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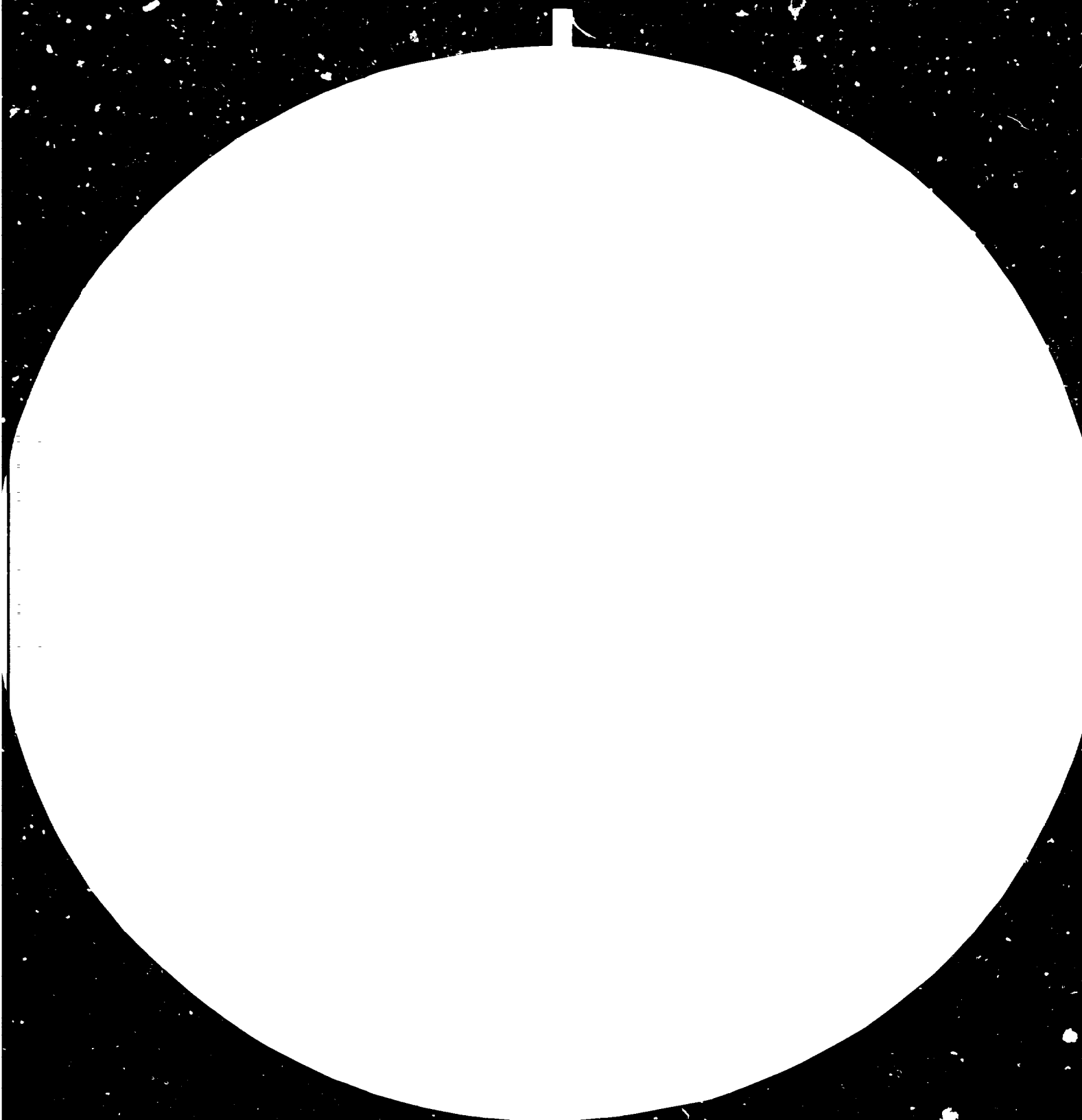

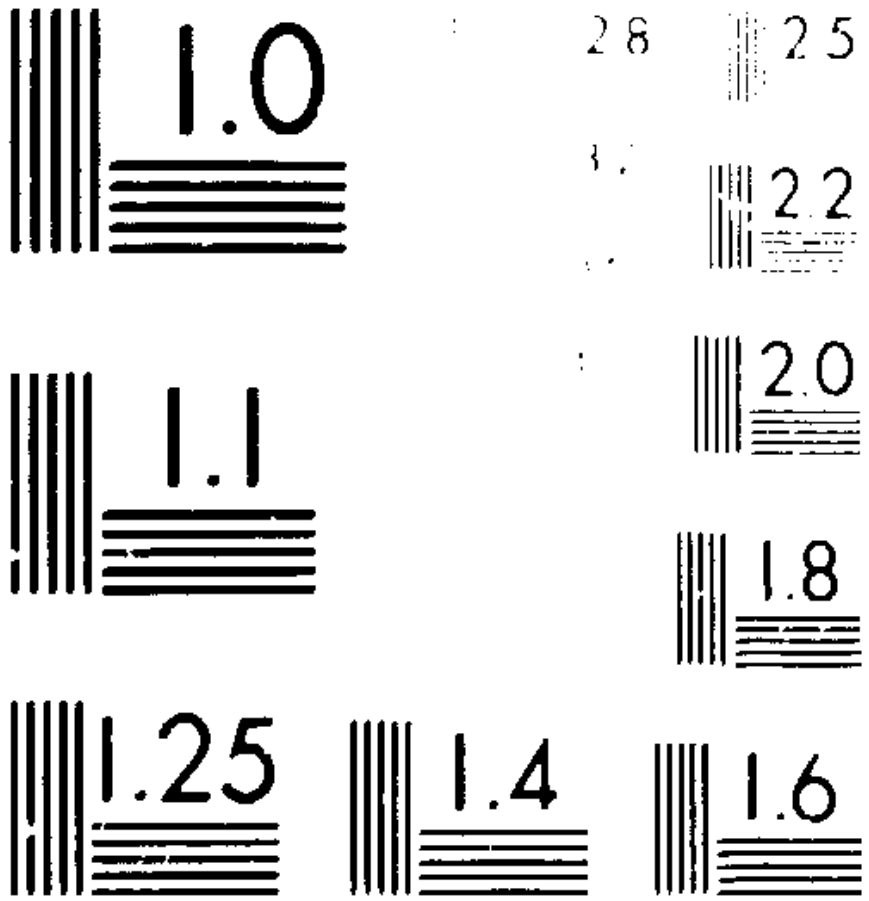
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Joint UNDP/UNIDO/ESCAP/China Senior Expert Group Meeting on the Creation of a Regional Network System and the Assessment of Priority Needs on Research, Development and Training in the field of Small/Mini Hydro Power Generation

Hangzhou, P.R. China, 12-17 July 1982

Institutional Strengthening * (Hydroelectric power, Nepal).

by

A.K. Shrestha **

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TERMS OF REFERENCE FOR THE CONSULTANTS

Nepal is situated in the southern flank of the Himalaya in between China and India. It is a land locked country. Geographically, it has four distinct regions:

i) Snow clad mountains in the north most part
ii) The mid hill region
iii) The siwalic hill region
iv) The plain area of terai in the south most part

All of these regions are spread from the East to the West, the total land area is about 1,41,577 square kilometer with a total population of 15 millions and a population density of 105 persons per Sq. kilometer. In average 60% of the population lives in the mid-hill region. Almost all the hill population is agrarian.

Nepal is a stark instance of extreme shortage of fossil fuels. The only source of energy being utilized traditionally is the fire wood. But Nepal is bestowed with emmense hydropower potential. The estimated theoritical hydro power potential is about 90,000 MW. The exploitation of hydro-power potential is the priority sector in the development programme.

The growing demand of energy for stimulation of economic activities and the house hold need has to be met from this alone. The Government had planned the power development of hydro-power in the following scales:-

i) Small and micro plants, ranging from 10 KW to 5000 KW capacity to meet the energy requirement of remote hill areas.
ii) Medium range plants, ranging from 5 MW to 100 MW capacity to meet the demand of towns and the terai regions to meet the energy need of immediate future.
iii) Large scale development ranging from 100 MW and above to meet the long term energy need and possibly for export to the neighboring countries.

A national grid is under construction to supply power in the terai area and the urban and semi-urban areas. All of the medium and large power stations will eventually be linked together by the transmission lines.

The small and micro hydro power generation has become very necessary in remote hill regions where building and maintenance of transmission line is very difficult and costly. The localized power generation is an expedient way of development of energy source to meet the demand of remote rural areas for industries and household uses.

ORGANIZATION

1. Electricity Department

Electricity Department under the Ministry of Water Resources of His Majesty's Government is responsible for planning and development of power sector for the Kingdom of Nepal. The Electricity Department operates its activities in long term, short term and annual plan basis. The funding for the activities is through the annual budget allocated by the Government.

2. Nepal Electricity Corporation

Nepal Electricity Corporation is a semi autonomous corporate body wholly owned by His Majesty's Government. This body is responsible for the operation, maintenance and distribution of generating plants, transmission line and distribution facilities in the country. Normal practice is that generation, transmission and distribution facilities developed by the Electricity Department is being transferred to the Electricity Corporation for operation.

3. Small Hydel Development Board

Small Hydel Development Board (SHDB) is a semi autonomous Government Board constituted on an ad hoc basis with specific responsibility of planning, construction and operation of mini and small hydro electric power plants in the capacity range of 25 KW to 5000 KW in the remote and backward hill areas in the northern part of the country. The Minister of Water Resources is the Chairman and the Chief Engineer of Electricity Department is the member Secretary of the Board.

The funding for its activities is obtained for through Government budget and bilateral and multi-laterial assistnace. Currently there are 30 projects spread throughout the country, some in the state of completion some under construction and some other under investigations and planning. The Board has planed to prepare feasibility studies and detailed engineering design for another 10-15 projects within the next 2 to 3 years.

PRESENT PROBLEMS

In the context of small/micro hydel developments in Nepal the problems identified are:-

i) Potentials of mini/small hydro power stations exist in mountanious regions where motorable roads are non-existant.

ii) The major construction materials such as cement, machineries and equipments are imported from overseas countries. These materials need airlifting or transportation by human to the project sites.

iii) There is a serious shortage of skilled manpower for field investigations and engineering design - The scale of development (for mini and small hydro stations ranging from 25 KW to 5000 KW) do not economically justify the use of foreign consultants in a projectwise basis.

iv) Qualified and competent construction contractors are not willing to take up contract work in remote hill areas. This has limited the wider participation of the civil contractors, consequently the quality of the construction and the targeted schedule are being effected.

v) Nepal has not so far developed turbine generator of standard quality. Procurement of such equipments on open competitive bidding has resulted the use of turbine-generator of mode and origin. This has created the problems of training the operators, and problems of maintenance and spare parts.

vi) Electricity that will be utilized at the beginning of installation of such plant will be domestic particularly for lighting purpose. Therefore the station will be run on a very low load factor.

vii) For the guarantee of supply, the withdrawal of flows from river or streams is to be based on minimum flow whereas the ration between maximum and minimum flows are several thousands. Therefore, structures that are to be erected on rivers or streams become too costly as compared to the size of the plant.

viii) People of these regions cannot afford costly energy from such costly plants.

ix) Wide scale development of such plants all throughout the country need enormous skilled manpower in design, construction and operation and maintenance.

In view of the problems of the above and growing need to develop micro and small hydro electric plants in the remote and rural areas of the country the national focal points for MHG and SHP activities are identified as follows:

A. Approach for low cost development:-

i) Reconnaissance study of potential mico-hydel sites and make and inventory of such projects covering the whole country and to plan the sequence of development.

ii) Investigate how load characteristics of power market areas could be improved.

iii) Research studies about how construction works on rivers could be minimised/avoided with assumed supply of minimum flows to power channels.

iv) Make studies about the possibilities of phasing the investments.

v) R+D for making use of local materials.

B. Manpower Development

It is the fundamental issue that development of proper manpower trained in field investigations, engineering design, construction works, erection and operation, maintenance of electro-mechanical equipments is the pre-requisite for the success of micro and small hydro electric developments.

In this context the following suggestions can be made.

1. To engage qualified and competent consulting firm to train the local staff by actual work participation in Nepal for a period of 3 to 4 years. The local staff should works under the guidance of the exports of the consultants in all the phases of the works from field investigations to the operation and maintenance.

C. Equipment Development

Another important factor on which lies the success of this programme is the standarisation of the generating equipments, specially the turbine and the generator. This is only possible if such equipments are produced locally.