Chapter 1
Introduction

Many areas in the Hindu Kush-Himalayan (HKH) region are little developed and inaccessible; and people live under difficult conditions with much drudgery and deprivation. At the same time there is increasing degradation of existing resources and the environment. Energy, considered to be the crucial ingredient for development, both social and economic, is in short supply. And this is particularly true for useful forms of energy such as electricity. Development of appropriate energy resources and systems and improving access will be crucial for the development of such areas. As a result of the difficulties associated with distribution and transportation, it is preferable to develop and use local energy resources in projects that can be initiated and managed/operated by the local populace without outside intervention.

The power or energy of flowing or falling water, available in most remote and underdeveloped mountain areas in the micro-hydropower (MHP) range of 0.2 to about 100kW, can meet local needs in a simple, convenient, environmentally friendly, and relatively cheap way, provided appropriate inputs and methodologies are adopted and implemented. Experience in many developing countries has clearly shown the viability of this renewable and environmentally friendly resource in such places. However, it has also become clear that properly designed and implemented inputs, such as training manuals on various aspects and back-up support, are vital for the success of such programmes. Another important prerequisite is involvement; the beneficiaries or communities involved should play a leading role in the whole process of planning, fund-raising, decision-making, survey, installation, and management and operation. Without this complete involvement of the beneficiaries, the chances for long-term success of the plant are not very high.

1.1 About this Manual

After extensive studies, consultations, and analysis of the current situation in the HKH region, ICIMOD decided to develop three training programmes and a series of manuals aimed at the professionals involved in the implementation of private MHP schemes at the grassroots' level[1]. Four manuals are being prepared to cover the following aspects of setting-up and running MHP plants in remote areas, particularly in the HKH region.

[1] Private' is taken here to mean any plant set up independently of a central authority such as the government or an electricity utility. It includes schemes developed by local entrepreneurs as well as those set up and owned by local communities, whether or not they are supported by an agency grant.

- Site Survey and Layout Design
- Installation and Commissioning
- Operation and Management
- Maintenance and Repair

This manual is one of this series and covers all aspects of installation, from packing and transportation of the equipment to the site, to commissioning and handing over the plant to the owner-manager(s). The intended target group are private sector installers who may have some experience of installation, but who have little formal training in this special area. Such people will be able to use the current manual to improve the installation process and as an aid in dealing with specific problems and other aspects of installation. The manual has deliberately been kept as simple as possible to provide the maximum benefit to those in need; even so the installer should preferably have some technical qualification, for example a certificate or diploma in a relevant engineering trade, so that he[2] can understand the technical aspects fully. Clearly, it is impossible to cover all aspects of installation for all types of sites and equipment within one manual. However, an effort has been made to cover most installation aspects for micro-sized plants, especially up to 50kW in capacity. Some plants may also have agro-processing or other equipment within the powerhouse. Installation of such equipment has not been covered in this manual since it is a separate subject. Instructions for installing and commissioning such equipment are usually provided by the manufacturer.

The information provided in this manual is intended to help installers improve their capabilities even without extensive supplementary training. There is no doubt, however, that maximum benefit will be obtained from the manual if the installer is first able to participate in a proper training course in which this manual is used as a training manual.

There are three main components in the installation process in addition to packing and transporting the equipment to the site safely: construction of the civil engineering structures, including the weir, intake, canal, forebay, powerhouse, and tailrace; electro-mechanical installation of the turbine, generator, valve(s) and penstock; and installation of the transmission lines. This manual focusses on the installation or construction and testing and commissioning of these components.

[2] Note: Throughout this manual the term 'he' is used to refer to the installer whether male or female.