sustain and justify the additional infrastructure. In addition, the available funding as well as rates of installation fluctuate tremendously from year to year. Therefore, the installation rates have to go up considerably to, e.g., a cumulative capacity of one MW per year (about 50 plants with an average capacity of 20kW), in both Pakistan and Nepal. Otherwise, the suggested institutional arrangements will not be justifiable on economic grounds.

**Table 3.2: Desirable Institutional Set ups in Nepal and Pakistan**

Name and Function	Status	
	Nepal	Pakistan
<b>Government Federal/Central (Ministry, Division/Deptt./Directorate)</b> <ul style="list-style-type: none"> <li>▶ policy and legislation formulation</li> <li>▶ planning</li> <li>▶ fund procurement from donors</li> <li>▶ fund allocation</li> </ul>	exists	exists
<b>Provincial/State Govt. (wherever applicable)</b> <ul style="list-style-type: none"> <li>▶ policy formulation</li> <li>▶ policy implementation</li> <li>▶ programme implementation</li> </ul>	not applicable	exists
<b>Central Specialist Agency</b> <ul style="list-style-type: none"> <li>▶ mobilisation of funds</li> <li>▶ promotion</li> <li>▶ preparation of implementation methodology</li> <li>▶ fixation of subsidy levels, interest rates</li> <li>▶ advisory service to the government</li> <li>▶ master plans</li> <li>▶ technical standards/guidelines</li> <li>▶ oversee overall implementation</li> <li>▶ coordination</li> <li>▶ initiating/sponsoring relevant studies</li> <li>▶ initiating and arranging R &amp; D, including end uses and appliances</li> <li>▶ training programmes and materials</li> <li>▶ development of field repair facilities</li> </ul>	does not exist	exists <sup>*1</sup>
<b>Rural Electrification Support Units</b> <ul style="list-style-type: none"> <li>▶ site identification</li> <li>▶ assistance in planning, installation, and commissioning</li> <li>▶ promotion</li> <li>▶ monitoring and backstopping</li> <li>▶ advice and assistance in repairs</li> </ul>	does not exist <sup>*2</sup>	does not exist <sup>*2</sup>
<b>Fund Disbursement Agencies (banks, finance corporations, NGOs)</b> <ul style="list-style-type: none"> <li>▶ appraisal and approval of subsidy/loan applications</li> <li>▶ disbursement of funds</li> <li>▶ monitoring</li> <li>▶ loan recovery</li> <li>▶ completion certificates</li> </ul>	exists <sup>*1</sup>	exists <sup>*1</sup>
<b>Implementing Agencies (GOs/NGOs, Manufacturers, Consultants)</b> <ul style="list-style-type: none"> <li>▶ site survey/assessment</li> <li>▶ plant and layout design</li> <li>▶ planning for installation</li> <li>▶ mobilisation of community participation</li> <li>▶ installation, commissioning, and testing</li> <li>▶ equipment transportation</li> <li>▶ initial information package, including operating manual</li> <li>▶ training</li> <li>▶ participation in monitoring and backstopping</li> </ul>	exists <sup>*1</sup>	exists <sup>*1</sup>

<b>Manufacturers</b> <ul style="list-style-type: none"> <li>▶ design of components and machinery</li> <li>▶ manufacture</li> <li>▶ procurement of other parts/systems</li> <li>▶ quality control and testing</li> </ul>	exists *1	exists *1
<b>R &amp; D Organisations</b> <ul style="list-style-type: none"> <li>▶ improvement of quality performance and reliability</li> <li>▶ cost reduction</li> <li>▶ improvement of assembly/disassembly and installation</li> </ul>	exists *3	exists *3
<b>Repair Facilities (at appropriate locations)</b> <ul style="list-style-type: none"> <li>▶ undertake repairs</li> </ul>	does not exist*2	does not exist*2
<b>Monitoring and Evaluation (consultants, technical agencies, experts)</b> <ul style="list-style-type: none"> <li>▶ undertake monitoring &amp; evaluation</li> </ul>	exists *3	exists *3
<b>Training Organisations (manufacturers, educational institutions, specialist agencies, promoting agencies)</b> <ul style="list-style-type: none"> <li>▶ organise and conduct various training programmes</li> <li>▶ prepare training materials</li> <li>▶ evaluate and improve training programmes</li> </ul>	partly exists *4	partly exists *4

### Explanatory Notes

- \*1 Organisations already exist doing this type of work in this field. However, they need to be orientated and strengthened.
- \*2 Such units do not exist at present. However, PCAT and AKRSP in Pakistan are working in a relatively smaller area than Nepal. AKRSP also has two or three field offices which could be easily strengthened to become support units. Therefore, only one or two additional units/offices need to be set up. In the case of Nepal, only one small office has been set up by a private manufacturing establishment in the north-western region. Therefore, about four or five such units have to be established eventually. As a start, one or two such units could be established, either as subsidiaries of the central specialist agency or of some other appropriate institution.
- \*3 In this case, although appropriate agencies, other than the manufacturers, do exist (e.g., RONAST in Nepal and PCSIR, HMC, etc in Pakistan), they are currently not engaged in R & D activities related to MMHP to any significant extent. Thus, their capabilities have to be improved considerably to enable them to undertake worthwhile R & D work. In Nepal especially, manufacturers are making a considerable effort, usually with sizeable assistance from ex-patriate expert agencies. Still it would be more helpful if some R & D agencies were also involved in this field.
- \*4 Some regular training programmes for operators and managers are being organised in Nepal; however, they are not meeting the needs. Pakistan is considerably behind in this field. Proper arrangements need to be made in both countries. Most of the work, especially preparation of training materials, needs to be undertaken by the central specialist agency. At the same time, some other agencies, such as technical education institutes in appropriate locations, can also be involved in organising the training programmes (after assessing their capabilities and interest and providing them with the necessary strengthening inputs).