CHAPTER - 9

9.1 DISCUSSION AND CONCLUSIONS:

With the development of innovative model of the water wheel, efforts have to be made to explore potential for many end-use applications and providing electricity to the remotest hamlets of the North east. The technical solutions need to be confined with business skills at the local village level, more local participation and capacity building to sustain and build up on the efforts. Financing and institutional mechanisms needs to be well defined for effective development of these ultra low head hydro projects as well as help to organize continuous and adoptive action research to make it more appropriate and versatile for the wider acceptance of the technology. With the development of the water mills sector, the socio-economic development of the local community of the Himalayan and sub-Himalayan areas has enhanced. The self employment opportunities such as black smithy, carpenters, skilled technicians etc. have increased with the development of the market for these upgrades water mills. More and more district level water millers associations need to be encouraged to spread the water milling movement to the North Eastern parts of the Indian Himalayas.

1. In this study efforts have been made to identify the potential sites of development of low Head Hydro Power Projects capable of power output in the range of 5 kw in the decentralized mode. The study envisages the development
of the already existing sites of the traditional watermills in the sub-Himalayan region and hilly regions of the North East into the sites for these picco or tiny micro hydel power units with the power out put of the range from 3kw to the maximum of 5 kw. Since in the north east the density of habitation is very thin and the villagers are spread out in tiny hamlets sometimes consists of only 2-3 households and in such situation supply of electricity to these thin habitation is through the conventional grid is very expensive and very difficult taking into the hostile terrain across the mountainous region. In such condition decentralized power supply options and moreso the stand stand alone mode through these micro hydro power units not only solve the problem of electrification of these tiny hamlets but also would invariably have definite socio-economic impact on these isolated and otherwise underdeveloped villages of the North East. These low Head Micro hydro power units will help create sustainable development in the Mountain region. Sufficient scientific inputs are required to evolve a suitable model of these tiny hydro units so as to make it acceptable to the local needs. Even individual household can own such unit for its day to day energy needs and simultaneously set up other economic activities centres based on these micro hydro units. Technical and financial evaluation of these units in the study shows that the developed model of this low Head Hydro Units are very useful to the rural energy needs specially provising stands alone power to isolated and remote hamlets or even a single household depending upon the power rating of the hydro sets. Efforts have been made to make the design simple and reliable. In the study efforts have been made to optimize the design of the above mentioned low head
hydro power units so as to make it simple for operation and maintenance by the village community or even by the individual household. The rational design of these low head hydro units are such that by determining the optimum diameter of the runner of the hydro units the power ratings can be worked to suite the needs of the local village community or even to a single household. Also, the working principle of the units is also depended upon the speed of the runner or the RPM of the runner wheel so to optimize the generation of power units of the order 2kw-5kw in the stand alone mode. The main emphasis has been given to the concept of decentralized electricity supply through these tiny hydro units to the villages which are otherwise unelectrified due to their remoteness and isolation.

The development of watermills in the sub-Himalayan region will go on long run in creating a suitable environment for in turn promotion of small and medium scale industry to help mitigate the problem of employment. The local and uninterrupted energy production would not only help boost utilization of resources such as agriculture, horticulture, but also encourages to start other socio economic activities in the mountain region. With the setting up of these watermill units in the various perennial streams of the sub-Himalayan region, a new avenue for forming village level energy services companies (ESCos) to run, maintain and development of these units locally, will provide an opportunity for utilizing the skilled and unskilled human resources in the hilly terrain of the sub-Himalayan region. Besides creating opportunity for self-employment with the establishment of the networks of watermills in the mountain region, other sectors like floriculture, horticulture, fishery and agro processing units can be developed
so as to encourage economic activities that are economically and environmentally viable and help in employment generation.

Proper scientific and technological inputs are necessary to help create a congenial environment for development of low head hydro power technology intervention in the hilly region of the North East to achieve the following objects:-

- Increase productivity among the local people thereby enhancing their daily income.
- Provide efficient but simple agro-processing services to the local community at their door step.
- Providing proper technology to supply independent uninterrupted and reliable power supply in rural areas from locally available sources i.e. from the existing perennial water streams and nullahs.
- Creating rural energy centres for promotion of all economic activities in the village.
- Encourage to form rural energy services companies (ESCo)s for operation and repair and maintenance of the watermills.

These tiny micro hydel sets unlike large Hydro projects do not have any adverse effect on environment and eco system. These do not require any massive civil construction like dams, high retaining wall etc. and ultimately do not require any rehabilitation of villages and other side effects.
9.2 ENVIRONMENTAL IMPACT:

Much of the intuitive appeal of hydropower lies in its potential for environmentally sound energy generation. Operation of mini and micro-hydro installations is essentially the control and exploitation of renewable resources to produce usable energy in a pollution-free manner. Similarly, although the current ability to substitute for traditional or fossil fuels is limited, these resources are not required in significant quantities to operate the plant, so hydropower is not contributing to their further depletion.

9.3 VILLAGE ELECTRIFICATION:

Extension of grid supply to villages has been an unremunerative proposition for the SEBs. The cost of extending supply through 33 KV and 11 KV lines has also been increasing. In fact, the villages now left to be electrified are located in remote inaccessible areas including hilly, tribal, and forest areas. In India, there are about 80,000 nos. of un-electrified villages and out of which a substantial number are in the North East which are essentially very remote and inaccessible. The cost of extending the grid supply to such villages would be prohibitive for meeting low levels of demand. Hence, it would be advantageous to consider non-conventional means of electrification such as mini-micro hydel-power for specific locations and end-uses especially in the sub-Himalayan region where availability of hydro source are in plenty. Therefore, mini-hydro power projects, in particular, can make significant contribution to electrification of new villages and expanding electrification in already electrified villages.