Chapter - 5

CASE STUDY OF WATER MILLS IN ARUNACHAL PRADESH AND ASSAM

Two Case Studies of installation of water Mills in Arunachal Pradesh and Assam have been undertaken in details to establish the techno economic feasibility of the development of water mills as tiny and microhydro power projects in the north eastern states. Detail cost estimates of the construction of he above two water mills as well as the socio economic activities in both cases have been worked our and the same has been stated as follows :

5.1 CASE STUDY NO - (1)

5.1.1 INSTALLATION OF WATER MILL AT LONGPAI VILLAGE IN ASSAM

Longpai is a small Karbi Village situated in the Karbi Anglong district of Assam. It is located at a distance of approx. 20 Km from Hamren which is the sub-divisional head quarter. Within a radius of about seven kilometer from Longpai, lie several villages, viz. Amlong Umdap, Mazar, Socheng, Umphy and Longmakang. These villages are mostly inhabited by Karbi Tribal. The Longpai Small Hydro Power Project is prepared by utilisation of head drops of the river AMLONSU near the Longpai Village. The catchment area is 11.2 Km. Available head at the site is 11-10 meter. The design discharge is 200 lps. The estimated out put from the project is 15 KW, which is to be
utilised by installation of multipurpose power unit with electricity generation to meet the lighting need during the evening hours and run a water mill during day time.

DETAILS OF WATER MILL INSTALLED AT LONGPAI VILLAGE IN Assam.

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<tbody>
<tr>
<td><strong>1. SOURCE</strong></td>
<td><strong>AMLONGSU RIVER</strong></td>
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<tr>
<td><strong>2. LOCATION</strong></td>
<td><strong>LONGPAI VILLAGE, WEST KARBI ANGLONG</strong></td>
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<td><strong>3. APPROACH</strong></td>
<td><strong>GUWAHATI TO HAREM AND HAREM TO LONGPAI</strong></td>
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<td><strong>4. CATCHMENT AREA</strong></td>
<td><strong>11.2 SQ.KM</strong></td>
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<tr>
<td><strong>5. AVERAGE ANNUAL RAINFALL</strong></td>
<td><strong>5805 MM</strong></td>
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<tr>
<td><strong>6. HEAD</strong></td>
<td><strong>11 METRES</strong></td>
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<tr>
<td><strong>7. DISCHARGE</strong></td>
<td><strong>300 LPS</strong></td>
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<tr>
<td><strong>8. DESIGN DISCHARGE</strong></td>
<td><strong>200 LPS</strong></td>
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<tr>
<td><strong>9. ESTIMATED POWER OUTPUT</strong></td>
<td><strong>15 KW</strong></td>
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<td>10. FLOW AVAILABILITY</td>
<td>PERENIAL</td>
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<tr>
<td>------------------------</td>
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<tr>
<td>11. NO. OF HOUSEHOLDS</td>
<td>85</td>
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<tr>
<td>12. POPULATION</td>
<td>500</td>
</tr>
<tr>
<td>13. POWER REQUIREMENT</td>
<td>15 KW</td>
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<td>14. DEVELOPER</td>
<td>LONGPAI VILLAGE ENERGY Management SOCIETY</td>
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<tr>
<td>15. END USE</td>
<td>Mechanical and Electrical uses.</td>
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### 5.1.2 CAPITAL COSTS

#### 5.1.2 (a) Water Mill installation:

Civil Structures: Boulder diversion dam, Boulder lined channel Desilting arrangement, forebay tank, PVC penstock piping, power with tail race drain.


Total installed cost assumed @ Rs. 90,000.00 per KW x 15 KW = Rs.13.50 Lac

1. **TRANSMISSION AND DISTRIBUTION LINES:**

   Assumed length 4 Kms @ Rs. 1.00 lac / Km. = Rs. 4.00 Lac.

2. **MECHANICAL END USE:**

   RICH HULLERS (One/ two nos.) with accessories like Polishers / Separator as required with installation charge = Rs. 1.50 Lac.
3. **DOMESTIC LIGHTING**:

Sharing of cost for energy efficient and load development devices in 80 households = Rs. 1.00 Lac.

4. **STREET LIGHTING**:

Provision of 25 nos. street lights with 2 X 20 KW fluorescent lamps with electromagnetic ballast each along with power factor correction device = Rs. 0.50 Lac.

5. **WATER PUMP**:

Pump with pipe lines and storage tank = Rs. 1.00 Lac.

\[
\text{Total} = \text{Rs. 21.50 Lac.}
\]

b) **INCOME AND EXPENDITURE ESTIMATES (YEARLY BASIS)**

**INCOME**:

Electricity charge

80 households @ Rs. 50.00 per month collected on a fixed basis - Rs. 48,000.00

Rich Hulling Income - Rs. 52,000.00

**TOTAL INCOME** - Rs. 1,00,000.00

(No charge are proposed to be levied for the street lights and water pump)
EXPENDITURE

Salary of two persons for operation and maintenance - Rs. 15,000.00

Maintenance cost including replacement spares - Rs. 20,000.00

Depreciation charge as annual repayment - Rs. 40,000.00

TOTAL EXPENDITURE - Rs. 75,000.00

PROFITS:

Rationed by the developer / society- TOTAL PROFITS = Rs. 25,000.00 Per year.

iv) CRITERIA FOR SELECTION

Water Mill Site

Head Available : 10 m

Anticipated Discharge : 200 lps

Expected Output : 15 KW

Possible End Uses : Electricity & Rice Huller

Thus from the Longpai project from the income and expenditure estimates, it is seen that the use of water mill in the project is financially viable.
5.2 CASE STUDY NO-(2)

5.2.1 INSTALLATION OF IMPROVED WATER MILLS AT RAMA CAMP & BARBU VILLAGE IN ARUANACHAL PRADESH.

Installation of improved water mills at Rama Camp and Barbu Village in the West Kameng District of Arunachal Pradesh in the North East India is taken as Case Study No-2.

The finding is based on the field observations of installation of improved water mills at Rama Camp and Barbu Village of Arunachal Pradesh, so as to estimate cost / economic benefits for installation of the water mills. The up graded system of water mill at Rama Village which is an income generating mode has been able to grind maize which is a primary crop being harvested in the area.

Earlier timing for grinding maize and other crops with traditional water mills are as follows:

1) Coarse grinding takes about  = 5 hours.
2) Fine grinding (Atta) taken about  =10 hours.

Present timing with the installation of the above up graded system in the village is as follows:

1) Coarse grinding takes about  = 10 minutes.
2) Fine grinding takes about  = 2.5 hours.
From the above, it is observed that the upgraded system has reduced the time of grinding crops and other agricultural items to great extent. The cost benefits from this can be highlighted as follows:

The time of operation for one job can be taken as = 20 minutes.

Supposing, the total time of operation of the system is to be = 5 hrs per day.

Therefore the number of shift of operation of the system = 5 X 60 / 20

= 15 shifts.

Now the owner of the system takes 1 kg of maize as an operation charge for grinding as many as 20 Kg of maize. (Barter system still existing in the Rama village)

Taking the cost of one Kg of maize = Rs. 10/-

Therefore total revenue collected by the = 15 shifts X Rs. 10/-

= Rs. 150/- per day.

Therefore the total revenue collected per month is = 150 X 30

= Rs. 4500/-
The total system cost of the upgraded water mill = Rs. 4500/- approx.
comes to about

Thus it is seen the pay back period for installation of the above upgraded water mill is approximately one month. After investment, an amount of Rs. 4500/-, the owner of the system gets back investment in a month and after that it becomes income generating process for the owner.

Therefore from the above data collected for the above two case studies one can logistically came to the conclusion that water mills project can be made financial viable. Also by suitable modification of the accessory machines like alternator/governor etc. the water mills can be judiciously use for electricity generation process and thereby making it de-centralized power generating sources for lighting and other mechanical end use of the rural people.